



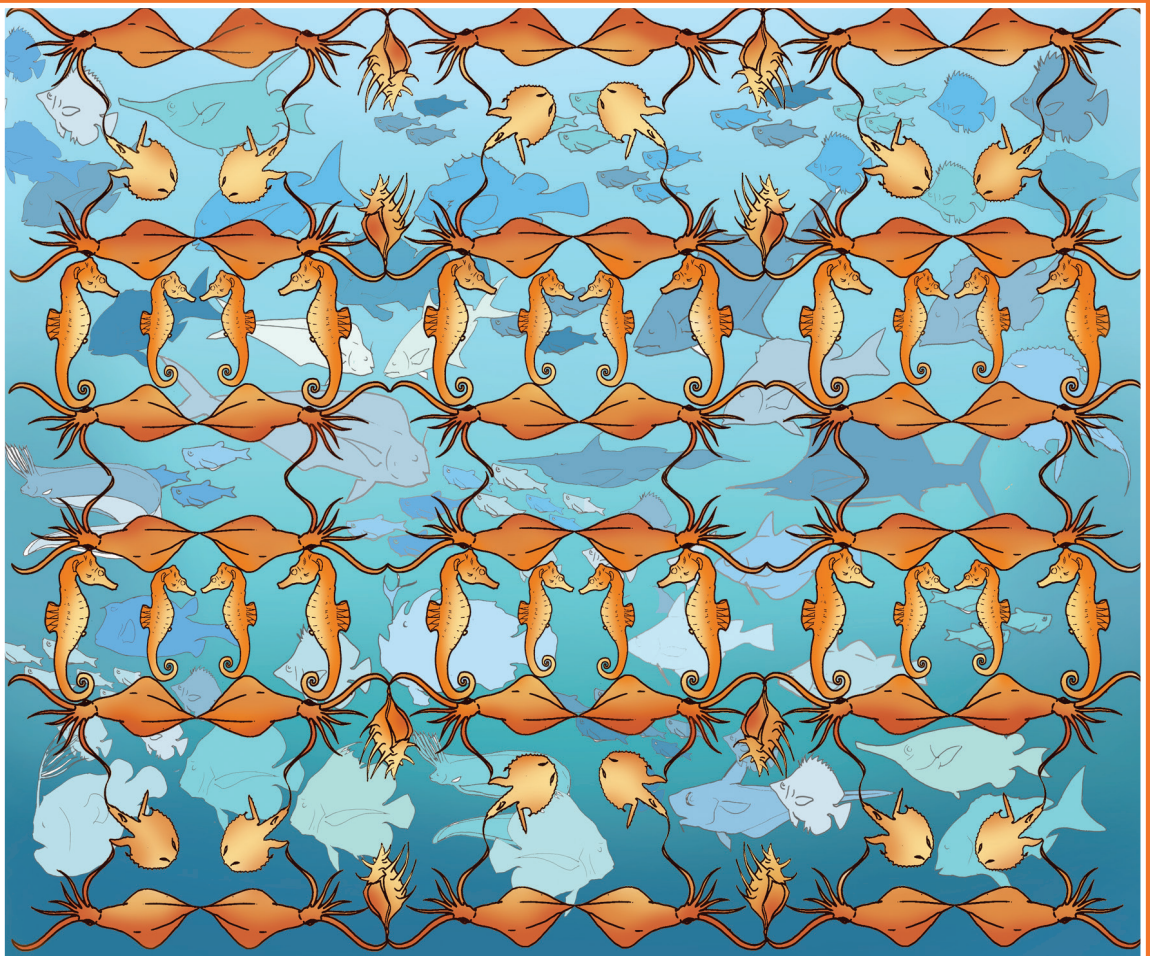
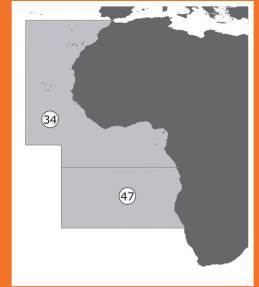
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FAO SPECIES IDENTIFICATION GUIDE FOR FISHERY PURPOSES

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THE LIVING MARINE RESOURCES OF THE
**EASTERN CENTRAL
ATLANTIC**

Volume 2 Bivalves, gastropods, hagfishes,
sharks, batoid fishes and chimaeras



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**THE LIVING MARINE RESOURCES OF THE
EASTERN CENTRAL ATLANTIC**

VOLUME 2

Bivalves, gastropods, hagfishes, sharks, batoid fishes, and chimaeras

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Rome, 2016**

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SUMMARY

This multivolume field guide covers the species of interest to fisheries of the major marine resource groups exploited in the Eastern Central Atlantic. The area of coverage includes FAO fishing area 34 and part of 47. The marine resource groups included are bivalves, gastropods, chitons, cephalopods, stomatopods, shrimps, lobsters, crabs, hagfishes, sharks, batoid fishes, chimaeras, bony fishes and sea turtles. The introductory chapter outlines the environmental, ecological, and biogeographical factors influencing the marine biota, and the basic components of the fisheries in the Eastern Central Atlantic. Within the field guide, the sections on the resource groups are arranged phylogenetically according to higher taxonomic levels such as class, order, and family. Each resource group is introduced by general remarks on the group, an illustrated section on technical terms and measurements, and a key or guide to orders or families. Each family generally has an account summarizing family diagnostic characters, biological and fisheries information, notes on similar families occurring in the area, a key to species, a checklist of species, and a short list of relevant literature. Families that are less important to fisheries include an abbreviated family account and no detailed species information. Species in the important families are treated in detail (arranged alphabetically by genus and species) and include the species name, frequent synonyms and names of similar species, an illustration, FAO common name(s), diagnostic characters, biology and fisheries information, notes on geographical distribution, and a distribution map. For less important species, abbreviated accounts are used. Generally, this includes the species name, FAO common name(s), an illustration, a distribution map, and notes on biology, fisheries, and distribution. Each volume concludes with its own index of scientific and common names.

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Editorial Notes

The editorial notes in Volume 1 included descriptions and notes on the geographical limits, institutional affiliations, objectives, history of the project, common and scientific names used, different levels of taxonomic coverage, sizes reported, distribution maps, citations styles, and recognition of scientists and personnel involved in the project. The following editorial notes are intended to supplement information specific to Volumes 2, 3, and 4.

Taxonomy and Systematics of Fishes

This guide has been in production for an unusually long time. This period coincides with many advances in our understanding of the systematics of fishes and subsequent recommendations in the changes in higher taxonomy of fishes (Wiley & Johnson, 2010; Helfman & Collette, 2011; Betancur *et al.*, 2013, Near *et al.*, 2013). These volumes were originally 'typeset' prior to these advances and based primarily on the taxonomy of Nelson (2006). Fortunately, the familial composition of fishes has not changed as dramatically as some of the higher taxonomic levels that have been suggested. We retained Nelson's (2006) taxonomy because of constraints on changing the format of the book and because much of the newer taxonomy still needs to be reconciled more completely in terms of both morphological and molecular evidence. In fact, a recent book on fishes still does not fully incorporate these recommended changes (Hastings *et al.*, 2014). We have attempted to incorporate as many taxonomic updates as possible in the months preceding the publication of these volumes. We have also attempted to contact all of the authors although some original authors are deceased and others have retired or no longer respond to correspondence. We decided to go ahead and print these volumes with the most recent information from authors as possible although some recent taxonomic changes may not have been incorporated. We hope that our decision to print these volumes, together with potential imperfections, is a better alternative than having all the hard work that went into their production go to waste. If questions remain about taxonomy, we recommend consulting Eschmeyer's online Catalog of Fishes (<http://www.calacademy.org/scientists/projects/catalog-of-fishes>) for the most updated pronouncement on familial, genus and species assignments (although in rare cases some authors do not accept these assignments).

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We would also like to reiterate our sincere gratitude to the MAVA Foundation whose grant to the International Union for Conservation of Nature's (IUCN) Global Marine Species Assessment provided much needed support to complete editing of these guides and to convene Red List Assessment workshops for marine fishes of the region. Final desktop publishing and printing of this guide was supported by the EAF-Nansen Project "Strengthening the Knowledge Base for and Implementing an Ecosystem Approach to Marine Fisheries in Developing Countries". We thank the many scientists and facilitators who reviewed distributional and ecological data for marine fishes that improved these guides during these workshops:

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Notes: As several changes in authorship and institutional affiliations have taken place since the printing of the first volume of this book, we have decided to reprint the list of contributing authors so as to present the most updated information. We would like to also take this opportunity to remember our valued contributors who have passed away since the inception of this project, and denote those authors with (†) both here and in their chapters.

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BIVALVES

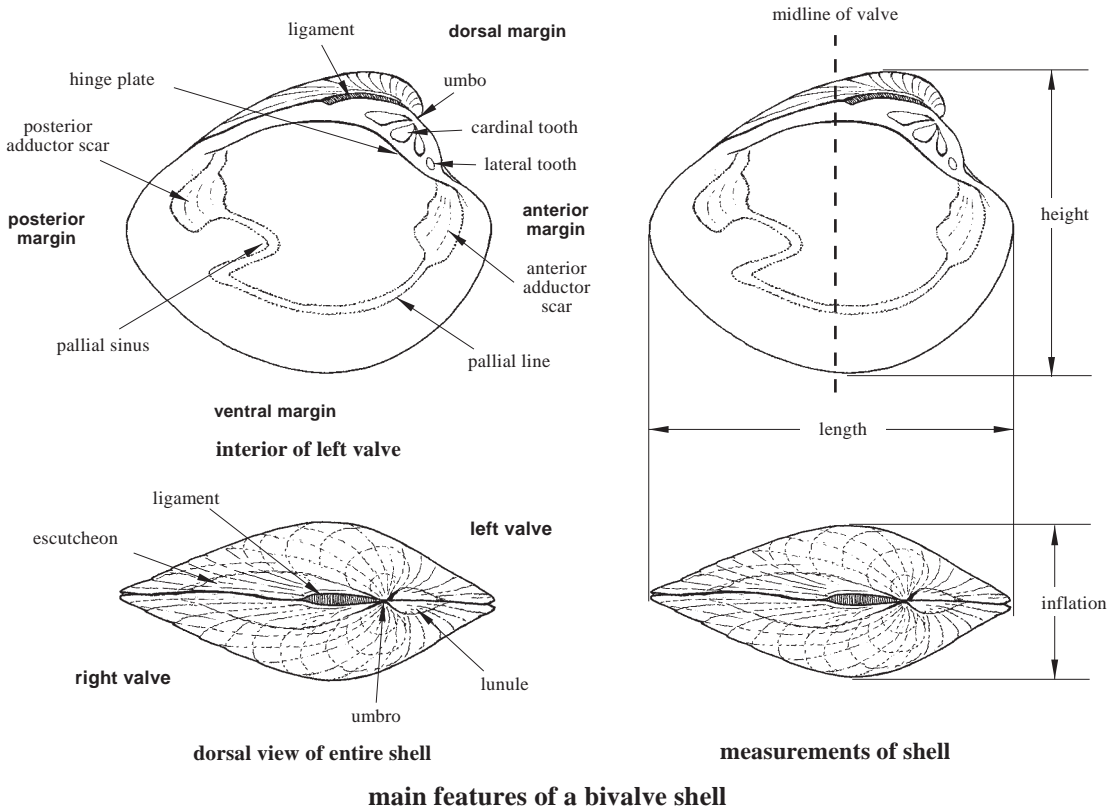
(ACEPHALA, LAMELLIBRANCHIA, PELECYPODA)

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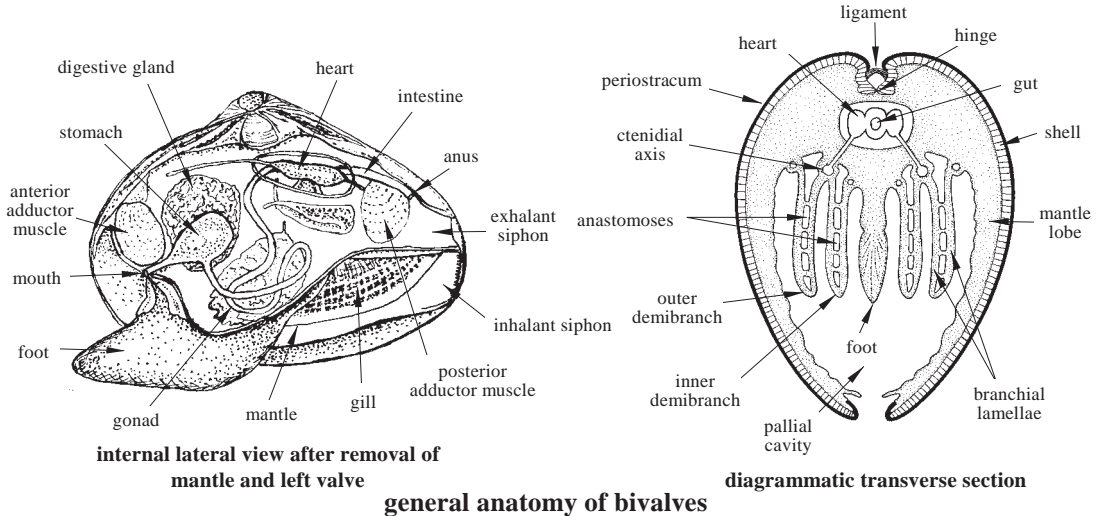
GENERAL REMARKS

Bivalves are aquatic molluscs which fundamentally are bilaterally symmetrical. Their characteristic shell is composed of **2 calcified valves** lying on right and left sides of the body. Both valves are typically equally convex (**equivalve shell**), but they may differ in size and shape (**inequivalve shell**) as the result of an alteration of bilateral symmetry. Valves are articulated along a marginal process of the dorsal side called the **hinge**, and are connected by an elastic and poorly calcified structure, the **ligament**. Under the action of the ligament, the 2 valves tend to open along their anterior, posterior and mainly ventral margins. They are closed by the pulling action of 1 or 2 (sometimes 3) **adductor muscles**. These are fixed to the inner side of the valves by areas leaving well-defined imprints, the **adductor muscle scars**.



The soft, unsegmented body of bivalves is laterally compressed, but has neither head (Acephala) nor masticatory apparatus. It is covered by the **mantle**, an overgrowing sheet of tissue composed of 2 lobes, 1 lining and secreting each valve. **Pallial lobes** are fused dorsally with the visceral mass, and enclose ventrally a rather wide pallial cavity communicating with the outside. They are tightly attached to the interior of valves along a well-defined **pallial line**, close to the ventral margin of shell. The mantle-lobe margins may be somewhat fused, forming posteriorly 2 **siphons** through which water is taken in (ventral, inhalant siphon) or expelled (dorsal, exhalant siphon). The **foot**, a muscular ventral structure is sometimes hatchet-shaped (Pelecypoda) and enables a burrowing locomotion or a fixation to hard substrates by means of elastic filaments (**byssus**). Many Bivalves exhibit a pair of respiratory lamellous **gills** (Lamellibranchia), whose activity produces a complex system of currents largely concerned with the collection of food. Most forms of bivalves are microphagous and feed either on plankton or organic matter suspended in water (suspension feeders), or on food collected on the substrate floor (deposit feeders). However, a few species have evolved specialized feeding strategies (carnivores, xylophages).

In most bivalves, sexes are separate and reproductive cells are expelled into the water where fertilization occurs; larvae have a relatively long free-swimming planktonic life, followed by a metamorphosis leading to the definitive benthonic mode of life. However, some species may exhibit various forms of hermaphroditism, and fertilization may occur in the pallial cavity, sometimes with protection of eggs or larvae in a "brooding chamber". The planktonic larval stage may be reduced or totally absent, and then young hatch directly as benthic organisms.



The biodiversity of the malacological fauna in the tropical East Atlantic was thought to be much less important than that of the western Atlantic, but it is probably largely underestimated and no confident estimate is presently available in the literature. However, a recent evaluation of the tropical West African bivalve fauna (Cosel, unpublished data) found about 600 marine and brackish-water species allocated to 68 families, compared to a total number of 10 000 species in the world. For the present contribution, 177 species belonging to 32 families have been selected, mainly on the basis of size, abundance, distribution and commercial interest. To realize this selection of species, based on the first edition of the FAO Eastern Central Atlantic Guide (Abbott, 1981), the author has largely used his "Annotated list of marine and brackish-water species of interest to fisheries" (1992, FAO unpublished report) that has circulated for improvement among specialists as a basis for the FAO Species Catalogue, Bivalves of the World (in preparation). However, in view of the paucity of detailed informations on fisheries in many places, many other species are probably collected locally in the area.

The author had the opportunity to study numerous specimens collected in tropical West Africa by Dr R. von Cosel, Muséum National d'Histoire Naturelle (Paris, France), who kindly authorized him to consult his manuscript on tropical East African bivalves.

GLOSSARY OF TECHNICAL TERMS

Accessory plate – Calcareous and periostracal structure covering the soft parts in the Pholadidae, in addition to the shell valves.

Adductor muscle – Muscle connecting the 2 valves of a shell, to draw them together.

Apophysis – Finger-like calcareous structure to which the foot muscles are attached in the Pholadidae and Teredinidae.

Branchial – Pertaining to the gills.

Branchial lamella – (See **Gill**).

Byssus – Clump of horny threads spun by the foot, by which a bivalve can anchor to a hard substrate.

- Cancellate** – Sculptural pattern consisting of radial elements intersecting concentric ones at right angles.
- Cardinal area** – Surface of the shell extending between umbo and hinge margin.
- Cardinal tooth** – (See **Tooth**).
- Chomata** – Marginal crenulations in Ostreidae and Gryphaeidae, occurring all around the inner side of valves or only near the hinge, composed of small tubercles or ridgelets on the right valve, and corresponding pits on the left valve.
- Commissure** – Line of junction of the valves.
- Concentric** – Parallel to lines of growth.
- Cruciform muscles** – Crossed muscles connecting valves and serving to retract the siphons, leaving 2 small scars near posteroventral end of pallial line in some bivalves (e.g., Tellinidae).
- Ctenidial axis** – (See **Gill**).
- Ctenolium** – A row of small teeth on lower side of byssal notch in some Pectinidae.
- Demibranch** – (See **Gill**).
- Denticle** – A small tooth.
- Divaricate** – Sculptural pattern composed of diverging or splitting elements, usually along a line.
- Ear** – Lateral expansion of the dorsal part of a shell.
- Equilateral** – The condition of a valve when growth on either side of umbo is symmetrical.
- Equivalve** – The condition of a shell when valves are of same shape and size.
- Escutcheon** – Differentiated area extending along dorsal margin of valves, behind umbones.
- Eulamellibranchiate type** – Gill demibranchs composed of 2 lamellae. Branchial filaments and lamellae always connected by tissular junctions (e.g. Veneridae).
- Filibranchiate type** – Gill demibranchs composed of 2 lamellae. In addition to the ciliary junctions between branchial filaments, anastomosed tissular junctions may unite lamellae of each demibranch (e.g. Mytilidae and Pectinidae).
- Foot** – Mobile and extensible muscular organ, used for locomotion or for attachment to substrate by mean of byssal threads.
- Gape** – Opening or gap remaining between margins of valves, when shell is closed.
- Gill** – Respiratory organ generally composed of 2 thin leaf-like structures (demibranchs) suspended to a dorsal axis (ctenidial axis); each demibranch may be either simple or bent back upon itself and then formed of 2 sheets (branchial lamellae). A lamella is constituted of many ciliated filaments parallel to each other and interconnected by more or less complex junctions. Four main types of gill structures are currently recognised among bivalves: the protobranchiate, filibranchiate, eulamellibranchiate and septibranchiate types (see these terms).
- Growth marks** – (See **Sculpture**).
- Hinge** – Part of the dorsal margin along which the valves meet.
- Hinge line** – Shell margin adjacent to the hinge.
- Hinge plate** – Infolding of dorsal shell margin bearing hinge teeth and sockets, and lying in each valve in a plane parallel to that of junction of valves.
- Imbricate** – Overlapping like tiles or shingles on a roof.
- Inequilateral** – The condition of a valve when growth on either side of umbo is assymetrical.

Inequivalve – The condition of a shell when valves are not alike in shape or size.

Keel – A prominent, angular ridge.

Lamellate – With thin, flattened plates.

Lateral tooth – (See **Tooth**).

Lenticular – Shaped like a biconvex lens.

Ligament – Horny, elastic structure joining the 2 valves dorsally.

Ligamental area – Part of cardinal area occupied by the ligament.

Lunule – Differentiated area extending along dorsal margin of valves, just in front of umbones.

Mantle – Fleishy sheet surrounding vital organs and composed of 2 lobes, 1 lining and secreting each valve.

Muscle scar – Impression marking the place of attachment of a muscle inside the shell.

Nacreous – Pearly, often with multicoloured hues, as in mother-of-pearl.

Nymph – Narrow platform extending behind umbo along dorsal margin, to which the external ligament is attached.

Opisthogyrate – The condition of a shell when umbones are directed posteriorly.

Orbicular – Disk-shaped, nearly circular.

Orthogyrate – The condition of a shell when umbones are perpendicular to hinge line, which means they are directed neither anteriorly nor posteriorly.

Pallet – Small paddle-shaped or feather-like calcareous and periostracal structure, a pair of which closes the burrow opening when siphons are retracted in the Teredinidae.

Pallial – Pertaining to the mantle.

Pallial line – A line near internal margin of valve, marking the site of attachment of the mantle edge.

Pallial sinus – Posterior indentation of pallial line, marking the site of attachment of muscles allowing siphons to retract within the shell.

Pedal – Pertaining to the foot.

Periostracum – Layer of horny material covering the shell.

Plicate – Folded or ridged.

Porcelaneous – With translucent, porcelain-like appearance.

Prosogyrate – The condition of a shell when umbones are directed anteriorly.

Protobranchiate type – Gill demibranchs simple, formed of leaf-like filaments loosely connected by sparse ciliary junctions.

Radial – Diverging from umbo, like the spokes of a wheel.

Rostrate – With a beak-like projection (rostrum).

Sculpture – Relief pattern developed on the outer surface of the shell; sculpture is overlain by concentric growth marks corresponding to various positions of shell margins during growth.

Scabrous – Rough, like a file.

Scale – Localized projection on the outer surface of the shell, commonly situated on a rib.

Septibranchiate type – Gills absent, replaced by a muscular horizontal partition (the “septum”) pierced by small pores. This structure enables carnivorous nutrition and is encountered in a group of predominantly deep-sea bivalves (e.g. Cuspidariidae).

Siphons – Extensible, tube-like projections of the posterior marginal region of mantle, forming 2 openings for water inflow (inhalant siphon) and outflow (exhalant siphon).

Socket – Recess of the hinge plate, for reception of a tooth of opposite valve.

Tooth – Calcareous projection from the hinge, received in socket of opposite valve; cardinal teeth are close to umbo, whereas lateral teeth are set apart from these, anteriorly or posteriorly.

Umbo (pl. **umbones**) – The first-formed part of a valve, usually above the hinge.

Umbonal reflection – Expansion of the internal dorsal margin, which is inrolled over the umbones, in the Pholadidae and the Teredinidae.

Valve – One of the main calcareous halves of a bivalve.

IDENTIFICATION NOTE

An illustrated key to families of those species included in this guide is provided here. After a family is determined by using this key, the user should turn to the descriptive accounts of families and species. Each section on a family includes, in addition to a diagnosis of the family, a key to the species. Furthermore, there are detailed accounts for the most important species given, and abbreviated accounts for species of secondary interest.

For a correct identification of a bivalve species, it is absolutely essential to orientate the shell properly and to distinguish the right valve from the left valve. Basically, the area where the mantle lobes are fused together and with the visceral mass is considered as dorsal. It is about the same to consider that the hinge and umbones occupy a dorsal position. The anterior margin is then relatively close to the mouth, and the posterior margin close to the anus (see also figures on page 666-667).

In a bivalve shell, it is useful to remember that:

- the pallial sinus, when present, is posterior;
- the centre of the adductor scar is posterior in a species with only 1 adductor muscle.
- the external ligament, when stretching along one side of the umbones, is posterior to them.

However, these simple rules cannot be applied to all species, and sometimes other criteria must be used. In such cases, appropriate features of orientation are depicted in the family or species accounts of this guide.

KEY TO FAMILIES OCCURRING IN THE AREA

Remarks on key characters: features used in this key only apply to species included in the present contribution; they do not consider a few exceptions within the families, the inclusion of which would make the key too complex for general use.

- 1a.** Only 1 adductor muscle scar in each valve → **2**
1b. Two (sometimes 3) adductor muscle scars in each valve → **5**

- 2a. Interior of shell partly nacreous, with a non-nacreous border developed at least ventrally **Figure A**
 2b. Interior of shell, if nacreous, without a non-nacreous border → 3
- 3a. Dorsal margin drawn out into ear-shaped or wing-shaped lateral expansions **Figure B**
 3b. Dorsal margin not drawn out into such expansions → 4
- 4a. Ligament mainly internal **Figure C**
 4b. Ligament mainly external **Figure D**
- 5a. Shell with calcareous accessory plates or tube and pallets; a finger-like apophysis projecting from the umbonal cavity in each valve **Figure E**
 5b. Shell without calcareous accessory plates nor tube and pallets; no finger-like apophysis projecting in either valve → 6
- 6a. Anterior and posterior adductor scars very unequal, the anterior one always small . . . **Figure F**
 6b. Anterior and posterior adductor scars not very unequal → 7
- 7a. Hinge with numerous alternating small teeth and sockets, all or part of them transverse to dorsal margin **Figure G**
 7b. Hinge differently shaped → 8
- 8a. Periostracum widely protruding beyond margins of the valves; anterior adductor scar larger than the posterior one **Figure H**
 8b. Shell not as above → 9
- 9a. Internal ligament present → 10
 9b. Internal ligament absent → 11
- 10a. Hinge without teeth **Figure I**
 10b. Hinge with well developed teeth **Figure J**
- 11a. Hinge teeth and corresponding sockets more or less parallel to dorsal margin **Figure K**
 11b. Hinge teeth and corresponding sockets not parallel to dorsal margin → 12
- 12a. Shell more than twice as long as high, widely gaping anteriorly and posteriorly **Figure L**
 12b. Shell differently shaped → 13
- 13a. Anterior adductor scar elongate, with an oblique ventral lobe detached from pallial line . . **Figure M**
 13b. Anterior adductor scar, if elongate, not with an oblique ventral lobe detached from pallial line → 14
- 14a. Hinge with 3 (sometimes 4) cardinal teeth, at least in the left valve **Figure N**
 14b. Hinge with no more than 2 cardinal teeth in either valve → 15
- 15a. Pallial line with a sinus **Figure O**
 15b. Pallial line without a sinus **Figure P**

Note: The following figures contain all the families included in this contribution, plus those quoted as similar to the treated families. These similar families are marked with an asterisk (*).

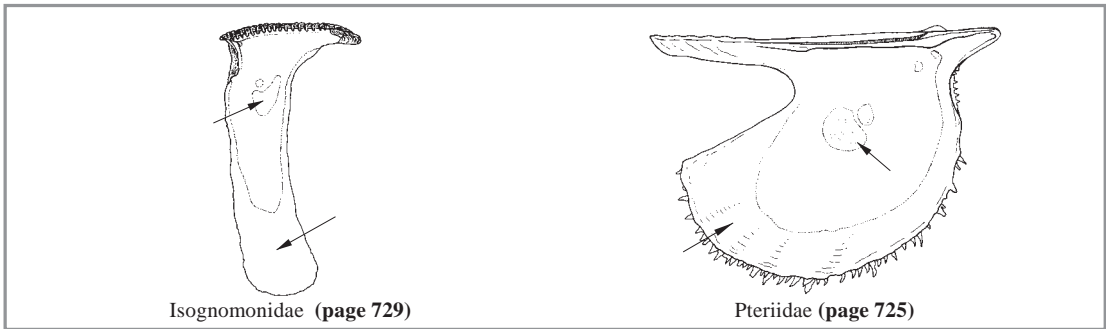


Figure A

Figure A:

Isognomonidae: shell compressed, with a straight dorsal margin, slightly inequivalve. Ligament external, set in a series of transverse grooves along the dorsal margin. Hinge without teeth. Interior partly nacreous. Only 1 adductor muscle scar, with a well developed retractor scar. Pallial line without a sinus.

Pteriidae: dorsal margin often produced at each end into a wing-like ear, sometimes very long behind. Shell slightly inequivalve. Right valve with a byssal notch anteriorly. Hinge toothless or with denticles. Interior brilliantly nacreous. Only 1 adductor muscle scar. Pallial line without a sinus.

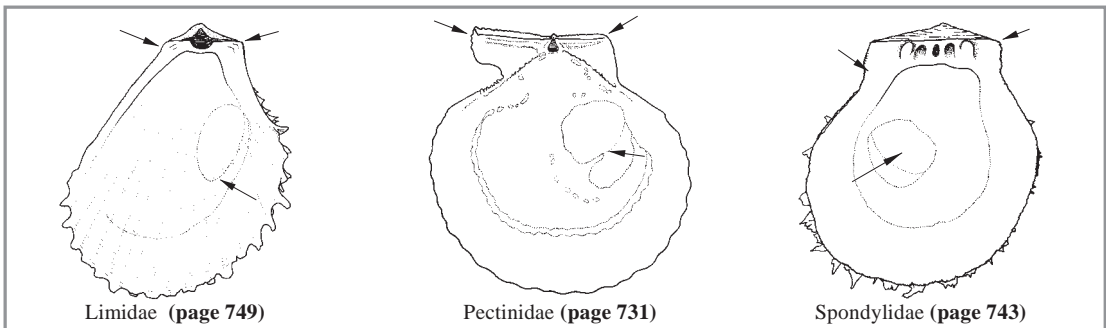


Figure B

Figure B:

Limidae: shell equivalve, higher than long, inequilateral, extended obliquely in an anteroventral direction. Dorsal margin with 2 small ears. Trigonal cardinal area with a median ligamental groove. Hinge toothless. Interior partly nacreous. A single adductor muscle scar. Pallial line without a sinus.

Pectinidae: shell more or less inequivalve, ovate to subcircular with a straight dorsal margin forming wing-like ears. A byssal notch and a ctenuium at right valve. Ligament internal, in a small trigonal pit pointing under the umbones. Hinge without teeth. A single adductor muscle scar. Pallial line without a sinus.

Spondylidae: shell stout, inequivalve, cemented to substrate by the right valve. Hinge line straight. A trigonal cardinal area, higher in the right valve than in the left. Ligament internal. Hinge with 2 strong teeth and 2 deep sockets in each valve, symmetrically arranged in relation to the internal ligament. A single adductor muscle scar. Pallial line without a sinus.

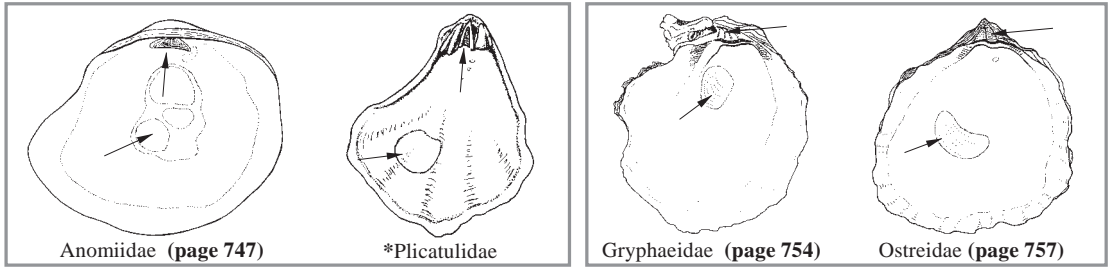


Figure C

Figure D

Figure C:

Anomiidae: shell inequivalve, often irregular, adhering to substrate by mean of a calcified byssus passing through a hole-like embayment of right valve. Ligament internal. Hinge without teeth. Central area of the interior thickened, with 1 or 2 retractor muscle scars in left valve, in addition to the single adductor scar. No pallial sinus.

***Plicatulidae:** shell slightly inequivalve, cemented to substrate by the right valve. Cardinal area small. Ligament internal. Hinge with 2 crenulated teeth and 2 sockets in each valve, symmetrically arranged in relation to the internal ligament. A single adductor muscle scar. No pallial sinus.

Figure D:

Gryphaeidae: shell more or less inequivalve, cemented to substrate by left valve, with a microscopic vesicular structure. Ligamental area with a shallow median groove. Hinge without teeth. A single adductor muscle scar, closer to the hinge than to the ventral margin. Internal margins with long, branched, sinuous chomata.

Ostreidae: shell inequivalve, cemented to substrate by left valve, right valve quite flat. Ligamental area with a shallow median groove and 2 lateral thickenings. Hinge without teeth. A single adductor muscle scar, median in position or nearer to the ventral margin. Internal margins smooth or with simple short chomata.

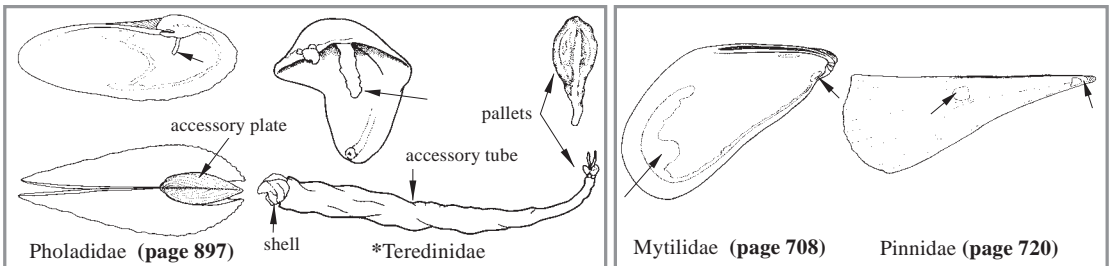


Figure E

Figure F

Figure E:

Pholadidae: shell subequivalve, gaping. Dorsal margin forming an umbonal reflection. A number of accessory calcareous plates about the main shell. Ligament reduced. Hinge without teeth. A finger-like internal apophysis. Three adductor muscle scars. Pallial line deeply sinuated.

***Teredinidae:** shell reduced, equivalve, widely gaping. Anteroventral margin with a deep, right-angled notch. Dorsal margin forming an umbonal reflection. Ligament reduced. Hinge without teeth. A finger-like internal apophysis. An internal umbonoventral ridge, with a knob at both ends. Three adductor muscle scars. Accessory calcareous tube lining burrow long, closed by a pair of pallets.

Figure F:

Mytilidae: shell equivalve and very inequilateral, with a byssal gape. Umbones at or near anterior end. Periostracum prominent. Ligament external, deep-set, supported by a whitish ridge. Hinge teeth absent or reduced. Adductor muscle scars unequal, the anterior one small to absent. Pallial line without a sinus. Inner side with an extensive nacreous layer.

Pinnidae: shell brittle, equivalve, subtrigonal, ventrally and posteriorly gaping; very inequilateral, pointed in front. Anterior end eroded and internally closed by small transverse partitions. Ligament linear. Hinge without teeth. Interior with a thin nacreous layer, restricted to the anterior half. Two unequal adductor muscle scars.

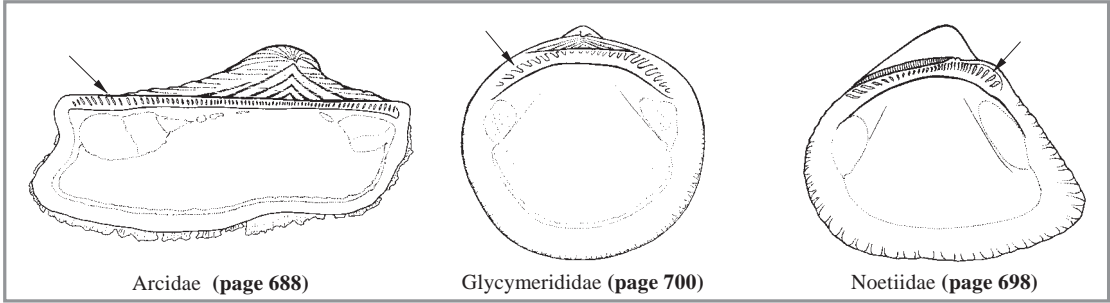


Figure G

Figure G:

Arcidae: shell equivalve to slightly inequivalve, mostly longer than high, more or less inequilateral. Umbones prosogyrate, on top of a wide cardinal area. Ligament external, often with V-shaped grooves. Hinge elongate, straightish, with numerous small transverse teeth. Two subequal adductor muscle scars. Pallial line without a sinus.

Glycymerididae: shell equivalve, closed, subequilateral, rounded in outline. Submedian umbones, on top of a trigonal cardinal area engraved by tent-shaped grooves and covered with external ligament. Hinge arched, bearing a series of teeth diverging outwards. Two subequal adductor muscle scars, their inner margin with a radial ridge. Pallial line without a sinus.

Noetiidae: shell equivalve, generally inequilateral and longer than high. Umbones often opisthogyrate, set apart by a trigonal cardinal area. Ligament external, with oblique grooves and transverse striations. Hinge elongate, straightish, with numerous small transverse teeth. Two subequal adductor muscle scars with a ridge or a shelf along one or both scars. Pallial line without a sinus.

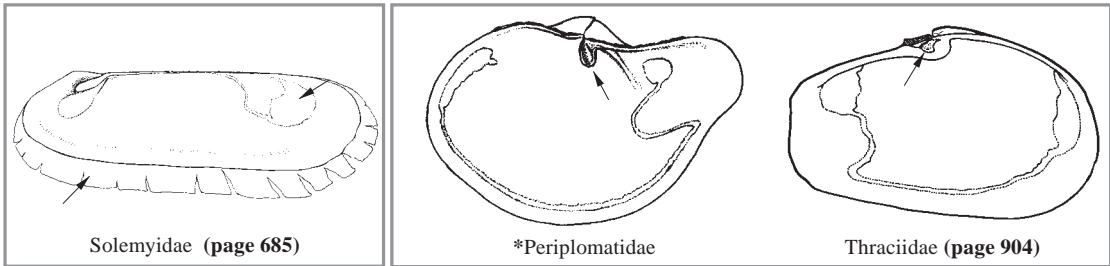


Figure H

Figure I

Figure H:

Solemyidae: shell equivalve, very inequilateral, transversally elongate. Umbones small, near posterior end. Outside nearly smooth. Periostracum varnish-like, thick, widely protruding beyond ventral margin and at both ends. Ligament often sunken. Hinge without teeth. Posterior adductor scar smaller than anterior one. Pallial line without a sinus.

Figure I:

***Periplomatidae:** shell rounded, subrostrate posteriorly, gaping, markedly inequivalve. Umbones with an obvious median slit. Outer surface finely granulated. Internal ligament attached on protruding spoon-like pits, each supported by an oblique buttress. Hinge without teeth. Interior subnacreous. Two adductor muscle scars. Pallial line with a rather deep sinus.

Thraciidae: shell thin, elongate-ovate, truncate posteriorly, usually closed, somewhat inequivalve. Umbones without an obvious median slit. Outer surface finely granulated. Internal ligament not protruding ventrally nor supported by oblique buttresses. Hinge without teeth. Interior not nacreous. Two adductor muscle scars. Pallial line with a broad sinus.

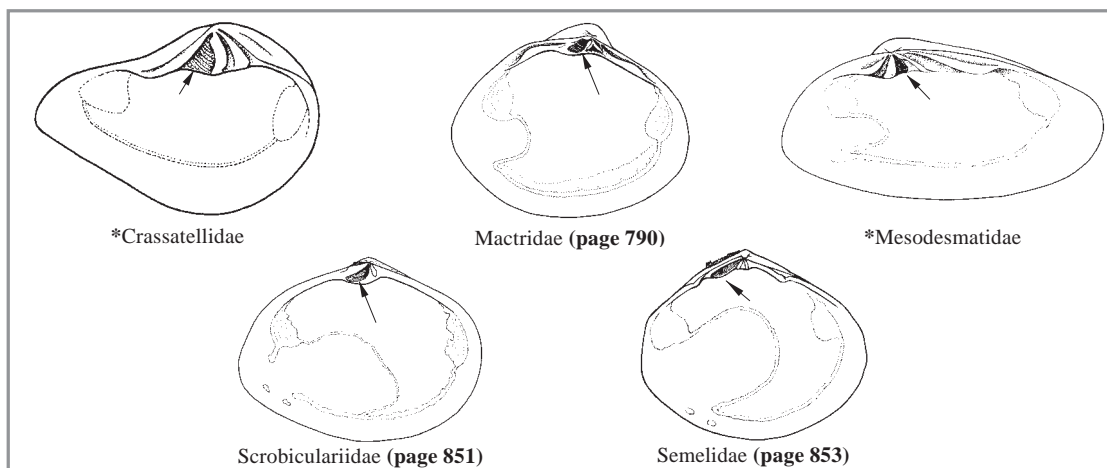


Figure J

Figure J:

***Crassatellidae:** shell thick, equivalve. Umbones prosogyrate to orthogyrate. Sculpture mainly concentric. Lunule and escutcheon distinct. Internal ligament in a pit of hinge plate. Hinge with 2 cardinal teeth and lateral teeth. Two adductor muscle scars. Pallial line without a sinus.

Mactridae: shell equivalve. Umbones prosogyrate. Internal ligament well developed, in a trigonal pit of hinge plate. Hinge characteristic, with 2 cardinal teeth and lateral teeth; cardinal teeth of left valve forming an inverted V-shaped process. Two adductor muscle scars. Pallial line with a well developed sinus.

***Mesodesmatidae:** shell equivalve, inequilateral, subtrigonal to wedge-shaped. Umbones opisthogyrate. Internal ligament in a deep pit of hinge plate. One or 2 cardinal teeth and lateral teeth. Two adductor muscle scars. Pallial line with a short sinus.

Scrobiculariidae: shell almost equivalve, rather thin and laterally compressed. Internal ligament in a pit of hinge plate. Hinge with 2 cardinal teeth in right valve and 1 in left valve. Two adductor muscle scars. Pallial sinus wide and deep. Cruciform muscles leaving small paired scars near pallial line.

Semelidae: shell rather compressed, often slightly inequivalve, with a rightwards flexure posteriorly. Internal ligament in a small pit of hinge plate. Hinge with 2 cardinal teeth and lateral teeth. Two adductor muscle scars. Pallial line with a deep sinus. Cruciform muscles leaving small paired scars near pallial line.

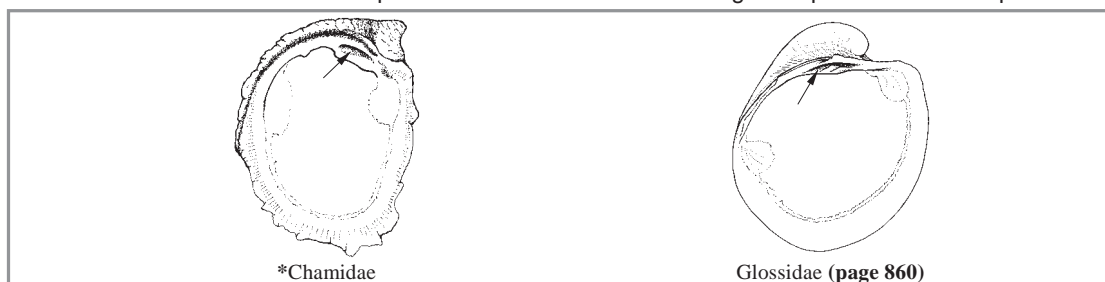


Figure K

Figure K:

***Chamidae:** shell thick, strongly inequivalve and inequilateral; very variable in shape, cemented to substrate by either the left or the right valve. Umbones prosogyrate, low, spirally wound. Ligament external. Hinge with large, curved teeth and corresponding sockets, more or less parallel to dorsal margin. Two subequal adductor muscle scars. Pallial line without a sinus.

Glossidae: shell equivalve, globular, appearing heart-shaped from the anterior side. Umbones prosogyrate, spirally enrolled. Hinge teeth more or less parallel to dorsal margin. Two subequal adductor muscle scars. Pallial line without a sinus.

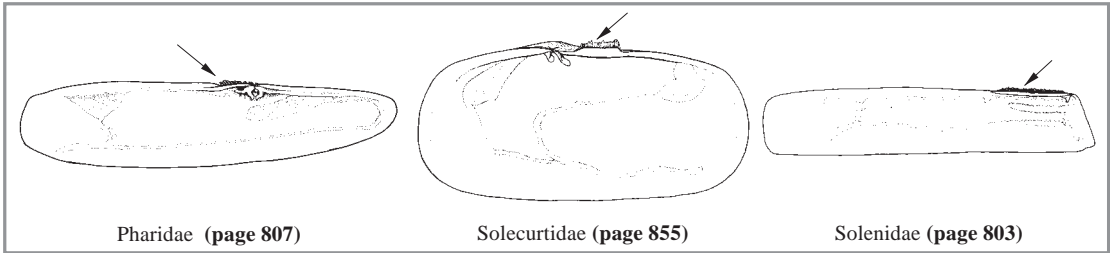


Figure L

Figure L:

Pharidae: shell equivalve, with a narrowly elongate shape, gaping at both ends. Umbones subcentral or near the anterior end. Ligament external. Hinge feeble, with 2 teeth in right valve, and 3 or 4 teeth in left valve. Two adductor muscle scars, the anterior one larger. Pallial sinus relatively shallow.

Solecurtidae: shell equivalve, elongate-quadrate, widely gaping at both ends. Umbones subcentral. Ligament external, on projecting nymphs. Two cardinal teeth in either valve. Two adductor muscle scars. Pallial sinus deep.

Solenidae: shell equivalve, with a narrowly elongate shape, gaping at both ends. Umbones at or nearby the anterior end. Ligament external. Hinge feeble, with 1 cardinal tooth in each valve. Two adductor muscle scars, the anterior one elongate. Pallial sinus relatively shallow.

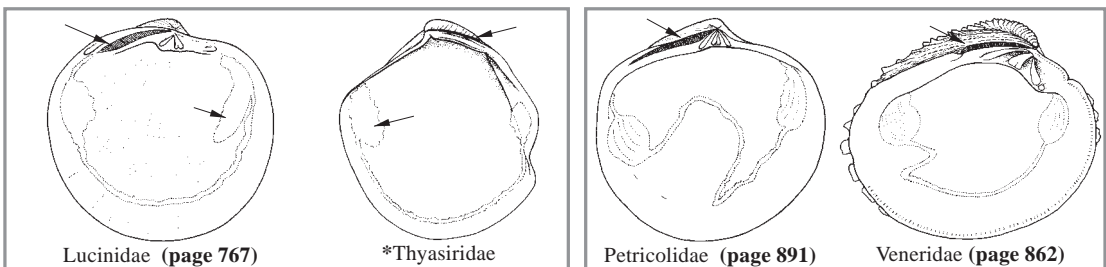


Figure M

Figure N

Figure M:

Lucinidae: shell equivalve, lenticular, slightly inequilateral. Ligament more or less deeply sunken in posterodorsal margin. Two cardinal teeth and lateral teeth in either valve, sometimes reduced to absent. Two adductor muscle scars, the anterior narrowly elongate with an oblique ventral lobe detached from pallial line. No pallial sinus.

***Thyasiridae:** shell equivalve, thin, trigonal, inequilateral. Posterior part of valves set off by 1 or more deep radial furrows or folds. Ligament marginal. Hinge teeth obsolete to absent. Two adductor muscle scars, the anterior elongate, with an oblique ventral lobe detached from pallial line. No pallial sinus.

Figure N:

Petricolidae: shell equivalve, inequilateral, with prosogyrate umbones. No lunule nor escutcheon. Three cardinal teeth in left valve and only 2 in right valve; lateral teeth wanting. Two adductor muscle scars. Pallial sinus deep.

Veneridae: shell mostly solid, equivalve, inequilateral, with prosogyrate umbones. Lunule and/or escutcheon usually present. Ligament external. Three (sometimes 4) cardinal teeth in each valve, anterior lateral teeth sometimes present. Two adductor muscle scars. Pallial sinus usually present.

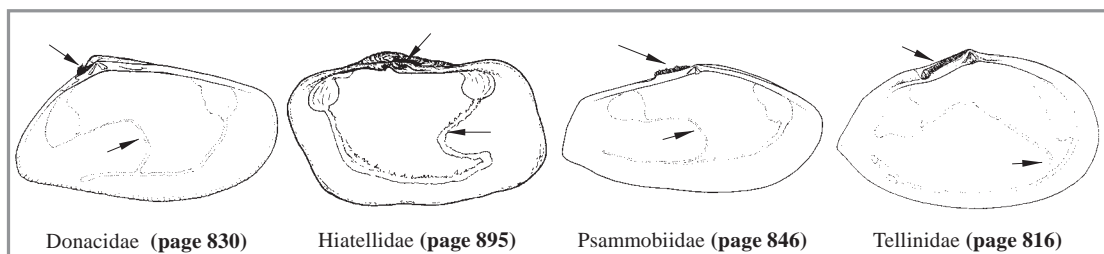


Figure O

Figure O:

Donacidae: shell equivalve, trigonal to wedge-shaped, with a shorter posterior end. Umbones opisthogyrate. Ligament external. Two small cardinal teeth and lateral teeth. Two adductor muscle scars. Pallial sinus deep. Cruciform muscle scars obscure.

Hiatellidae: shell thick and chalky, larger than high, gaping anteriorly and posteriorly, equivalve to somewhat inequivalve. Umbones more or less anterior. Ligament external. Hinge reduced, with 1 or 2 cardinal teeth. Two adductor muscle scars. Pallial sinus well developed.

Psammobiidae: shell ovate to subelliptical or trapezoidal, somewhat gaping. Ligament external, on projecting nymphs. Two small cardinal teeth in either valve; lateral teeth absent. Two adductor muscle scars. Pallial sinus deep. Cruciform muscle scars often obscure.

Tellinidae: shell rather thin and compressed, often slightly inequivalve, with a rightwards flexure on posterior end. Ligament external. Two small cardinal teeth in either valve; lateral teeth often present. Two adductor muscle scars. Pallial sinus deep. Cruciform muscles leaving small paired scars near pallial line.

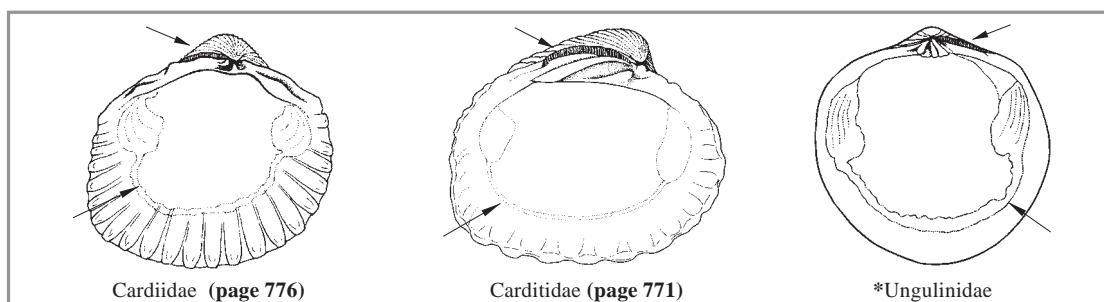


Figure P

Figure P:

Cardiidae: shell equivalve, inflated, oval to subquadrate. Umbones prominent. External sculpture mostly radial. Ligament external. Hinge characteristic, with teeth curving outwards; 2 cardinal teeth and lateral teeth in each valve; cardinal teeth cruciform in arrangement. Two adductor muscle scars. Pallial line without a sinus.

Carditidae: shell equivalve, stout, inequilateral. Exterior mostly with radial ribs. Ligament external. Two cardinal teeth unequal and with tiny transverse striations; lateral teeth frequently reduced to absent. Two adductor muscle scars. Pallial line without a sinus.

***Ungulinidae:** shell equivalve, lenticular, slightly inequilateral. Ligament external, not sunken in a marginal groove. Two cardinal teeth in either valve, lateral teeth reduced to absent. Two adductor muscle scars, the anterior elongate but without an oblique ventral lobe detached from pallial line. No pallial sinus.

**LIST OF FAMILIES AND SPECIES OF INTEREST TO FISHERIES
OCCURRING IN THE AREA**

The symbol 🐚 is given when species accounts are included.

SOLEMYIDAE

- 🐚 *Solemya togata* (Poli, 1791).

ARCIDAE

- 🐚 *Anadara corbuloides* (Monterosato, 1878).
🐚 *Anadara gibbosa* (Reeve, 1844).
🐚 *Anadara senegalensis* (Gmelin, 1791).
🐚 *Arca bouvieri* P. Fischer, 1874.
🐚 *Arca noae* Linnaeus, 1758.
🐚 *Barbatia barbata* (Linnaeus, 1758).
🐚 *Barbatia complanata* (Bruguière, 1789).
🐚 *Mosambicarca hians* (Reeve, 1844).
🐚 *Senilia senilis* (Linnaeus, 1758).

NOETIIDAE

- 🐚 *Stenocista gambiensis* (Reeve, 1844).

GLYCYMERIDIDAE

- 🐚 *Glycymeris concentrica* (Dunker, 1853).
🐚 *Glycymeris formosa* (Reeve, 1843).
🐚 *Glycymeris pilosa* (Linnaeus, 1767).
🐚 *Glycymeris scripta* (Born, 1778).
🐚 *Glycymeris stellata* (Bruguière, 1789).
🐚 *Glycymeris violacescens* (Lamarck, 1819).

MYTILIDAE

- 🐚 *Aulacomya atra* (Molina, 1782).
🐚 *Choromytilus meridionalis* (Krauss, 1848).
🐚 *Lithophaga aristata* (Dillwyn, 1817).
🐚 *Lithophaga lithophaga* (Linnaeus, 1758).
🐚 *Modiolus barbatus* (Linnaeus, 1758).
🐚 *Modiolus letourneuxi* Bourguignat, 1877.
🐚 *Modiolus lulat* (Dautzenberg, 1891).
🐚 *Modiolus martorelli* (Hidalgo, 1878).
🐚 *Mytilus galloprovincialis* Lamarck, 1819.
🐚 *Perna* cf. *perna* (Linnaeus, 1758).

PINNIDAE

- 🐚 *Atrina chautardi* (Nicklès, 1953).
- 🐚 *Atrina fragilis* (Pennant, 1777).
- 🐚 *Pinna rudis* Linnaeus, 1758.

PTERIIDAE

- 🐚 *Pteria atlantica* (Lamarck, 1819).
- 🐚 *Pteria hirundo* (Linnaeus, 1758).

ISOGNOMONIDAE

- 🐚 *Isognomon dunkeri* (P. Fischer, 1881).

PECTINIDAE

- 🐚 *Aequipecten flabellum* (Gmelin, 1791).
- 🐚 *Aequipecten opercularis* (Linnaeus, 1758).
- 🐚 *Bractechlamys corallinoides* (d'Orbigny, 1840).
- 🐚 *Flexopecten flexuosus* (Poli, 1795).
- 🐚 *Flexopecten glaber* (Linnaeus, 1758).
- 🐚 *Hinnites corallinus* G.B. Sowerby I, 1827.
- 🐚 *Manupecten pesfelis* (Linnaeus, 1758).
- 🐚 *Mimachlamys varia* (Linnaeus, 1758).
- 🐚 *Pecten jacobaeus* (Linnaeus, 1758).
- 🐚 *Pecten keppelianus* G.B. Sowerby III, 1905.

SPONDYLIDAE

- 🐚 *Spondylus gaederopus* Linnaeus, 1758.
- 🐚 *Spondylus senegalensis* Schreibers, 1793.

ANOMIIDAE

- 🐚 *Anomia ephippium* Linnaeus, 1758.

LIMIDAE

- 🐚 *Acesta angolensis* (Adam and Knudsen, 1955).
- 🐚 *Acesta excavata* (Fabricius, 1779).
- 🐚 *Lima lima* (Linnaeus, 1758).
- 🐚 *Limaria tuberculata* (Olivi, 1792).

GRYPHAEIDAE

- 🐚 *Hyotissa rosea* (Gmelin, 1791).
- 🐚 *Neopycnodonte cochlear* (Poli, 1795).

OSTREIDAE

- 🐚 *Crassostrea gasar* (Dautzenberg, 1891).
- 🐚 *Crassostrea gigas* (Thunberg, 1793).
- 🐚 *Dendostrea frons* (Linnaeus, 1758).
- 🐚 *Ostrea edulis* Linnaeus, 1758.
- 🐚 *Ostrea stentina* Payraudeau, 1826.
- 🐚 *Saccostrea cucullata* (Born, 1778).
- 🐚 *Striostrea denticulata* (Born, 1778).

LUCINIDAE

- 🐚 *Loripes lucinalis* (Lamarck, 1818).
- 🐚 *Lucina adansoni* d'Orbigny, 1840.
- 🐚 *Lucinoma borealis* (Linnaeus, 1767).

CARDITIDAE

- 🐚 *Cardiocardita ajar* (Bruguière, 1792).
- 🐚 *Cardita rufescens* Lamarck, 1819.
- 🐚 *Cardites antiquatus* (Linnaeus, 1758).
- 🐚 *Cardites tankervillei* (Wood, 1828).

CARDIIDAE

- 🐚 *Acanthocardia aculeata* (Linnaeus, 1758).
- 🐚 *Acanthocardia echinata* (Linnaeus, 1758).
- 🐚 *Acanthocardia paucicostata* (G.B. Sowerby II, 1834).
- 🐚 *Acanthocardia tuberculata* (Linnaeus, 1758).
- 🐚 *Bucardium ringens* (Bruguière, 1789).
- 🐚 *Cardium costatum* Linnaeus, 1758.
- 🐚 *Cardium indicum* Lamarck, 1819.
- 🐚 *Cardium maxicostatum* ter Poorten, 2007.
- 🐚 *Cerastoderma edule* (Linnaeus, 1758).
- 🐚 *Cerastoderma glaucum* (Bruguière, 1789).
- 🐚 *Europicardium caparti* (Nicklès, 1955).
- 🐚 *Fulvia fragilis congoensis* Cosel, 1995.
- 🐚 *Laevicardium crassum* (Gmelin, 1791).
- 🐚 *Trachycardium (Dallocardia) serrulatum* (Deshayes, 1855).

MACTRIDAE

- 🐚 *Barymactra rostrata* (Spengler, 1802).
- 🐚 *Eastonia rugosa* (Helbling, 1779).
- 🐚 *Leptospisula nivea* (Gmelin, 1791).

- ☞ *Lutraria angustior* Philippi, 1844.
- ☞ *Lutraria lutraria* (Linnaeus, 1758).
- ☞ *Lutraria magna* (da Costa, 1778).
- ☞ *Lutraria senegalensis* Gray, 1837.
- ☞ *Mactra glabrata* Linnaeus, 1767.
- ☞ *Mactra stultorum* (Linnaeus, 1758).
- ☞ *Scissodesma angolensis* (Cosel, 1995).
- ☞ *Scissodesma nitida* (Gmelin, 1791).
- ☞ *Scissodesma spengleri* (Linnaeus, 1767).
- ☞ *Spisula subtruncata* (da Costa, 1778).

SOLENIIDAE

- ☞ *Solen guinensis* Hanley, 1842.
- ☞ *Solen marginatus* Pulteney, 1799.

PHARIDAE

- ☞ *Ensis ensis* (Linnaeus, 1758).
- ☞ *Ensis goreensis* (Clessin, 1888).
- ☞ *Ensis minor* (Chenu, 1843).
- ☞ *Pharus chenui* Cosel, 1993.
- ☞ *Pharus legumen* (Linnaeus, 1758).
- ☞ *Sinucultellus atlanticus* Cosel, 1993.
- ☞ *Sinupharus africanus* (Chenu, 1843).

TELLINIDAE

- ☞ *Apolymetis papyracea* (Gmelin, 1791).
- ☞ *Gastrana fragilis* (Linnaeus, 1758).
- ☞ *Gastrana matadoa* (Gmelin, 1791).
- ☞ *Macoma cumana* (Costa, 1830).
- ☞ *Macoma innominata* Bertin, 1878.
- ☞ *Macoma (Rostrimacoma) cancellata* (G.B. Sowerby I, 1853).
- ☞ *Macoma (Rostrimacoma) ventricosa* (Deshayes, 1855).
- ☞ *Tellina incarnata* Linnaeus, 1758.
- ☞ *Tellina madagascariensis* Gmelin, 1791.
- ☞ *Tellina planata* Linnaeus, 1758.
- ☞ *Tellina pulchella* Lamarck, 1818.
- ☞ *Tellina senegambiensis* Salisbury, 1934.
- ☞ *Tellina strigosa* Gmelin, 1791.
- ☞ *Tellina tenuis* da Costa, 1778.

DONACIDAE

- ☞ *Donax burnupi* G.B. Sowerby III, 1894.
- ☞ *Donax rugosus* Linnaeus, 1758.
- ☞ *Donax semistriatus* Poli, 1795.

- 🐚 *Donax serra* Röding, 1798.
- 🐚 *Donax trunculus* Linnaeus, 1758.
- 🐚 *Donax variegatus* (Gmelin, 1791).
- 🐚 *Donax venustus* Poli, 1795.
- 🐚 *Donax vittatus* (da Costa, 1778).
- 🐚 *Galatea bernardii* Dunker 1857.
- 🐚 *Galatea congica* Boettger, 1885.
- 🐚 *Galatea paradoxa* (Born, 1780).
- 🐚 *Iphigenia curta* (Dunker, 1867).
- 🐚 *Iphigenia delessertii* (Bernardi, 1860).
- 🐚 *Iphigenia laevigata* (Gmelin, 1791).

PSAMMOBIIDAE

- 🐚 *Gari castrensis* (Spengler, 1794).
- 🐚 *Gari depressa* (Pennant, 1777).
- 🐚 *Gari fervensis* (Gmelin, 1791).
- 🐚 *Gari jousseaumeana* Bertin, 1880.
- 🐚 *Gari virgata* (Lamarck, 1818).

SCROBICULARIIDAE

- 🐚 *Scrobicularia plana* (da Costa, 1778).

SEMELIDAE

- 🐚 *Semele lamyi* Nicklès, 1955.

SOLECURTIDAE

- 🐚 *Azorinus chamasolen* (da Costa, 1778).
- 🐚 *Solecortus afroccidentalis* Cosel, 1989.
- 🐚 *Solecortus strigilatus* (Linnaeus, 1758).
- 🐚 *Tagelus adansonii* (Bosc, 1801).

GLOSSIDAE

- 🐚 *Glossus humanus* (Linnaeus, 1758).

VENERIDAE

- 🐚 *Callista chione* (Linnaeus, 1758).
- 🐚 *Chamelea striatula* (da Costa, 1778).
- 🐚 *Circomphalus foliaceolamellosus* (Dillwyn, 1817).
- 🐚 *Dosinia exoleta* (Linnaeus, 1758).
- 🐚 *Dosinia lupinus* (Linnaeus, 1758).
- 🐚 *Dosinia orbigny* Dunker, 1845.
- 🐚 *Lepidocardia floridella* (Gray, 1838).

- 🐚 *Pitar elatus* (G.B. Sowerby III, 1908).
- 🐚 *Pitar tumens* (Gmelin, 1791).
- 🐚 *Pitar virgo* (Gray, 1838).
- 🐚 *Ruditapes decussatus* (Linnaeus, 1758).
- 🐚 *Tivela bicolor* Gray, 1838.
- 🐚 *Tivela tripla* (Linnaeus, 1771).
- 🐚 *Venerupis (s.l.) aurea* (Gmelin, 1791).
- 🐚 *Venerupis corrugata* (Gmelin, 1791).
- 🐚 *Venerupis (s.l.) dura* (Gmelin, 1791).
- 🐚 *Venerupis (s.l.) rhomboides* (Pennant, 1777).
- 🐚 *Venus (s.l.) casina* Linnaeus, 1758.
- 🐚 *Venus chevreuxi* Dautzenberg, 1891.
- 🐚 *Venus (s.l.) crebrisulca* Lamarck, 1818.
- 🐚 *Venus declivis* G.B. Sowerby II, 1853.
- 🐚 *Venus lyra* Hanley, 1845.
- 🐚 *Venus nux* Gmelin, 1791.
- 🐚 *Venus (s.l.) subrosalina* Tomlin, 1923.
- 🐚 *Venus verrucosa* Linnaeus, 1758.

PETRICOLIDAE

- 🐚 *Mysia undata* (Pennant, 1777).
- 🐚 *Petricolaria gracilis* (Deshayes, 1853).

HIATELLIDAE

- 🐚 *Panopea glycimeris* (Born, 1778).

PHOLADIDAE

- 🐚 *Barnea candida* (Linnaeus, 1758).
- 🐚 *Barnea truncata* (Say, 1822).
- 🐚 *Pholas campechiensis* (Gmelin, 1791).
- 🐚 *Pholas dactylus* Linnaeus, 1758.
- 🐚 *Talona explanata* (Spengler, 1792).

THRACIIDAE

- 🐚 *Thracia phaseolina* (Lamarck, 1818).
- 🐚 *Thracia pubescens* (Pulteney, 1799).

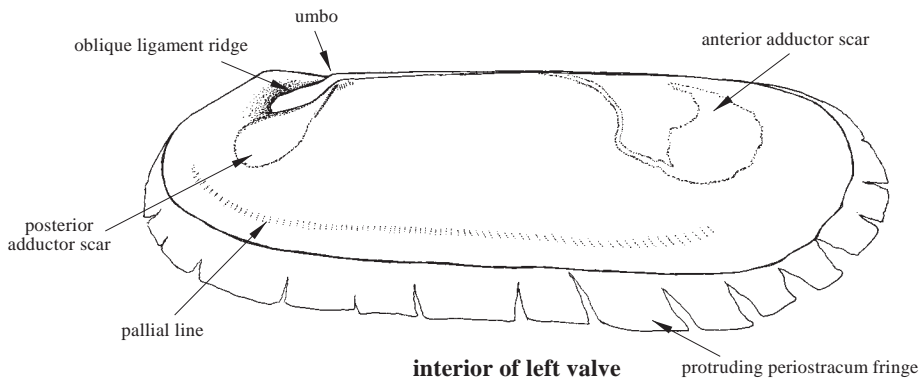
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SOLEMYIDAE

Awning clams

Diagnostic characters: Shell equivalve, very inequilateral, thin and laterally compressed, gaping anteriorly and posteriorly; outline ovate and transversally elongate. Umbones small, not protruding, located near posterior end. Outside nearly smooth, apart from a groove radiating from umbones to posterior end. Periostracum horny brown and varnish-like, thick with thinner radial bands, widely protruding at ventral margin and at both ends to form a frill beyond the calcified part of the shell. Ligament mainly behind the umbones, often sunken and buttressed by internal oblique ridge. Hinge without teeth. Posterior adductor scar smaller than anterior one. Pallial line often obscure, but without a sinus. Internal margins smooth and thin. Gills of protobranchiate type, usually large and extensive. Siphons absent. Alimentary canal simple with minute labial palps; gut often reduced or even absent. Foot very large, with a marginally papillate sole. Mantle lobes united ventrally, with a large anteroventral gape and a smaller posterior opening; special muscles allowing the periostracal fringe to be tucked in during closure of valves.



Habitat, biology, and fisheries: Characteristic of reducing sediments, and associated with symbiotic chemoautotrophic bacteria that are stored in the hypertrophied gills; bacteria play an essential nutritional role using CO_2 to synthesize organic molecules with energy obtained through oxidation of reduced sulphur compounds. Active burrowers in anoxic sand or mud, entering the sediment through an oblique angle, and forming U-shaped, V-shaped or Y-shaped burrows. Animals displaying special behaviours to realize the alternative necessary supply in oxygen (for the animal's respiration) and in sulphide (for the sulphide-oxidising symbionts). Depending upon species, animal may swim up and down between the oxygenated and anoxic regions of its burrow, or create a temporary respiratory water flow in the burrow, followed by passive accumulation of sulphide coming from the surrounding anoxic sediment. Can leap above the sea bottom and swim, using the long, piston-like foot, and expelling water through posterior end of mantle cavity by clapping the valves together. Swimming behaviour used to escape from unfavourable environments as well as to select favourable environments. Sexes separate. Symbiotic bacteria present in ovaries of adult female, then directly transmitted from mother to offspring. Early development includes a planktonic larval stage with distinctive larvae moving by action of the cilia of their outer test, and bivalved young emerging from the larval test after metamorphosis. Interest to fisheries rather poor in the area.

Similar families occurring in the area

None. The unusual hinge and periostracal characters easily distinguish Solemyidae from all other bivalve families.

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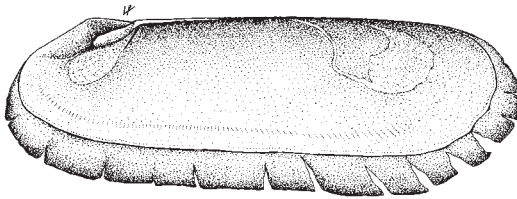
A single species of interest to fisheries occurring in the area

***Solemya togata* (Poli, 1791)**

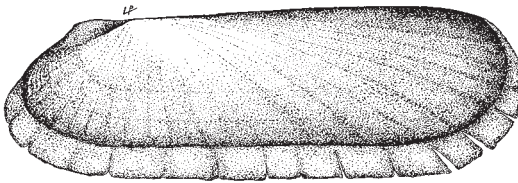
Frequent synonyms / misidentification: *Solemya mediterranea* Lamarck, 1818 / None.

En – Mediterranean awning clam; **Fr** – Solémye méditerranéenne; **Sp** – Navaja dentada.

Maximum shell length to nearly 9.5 cm, commonly to 4cm. In fine muddy sand or in mud, mostly in sea grass field areas, from the intertidal zone to about 30 m depth. Species with a reduced gut, relying both on deposit feeding and on sulphide-oxidising bacteria to feed. Most common in the Mediterranean, rarer in the south. Sometimes collected at low tide or by diving in shallow waters, and occasionally caught by dredges, bottom trawls or nets. Outside the area, it is known to appear occasionally in Egyptian markets. Mediterranean and East Atlantic, from northern Spain to Gabon, Madeira, Cape Verde islands, in southern Angola and South Africa.



interior of left valve



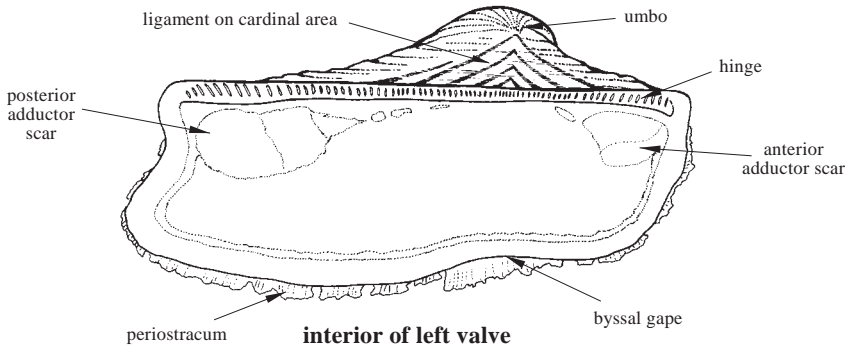
exterior of right valve



ARCIDAE

Ark shells

Diagnostic characters: Shell solid, equivalve or slightly inequivalve, in the latter case left valve somewhat overlapping right; roughly quadrate to ovate in shape and mostly longer than high, **more or less inequilateral**. A byssal gape sometimes developed on ventral margin. **Umbones** in front of the midline, **prosogyrate, on top of a wide cardinal area**. **Ligament external**, stretching across the cardinal area, **often with V-shaped grooves**. Outer surface of shell with radial ribs, often crossed by concentric sculpture. Periostracum well developed, often thick and fibrous, lamellate to hairy. **Hinge elongate, straightish** to slightly arched, **with numerous small transverse teeth** which increase in size towards anterior and posterior ends. Interior of shell porcelaneous. **Two subequal adductor muscle scars**. **Pallial line without a sinus**. Internal margins of valves smooth to strongly crenulated. Gills of filibranchiate type, without interlamellar junctions. Blood of a red colour, due to the presence of the respiratory pigment haemoglobin. Siphons absent. Foot stout, deeply grooved, mostly byssiferous, at least in the young stages. Mantle widely open, with compound eyes covered by periostracum on margins.

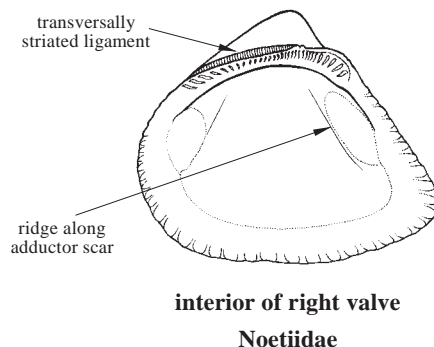
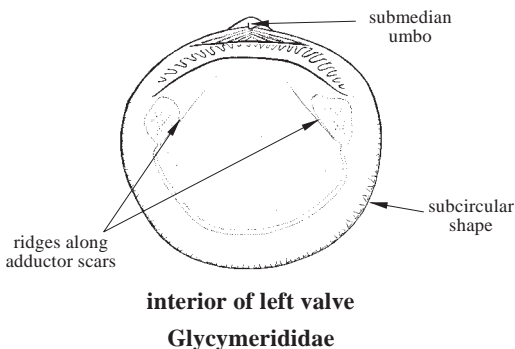


Habitat, biology, and fisheries: Sedentary animals, living attached to the substrate by means of their fringe-like byssus and sometimes nestling in rock crevices, or unattached and often more or less buried in soft bottoms. The presence of haemoglobin enables them to colonize habitats of low oxygen concentration. Sexes generally separate. Pelagic larval stage relatively long. Arcidae have been regularly and abundantly collected for food in the studied zone since ancient times, and some species are of great economic importance. Their heavy shell is exploited for pavement and as a source of lime.

Similar families occurring in the area

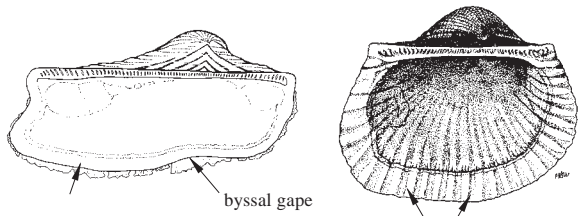
Glycymerididae: Shell equilateral or nearly so, subcircular in shape. Umbones submedian. Dental series of the hinge generally strongly arched ventrally. A radial ridge along inner margin of the adductor scars, always stronger at front of the posterior scar.

Noetiidae: Shell very similar to Arcidae in general shape and hinge characters. Differs by the transversally striated ligament, and the ridge or shelf at inner margin of 1 or both adductor scars.



Key to species of interest to fisheries occurring in the area

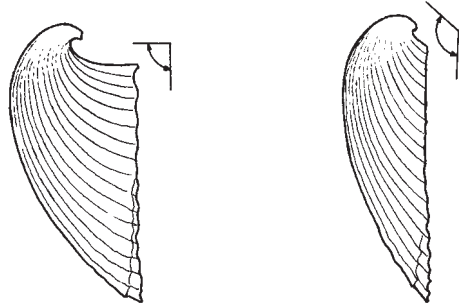
- 1a. Inner ventral margin smooth, sometimes a little affected by the external ribs; ventral margin with a distinct byssal gape (Fig. 1a) → 2
- 1b. Inner ventral margin with strong crenulations corresponding with the external ribs; ventral margin without distinct byssal gape (Fig. 1b) → 5



a) Arcinae type b) Anadarinae type

Fig. 1 interior view

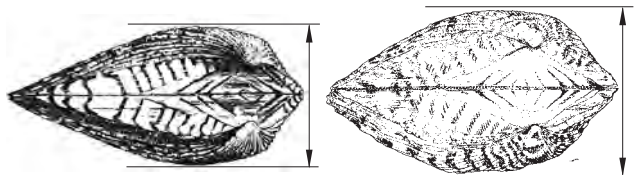
- 2a. Ligamental area wide and almost flat, meeting the commissural plane of valves nearly at right angle (Fig. 2a) . . . → 3
- 2b. Ligamental area narrow and slanting to commissural plane of valves (Fig. 2b) → 4



a) Arca b) Barbatia

Fig. 2 anterior view

- 3a. Shell shape relatively long and moderately inflated; posterior margin strongly sinuous and somewhat expanded at ventral end (Fig. 3a) *Arca noae*
- 3b. Shell shape relatively short and strongly inflated; posterior margin straightish to shallowly sinuous, not expanded at ventral end (Fig. 3b) . . . *Arca bouvieri*



a) Arca noae b) Arca bouvieri

Fig. 3 dorsal view

- 4a. Outer shell colour whitish; radial ribs of median posterior slope larger than surrounding ones, well spaced and often bifid (Fig. 4) . . *Barbatia complanata*
- 4b. Outer shell colour reddish brown, often with a paler band radiating toward byssal gape; radial ribs of median posterior slope not distinctly different from surrounding ones (Fig. 5) *Barbatia barbata*

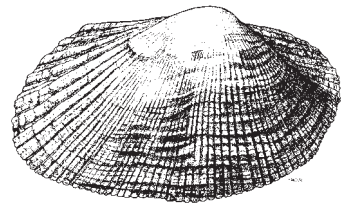


Fig. 4 *Barbatia complanata* (exterior)

- 5a. Rib interspaces distinctly narrower than ribs on both valves → 6
- 5b. Rib interspaces as broad as ribs or slightly larger, at least on 1 valve → 7

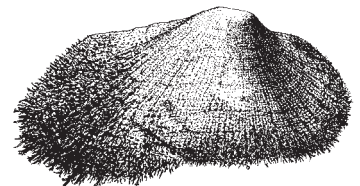


Fig. 5 *Barbatia barbata* (exterior)

- 6a. Shell medium sized (up to 7.5 cm long), much longer than high, with rather low anterior umbones; about 30 radial ribs (from 29 to 32) at each valve (Fig. 6) ***Mosambicarca hians***
- 6b. Shell large sized (up to 13.5 cm long), about as high as long, with strongly projecting submedian umbones; about 12 radial ribs (from 10 to 15) on each valve (Fig. 7) ***Senilia senilis***
- 7a. Posteroventral margin of valves rounded; about 33 radial ribs (from 30 to 35) at each valve (Fig. 8) ***Anadara corbuloides***
- 7b. Posteroventral margin of valves subangular; up to 28 radial ribs on each valve. → 8

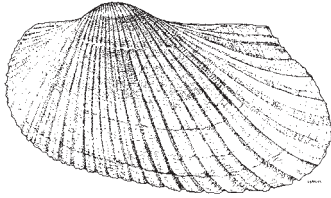


Fig. 6 *Mosambicarca hians*
(exterior)

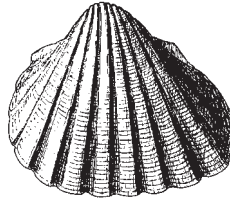


Fig. 7 *Senilia senilis*
(exterior)

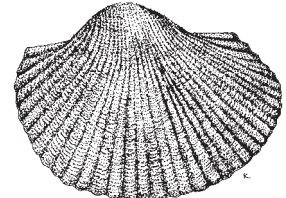


Fig. 8 *Anadara corbuloides*
(exterior)

- 8a. Shell slightly inequivalve, with left valve overlapping right valve on ventral and posterior margins; each valve with 23 or 24 radial ribs (Fig. 9) ***Anadara senegalensis***

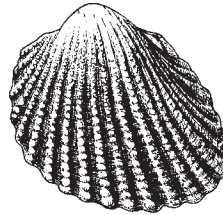


Fig. 9 *Anadara senegalensis*
(exterior)

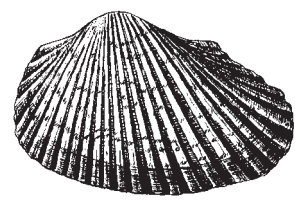


Fig. 10 *Anadara gibbosa*
(exterior)

- 8b. Shell equivalve; each valve with about 26 radial ribs (from 24 to 28) (Fig. 10) ***Anadara gibbosa***

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Anadara corbuloides* (Monterosato, 1878).
- 🐚 *Anadara gibbosa* (Reeve, 1844).
- 🐚 *Anadara senegalensis* (Gmelin, 1791).
- 🐚 *Arca bouvieri* P. Fischer, 1874.
- 🐚 *Arca noae* Linnaeus, 1758.
- 🐚 *Barbatia barbata* (Linnaeus, 1758).
- 🐚 *Barbatia complanata* (Bruguère, 1789).
- 🐚 *Mosambicarca hians* (Reeve, 1844).
- 🐚 *Senilia senilis* (Linnaeus, 1758).

References

- Lamy, E. 1907a. Révision des *Arca* vivants du Muséum d'Histoire Naturelle de Paris. *Journal de Conchyliologie*, 55(3): 1–111, pl.1.
- Lamy, E. 1907b. Révision des *Arca* vivants du Muséum d'Histoire Naturelle de Paris (Suite). *Journal de Conchyliologie*, 55(3): 199–307, pl.3.
- Oliver, P.G. & Cosel, R. von 1992. Taxonomy of Tropical West African Bivalves. IV. Arcidae. *Bulletin du Muséum national d'Histoire naturelle*, (4)14A(2): 293–381.

Anadara senegalensis (Gmelin, 1791)

Frequent synonyms / misidentifications: *Arca senegalensis* Gmelin, 1791; *Potiarca senegalensis* (Gmelin, 1791) / *Anadara subglobosa* (Dunker in Kobelt, 1891).

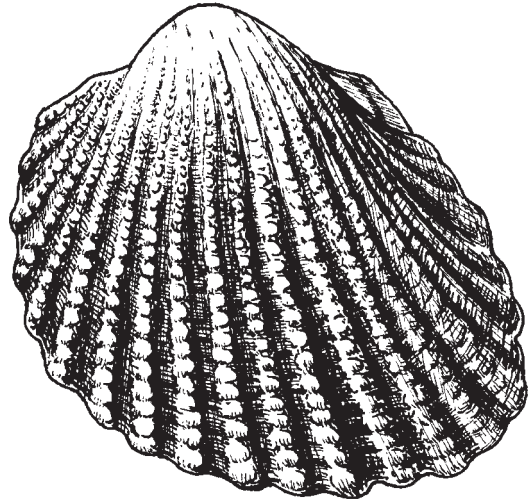
FAO names: **En** – Senegal ark; **Fr** – Arche du Sénégal; **Sp** – Arca de Senegal.

Diagnostic characters: Shell rather small (up to 3 cm long), **markedly inflated**, with height about as great as inflation, variable in shape and thickness but roughly rhomboidal ovate in outline and longer than high to almost as high as long; **slightly inequivalve**, with left valve overlapping right valve along posteroventral margins. **Umboes in the anterior third** of shell length, prominent, cardinal area rather narrow. Anterior margin weakly convex, smoothly curving into ventral margin which is broadly convex and forming a rounded angle with slightly oblique posterior margin. **About 23 or 24 radial ribs** at each valve, with relatively wide interstices; **ribs of left valve strongly nodulose**, but on the posterior slope; right valve with more weakly developed nodules on anterior 6 to 8 ribs only. Ligament with V-shaped grooves, not covering completely the anterior part of cardinal area. **Periostracum** well developed, **concentrically striated**, scaly to spiky in the interstices of ribs. Hinge plate moderately thick, rather straight ventrally, teeth small and transverse throughout, and forming 2 sets with slight submedian separation. **Internal margins with strong crenulations** corresponding with the external ribs. No byssal gape. **Colour: outside** of shell **white under the rusty brown periostracum** with darker erect bristles. Interior of shell white.

Size: Maximum shell length 3 cm, commonly from 2 to 2.5 cm.

Habitat, biology, and fisheries: Buried in fine, muddy bottoms of intertidal and sublittoral zones to about 35 m depths. Shells of populations living close to the estuaries of large rivers often somewhat larger and longer than deep. Occurring together with *Modiolus letourneuxi* and frequently collected for subsistence by coastal people where abundant. Sometimes cast ashore in great quantities by storms. Shells often forming a major component of the drift deposits on the shores, and used as road ballasting.

Distribution: Somewhat imperfectly known, because of frequent confusion with 3 other sublittoral species of the area, *Anadara subglobosa* (Dunker in Kobelt, 1891), *A. eborensis* Oliver & Cosel, 1993 and *A. camerunensis* Oliver & Cosel, 1993. Eastern Atlantic, from Senegal to Guinea, Côte d'Ivoire to Togo, and Gabon to southern Angola.



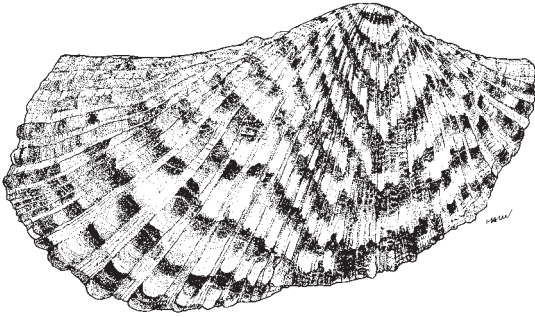
exterior of left valve



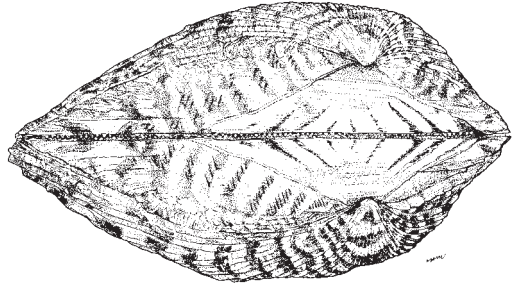
***Arca bouvieri* P. Fischer, 1874**

Frequent synonyms / misidentifications: *Arca sanctaehelenae* E.A. Smith, 1890 / *Arca noae* Linnaeus, 1758.

FAO names: **En** – Bouvier's ark; **Fr** – Arche de Bouvier; **Sp** – Arca de Bouvier.



exterior of right valve



dorsal view of entire shell

Diagnostic characters: **Shell equivalve**, thick and very inflated, **inequilateral**, posteriorly expanded. Shape somewhat irregular, **relatively short and oblong subrectangular** in outline. **Posterior margin straightish** to shallowly sinuous, **not expanded at ventral end** in the adults; **ventral margin with a well-developed byssal gape** often associated with a shallow radial constriction of valve. **Umboes in the anterior third** of shell length, on top of a wide and almost flat **cardinal area meeting the commissural plane nearly at right angle**. Outer sculpture of numerous radial ribs, riblets and threads crossed by irregular growth marks, radial ribs well developed and somewhat stronger on posterior slope. Periostracum thin, arranged in concentric lamellae, mainly persisting towards shell margins. Ligament covering most of the cardinal area, with imbricate V-shaped grooves. Hinge straight, very long and narrow, with numerous and small transverse teeth. **Inner ventral margin smooth**, sometimes a little affected by the external ribs. **Colour:** **outside** of shell cream or whitish, variously overlain **with oblique zigzag brick red to purplish red stripes**; periostracum straw coloured. Interior whitish, often variably tinged with yellow and brown

Size: Maximum shell length 7 cm, commonly from 5 to 6 cm.

Habitat, biology, and fisheries: Attached by byssus to various hard substrates such as rocks, stones or shells, mostly with calcareous algae that commonly encrust their shell. From shallow subtidal waters to about 60 m depth. Often found in the same areas as *Mosambicarca hians*, *Cardites tankervillei* and *Venus declivis*. Collected for food by coastal people where abundant.

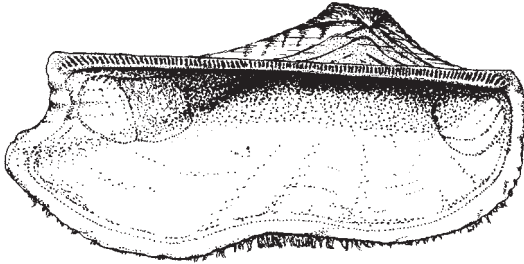
Distribution: Tropical eastern Atlantic, from Senegal to southern Angola; Canary, Cape Verde, São Tomé, Príncipe, Annobon, Ascension and St Helena islands.



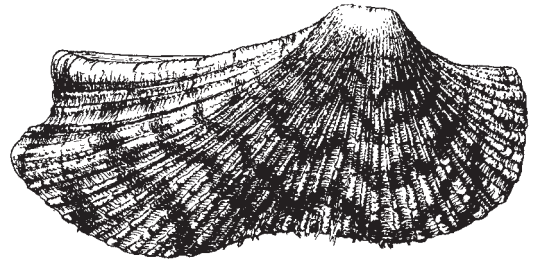
***Arca noae* Linnaeus, 1758**

Frequent synonyms / misidentifications: *Arca despecta* P. Fischer, 1876; *A. noe* Linnaeus, 1758 [spelling error] / *Arca bouvieri* P. Fischer, 1874.

FAO Names: **En** – Noah's ark; **Fr** – Arche de Noé; **Sp** – Arca de Noé.

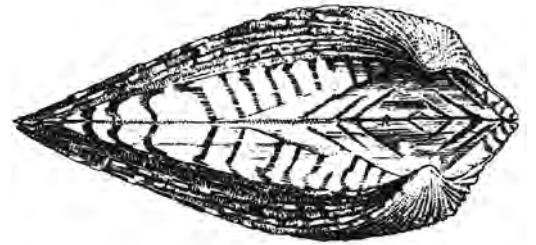


interior of left valve



exterior of right valve

Diagnostic characters: Shell equivalve, thick and inflated, **very inequilateral**, strongly expanded posteriorly. Shape somewhat irregular, **narrowly elongated and subtrapezoidal** in outline, with a broad rounded fold from umbones to posteroventral margin. **Posterior margin strongly sinuous** and somewhat **expanded at ventral end**; **ventral margin with a well-developed byssal gape** often associated with a shallow radial constriction of valve. **Umbones in the anterior quarter** of shell length, on top of a wide and almost flat **cardinal area meeting the commissural plane nearly at right angle**.



dorsal view of entire shell

Outer sculpture of numerous narrow radial ribs, riblets and threads crossed by irregular growth marks, and a few widely set radial ribs on posterior slope. Periostracum fragile, fibrous and bristly, mainly persisting towards shell margins. Ligament covering most of the cardinal area, with imbricate V-shaped grooves. Hinge straight, very long and narrow, with numerous and small transverse teeth. **Inner ventral margin smooth**, sometimes a little affected by the external ribs. **Colour:** **outside** of shell cream to dirty white, often posteriorly tinged **with** dark brown and with closely spaced **oblique zigzag tawny to rusty brown stripes**; periostracum ochre. Inner side whitish, tinged with yellow or brown.

Size: Maximum shell length 10 cm, commonly from 6 to 8 cm.

Habitat, biology, and fisheries: Strongly fixed by byssus to various hard substrates, from low tide levels to about 50 m depth. Common on rocky bottoms, on exposed areas as well as in crevices or at underside of rocks; occurs also on soft detritic substrates, attached to isolated hard objects like stones or dead shells. Collected by hand or with rake near the shore, with dredges, bottom trawls or nets offshore.

Distribution: Imperfectly known, because of recurrent confusion with *Arca bouvieri*. In the Atlantic, probably occurring from southern Portugal to Senegal, in the Canaries and Cape Verde Islands. Throughout the Mediterranean.



***Mosambicarca hians* (Reeve, 1844)**

Frequent synonyms / misidentifications: *Anadara dunkeri* (Kobelt, 1891); *A. geissei* (Dunker, 1891); *Arca geissei* Dunker, 1891; *A. setigera* Dunker, 1853 [not of Reeve, 1844] / None.

FAO names: **En** – Geisse's ark; **Fr** – Arche de Geisse; **Sp** – Arca de Geisse.

Diagnostic characters: **Shell** medium-sized (up to 7.5 cm long), nearly equivalve, somewhat **laterally compressed, much longer than high** and oblong subrectangular in outline. Dorsal margin rather long and straight, anterior margin more broadly rounded than posterior margin which is somewhat obliquely expanded.

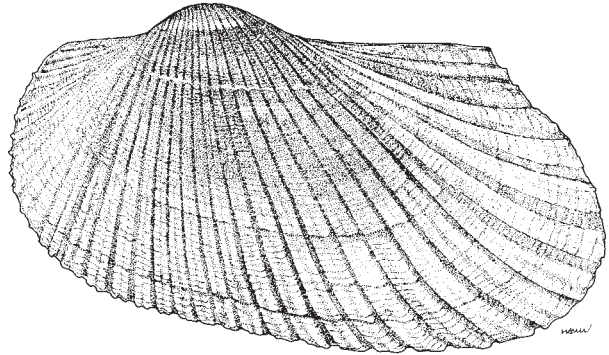
Umboes in the anterior third of shell length, **rather low**, cardinal area quite narrow. **About 30 radial ribs** (from 29 to 32) at each valve; on **anterior** half of valves, **ribs usually with a narrow median groove on top**; ribs of posterior slope broader and more flat. Rib interspaces distinctly narrower than ribs on both valves. Ligament covering most of the cardinal area, with V-shaped grooves.

Periostracum thick and coarse, often eroded on umboes, arranged in appressed concentric lamellae, **with densely set bristles arising from the median grooves of anterior ribs and from the rib interstices**, distinctly longer on posterior slope. Hinge plate long and narrow, widely arched ventrally, teeth small and transverse in the middle, slightly longer and oblique at both ends. **Internal margins with strong crenulations** corresponding with the external ribs. **No distinct byssal gape.** **Colour: outside of shell dirty white under the deep reddish brown periostracum**; juvenile specimens with a maculated pattern of brown due to variation of periostracum thickness. Interior of shell white.

Size: Maximum shell length 7.5 cm, commonly to 4 cm.

Habitat, biology, and fisheries: Half-buried in sublittoral fine and mixed sands with calcareous algae and empty shells, often with gravels or stones, from about 3 to 35 m depth. Adult specimens often in dense populations, occurring in the same areas as *Arca bouvieri*, *Cardites tankervillei* and *Venus declivis*. Exploited for food by coastal people where abundant and forming extensive beds.

Distribution: Eastern Atlantic, from Mauritania and Cape Verde Islands to southern Angola.



exterior of left valve

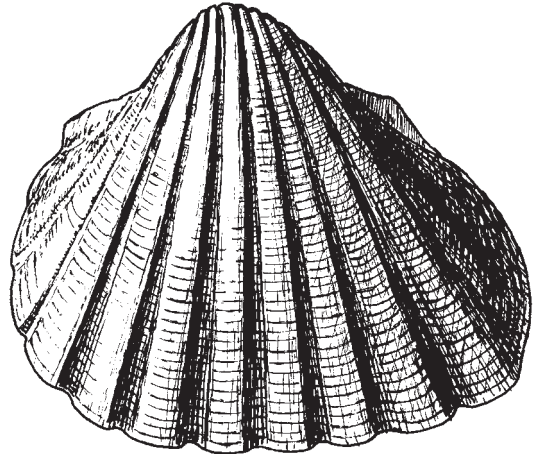


***Senilia senilis* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Anadara senilis* (Linnaeus, 1758); *Arca senilis* Linnaeus, 1758 / None.

FAO names: **En** – Heavy African ark; **Fr** – Arche épaisse d'Afrique; **Sp** – Arca gruesa africana.

Diagnostic characters: **Shell equivalve**, solid, **very thick and extremely heavy**, especially in large specimens (up to 13.5 cm long), trigonal ovate in shape, strongly inflated about the umbones but somewhat compressed and drawn posteriorly, often **about as high as long** and moderately inequilateral. Dorsal margin angulated at both ends. **Umbones** about median, **markedly prosogyrate** and strongly protruding, cardinal area rather large, broader anteriorly. Outer sculpture of **12 radial ribs** (10 to 15) with **narrow interspaces** at each valve; **ribs broad and smooth**, usually **flattened**, fading out on anterior and posterior slopes. Ligament covering most of the cardinal area, with V-shaped grooves. **Periostracum smooth**, rather thin but strong, **persistent**. **Hinge plate very broad**, teeth rather long, frequently more or less distorted or divided, and forming 2 sets separated by a narrow submedian oblique gap. **Internal margins with strong crenulations** corresponding with the external radial ribbing, fading out on posterior margin. **No byssal gape**. **Colour:** **outside** of shell whitish under the **reddish brown to nearly black** periostracum (olivaceous in young specimens); interior white.



exterior of left valve

Size: Maximum shell length 13.5 cm, commonly from 8 to 10 cm.

Habitat, biology, and fisheries: In fine sand, silt and sandy mud of creeks, estuaries and open or closed coastal lagoons with regular tidal and important seasonal salinity changes, associated with mangroves where it often occurs in great quantities. Frequently found together with *Tagelus adansonii*, this species can tolerate reduced as well as hyper-salinities, and is most abundant from the lower intertidal zone to 2 m. During the rainy season, when there is considerable run-off from the land into open tidal lagoons, shell valves automatically close when salinity has fallen to about 15‰, to isolate the animal from dangerous exposure to fresh water. This species represents the most important commercial ark of the area. Marketed and consumed in many parts of West Africa since prehistoric times, it is also used as bait for fishing lines in Angola. In some areas, notably in Mauritania, Senegal and Angola, important natural or kitchen-midden concentrations of shells are found, that are used for road pavement, ballasting of railway lines, or chalk burning. In Sierra Leone, shells also used in making handicrafts.



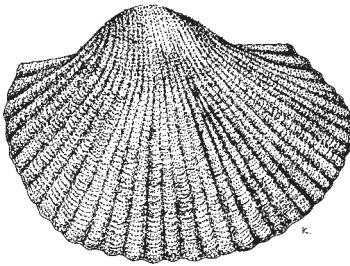
Distribution: Tropical eastern Atlantic, from Rio de Oro, Western Sahara to Angola; São Tomé Island.

***Anadara corbuloides* (Monterosato, 1878)**

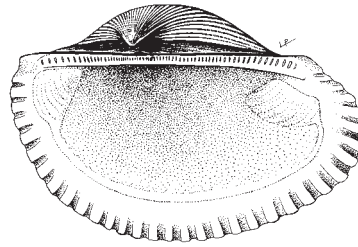
Frequent synonyms / misidentifications: *Arca polii* var. *grandis* Monterosato, 1875 [not *Arca grandis* Broderip and Sowerby, 1829] / None.

En – Basket ark; **Fr** – Arche corbeille; **Sp** – Arca canastillo.

Maximum shell length 7cm, commonly to 5 cm. In mud or fine muddy sand bottoms, from shallow subtidal waters to about 100 m depths. Most common offshore from 30 to 60 m. Occasionally taken as a bycatch in dredges, trawls and bottom nets. Eastern Atlantic, from southern Portugal to northern Angola. Mediterranean.



exterior of left valve



interior of right valve

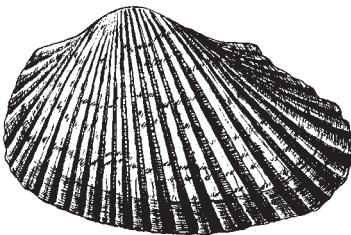


***Anadara gibbosa* (Reeve, 1844)**

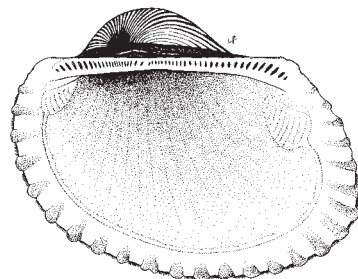
Frequent synonyms / misidentifications: *Anadara polii* (Mayer, 1868); *Arca polii* Mayer, 1868 / *Anadara diluvii* (Lamarck, 1805); *Diluvarca diluvii* (Lamarck, 1805) [an extinct fossil species].

En – Diluvial ark; **Fr** – Arche du déluge; **Sp** – Arca del diluvio.

Maximum shell length to 7 cm, commonly from 3 to 4 cm. Partly buried in various soft bottoms of the sublittoral and shelf zones, from about 5 to 500 m depths. In tropical West Africa, mostly occurring offshore on fine muddy sand or mud, from 50 to 200 m. Locally exploited in the Mediterranean, but mainly a bycatch of shrimp trawlers in the eastern Atlantic. Eastern Atlantic, from Portugal to southern Angola; Canary and Cape Verde islands. Throughout the Mediterranean.



exterior of left valve



interior of right valve

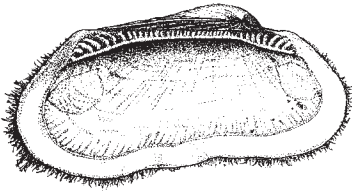


***Barbatia barbata* (Linnaeus, 1758)**

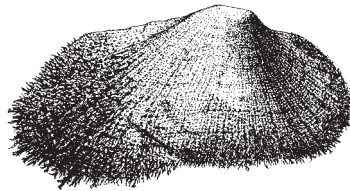
Frequent synonyms / misidentifications: *Arca barbata* Linnaeus, 1758 / None.

En – Hairy ark; **Fr** – Arche barbue; **Sp** – Arca barbada.

Maximum shell length 7.5 cm, commonly to 5 cm. Attached by byssus to hard substrates, on rocky, stony, coralligenous, sea-grass and muddy bottoms, including harbour muds, from the littoral zone to about 300 m depth. Collected for food in Morocco and in some Mediterranean countries, with bottom trawls and nets, dredges, hooks or rakes, or by diving. Eastern Atlantic, from Portugal to Morocco. Throughout the Mediterranean.



interior of left valve



exterior of right valve

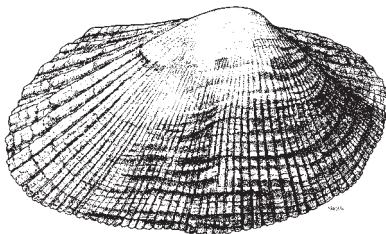


***Barbatia complanata* (Bruguère, 1789)**

Frequent synonyms / misidentifications: *Arca complanata* Chemnitz, 1784 [Invalid name]; *A. complanata* Bruguère, 1789; *Barbatia stigmosa* (Dunker, 1853) / *Barbatia candida* (Helbling, 1779); *B. helblingi* (Bruguère, 1789); *B. nivea* (Dillwyn, 1817).

En – Smoothed ark; **Fr** – Arche aplatie; **Sp** – Arca aplanada.

Maximum shell length 5 cm, commonly to 3.5 cm. Attached by byssus to various hard substrates such as rocks, stones and shells, from low tide levels to about 40 m depths. Locally collected for food by coastal populations, on the shore by hand or with rakes, with bottom trawls and nets or with dredges offshore. Tropical eastern Atlantic, from Cape Verde Archipelago and Guinea to southern Angola and in the Gulf of Guinea islands (Annobon, São Tomé and Iha da Príncipe).



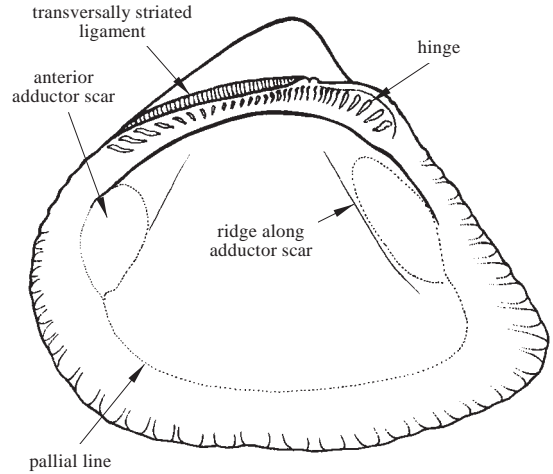
exterior of right valve



NOETIIDAE

Ark shells

Diagnostic characters: Shell solid, **equivalve**, subtrigonal, trapezoidal to elliptical in shape, **generally inequilateral and longer than high**. Ventral margin without a byssal gape. **Umbones** often opisthogyrate, **set apart** from dorsal margin by a **trigonal cardinal area**. **Ligament external**, stretching the cardinal area, with **oblique grooves and transverse striations**. Outer surface with radial sculpture. Periostracum conspicuous, generally pilose. **Hinge elongate, straightish** to slightly arched, with **numerous small transverse teeth** which somewhat increase in size towards anterior and posterior ends. Interior of shell porcelaneous. **Two subequal adductor muscle scars, with a ridge or a shelf** present along the inner margin of **one or both scars**. **Pallial line without a sinus**. Internal margins of valves smooth or crenulated. Gills of filibranchiate type. Foot stout, grooved, often byssiferous. Mantle widely open, often with marginal eyes covered by periostracum.



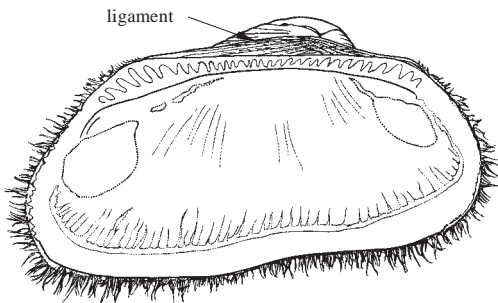
interior of right valve

Habitat, biology, and fisheries: Sedentary animals, byssally attached to hard substrates, or buried in soft sediments. Habitat and mode of life very similar to Arcidae. Unlike representatives of the latter family, species of Noetiidae have very limited importance for West African fisheries. In the studied area, species are too small (less than 2 cm long) and often not common enough to be exploited, except for *Stenocista gambiensis*, the only species included here.

Similar families occurring in the area

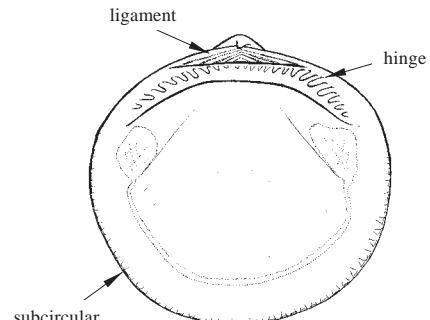
Arcidae: species with laterally compressed shape and elongated outline (*Mosambicarca hians* and species of genus *Barbatia*) strongly convergent with *Stenocista gambiensis*, but distinguishable by their ligament devoid of transverse striations.

Glycymerididae: Shell subcircular in shape. External ligament without transverse striations. Dental series of the hinge usually strongly arched ventrally.



interior of left valve

Arcidae



interior of left valve

Glycymerididae

References

Oliver, P.G. & Cosel, R. von 1992b. Taxonomy of Tropical West African Bivalves. V. Noetiidae. *Bulletin du Muséum national d'Histoire naturelle*, (4)14A(3-4): 655–691.

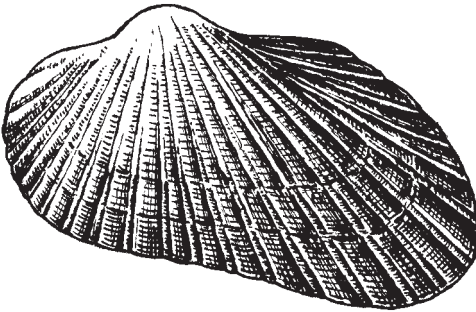
A single species of interest to fisheries occurring in the area.

***Stenocista gambiensis* (Reeve, 1844)**

Frequent synonyms / misidentifications: *Arca gambiensis* Reeve, 1844; *Anadara gambiensis* (Reeve, 1844); *Noetia gambiensis* (Reeve, 1844) / None.

En – Gambia ark; **Fr** – Arche de Gambie; **Sp** – Arca de Gambia.

Maximum shell length 4 cm, commonly to 3 cm. Locally common in fine soft bottoms of muddy sand or mud in shallow water environments under the influence of seasonal upwellings, from low intertidal levels to about 20 m depths. Huge labial palps probably used for sorting large quantities of soft sediment to feed. Collected for subsistence purpose by coastal people. Generally used in soups. Tropical eastern Atlantic, from Gambia and southern Senegal to Guinea, Côte d'Ivoire, and from the Congo to northern Angola.



exterior of left valve



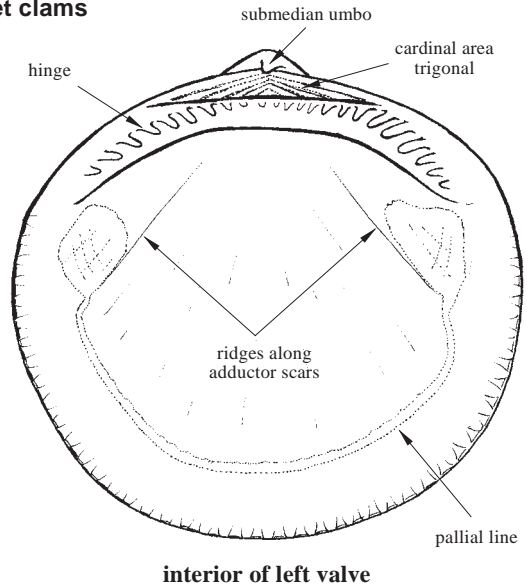
GLYCYMERIDIDAE

Bittersweet clams

Diagnostic characters: Shell **equivalve**, **closed**, solid, **subequilateral**, rounded, more or less circular to oval-subquadrate in **outline**; anterior side usually more evenly rounded than posterior one which is often somewhat narrowed and angulate. **Submedian** orthogyrate, slightly prosogyrate or opisthogyrate **umbones** situated **on top of a well-defined trigonal cardinal area** which is deeply **engraved by oblique or tent-shaped grooves and covered with a dark brown external ligament**. External surface quite smooth, only striated radially and concentrically, or with radial ribs. Periostracum thick and densely set with fine hair, or thin to almost absent. **Hinge** plate broad and strongly **arched, bearing a series of teeth diverging outwards** which diminish in size medially and distally along the anterodorsal and posterodorsal margins. Internal surface porcelaneous. **Two subequal adductor muscle scars, their inner margin with a radial ridge** always stronger at front of the posterior scar.

Pallial line without a sinus. Internal margins crenulated. Filibranchiate type gills, with smooth branchial sheets. Siphons and byssus absent, the latter at least in the adult. Foot large, hatchet-shaped, deeply grooved ventrally. Mantle widely open, with compounded marginal eyes covered by the periostracum.

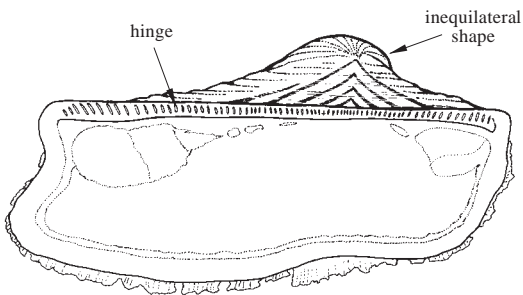
Habitat, biology, and fisheries: Shallow burrowers of soft bottoms often containing a coarse fraction, slowly ploughing through the substrate with the anterior end foremost, and binding the sand with mucus from the foot. Filter-feeding species. Can colonize habitats of low oxygen concentration thanks to the presence of the respiratory pigment haemoglobin in the blood. Bittersweets are locally collected for food in many areas of the studied zone.



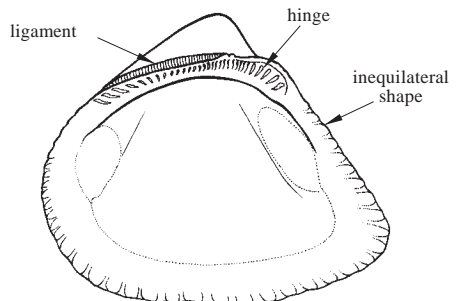
Similar families occurring in the area

Arcidae: shell inequilateral, often larger than high; a ventral byssal gape may be present. Dental series of the hinge straight to slightly arched. No radial ridge along the inner margin of adductor muscle scars.

Noetiidae: shell inequilateral, often longer than high. Hinge as in Arcidae. Ligament transversally striated.



interior of left valve
Arcidae



interior of right valve
Noetiidae

Key to species of interest to fisheries occurring in the area

- 1a. Outer shell colour pale (mostly whitish cream, becoming sometimes purplish pink toward the umbones), with a network of fine, reddish brown zigzag lines (Fig. 1) ***Glycymeris scripta***
- 1b. Outer shell colour differently patterned; zigzag elements, when present, thick and/or more or less merging into each other → 2
- 2a. Shell subquadrangular in outline, relatively inequilateral, more or less expanded posteroventrally; periostracum with a glossy appearance on umbonal half of shell → 3
- 2b. Shell subcircular in outline, relatively equilateral, not expanded posteroventrally; periostracum not glossy → 4
- 3a. Hinge plate relatively broad, with very close-set, thin and numerous teeth (Fig. 2) ***Glycymeris concentrica***
- 3b. Hinge plate relatively narrow, with less close-set, rather thick and less numerous teeth (Fig. 3) ***Glycymeris violacescens***

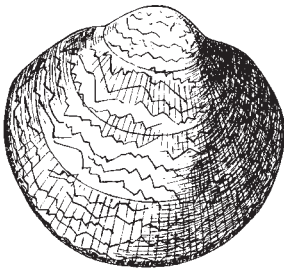


Fig. 1 *Glycymeris scripta*
(exterior)

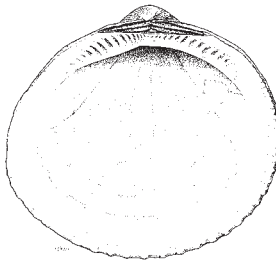


Fig. 2 *Glycymeris concentrica*
(interior)

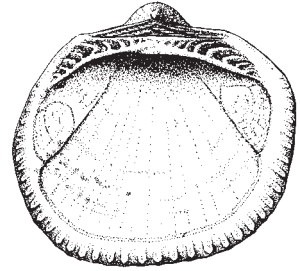


Fig. 3 *Glycymeris violacescens*
(interior)

- 4a. Shell relatively thin and poorly inflated, with a distinct colour pattern of small dense brownish to reddish zigzag or tent-shaped markings, becoming very close-set and nearly merging toward the valve margins, resulting in an apparently uniform reddish-brown colour (Fig. 4) ***Glycymeris stellata***
- 4b. Shell relatively thick and strongly inflated, with differently shaped colour patterns → 5
- 5a. Ligament extending on both sides of nearly orthogyrate umbones; shell sculpture mainly concentric; radial sculpture inconspicuous or reduced to very faint, punctuated grooves; outer colour with reddish brown to purplish radial dashes with mostly running and not sharp outlines (Fig. 5) ***Glycymeris formosa***
- 5b. Ligament mainly anterior to markedly opisthogyrate umbones; shell sculpture concentric and radial, giving a finely decussate aspect; radial sculpture of fine grooves and threads; outer colour differently patterned, often with more or less sharply defined brownish red drops or streaks, isolated or merged in zigzag patterns (Fig. 6) ***Glycymeris pilosa***

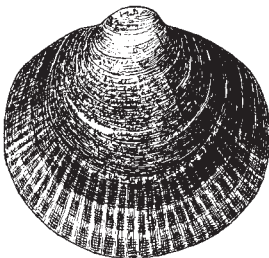


Fig. 4 *Glycymeris stellata*
(exterior)

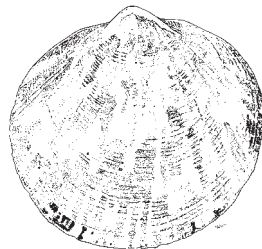


Fig. 5 *Glycymeris formosa*
(exterior)

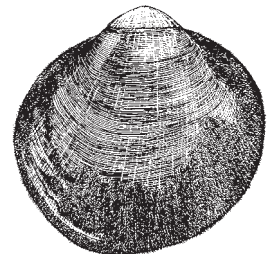


Fig. 6 *Glycymeris pilosa*
(exterior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Glycymeris concentrica* (Dunker, 1853).
- 🐚 *Glycymeris formosa* (Reeve, 1843).
- 🐚 *Glycymeris pilosa* (Linnaeus, 1767).
- 🐚 *Glycymeris scripta* (Born, 1778).
- 🐚 *Glycymeris stellata* (Bruguère, 1789).
- 🐚 *Glycymeris violacescens* (Lamarck, 1819).

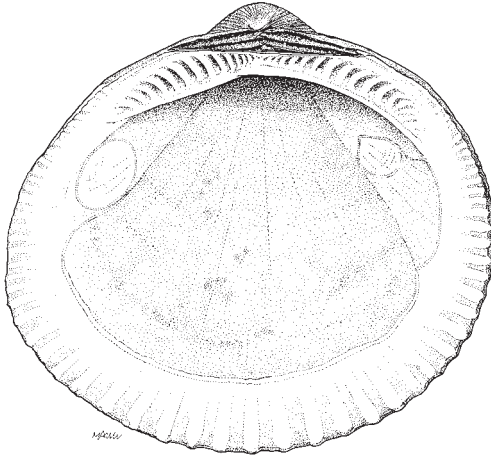
References

- Goud, J. & Gulden, G.** 2009. Description of a new species of *Glycymeris* (Bivalvia: Arcoidea) from Madeira, Selvagens and Canary Islands. *Zoologische Mededelingen Leide*, 83(33): 1059–1066.
- Lamy, E.** 1912. Révision des *Pectunculus* vivants du Muséum d'Histoire naturelle de Paris. *Journal de Conchyliologie*, 59(2): 81–156.
- Nolf, F. & Swinnen, F.** 2013a. The endemic West African species of the family Glycymerididae (Mollusca: Bivalvia), with description of two new species. *Neptunea*, 12(2): 1–8.
- Nolf, F. & Swinnen, F.** 2013b. The Glycymerididae (Mollusca: Bivalvia) of the NE Atlantic and the Mediterranean Sea. *Neptunea*, 12(3): 1–35.

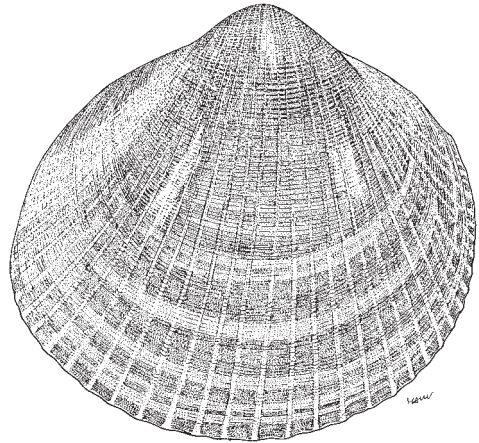
Glycymeris concentrica (Dunker, 1853)

Frequent synonyms / misidentifications: None / *Glycymeris spadicea* (Reeve, 1843) [= *G. decussata* (Linnaeus, 1758)].

FAO names: **En** – Concentric bittersweet; **Fr** – Amande concentrique; **Sp** – Almendra concéntrica.



interior of left valve



exterior of right valve

Diagnostic characters: Shell moderately inflated, **rounded subquadrangular in outline** and slightly longer than high, with rounded anterior margin and obtusely truncate posterior margin, **relatively light** and **inequilateral**, often **more or less expanded posteroventrally**. Umbones rather low, slightly opisthogyrate, in front of midline of valves. Posterior slope with 2 slight, obtuse angulations radiating from the umbones to posterodorsal and posteroventral ends of shell. **Outer surface** of shell with very low radial undulations and **with numerous, fine but well marked concentric grooves**, becoming denser and slightly wavy toward ventral margin, and each underlined by a series of tiny impressed points (corresponding to microscopic radial lines and only visible under a hand lens). **Periostracum persistent**, thin, smooth and **with a glossy appearance on umbonal half of shell**, becoming somewhat thicker and velvety towards shell margins, especially anteriorly. **Hinge plate relatively broad, with very close-set, thin and rather numerous teeth** (about 13 to 16 on each side of the umbo). **Colour:** **outside** of shell usually **reddish to purplish brown**, somewhat paler coloured to cream on the umbones, sometimes darker on dorsal margin, with a lighter radial band on posterior slope and with brown mottling pattern toward the umbones; **periostracum glossy yellowish brown to brown**, generally darker toward periphery of valves. Interior whitish, often tinged light orange to tan in the umbonal cavity and with dark brownish flecks posteriorly.

Size: Maximum shell length 5.9 cm, commonly to 3.5 cm.

Habitat, biology, and fisheries: In fine sand bottoms at shallow subtidal levels and offshore, between 2 and about 30 m depth. Frequently collected in bottom trawls and nets in Mauritania and Senegal, where it occurs abundantly.

Distribution: Eastern Atlantic, from Mauritania to northern Angola; Ilha do Príncipe and São Tomé islands.

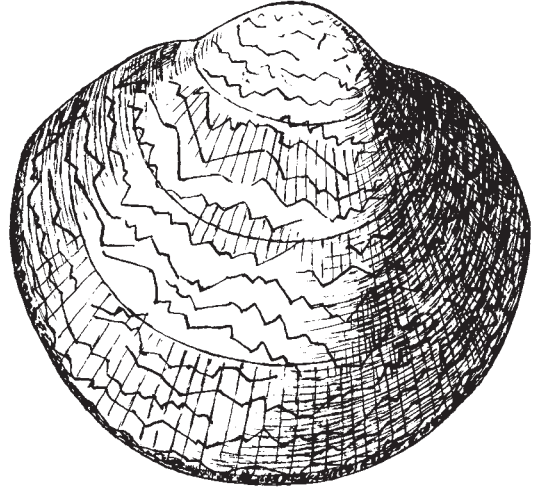


***Glycymeris scripta* (Born, 1778)**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Scripta bittersweet; Fr – Amande écriteure; Sp – Almendra escritura.

Diagnostic characters: Shell quite inflated, somewhat variable but **subcircular in outline** and slightly longer than high, rather thick and heavy, about **equilateral**. **Umbones** rather **low**, **orthogyrate to slightly opisthogyrate**, situated about midline of valves. **Anterodorsal and posterodorsal margins decidedly sloping**. **External sculpture weak**, with rather fine, irregular concentric growth lines, and tiny radial grooves mostly visible toward the umbones and on anterior and posterior slopes of valves. **Periostracum moderately thick** and velvety, **persistent only toward the margins**. **Hinge plate broad, with rather thick and only moderately numerous teeth** (about 9 to 11 teeth on each side of the umbo). **Colour: outside** of shell **pale coloured, mostly whitish cream**, becoming sometimes purplish pink toward the umbones, **with a network of fine, reddish brown to dark brown zigzag lines**. Periostracum dark brown. Interior white, often flushed with pale yellowish on area inside the muscle scars and sometimes more or less flecked with brownish posteroventrally.



exterior of right valve

Size: Maximum shell length 6.7 cm, commonly to 4.5 cm.

Habitat, biology, and fisheries: In sublittoral sandy bottoms, from about 5 to 50 m depths. A rather common species often collected in bottom nets and trawls. Used raw or in soups.

Distribution: Eastern Atlantic, from southern Morocco and Mauritania to Senegal, and from Côte d'Ivoire to Ghana. Occurrence in the western Mediterranean Basin uncertain.



Glycymeris stellata (Bruguère, 1789)

Frequent synonyms / misidentifications: *Glycymeris stellata* (Gmelin, 1791); *G. vovan* (Lamy, 1912) / *Glycymeris concentrica* (Dunker, 1853); *G. violacescens* (Lamarck, 1819).

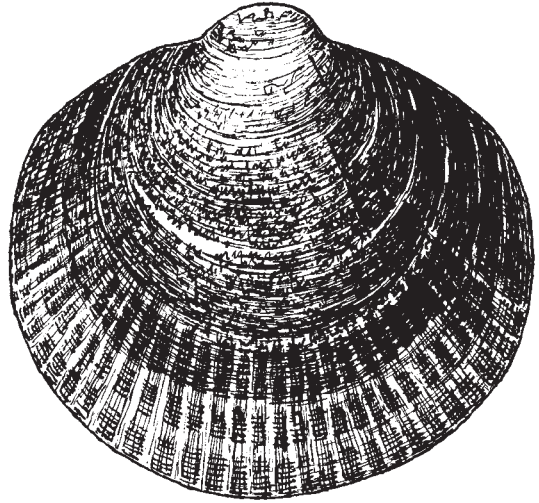
FAO names: **En** – Vovan bittersweet; **Fr** – Amande vovan; **Sp** – Almendra vovania.

Diagnostic characters: Shell poorly inflated, subcircular in outline and slightly longer than high, rather thin but solid, about equilateral. Umbones rather low, orthogyrate, situated about midline of valves. Anterodorsal and posterodorsal margins slightly arched and feebly sloping. External sculpture weak, with very low, rounded concentric lines and threads becoming more irregular toward ventral margin, and tiny shallow radial grooves only visible toward periphery of valves. Periostracum rather thick, with densely set short hair, persistent only toward the margins. Hinge plate broad, with variably thin to thick and rather numerous teeth (about 12 to 16 on each side of the umbo). **Colour:** outer colour of shell with a distinct pattern of small dense brownish to reddish zigzag or tent-shaped markings on a creamy to light tan ground, becoming very close-set and nearly merging toward the valve margins, resulting in an apparently uniform reddish brown colour; umbones usually in a pale coloured star-shaped area. Periostracum dark brown. Interior white, frequently more or less flecked with brown.

Size: Maximum shell length 7 cm, commonly to 4 cm.

Habitat, biology, and fisheries: In various soft bottoms. Sublittoral zone, from about 3 to 75 m depths. Common in the northern part of its range, where it is frequently caught in bottom trawls and nets. Used raw or in soups.

Distribution: Imperfectly known because of confusion with other species. Probably restricted to the tropical East Atlantic, from Senegal to Ghana and from Gabon to northern Angola.



exterior of right valve



***Glycymeris formosa* (Reeve, 1843)**

Frequent synonyms / misidentifications: None / None.

En – Beautiful bittersweet; **Fr** – Amande splendide; **Sp** – Almendra espléndida.

Maximum shell length 6.5 cm, commonly to 4 cm. Common in insular areas, but rather rare on the continental coasts of Africa. In various, sublittoral sandy bottoms, from about 2 to 50 m depths. Frequently caught in bottom trawls and nets where common. Restricted distribution in the tropical East Atlantic, from Ghana to Gabon; Cape Verde Islands and Gulf of Guinea islands: São Tomé, Ilha do Principe and Annobon.



exterior of right valve



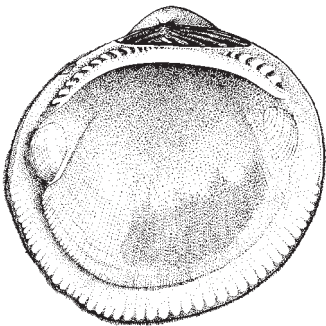
***Glycymeris pilosa* (Linnaeus, 1767)**

Frequent synonyms / misidentifications: *Pectunculus glycimeris* (Turton, 1822); *Glycymeris glycymeris pilosa* (Linnaeus, 1767) / *Glycymeris glycymeris* (Linnaeus, 1758).

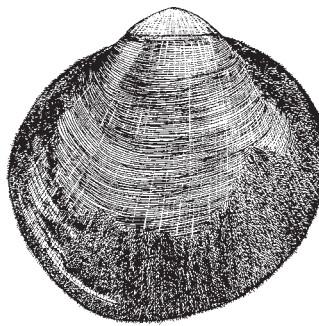
En – Pilose bittersweet; **Fr** – Amande velue; **Sp** – Almendra peluda.

Maximum shell length 9.6 cm, commonly to 6 cm (only 4 cm in the tropical East Atlantic). In various sandy to muddy bottoms, often with a coarse fraction. From infralittoral levels to continental shelf, down to about 150 m depths. Occasionally collected in bottom trawls or dredges in the studied zone. Eastern Atlantic, from Portugal to Western Sahara; throughout the Mediterranean.

Remarks: The recently recognized *Glycymeris vanhengstumi* Goud and Gulden, 2009 may represent a local Macaronesian form of *G. pilosa*.



interior of left valve



exterior of right valve

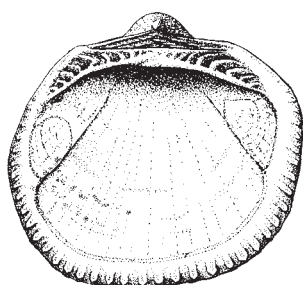


***Glycymeris violacescens* (Lamarck, 1819)**

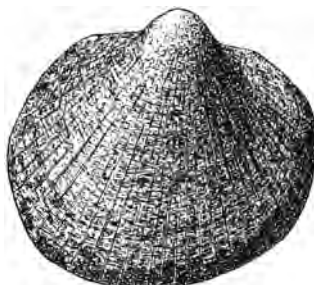
Frequent synonyms / misidentifications: ? *Glycymeris gaditanus* (Gmelin, 1791); ? *G. insubrica* (Brocchi, 1814); ? *G. nummaria* (Linnaeus, 1758) / *Glycymeris cor* (Lamarck, 1805) [an extinct fossil species].

En – Violet bittersweet; **Fr** – Amande violacée; **Sp** – Almeja tonta.

Maximum shell length 8.6 cm, commonly from 4 to 6 cm. In muddy sand bottoms, from shallow subtidal waters to about 40 m depth. Occasionally collected in bottom trawls or dredges along Moroccan coasts, and appearing in the local markets. Throughout the Mediterranean and in the nearby Atlantic, from southern Portugal to Morocco and possibly Madeira.



interior of left valve



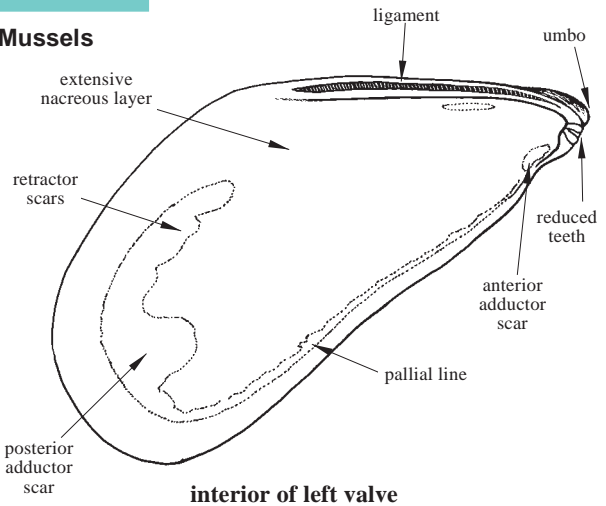
exterior of right valve



MYTILIDAE

Mussels

D diagnostic characters: **Shell** equivalve and **very inequilateral**, generally elongate ovate, subtrigonal or cylindrical, often **with a narrow byssal gape** at ventral margin. **Umbones** prosogyrate, **at or near anterior end** of shell. Outside quite smooth or radially ribbed; sculpture often stronger on posterodorsal and anterior areas, reduced on ventral median area. **Periostracum** usually **prominent**, smooth, lamellate or hairy. **Ligament** **external**, often **deep-set** along posterior dorsal margin, **supported by a calcified whitish ridge** which may be compact or finely pitted. **Hinge teeth absent or reduced**; small marginal crenulations sometimes present behind and/or along the ligament. **Adductor muscle scars unequal, the anterior one small to sometimes absent** in the adult; posterior adductor scar large, often more or less confluent with pedal or byssal retractor scars. **Pallial line without a sinus**. **Inner side of shell with an extensive nacreous layer**. Internal margins smooth or crenulated. Gills of filibranchiate type, branchial sheets smooth and often rather unequal. Foot elongate and grooved, with a well developed byssus. Siphons short to absent. Mantle with special glands in boring forms.

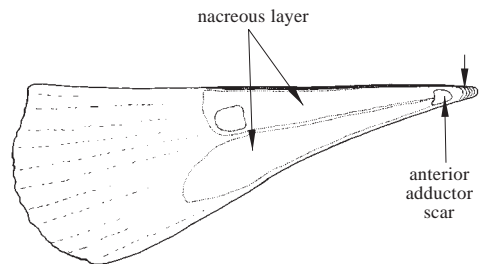


Habitat, biology, and fisheries: Sedentary animals, mainly attached to hard substrates by their well developed byssus, sometimes nestlers, coral and rock borers, or associated with ascidians. Many species of this family are collected in the area for human consumption, food for animals, or as bait. Nowadays, some mytilids represent major commercial species and aquaculture has strongly developed in many regions to keep up with increasing demand.

Remarks: Many Mytilidae are opportunistic and polymorphic species living attached to hard objects, and their shell characters may be exceedingly variable among individuals. Some species are often considered to be nearly worldwide, with a number of geographical subspecies. However, this simplistic view is not supported by studies based on biochemical, physiological, anatomical and cytological data, and the taxonomy of species within the genera *Mytilus*, *Aulacomya* and *Perna* is notably in need of a substantial revision. As the West African Mytilidae are still very imperfectly known, the names tentatively used here generally follow those traditionally attributed to species in this zone.

Similar families occurring in the area

Pinnidae: shell often very large, flexible, gaping at posterior end. Pointed anterior end closed by a series of small transverse partitions. Hinge always without teeth. Internal nacreous layer restricted to the anterior half of shell.



interior of left valve
Pinnidae

Key to species of interest to fisheries occurring in the area

- 1a. Hinge line with a few small teeth under the umbones (Fig. 1a) → 2
- 1b. Hinge line without teeth (Fig. 1b) → 5

- 2a. Anterior adductor scar present (Fig. 2a) → 3
- 2b. Anterior adductor scar absent (Fig. 2b) → 4

- 3a. Outer surface with coarse radial threads (Fig. 3) ***Aulacomya atra***
- 3b. Outer surface without radial sculpture (Fig. 4) ***Mytilus galloprovincialis***

- 4a. Shell colour light purplish brown under the yellowish brown or green periostracum; posterior retractor scars widely separated in 2 groups; ligamental ridge finely pitted (Fig. 5) ***Perna cf. perna***
- 4b. Shell colour bluish black under the black to brownish black periostracum; posterior retractor scars continuous; ligamental ridge compact (Fig. 6). ***Choromytilus meridionalis***

- 5a. Shell shape subcylindrical . . . → 6
- 5b. Shell with a different shape, more or less triangular to rhomboidal in outline → 7

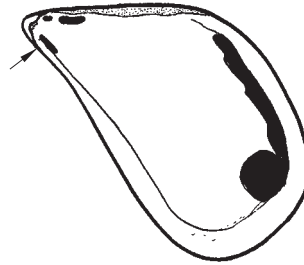


a) *Mytilus*

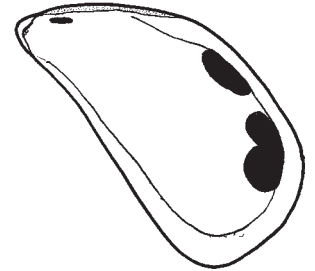


b) *Modiolus*

Fig. 1 hinge area of left valve



a) *Mytilus*



b) *Perna*

Fig. 2 interior of right valve

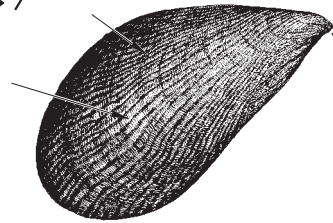


Fig. 3 *Aulacomya atra* (exterior)

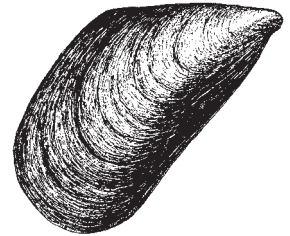


Fig. 4 *Mytilus galloprovincialis* (exterior)

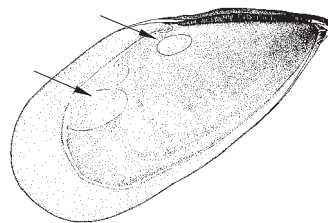


Fig. 5 *Perna cf. perna* (interior)

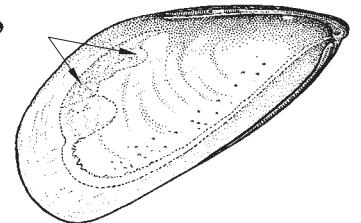


Fig. 6 *Choromytilus meridionalis* (interior)

6a. Outer surface with fine transverse striations on ventral median area; periostracum devoid of calcareous incrustation (Fig. 7) . ***Lithophaga lithophaga***

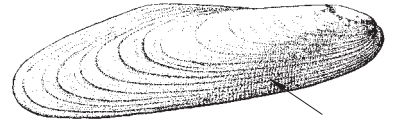


Fig. 7 *Lithophaga lithophaga* (exterior)

6b. Outer surface without transverse striation; periostracum more or less covered with a calcareous incrustation which projects beyond the posterior valve margin and ends in a pointed tip (Fig. 8) ***Lithophaga aristata***

projecting calcareous incrustations



Fig. 8 *Lithophaga aristata* (exterior)

7a. Shell shape roughly triangular, with relatively small umbones pointing at anterior end of shell; posterior two-thirds of valves covered with densely set periostracal bristles which are pointed and finely serrate along their ventral edge (Fig. 9) ***Modiolus barbatus***

7b. Shell shape roughly rhomboidal in outline, with relatively large umbones pointing above or slightly behind the rounded anterior end of shell; periostracal bristles, if present, differently shaped → 8

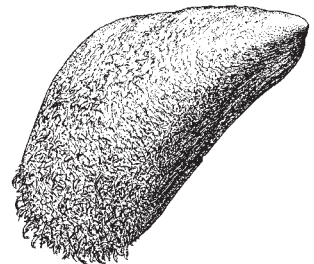


Fig. 9 *Modiolus barbatus* (exterior)

8a. Periostracum distinctly hairy on posterior part of shell, bristles long and somewhat leafy, broad on base and with slightly irregular edges (Fig. 10) ***Modiolus lulat***

8b. Periostracum not distinctly hairy on posterior part of shell, smooth and glossy or rough but often encrusted with mud → 9

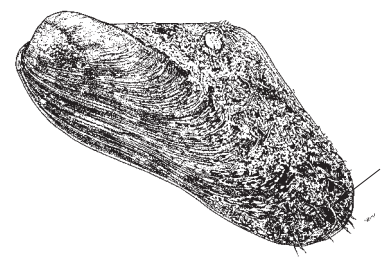


Fig. 10 *Modiolus lulat* (exterior)

9a. Anterior margin of valves clearly extending forward beyond the umbones; anterior half with regular concentric folds (Fig. 11) . . . ***Modiolus letourneuxi***

9b. Anterior margin of valves very short, hardly extending forward beyond the umbones; anterior half with irregular concentric growth lines and marks (Fig. 12). ***Modiolus martorelli***

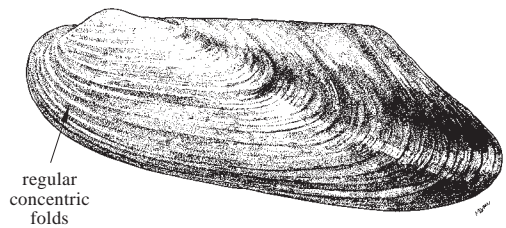


Fig. 11 *Modiolus letourneuxi* (exterior)

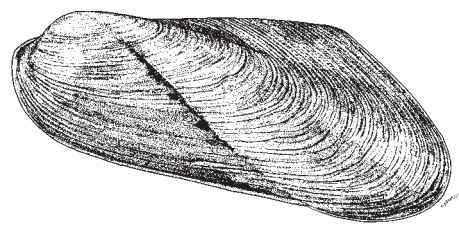


Fig. 12 *Modiolus martorelli* (exterior)

regular concentric folds

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Aulacomya atra* (Molina, 1782).
- 🐚 *Choromytilus meridionalis* (Krauss, 1848).
- 🐚 *Lithophaga aristata* (Dillwyn, 1817).
- 🐚 *Lithophaga lithophaga* (Linnaeus, 1758).
- 🐚 *Modiolus barbatus* (Linnaeus, 1758).
- 🐚 *Modiolus letourneuxi* Bourguignat, 1877.
- 🐚 *Modiolus lulat* (Dautzenberg, 1891).
- 🐚 *Modiolus martorelli* (Hidalgo, 1878).
- 🐚 *Mytilus galloprovincialis* Lamarck, 1819.
- 🐚 *Perna* cf. *perna* (Linnaeus, 1758).

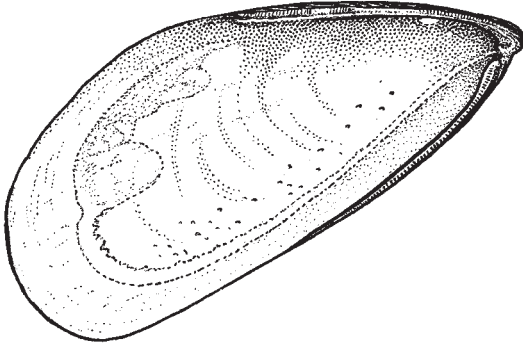
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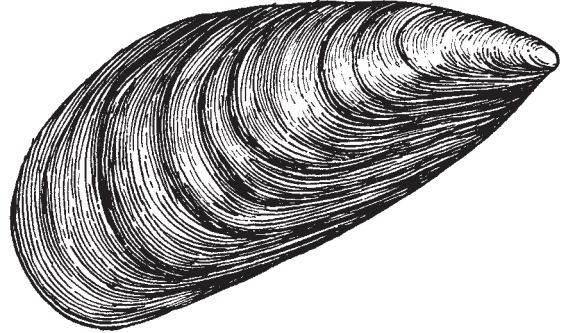
Choromytilus meridionalis (Krauss, 1848)

Frequent synonyms / misidentifications: *Mytilus meridionalis* Krauss, 1848 / *Choromytilus chorus* (Molina, 1782).

FAO names: **En** – Black mussel; **Fr** – Moule noire; **Sp** – Mejillón negro.



interior of left valve



exterior of right valve

Diagnostic characters: **Shell elongate**, roughly **trigonal-ovate** in outline, somewhat swollen and pointed anteriorly, rounded and more compressed posteriorly. **Umboes terminal and sharply tapering**, rather **incurved**. Anterior margin strongly reduced. Ventral margin long and straightish (from shallowly convex to slightly concave). Outer surface smooth apart from concentric growth marks. Periostracum rather thick and smooth, plastic-like, strongly adherent. **Ligamental ridge compact**. **Hinge mainly with 1 small tooth under the umbo in left valve and a corresponding groove in right valve**. **Anterior adductor scar absent** in adult specimens. Posterior retractor scars more or less continuous with the posterior adductor scar; **anterior retractor scar rather wide** and ovate, **situated along the ligamental ridge well behind the umbo**. Internal margins smooth. **Colour: outside of shell bluish black or purplish black under the black to brownish black periostracum**. Interior deep purplish blue, with a more or less thick glossy milky-white covering on area inside the pallial line.

Size: Maximum shell length 15.5 cm, commonly from 8 to 10 cm.

Habitat, biology, and fisheries: Fixed on rocks and other hard substrates, often in sandy areas. Living mainly in lower midintertidal zone, frequently in large colonies. Artisanal exploitation in southwestern Africa. Experimentally cultivated near Luderitz (Namibia) and in South Africa.

Distribution: Southeastern Atlantic and southwestern Indian Ocean; north to Namibia, and east to Mozambique.

Remarks: Relationships with the South American species *Choromytilus chorus* poorly known.



Lithophaga aristata (Dillwyn, 1817)

Frequent synonyms / misidentifications: *Leiosolenus aristatus* (Dillwyn, 1817); *Lithodomus caudatus* Gray, 1827; *L. caudigerus* (Lamarck, 1819); *Lithophaga caudigera* (Lamarck, 1819); *L. ropan* (Deshayes, 1840); *Myoforceps aristatus* (Dillwyn, 1817) / None.

FAO names: En – Scissor date mussel; Fr – Datte caudigère; Sp – Dátil tigasas.

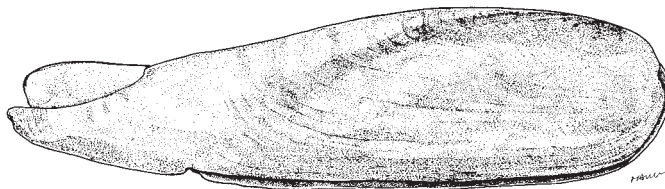
Diagnostic characters: Shell elongate, **subcylindrical and posteriorly narrowed** in outline, with umbones situated near the anterior end. Outer surface of shell nearly smooth under the periostracum, only sculptured with more or less developed concentric growth marks. **Periostracum thick**, smooth and glowing, **adherent, more or less covered with a calcareous incrustation which thickens and projects beyond the posterior margin of each valve and ends in a pointed tip.** Calcareous

incrustation chalky-like, tending to form fine transverse striations on ventral median area; **projecting posterior portions of incrustation** variably developed among specimens but **always crossing each other**, with the left valve tip usually situated on dorsal side of the right valve tip. **Hinge line smooth**, without teeth or crenulations. Internal margins smooth. **Colour: outside tawny ochre, calcareous incrustations dirty whitish.** Interior beige to brown and more or less iridescent.

Size: Maximum shell length 5 cm, commonly to 2.5 cm.

Habitat, biology, and fisheries: Boring into soft rocks and various hard substrates such as limestone, chalk, sandstone, corals or shells, from low in the intertidal zone to about 100 m depth. In Dakar area, commonly occurring also in aggregate tubes of serpulid polychaete worms. This common species is caught for its excellent meat in many places, at low tide and shallow water levels.

Distribution: Eastern Atlantic, from southern France to southern Angola; Canary Islands, Cape Verde Archipelago and Gulf of Guinea islands. Southern and western Mediterranean. Also occurring in the West Atlantic (from North Carolina to Florida, Gulf of Mexico and the Caribbean islands to Columbia, Venezuela and Brazil), and in the East Pacific (from southern California to Peru). Claimed to be a cosmopolitan species, but occurrences in the Indo-West Pacific realm (Red Sea, Japan, Australia) probably due to misidentifications.



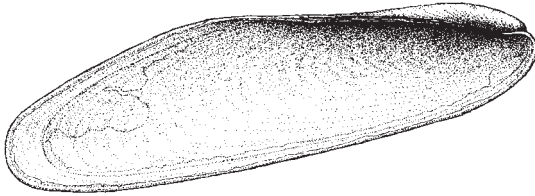
right side view of entire shell



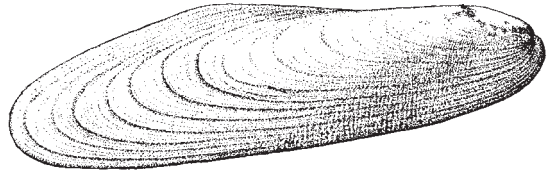
***Lithophaga lithophaga* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Lithodomus lithophagus* (Linnaeus, 1758) / None.

FAO names: **En** – European date mussel; **Fr** – Datte lithophage; **Sp** – Dátil de mar.



interior of left valve



exterior of right valve

Diagnostic characters: Shell elongate, subcylindrical in outline, with umbones situated near the anterior end. Outer surface sculptured with more or less developed concentric growth marks and **fine transverse striations on ventral median area**. **Periostracum thick**, smooth and glowing, adherent, **devoid of calcareous incrustation**. **Hinge line smooth**, without teeth or crenulations. Internal margins smooth. **Colour: outside fawn to dark brown, giving the shell the appearance of a date**. Interior pale blue grey, slightly iridescent, often posteriorly and dorsally maculated with purplish or brown.

Size: Maximum shell length 12 cm, commonly from 5 to 6 cm.

Habitat, biology, and fisheries: Boring in limestone rocks and boulders by mean of a chemical process, probably by a weak carbonic acid. Mainly found at shallow subtidal depths, including at the entrance of harbours, but also occurring deeper to about 100 m. Because of its highly prized meat, this species is actively collected for local consumption by rock breaking, manually or with pneumatic hammer. However, it is generally too difficult to collect and not common enough to be regularly marketed in the studied zone. Because of strong depletion of populations due to overcollecting, it is now protected in the Mediterranean.

Distribution: Eastern Atlantic, from Portugal to Senegal, and in northern Angola; Cape Verde Islands. Throughout the Mediterranean.

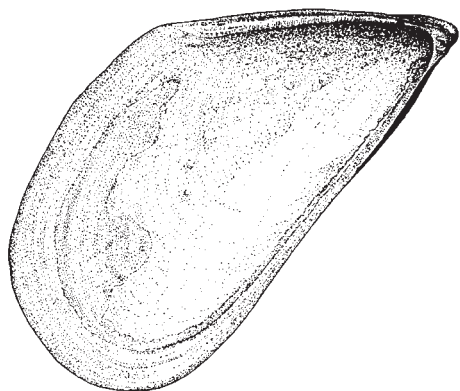
Remarks: Exact distribution imperfectly known, because of confusion with similar species of the genus. The Red Sea form attributed to this species probably belongs to an endemic species, *Lithophaga robusta* (Jousseume *in* Lamy, 1919).



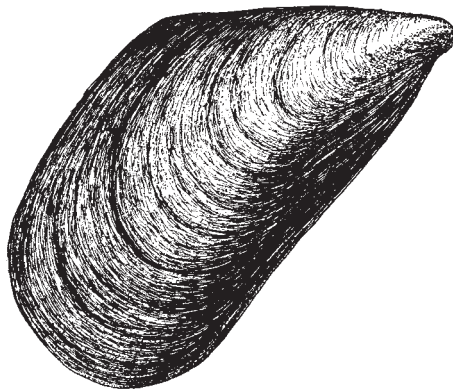
***Mytilus galloprovincialis* Lamarck, 1819**

Frequent synonyms / misidentifications: *Mytilus edulis diegensis* Coe, 1945; *M. edulis* var. *galloprovincialis* Lamarck, 1819 / *Mytilus edulis* Linnaeus, 1758.

FAO names: En – Mediterranean mussel; Fr – Moule méditerranéenne; Sp – Mejillón mediterráneo.



interior of left valve



exterior of right valve

Diagnostic characters: Shell elongate, very variable in shape, roughly trigonal-ovate to subquadrate in outline, swollen and pointed anteriorly, compressed and rounded posteriorly. Umbones terminal, rather sharp and ventrally incurved. Posterodorsal area of valves tending to form a flattened expansion that makes the ligament margin rather prominent. Anterior margin strongly reduced, lunule shaped. Outer surface devoid of radial sculpture, with concentric growth marks only. Periostracum smooth, strongly adherent. Ligamental ridge finely pitted. Hinge with a few small teeth under the umbones. Anterior adductor scar present. Retractor scars widely continuous with the posterior adductor scar. Anterior retractor scar narrow and elongate, situated along the ligamental ridge well behind the umbo. Internal margins smooth. Colour: outside of shell generally purplish black. Interior bluish to purplish grey, more or less deeply tinged whitish and slightly iridescent toward the umbonal cavity.

Size: Maximum shell length 16.5 cm, commonly from 5 to 8 cm.

Habitat, biology, and fisheries: Attached to various substrates, on hard or soft bottoms. Intertidal to shallow water; also in brackish coastal lagoons. May form dense populations, alone or with *Perna* cf. *perna* where they co-occur. Collected for food locally, at least in the northern part of the studied area. In Mauritania, marketed mixed with *Perna*. Recognized since 2004 a species of aquaculture potential in Namibia, where it expanded from the South African west coast probably as a result of a mariculture venture. This is a major commercial species in Europe. Introduced in many areas, accidentally or for aquaculture.

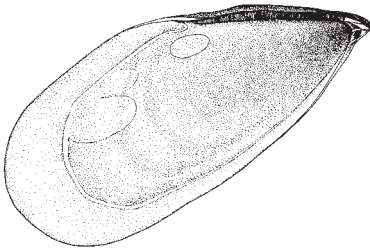
Distribution: Eastern Atlantic, from northern Great Britain, western Ireland and northwestern France to Mauritania, and in southern Angola, Namibia and South Africa. Throughout the Mediterranean and the Black Sea. Also occurring in widely scattered areas of the world, where it was often known under different names.



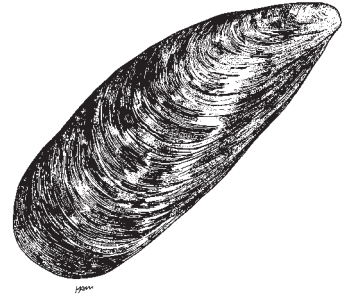
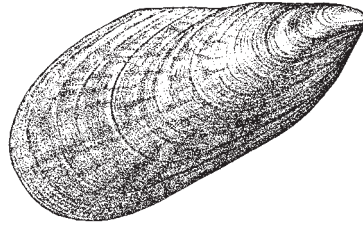
***Perna cf. perna* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Perna picta* (Born, 1778) / None.

FAO names: **En** – African mussel; **Fr** – Moule d'Afrique; **Sp** – Mejillón africano.



interior of left valve



exterior of right valves
examples showing diversity of shape

Diagnostic characters: Shell very variable in shape, roughly trigonal-ovate to elongate subquadrate in outline, pointed and somewhat swollen anteriorly, more compressed and rounded posteriorly. Umbones terminal and sharply tapering, slightly incurved. Anterior margin reduced. Ventral margin long and usually straightish to slightly convex. Outer surface nearly smooth apart from concentric growth marks and faint radial lines. Periostracum rather thick and smooth, adherent. Ligamental ridge finely pitted. Hinge with 1 small tooth in left valve and 2 in right valve. Posterior retractor scars forming 2 distinct groups, the posterior one continuous with the posterior adductor scar, and the anterior one widely separated, rounded-ovate in shape and situated a short way to posterior end of ligament; anterior retractor scar narrow and elongate, situated along the ligamental ridge near to the umbo. Internal margins smooth. **Colour:** outside of shell light purplish brown under the yellowish brown or green periostracum. Interior whitish and iridescent, often widely tinged yellowish or purplish brown on dorsal and posterior sides.

Size: Maximum shell length 16 cm, commonly from 6 to 8 cm.

Habitat, biology, and fisheries: Fixed to hard substrates, from lower intertidal zone to about 5 m depths; mainly occurring subtidally on the wave exposed shores. This is an important commercial species in the studied zone. Marketed in many places of the African mainland as well as in Canary Islands. Most common on open sea coasts, this species neither tolerates low salinities nor the high temperatures of permanently tropical conditions. May form natural banks locally, and co-occurs with *Mytilus galloprovincialis* in the northern part of its range.

Distribution: In the East Atlantic, from southern Portugal to Senegal, and from Congo to South Africa. Also present in southwestern Mediterranean, east to Tunisia and southern Sicily.

Remarks: Taxonomy of the genus *Perna* in the Atlantic and Indian oceans strongly needs a revision.



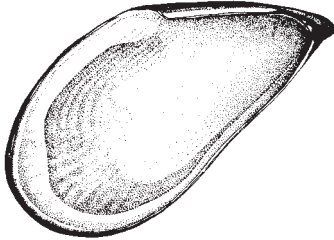
***Aulacomya atra* (Molina, 1782)**

Frequent synonyms / misidentifications: *Aulacomya ater* (Molina, 1782) [Incorrect spelling]; *A. crenata* (Lamarck, 1819); *A. capensis* (Dunker, 1846); *Mytilus magellanicus* Chemnitz, 1785 [Invalid name]; *M. orbignyanus* Hupé, 1854 / None.

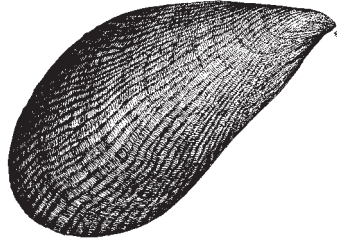
En – Cholga mussel; **Fr** – Moule cholga; **Sp** – Cholga.

Maximum shell length 9.5 cm, commonly from 6 to 7 cm. Fixed on various hard substrates, in the intertidal and sublittoral zones to about 50 m depth. Traditionally collected for food by coastal populations in southern Africa. Outside the studied zone, it is intensely fished and cultivated in Chile. Widely distributed in oceans of the southern hemisphere: Southeast Atlantic, from Namibia to Eastern Cape (South Africa); Pacific and Atlantic coasts of South America, from Peru to Terra del Fuego and Brazil; Southwest Pacific, in New Zealand.

Remarks: *Aulacomya atra* is often considered to have a very wide distribution in the southern hemisphere with a number of geographical subspecies which are sometimes considered as good species; in this case the African form should be called *Aulacomya capensis* (Dunker, 1846).



interior of left valve



exterior of right valve

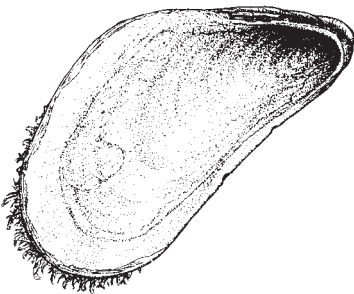


***Modiolus barbatus* (Linnaeus, 1758)**

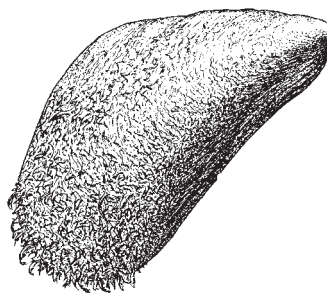
Frequent synonyms / misidentifications: *Modiola barbata* (Linnaeus, 1758) / None.

En – Bearded horse mussel; **Fr** – Modiole barbue; **Sp** – Barbudo.

Maximum shell length 9 cm, commonly to 5 cm. Common. Attached to various hard substrates. Low intertidal to about 110 m depth. Occasional bycatch in sublittoral trawling activities. Eastern Atlantic, from Ireland and the British Isles to Mauritania. Throughout the Mediterranean; Black Sea.



interior of left valve



exterior of right valve

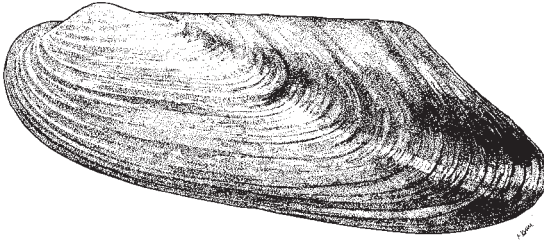


Modiolus letourneuxi (Bourguignat, 1877)

Frequent synonyms / misidentifications: *Jolya letourneuxi* Bourguignat, 1877; *Modiola elongata* Hanley, 1843 [not of Swainson, 1821]; *M. plicata* Reeve, 1857 [not of Gmelin, 1791]; *Modiolus letourneuxi* [Spelling error]; *Modiolus stultorum* (Joussemae, 1893) / None.

En – Rhomboid mussel; **Fr** – Modiole losangique; **Sp** – Mejillón romboidal.

Maximum shell length 8 cm, commonly to 5 cm. On soft bottoms, in nest made of byssal threads and sediment. Sublittoral zone, usually from about 2 to 40 m but also deeper, down to 102 m depths. Occasionally taken by shrimp trawlers. Eaten steamed or in soups. Eastern Atlantic, from Morocco to northern Angola.



exterior of left valve

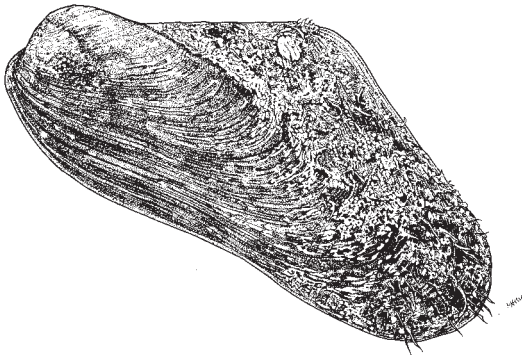


Modiolus lulat (Dautzenberg, 1891)

Frequent synonyms / misidentifications: None / *Modiolus nitens* (Menke, 1848) [= *Xenostrobus pulex* (Lamarck, 1819)].

En – Shiny mussel; **Fr** – Modiole lutat; **Sp** – Mejillón liso.

Maximum shell length 8 cm, commonly to 5 cm. On hard or soft bottoms. Rather common in shallow sublittoral water, to about 10 m depth. Collected for food by coastal people. Eaten steamed or in soups. Eastern Atlantic, from southern Morocco to Guinea. Recently found in the southwesternmost Mediterranean.



exterior of left valve

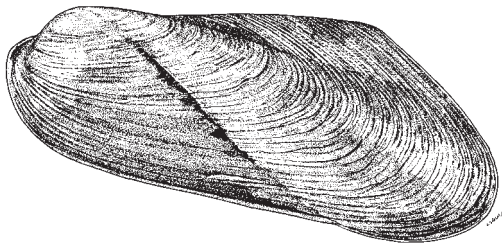


***Modiolus martorelli* (Hidalgo, 1878)**

Frequent synonyms / misidentifications: None / *Modiolus lulat* (Dautzenberg, 1891).

En – Martorelli mussel; **Fr** – Modiole de Martorelli; **Sp** – Mejillón de Martorelli.

Maximum shell length 9 cm, commonly to 6 cm. In muddy bottoms of the continental shelf, mostly at 90 to 110 m depths and shallower in the north. Occasionally taken in trawls. Eastern Atlantic, from the Strait of Gibraltar to Sierra Leone; southward in Côte d'Ivoire and in Congo. Southwestern Mediterranean, east to Tunisia and Sicily.



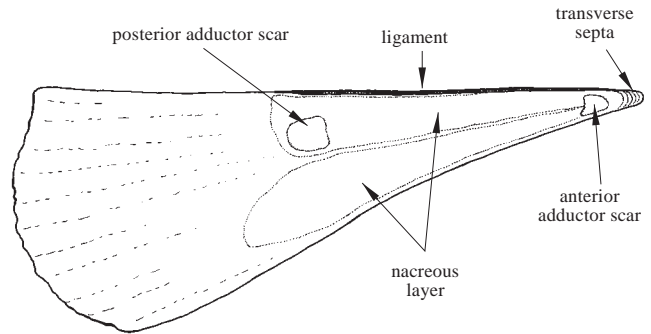
exterior of left valve



PINNIDAE

Pen shells

Diagnostic characters: Shell large and brittle, equivalve, laterally compressed, subtrigonal in outline, ventrally and posteriorly gaping; very inequilateral, pointed in front, wide and flexible behind. Umbones at anterior end which is eroded and internally closed by a series of small transverse partitions. Outer sculpture mainly composed of radial ribbing, smoothish or provided with imbricated scales or spines, and often crossed by concentric undulations ventrally. Periostracum usually absent. Ligament linear,



interior of left valve

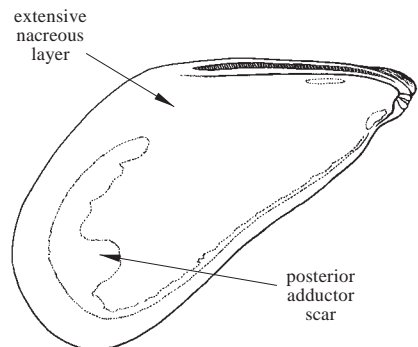
recessed in a narrow groove along dorsal margin. Hinge without teeth. Interior of shell with a thin nacreous layer which is restricted to the anterior half of valves. Two unequal adductor muscle scars, the anterior relatively small and placed in the anterior angle of shell, the posterior large and situated about midlength. No pallial sinus. Internal margins thin, smoothish, reflecting the external sculpture. Gills of eulamellibranchiate type, with folded branchial sheets. Foot conical, elongate and grooved, with a profuse silky byssus. Siphons absent. Mantle widely open, papillate on margins.

Habitat, biology, and fisheries: Sessile animals, living generally partly embedded in heterogeneous soft bottoms, with the narrow anterior tip of shell downwards, and attached to various hard elements of the substrate by means of long byssal threads. The posterior gape of the flexible shell can be closed by contraction of the adductor muscles. In relation with their vertically embedded mode of life, the Pinnidae have developed several unique anatomical features: a pair of special gutter shaped canals inside the mantle lobes, to remove rapidly sediment material from the anterior portion of the mantle cavity, and a protrusible pallial organ above the posterior adductor muscle, to clear away debris from the posterior part of the shell. Sexes separate. Free-swimming larval stage present.

Pinnidae have long been collected for their edible muscle and meat and, in the northern part of the studied zone, the long and resistant byssus was used to weave extremely elegant textiles of high price. In the nearby Mediterranean, this manufacture lasted until the end of the nineteenth century in southern Italy and Malta Island. The large shells of Pinnidae are also sometimes used in shellcraft industries, or sold as souvenir to tourists.

Similar families occurring in the area

Mytilidae: Stiff shell, without posterior gape. Internal nacreous layer not restricted to anterior half of shell. Hinge sometimes with small teeth or crenulations. Anterior end always without internal transverse partitions. Posterior adductor scar situated in posterior quarter of valves.



interior of left valve

Mytilidae

Key to species of interest to fisheries occurring in the area

- 1a. Outer surface of valves with a median radial keel, at least for the young stages of growth; internal nacreous layer divided into 2 lobes by a median radial groove (Fig. 1) . . . ***Pinna rudis***
- 1b. Outer surface of valves without a median radial keel, even for the young stages of growth; internal nacreous layer undivided (Fig. 2) → 2
- 2a. Posterior adductor scar completely enclosed within the nacreous area (Fig. 3) ***Atrina chautardi***
- 2b. Posterior adductor scar slightly protruding at posterior limit of the nacreous area (Fig. 4) ***Atrina fragilis***

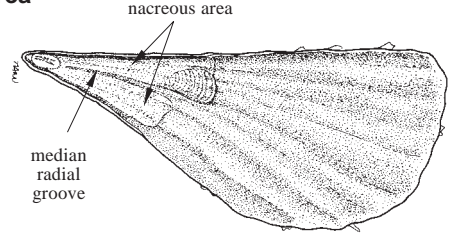


Fig. 1 *Pinna rudis* (interior)

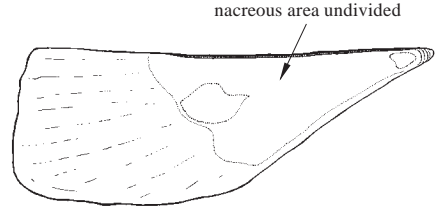


Fig. 2 *Atrina* (inner surface)

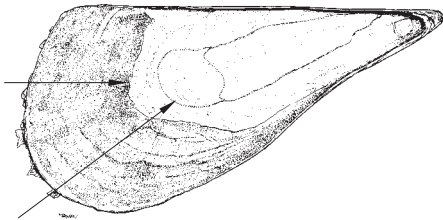


Fig. 3 *Atrina chautardi* (interior)

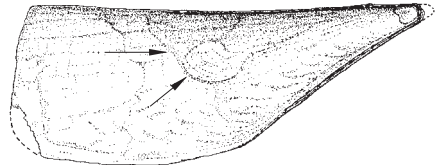


Fig. 4 *Atrina fragilis* (interior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Atrina chautardi* (Nicklès, 1953).
- 🐚 *Atrina fragilis* (Pennant, 1777).
- 🐚 *Pinna rudis* Linnaeus, 1758.

References

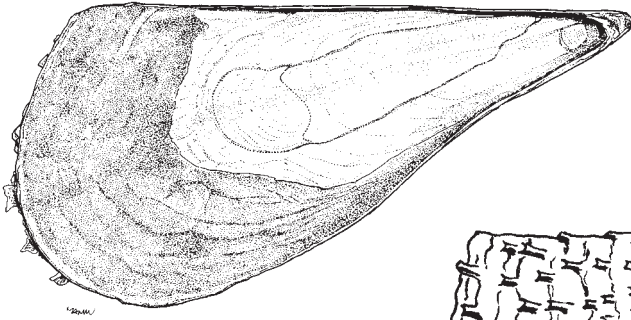
Rosewater, J. 1961. The family Pinnidae in the Indo-Pacific. *Indo-Pacific Mollusca*, 1(4): 175–226.

Turner, R.D. & Rosewater, J.R. 1958. The family Pinnidae in the Western Atlantic. *Johnsonia*, 3(38): 285–346.

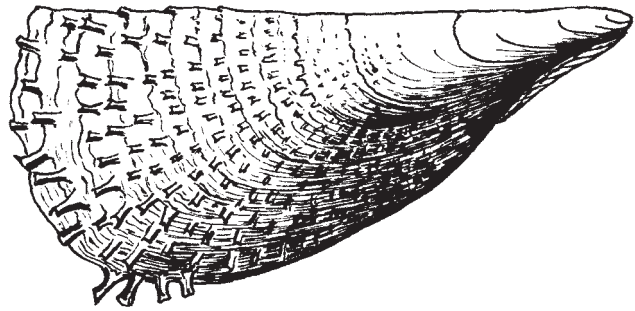
Atrina chautardi (Nicklès, 1953)

Frequent synonyms / misidentifications: *Pinna chautardi* Nicklès, 1953 / *Pinna ramulosa* Reeve, 1858 [= *Atrina seminuda* (Lamarck, 1819)].

FAO names: **En** – Chautard's pen shell; **Fr** – Jambonneau de Chautard; **Sp** – Pina de Chautard.



interior of left valve



exterior of right valve

Diagnostic characters: Shell **medium-sized** (up to 22 cm long), moderately flattened, elongated, **broadly fan-shaped**, rather thin and quite fragile, **without a median radial keel**, even for the young stages.

Dorsal margin nearly straight, posterior margin broadly convex to somewhat truncate. Ventral margin broadly sinuate, widely rounded posteriorly and slightly depressed anteriorly. Outer **sculpture** of valves very **variable**, usually **with** about **12 to 20** or more **irregular, low radial ribs bearing long to short scales**. Dorsalmost 8 to 10 radial ribs usually somewhat larger and better defined than the others; ribs of some specimens occasionally reduced to ill-defined shallow undulations, but scales nevertheless present. **Internal nacreous layer undivided**, occupying the anterior two-thirds of valves. **Posterior adductor scar completely enclosed within the nacreous area**. **Colour:** **outside** of shell **horn-coloured to dull greyish brown**. Interior glossy and similarly coloured, becoming iridescent on nacreous area.

Size: Maximum shell length 22 cm, commonly to 15 cm.

Habitat, biology, and fisheries: In fine sandy bottoms. Sublittoral zone and offshore, from about 4 to nearly 80 m depths. May be locally abundant and form high density populations. Occasionally taken as a bycatch by shrimp trawlers, and locally collected for food by coastal people. Muscle consumed fried in oil, or in seafood dishes.

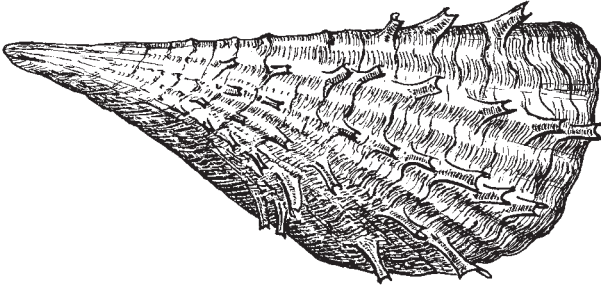
Distribution: Eastern Atlantic, from Rio de Oro, Western Sahara to northern Angola.



***Pinna rudis* Linnaeus, 1758**

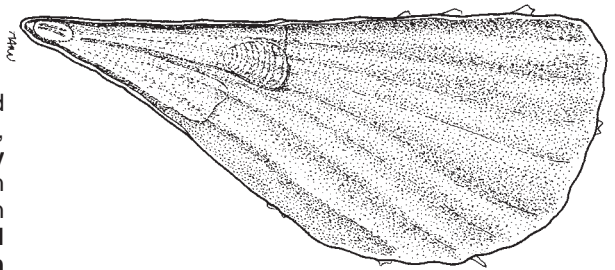
Frequent synonyms / misidentifications: *Pinna ferruginea* Röding, 1798; *P. pernula* Chemnitz, 1785 [Invalid name]; *P. pernula* Röding, 1798 / None.

FAO names: **En** – Rough pen shell; **Fr** – Jambonneau rude; **Sp** – Pina áspera.



exterior of left valve

Diagnostic characters: Shell medium-sized (up to 22 cm long), moderately inflated, somewhat variable in shape but **roughly wedge-shaped**, rather thin and translucent in young stages, becoming quite thick and solid in fully grown specimens, **with a low longitudinal median keel in the anterior part of each valve**. Dorsal margin nearly straight or somewhat concave, posterior margin more or less broadly rounded. Ventral margin widely convex posteriorly, straightish to shallowly depressed anteriorly. Outer surface of valves usually with **5 to 8 strong radial ribs bearing widely spaced and large, tubular spines** on posterior part of shell (rib number sometimes tending to increase toward posterior end of valves). **Internal nacreous layer divided into 2 lobes by a median radial groove**, with the **ventral lobe usually markedly shorter** than the dorsal lobe. Posterior adductor scar situated at posterior end of the dorsal nacreous lobe. **Colour:** **outside** of shell red-orange to **dark reddish brown**. Interior deep red-orange and glossy, with the nacreous layer brilliant iridescent.



interior of right valve

Size: Maximum shell length 56 cm, commonly to 20 cm.

Habitat, biology, and fisheries: In heterogenous detritic bottoms and shallow water seagrass beds. Sublittoral, from extreme low tide levels to about 20 m depth. May be common locally in some West African coastal areas and around islands. Collected mainly by hand in shallow water, snorkelling or scuba-diving, occasionally in bottom trawls. Muscle is consumed fried in oil, or in seafood dishes.

Distribution: Widely distributed in the Atlantic. In the eastern Atlantic, from Portugal to southern Angola; Macaronesian islands, the Cape Verde Archipelago, Gulf of Guinea islands, Ascension and St. Helena islands. Southern and Central Mediterranean basins. Western Atlantic in the Caribbean.

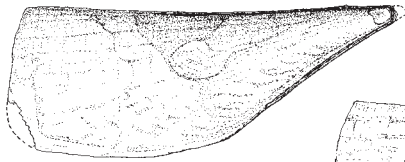


***Atrina fragilis* (Pennant, 1777)**

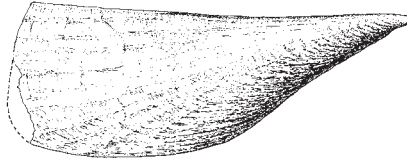
Frequent synonyms / misidentifications: *Pinna fragilis* Pennant, 1777 / *Atrina pectinata* (Linnaeus, 1767).

En – Brittle pen shell; **Fr** – Jambonneau fragile; **Sp** – Alabarda.

Maximum shell length 35 cm, commonly to 20 cm. In mud, muddy sand or muddy gravel bottoms, from low subtidal levels to about 600 m depth. In southern part of its range, mainly occurring in shallower areas, to a maximum depth of about 200 m. Occasionally taken in bottom trawls. Eastern Atlantic, from the British Isles to Mauritania and Canary Islands; also occurring in the Mediterranean.



interior of left valve



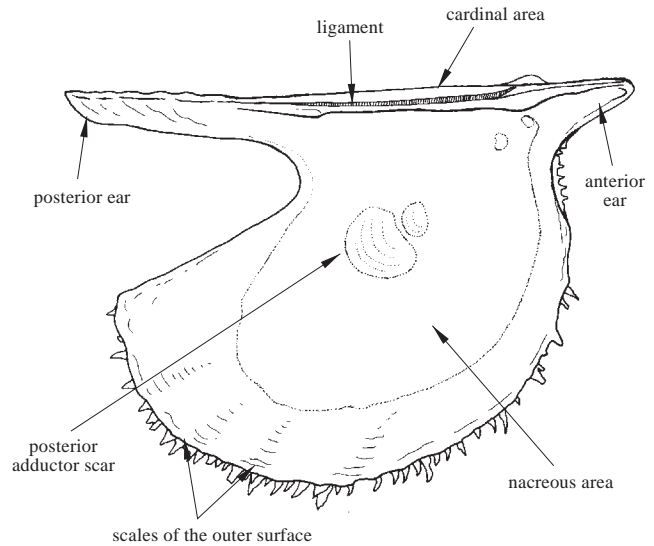
exterior of right valve



PTERIIDAE

Wing oysters

Diagnostic characters: Shell somewhat compressed, obliquely ovate to suborbicular in outline, with a straight **dorsal margin often produced at each end into a winglike ear**, trigonal in front and **sometimes very long behind**. Shell **slightly inequivalve**, with left valve a little more inflated than **right valve** which is provided with a strong **byssal notch anteriorly**. Outer surface of shell often scaly or lamellate. Umbones small, prosogyrate, in front of midlength of valves. A narrow cardinal area in each valve, with the external ligament more or less stretching along under and behind the umbo. **Hinge narrow and elongate, toothless or with 1 or 2 denticles** near umbo and a lamellate process posteriorly. **Interior of shell partly nacreous**, often with a wide non-nacreous margin ventrally. **Only one large, subcentral, posterior adductor muscle scar** usually present in the adult. **Pallial line without a sinus**. Gills of filibranchiate type, with folded or smooth branchial sheets. Foot small, grooved, with a well-developed byssus. Siphons absent. Mantle lobes free, with marginal tentacles.



interior of left valve

Habitat, biology, and fisheries: Pteriidae live attached by their strong byssus to various substrates (rocks, pebbles, shells, aquatic plants, gorgonaceans, etc.), mainly in warm, tropical to subtropical waters. They may occur in dense colonies. The Pteriidae have been actively exploited in many areas of the world since ancient times for their ability to produce pearls. Some species are intensely cultivated for pearl production and their shells used as a source of mother-of-pearl for the industry, notably in the Indo-West Pacific. However, the family is poorly represented in the studied zone, and is then of secondary economic importance. Their nacreous shell is artisanally used, and soft parts are also locally consumed by native coastal populations.

Similar families occurring in the area

Isognomonidae: cardinal area with a series of transverse ligamental grooves.



interior of left valve

Isognomonidae

Key to species of interest to fisheries occurring in the area

- 1a. Outer surface of shell rather pale coloured, often with darker radial stripes; ventral margin obliquely ovate, strongly expanded posteroventrally (Fig. 1) ***Pteria hirundo***
- 1b. Outer surface of shell dark coloured, often with paler radial stripes; ventral margin ovate, not expanded posteroventrally (Fig. 2) ***Pteria atlantica***

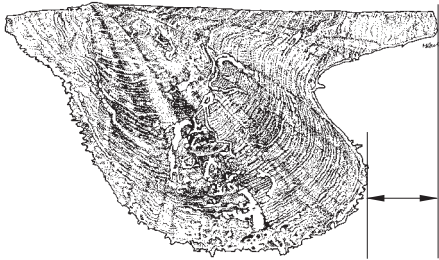


Fig. 1 *Pteria hirundo* (exterior)

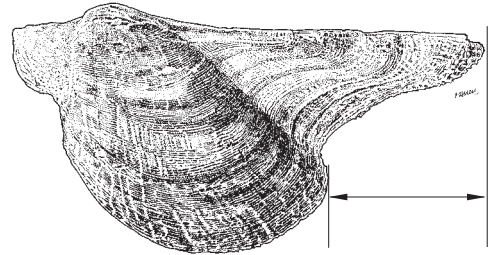


Fig. 2 *Pteria atlantica* (exterior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

🐚 *Pteria atlantica* (Lamarck, 1819).

🐚 *Pteria hirundo* (Linnaeus, 1758).

References

Alagarwami, K. (ed.) 1987. Pearl culture. *Central marine Fisheries Research Institute Bulletin*, (39): 1–136.

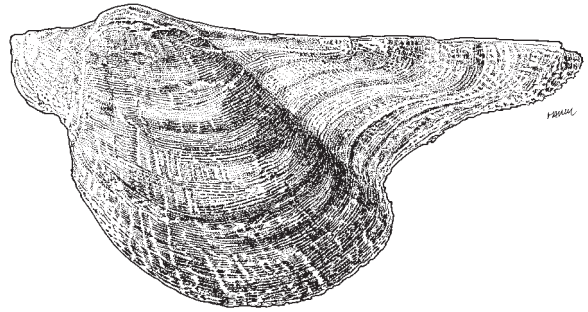
Shirai, S. 1994. *Pearls and Pearl Oysters of the world*. Okinawa, Marine Planning, 108 p.

Pteria atlantica (Lamarck, 1819)

Frequent synonyms / misidentifications: *Avicula atlantica* Lamarck, 1819 / *Pteria colymbus* (Röding, 1798); *P. hirundo* (Linnaeus, 1758).

FAO names: **En** – Atlantic wing oyster; **Fr** – Avicule chanon; **Sp** – Avícula del Atlántico.

Diagnostic characters: Shell rather thin but **solid**, reaching a **quite large** size (up to 13 cm long), **ovate and only slightly oblique** in outline (ventral margin not markedly expanded posteroventrally), **with posterior ears drawn out into** short to very long **wing-like expansions** which are often more or less twisted. Outer surface of shell, when not worn, with **densely set**, thin, appressed and **flattened, imbricated concentric scales** and moderately small, **radially arranged flattened spines**. **Hinge with 2 small teeth in each valve:** 1 rounded anterior tubercle near the umbo (obsolete in right valve) and 1 posterior ridge, situated behind the ligamental area and almost parallel to dorsal margin. **Colour:** **outside** of shell **dark coloured**, often with **paler brownish to greyish radial stripes**. Internal **nacreous area highly iridescent**. Non nacreous margin glossy, with the outer dark colouration showing through.



exterior of left valve

Size: Maximum shell length 13 cm; commonly to 8 cm.

Habitat, biology, and fisheries: Byssally attached to various hard objects, mainly gorgonaceans, on sandy to muddy bottoms. Continental shelf and upper slope, from about 10 to 400 m depths. Rather commonly caught in bottom trawls. The shell is used locally making decorative items, and the meat consumed by fishermen.

Distribution: Eastern Atlantic, from Mauritania to southern Angola; Cape Verde and São Tomé Islands.

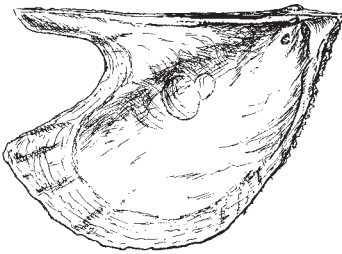


***Pteria hirundo* (Linnaeus, 1758)**

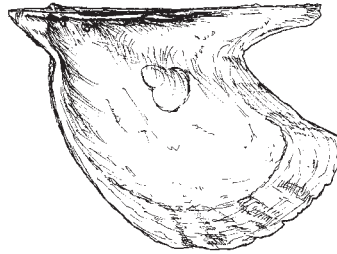
Frequent synonyms / misidentifications: *Avicula tarentina* Lamarck, 1819 / None.

En – European wing oyster; **Fr** – Avicule de Tarente; **Sp** – Avícula de Taranto.

Maximum shell length 11 cm, commonly to 7 cm. Byssally attached to various hard objects, on sandy or muddy gravel, muddy sand, mud. Offshore, on continental shelf and upper slope, from about 10 to 300 m depths. Most common between 50 and 150 m, but becoming uncommon in the southern part of its range. Occasional bycatch of shrimp and fish trawlers. Eastern Atlantic, from the British Isles to northern Angola; Canary and Cape Verde Islands. Throughout the Mediterranean.



interior of left valve



interior of right valve



exterior of left valve



ISOGNOMONIDAE

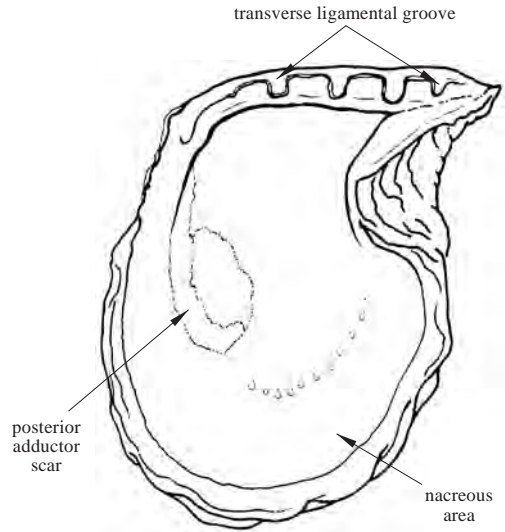
Tree oysters

Diagnostic characters: Shell compressed, elongate ovate to rounded and often irregular in outline, with a straight dorsal margin and narrow cardinal area; usually slightly inequivalve, right valve somewhat flatter than the left and with a narrow byssal gape anteriorly, commissural plane sometimes undulating. Outer surface of shell smoothish, with concentric lamellar processes or irregular undulations, radial sculpture slight to absent. Umbones small, prosogyrate, near the anterior end. Ligament external, set in a series of transverse grooves along the dorsal margin. Hinge narrow, without teeth. Interior of shell partly nacreous, with a more or less developed, often dark, non-nacreous border ventrally. Only 1 large, arcuate, posterior adductor muscle scar, with a well developed posterior pedal retractor scar next to it or fused with it. Pallial line without a sinus. Gills of filibranchiate type, with smooth branchial sheets. Foot small, subcylindrical, grooved, with a strong byssus. Siphons absent. Mantle lobes free, with short marginal tentacles.

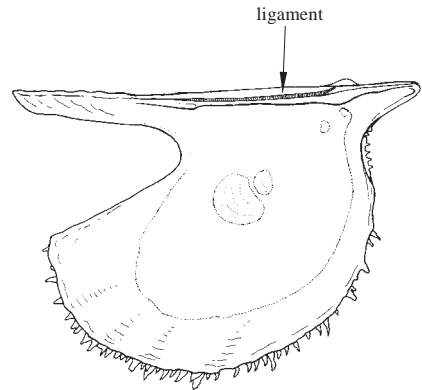
Habitat, biology, and fisheries: Sedentary animals, living attached by their byssal threads to various hard substrates, forming often dense colonies in tropical shallow waters. Collected for food by coastal populations.

Similar families occurring in the area

Pteriidae: cardinal area without a series of transverse grooves; ligament external, stretching along the cardinal area behind the umbones.



interior of left valve



interior of left valve

Pteriidae

References

- Oliver, P.G. 1992. *Bivalved Seashells of the Red Sea*. Wiesbaden, Hemmen & Cardiff, National Museum of Wales: 330 p.
- Yonge, C.M. 1968. Form and habit in species of *Malleus* (including the "hammer oysters") with comparative observations on *Isognomon isognomon*. *The Biological Bulletin*, 135(2): 378–405.

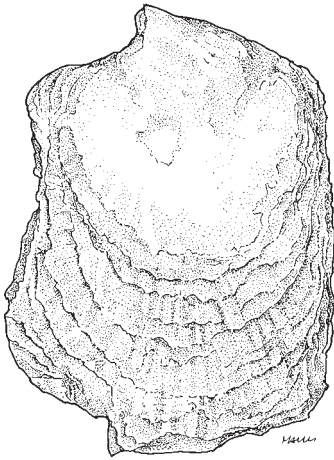
A single species of interest to fisheries occurring in the area.

Isognomon dunkeri (P. Fischer, 1881)

Frequent synonyms / misidentifications: *Perna anomioides* Nicklès, 1955 [not of Reeve, 1858] / *Isognomon isognomum* (Linnaeus, 1758); *I. perna* (Linnaeus, 1767); *I. vulsella* (Lamarck, 1819).

En – Dunker's tree oyster; **Fr** – Ostrège de Dunker; **Sp** – Concha hojarascas de Dunker.

Maximum shell length 8 cm, commonly from 5 to 6 cm. Common on rocks and stones, from lower intertidal zone to shallow subtidal waters, at about 2 or 3 m depths. Locally collected at low tide by coastal people, for subsistence purpose. Tropical East Atlantic, from Senegal to southern Angola; Cape Verde Islands and Gulf of Guinea islands (São Tomé, Ilha do Principe and Annobon).



exterior of left valve



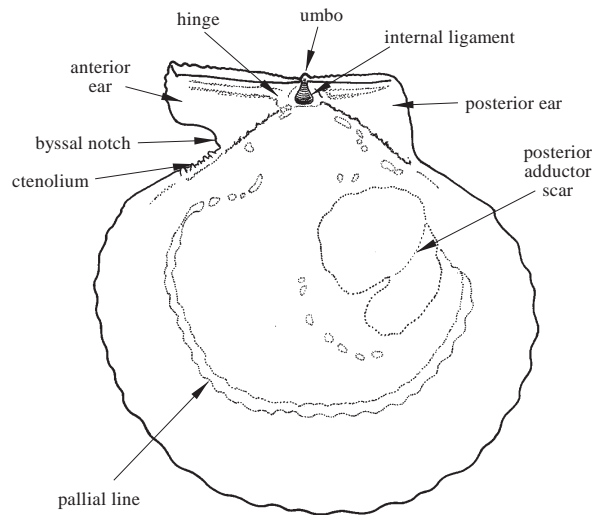
interior of right valve



PECTINIDAE

Scallops

D **Diagnostic characters:** Shell more or less **inequivalve**, usually with 1 valve more convex than the other; **ovate to subcircular** in outline **with** median low, orthogyrate umbones and **a straight dorsal margin forming wing-like ears** at both ends. Anterior ears generally well developed, often with **a byssal notch** and **a ctenolium at right valve**. Outer surface smooth or with mostly radial sculpture. One or both valves often brightly coloured. Periostracum absent. **Ligament** mostly **internal**, in a **small trigonal pit pointing under the umbones**; external ligament thin, stretching along the hinge line. **Hinge without teeth**, or with faint marginal ridges. Interior of shell porcelaneous, sometimes with a subnacreous appearance. **A single**, asymmetrical, (posterior) **adductor muscle scar**. **Pallial line without a sinus**. Internal margins generally undulate or crenulate. Gills of filibranchiate type, with folded or smooth branchial sheets. Foot reduced. Byssus persistent or disappearing with growth. No siphons. Mantle margins free, with eyes and short tentacles.



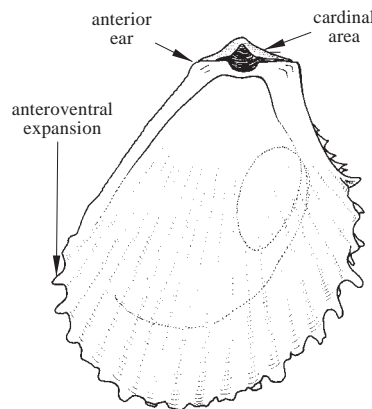
interior of right valve

Habitat, biology, and fisheries: Depending upon species, scallops live either byssally attached or free on the bottom and then capable of swimming by clapping the valves together, particularly as an escape from predators. Though Pectinidae usually represent important commercial species for the scallop market which is characterized by an increasing demand worldwide, they seem rather underexploited in the studied zone. This is partly due to the rarity or small size of commercially exploitable banks, but also to the often low level of fishery installations and lack of aquaculture experiments.

Similar families occurring in the area

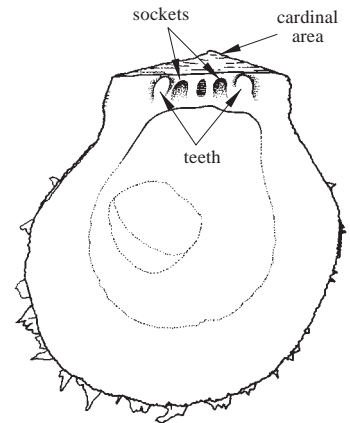
Limidae: shell equivalve, often drawn out anteroventrally. Anterior ears generally reduced. A wide trigonal cardinal area, between umbones and dorsal margin.

Spondylidae: Shell cemented to substrate by right valve. A large cardinal area between umbones and dorsal margin, generally bigger in the right valve than in the left. Hinge with 2 strong teeth and 2 deep sockets, symmetrically arranged in relation to the internal ligament.



interior of right valve

Limidae



interior of left valve

Spondylidae

Key to species of interest to fisheries occurring in the area

- 1a. Shell more or less distorted, cemented to substrate by right valve (Fig. 1) . . . *Hinnites corallinus*
- 1b. Shell with a regular shape, not cemented to substrate → 2

- 2a. Right (lower) valve strongly convex, left (upper) valve nearly flat (Fig. 2a) → 3
- 2b. Both valves convex (Fig. 2b) → 4

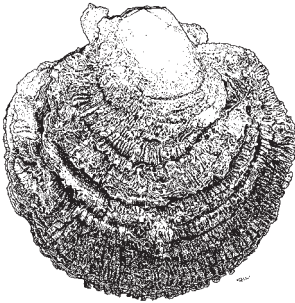


Fig. 1 *Hinnites corallinus* (exterior)

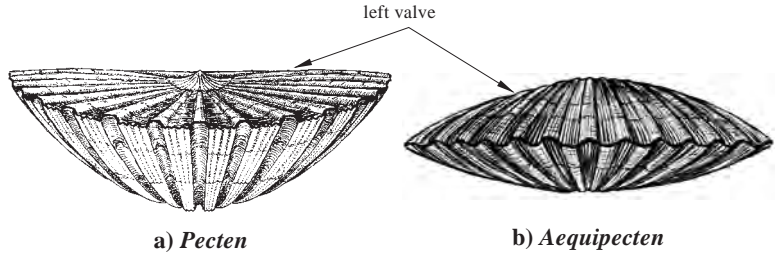


Fig. 2 ventral view of shell

- 3a. Shell relatively large, up to nearly 16 cm high; left valve with rounded radial ribs and weak interstitial riblets (Fig. 3) *Pecten jacobaeus*
- 3b. Shell relatively small, up to 8.6 cm high; left valve with somewhat angulated radial ribs and strong interstitial riblets (Fig. 4). . . *Pecten keppelianus*

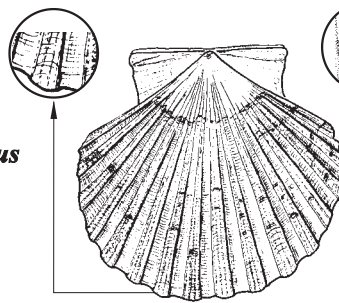


Fig. 3 *Pecten jacobaeus*

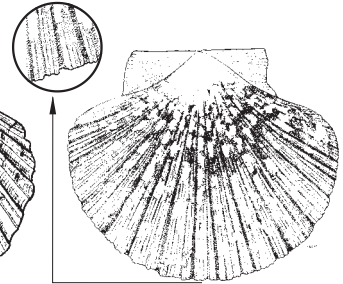
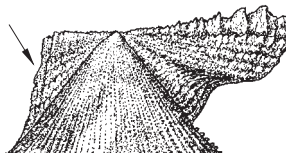
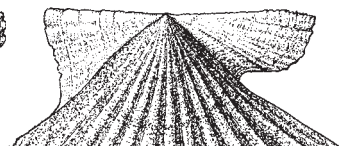


Fig. 4 *Pecten keppelianus*

- 4a. Ears markedly unequal in size, the posterior one much shorter than the anterior (Fig. 5a) → 5
- 4b. Ears about the same size (Fig. 5b) → 7



a) *Mimachlamys*



b) *Flexopecten*

Fig. 5 shape of ears

- 5a. Outer radial sculpture comprising a few large folds and numerous, surimposed small riblets → 6
- 5b. Outer radial sculpture devoid of folds, composed only of many small ribs with imbricated scales (Fig. 6) *Mimachlamys varia*
- 6a. Shell roughly rounded ovate in outline, only slightly higher than long; radial folds bearing large, strong nodules (Fig. 7) *Bractechlamys corallinoides*
- 6b. Shell roughly elongate ovate in outline, distinctly higher than long; radial folds devoid of nodules (Fig. 8) *Manupecten pesfelis*

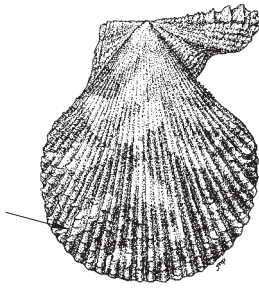


Fig. 6 *Mimachlamys varia* (exterior)

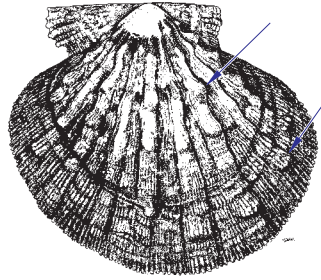


Fig. 7 *Bractechlamys corallinoides* (exterior)

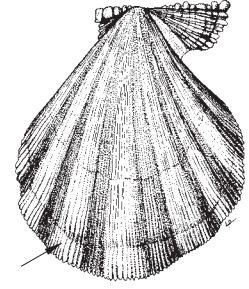


Fig. 8 *Manupecten pesfelis* (exterior)

- 7a. Outer surface of each valve with radial folds, not exceeding 14 in number → 8
- 7b. Outer surface of each valve with 16 to 25 radial ribs → 9

- 8a. Shell relatively large, up to 8.5 cm high; each valve with 9 to 14 radial folds (Fig. 9) . . . *Flexopecten glaber*

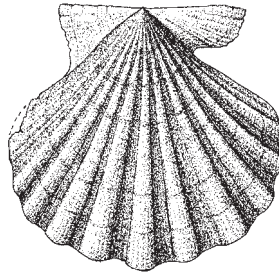


Fig. 9 *Flexopecten glaber* (exterior)

- 8b. Shell relatively small, up to 4 cm high; each valve with 4 to 6 radial folds, sometimes more or less split in 2 (Fig. 10) *Flexopecten flexuosus*

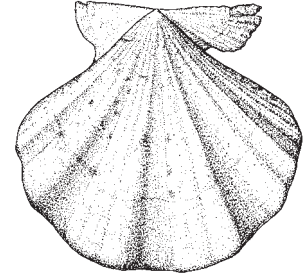
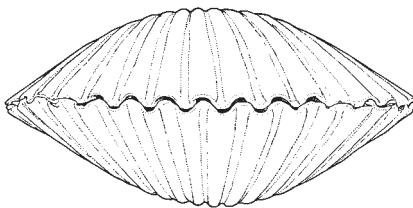


Fig. 10 *Flexopecten flexuosus* (exterior)

- 9a. Shell relatively small (up to 6 cm high) and inflated; subequivalve, right valve slightly more convex than left valve (Fig. 11a) *Aequipecten flabellum*
- 9b. Shell relatively large (up to 10 cm high) and laterally compressed; inequivalve, left valve more convex than right valve (Fig. 11b) *Aequipecten opercularis*



a) *Aequipecten flabellum*



b) *Aequipecten opercularis*

Fig. 12 ventral view of shell

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Aequipecten flabellum* (Gmelin, 1791).
- 🐚 *Aequipecten opercularis* (Linnaeus, 1758).
- 🐚 *Bractechlamys corallinoides* (d'Orbigny, 1840).
- 🐚 *Flexopecten flexuosus* (Poli, 1795).
- 🐚 *Flexopecten glaber* (Linnaeus, 1758).
- 🐚 *Hinnites corallinus* G.B. Sowerby I, 1827.
- 🐚 *Manupecten pesfelis* (Linnaeus, 1758).
- 🐚 *Mimachlamys varia* (Linnaeus, 1758).
- 🐚 *Pecten jacobaeus* (Linnaeus, 1758).
- 🐚 *Pecten keppelianus* G.B. Sowerby III, 1905.

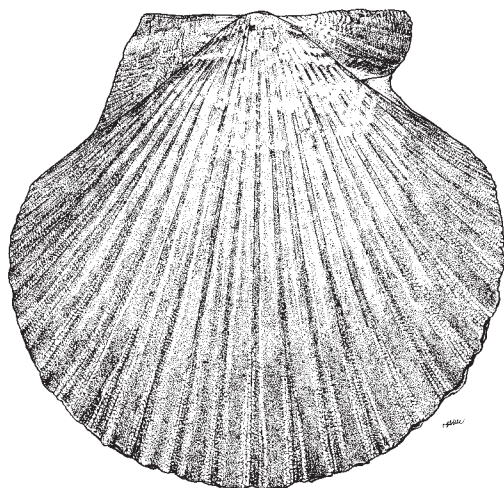
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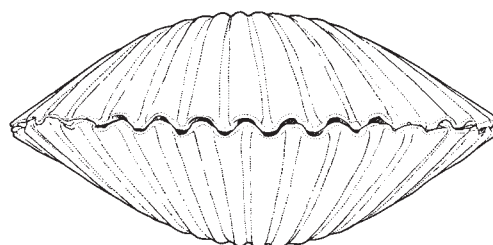
Aequipecten flabellum (Gmelin, 1791)

Frequent synonyms / misidentifications: *Argopecten flabellum* (Gmelin, 1791); *Chlamys flabellum* (Gmelin, 1791); *Pecten flabellum* Gmelin, 1791 / None.

FAO names: **En** – African fan scallop; **Fr** – Pétoncle éventail; **Sp** – Peine abanico.



right side view of entire shell



ventral view of entire shell

Diagnostic characters: Shell rather thin but solid, moderately small (up to 6 cm high), relatively inflated, subequilateral, **regularly rounded** in outline and **slightly longer than or nearly as long as high, subequivalve**. Both valves convex, the **left** (upper) valve only **slightly more inflated than the right** (lower) valve. Ears well developed and **about the same size**, the anterior ones only a little longer than the posterior ones. Ventral side of **right anterior ear with a moderately deep byssal notch and a ctenolium**. Outer surface with **18 to 23** moderately prominent rounded **radial ribs** on each valve, and **with numerous** secondary radial riblets and very fine, lamellate and wavy concentric lines throughout; **radial riblets and concentric lamellae equally developed on both valves**. Interior with more or less flattened radial ribs corresponding to the outer sculpture. **Colour:** outside of shell **very variable, mostly bright vermilion** to pink, brownish red or purple, occasionally cream or yellowish to brownish or greyish **uniform or maculated** near the umbones. Interior shiny white, often with orange to brownish margins.

Size: Maximum shell height 6 cm, commonly to 4 cm.

Habitat, biology, and fisheries: Common to locally abundant on various soft bottoms, offshore in the open sea, but also in shallower waters of protected bays, often in seagrass areas. Living free on the bottom, in very shallow subtidal levels and sublittoral zone, from about 1 to 30 m depths or more. An edible scallop of high quality, dredged offshore for commercial purposes from Senegal to Angola where it occurs in considerable quantities. However, the often small size of the scallop beds is rather unsuitable for large scale exploitation.

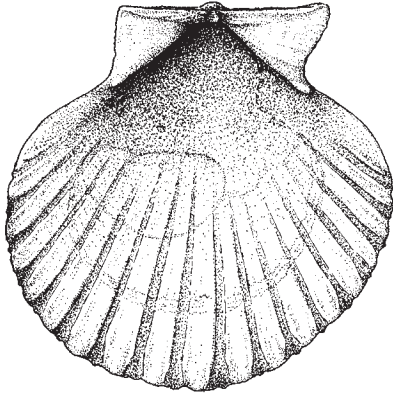
Distribution: Eastern Atlantic, from Western Sahara to northern Angola; Cape Verde Islands.



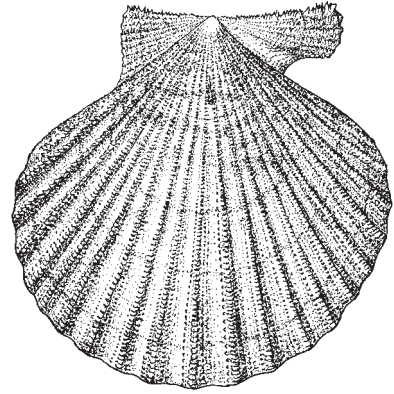
***Aequipecten opercularis* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Aequipecten audouini* (Payraudeau, 1826); *Chlamys lineata* (da Costa, 1778); *C. opercularis* (Linnaeus, 1758) / None.

FAO names: En – Queen scallop; Fr – Vanneau; Sp – Volandeira.



interior of left valve



exterior of right valve

Diagnostic characters: Shell thin but rather solid, medium-sized (up to 10 cm high), **laterally compressed**, subequilateral, **regularly rounded** in outline and **slightly longer than high**, somewhat **inequivalve**. Both valves **convex**, the left (upper) valve more inflated than the right (lower) valve. **Ears** well developed and **about the same size**, the anterior ones only a little longer than the posterior ones. Ventral side of **right anterior ear with a deep byssal notch and a ctenolium**. Outer surface with **16 to 25** shallow rounded **radial ribs** on each valve, and **with numerous** secondary radial riblets and very fine, lamellate and wavy concentric lines throughout; **radial riblets and concentric lamellae more developed on left valve** than on right valve. Interior with more or less flattened radial ribs corresponding to the outer sculpture. **Colour: outside of shell with very variable** and often vivid **colours**, more intensely on left than on right valve, **uniform or maculated**. Interior shiny white, frequently tinged with brown, pink, yellow or purple.



ventral view of entire shell

Size: Maximum shell height 11 cm, commonly from 4 to 6 cm.

Habitat, biology, and fisheries: Lying on various detritic bottoms. Sublittoral and shelf zone, from low tide to about 200 m. Coastal lagoons. Attached by byssus in young stages, living free in later stages and lying on its right valve (sometimes temporarily fixed to some hard object with a few byssal threads). Can swim actively. This species is actively exploited in many areas of its range. A popular food in France and in the United Kingdom.

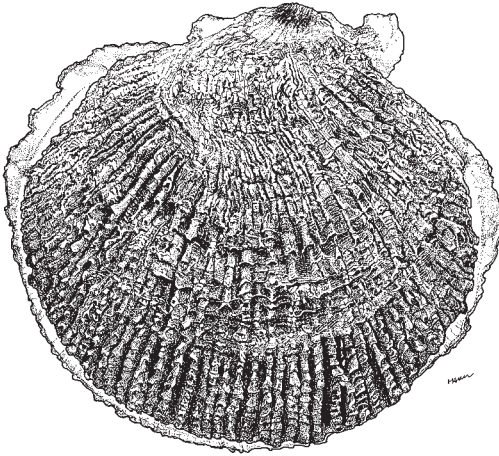
Distribution: Eastern Atlantic, from Norway and Iceland to Morocco, Macaronesian islands (Madeira and the Canaries), Cape Verde Archipelago and in the Mediterranean.



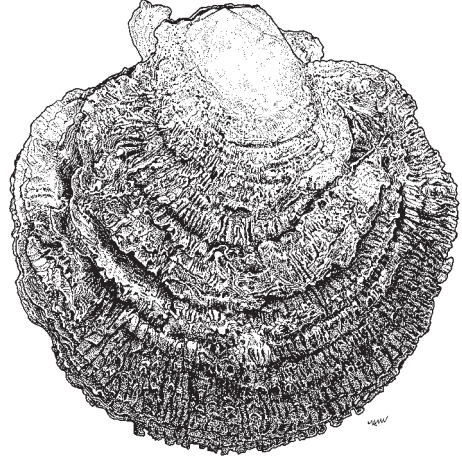
***Hinnites corallinus* G.B. Sowerby I, 1827**

Frequent synonyms / misidentifications: *Chlamys corallina* (G.B. Sowerby I, 1827); *Hinnites crispus* (Brocchi, 1814); *H. spectabilis* Cosel and Gofas, 1985 / None.

FAO names: En – Coral rock scallop; Fr – Hinnite rouge; Sp – Ostión gigante Africana.



left side view of entire shell



right side view of entire shell

Diagnostic characters: Shell large-sized (up to 17 cm high), massive, with an irregularly rounded and more or less distorted shape, cemented to substrate by right valve (shell not distorted during early stages of growth [height less than 2.5 cm] when cementation to substrate has not yet occurred). Ears well developed, slightly unequal in size and with a poorly marked byssal notch at right anterior ear of large specimens. Outer surface of the left (free) valve with many, irregular and unequal in size, scaly radial ribs and irregular growth lines; right (cemented) valve with broad irregular concentric lamellae on the attached area and radial ribs toward margins. **Colour:** outside of shell bright orange to brick red or deep purple. Interior whitish or yellowish, stained reddish on adductor muscle scar, or partly to nearly entirely deep purple; internal margins of the right (lower) valve frequently orange to brick red.

Size: Maximum shell height 17 cm, commonly from 8 to 10 cm.

Habitat, biology, and fisheries: Cemented to rocks and to various hard objects, either on areas exposed to light and in rock crevices or underside of rocks and stones. Requires very clear waters in moderately calm environments with strong seasonal upwelling. Mainly sublittoral, from extreme low tide to about 25 m depth. A common, locally abundant species, potentially exploitable like the East Pacific giant rock scallop *Crassadoma gigantea* (Gray, 1825).

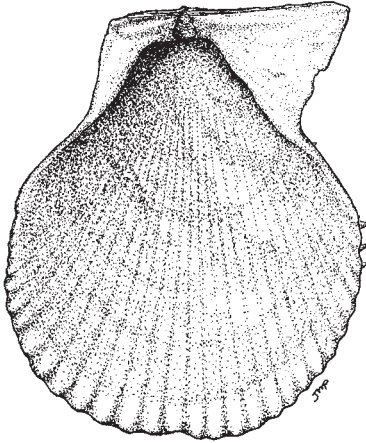
Distribution: Endemic to southern Angola.



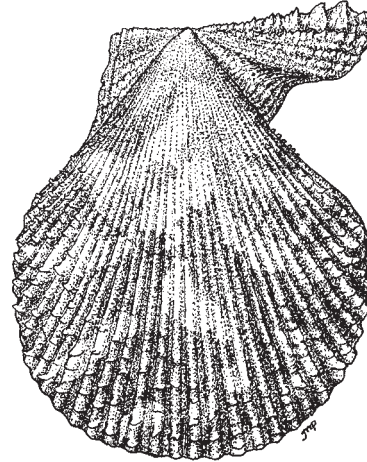
***Mimachlamys varia* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Chlamys varia* (Linnaeus, 1758); *Pecten varius* (Linnaeus, 1758) / None.

FAO names: **En** – Variegated scallop; **Fr** – Pétoncle bigarré; **Sp** – Zamburiña.



interior of left valve



exterior of right valve

Diagnostic characters: Shell rather thin but solid, medium-sized (up to 10 cm high), subequilateral, **higher than long and rounded ovate** in outline. **Both valves convex** and subequal, the right (lower) valve a little flatter than the left (upper) valve. **Ears markedly unequal in size**, the anterior ones more than twice longer than the posterior ones. Ventral side of **right anterior ear with a deep byssal notch and a ctenolium**. Main sculpture of **each valve with 25 to 35 regular, prominent, rounded radial ribs with numerous transverse imbricated scales** or spines. Interspaces about as broad as the ribs, nearly smooth, and with microscopic, obliquely diverging lines on anterior and posterior sides of valves. Ears densely ribbed with spiny radial cords; on right anterior ear, dorsalmost rib distinctly larger, somewhat protruding and adorned with erect scales. Interior with shallow radial undulations corresponding with the outer sculpture. **Colour: outside of shell extremely variable**, whitish, yellow, orange, red, brownish or purple, **often with irregular paler patterns**. Interior glossy, with similar coloration or white often tinged with brown or purple.

Size: Maximum shell height 10 cm, commonly from 4.5 to 5.5 cm.

Habitat, biology, and fisheries: Mostly living attached by byssus to rocks or to various hard objects, on coarse to fine soft bottoms. Can chemically cut its byssus and temporarily swim to find a new attachment site. Spawning from the end of spring to the end of summer. High density populations may occur when planktonic larvae are locally concentrated by coastal currents. A highly esteemed food, mainly collected subtidally by dredges (also at low tide in the northern part of its range). Commercial aquaculture experiments in progress in France. Brightly coloured shells also used for decorative purposes. Low tide to continental shelf, down to about 85 m depth. Also occurring in coastal lagoons.

Distribution: Eastern Atlantic, from Norway to Mauritania, Selvagen, Canary and Cape Verde islands. Throughout the Mediterranean; also in southwestern Black Sea, through Marmara Sea and the Bosphorus. Southern limit of distribution uncertain in the Atlantic, extending perhaps to Senegal.



***Pecten jacobaeus* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: None / *Pecten maximus* (Linnaeus, 1758); *P. keppelianus* G.B. Sowerby III, 1905.

FAO names: En – Great Mediterranean scallop; Fr – Coquille Saint-Jacques méditerranéenne; Sp – Concha de peregrino.

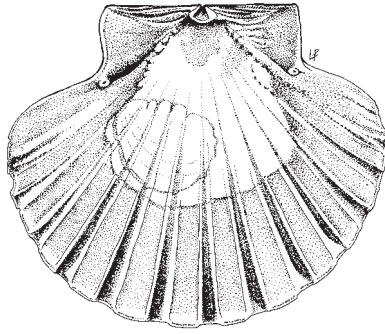
Diagnostic characters:

Shell large (up to nearly 16 cm high), rather thin but solid, **equilateral** and slightly longer than high, subcircular in outline **with** well developed and **nearly equal ears**, markedly **inequivalve**. **Left** (upper) **valve nearly flat** (slightly concave in early stages of growth), **right** (lower) **valve convex**. Right anterior ear devoid of byssal notch and ctenolium. Outer surface of each valve with **15 to 18**, regularly arranged, **prominent radial ribs** and fine lamellar concentric lines, mostly developed in rib interstices; **left valve with highly rounded radial ribs and weak riblets in the flattened interstices**; **ribs of right valve more angular** and flattened on top, **bearing well marked secondary radial riblets**. Interior glossy, with smooth radial folds corresponding to the main outer sculpture. **Colour: outside** of shell very variable, uniform or with colour patterns, **usually reddish brown on left valve, paler to whitish on right valve**. Interior porcelaneous white, often tinged with reddish brown on periphery.

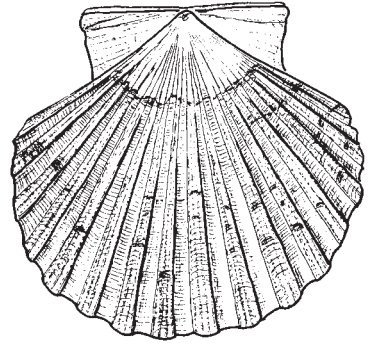
Size: Maximum shell height 15.8 cm, commonly from 8 to 10 cm.

Habitat, biology, and fisheries: Living free on various detrital bottoms. Capable of active swimming. Hermaphroditic species, with a reproductive cycle spreading over the whole year. Subtidal zone and continental shelf, to about 100 m depth or more. A highly appreciated sea food in the Mediterranean, where it is intensively exploited and even overfished locally. Actively trawled in Morocco, and used fresh or frozen.

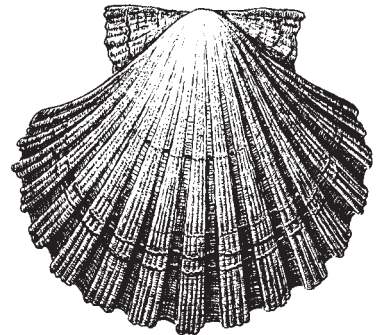
Distribution: Throughout the Mediterranean and in the nearby East Atlantic, from southern Portugal to Morocco; Macaronesian Islands, in the Azores, Madeira and the Canaries. Northern and southern limits of distribution uncertain because of recurrent confusion with *Pecten maximus* and *Pecten keppelianus*; most probably absent from tropical West Africa.



interior of left valve



exterior of left valve



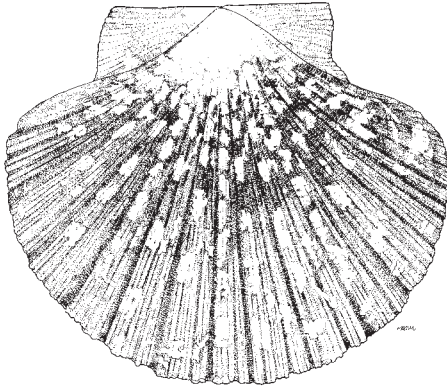
exterior of right valve



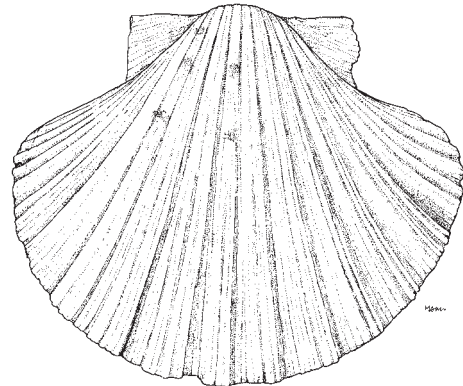
***Pecten keppelianus* G.B. Sowerby III, 1905**

Frequent synonyms / misidentifications: None / *Pecten jacobaeus* (Linnaeus, 1758); *Pecten maximus* (Linnaeus, 1758).

FAO names: **En** – African scallop; **Fr** – Coquille Saint-Jacques africaine; **Sp** – Vieira Africana.



exterior of left valve



exterior of right valve

Diagnostic characters: Shell medium-sized to **relatively small** (up to 8.6 cm high), **equilateral** and slightly longer than high, suborbicular in outline **with** well-developed and **nearly equal ears**, markedly **inequivalve**. **Left** (upper) **valve** slightly concave to **nearly flat**, **right** (lower) **valve** **strongly convex**. Right anterior ear devoid of byssal notch and ctenolium. Outer surface of each valve with **10 to 13**, regularly arranged, **prominent radial ribs**, and with fine lamellar concentric lines mostly developed in rib interstices of left valve; **left valve with somewhat angulated radial ribs and strong interstitial riblets**, progressively increasing in size toward ventral margin; **right valve with rather broad, poorly angular ribs, and with many smooth irregular thinner riblets**. Interior glossy, with smooth radial folds corresponding to the main outer sculpture. **Colour: outside of left valve orange to deep red or purplish brown**, often with light fawn near the umbo and with dark brown markings on radial ribs; **right valve paler coloured to whitish**, occasionally pinkish on umbonal area. Interior porcelaneous white.

Size: Maximum shell height 8.6 cm, commonly to 6 cm.

Habitat, biology, and fisheries: Living free on various sandy to muddy bottoms, with the right valve often half buried in the sediment and the left valve almost level with the substrate surface. Sublittoral water and continental shelf, from about 10 to 150 m depth or more. Can swim actively. Only occasionally exploited by trawlers, due to the often relatively limited density of its populations and rather small size of specimens.

Distribution: Eastern Atlantic, from Mauritania to southern Angola; the Canaries and Cape Verde Islands.

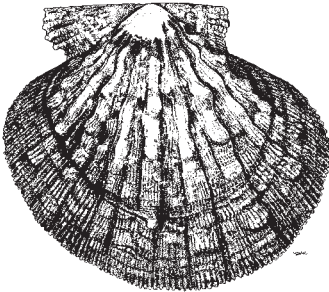


***Bractechlamys corallinoides* (d'Orbigny, 1840)**

Frequent synonyms / misidentifications: *Chlamys corallinoides* (d'Orbigny, 1840); *Lyropecten corallinoides* (d'Orbigny, 1840); *Nodipecten corallinoides* (d'Orbigny, 1840) / *Bractechlamys nodulifera* (G.B. Sowerby II, 1842).

En – Coral scallop; **Fr** – Pétoncle corail; **Sp** – Peine coral.

Maximum shell height 5 cm, commonly to 3.5 cm. Byssally attached on rocks at shallow subtidal depths or deeper on sandy bottoms with shells, gravels, stones or other hard substrates. Shallow water to continental shelf, from about 3 to 100 m depths (common from 25 to 45 m). A common, but localized species, trawled where common for its meat and for its decorative shell. Eastern Atlantic, in Portugal and oceanic islands off West Africa (Azores, Canary, Cape Verde and St Helena islands), but not along the continental coasts.



exterior of left valve

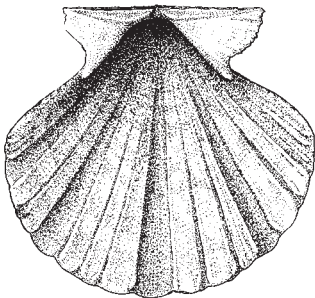


***Flexopecten flexuosus* (Poli, 1795)**

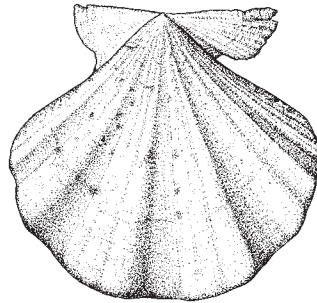
Frequent synonyms / misidentifications: *Chlamys flexuosa* (Poli, 1795); *Flexopecten coarctatus* (Born, 1778) [Invalidated name, based on the forgotten name *Ostrea coarctata*] / *Flexopecten glaber* (Linnaeus, 1758); *F. hyalinus* (Poli, 1795).

En – Flexuous scallop; **Fr** – Pétoncle ondé; **Sp** – Vieira ondulada.

Maximum shell height 4.5 cm, commonly to 2.5 cm. On detritic bottoms of sand, mud and gravel amongst seaweeds and/or rubble. Sublittoral zone to continental shelf, from about 10 to 250 m depths. Generally unexploited as food, due to its relatively small size, but shell sometimes used for decorative purposes. Throughout the Mediterranean and in the nearby East Atlantic, from Portugal to Morocco; Macaronesian archipelago, in the Azores, Madeira, the Selvagens and the Canaries, south to Cape Verde Islands; also through Marmara Sea and Bosphorus to the southwestern Black Sea.



interior of left valve



exterior of right valve

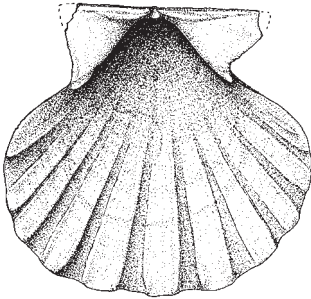


***Flexopecten glaber* (Linnaeus, 1758)**

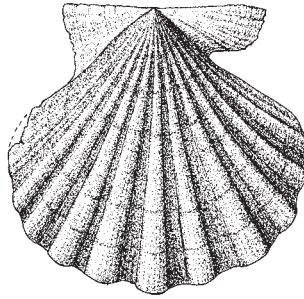
Frequent synonyms / misidentifications: *Chlamys glabra* (Linnaeus, 1758); *Proteopecten glaber* (Linnaeus, 1758); *P. griseus* (Lamarck, 1819) / *Flexopecten flexuosus* (Poli, 1795).

En – Smooth scallop; **Fr** – Pétoncle glabre; **Sp** – Xelét.

Maximum shell height 8.5 cm, commonly from 4 to 5 cm. On rocky, sandy or muddy detritic bottoms. Subtidal, common mostly in shallow water (from 6 m onward), but sometimes occurring deeper on continental shelf and slope. Can also live in coastal lagoons, in areas with moderate salinity variation of the sea water. Hermaphroditic species, reproductive cycle spreading over a large period. Actively exploited for food in the Mediterranean, but only occasionally in the Atlantic where it appears less commonly. Eastern Atlantic, from Portugal to Morocco. Throughout the Mediterranean; also in the Black Sea. Northernmost limit uncertain, perhaps extending to the Bay of Biscay (France).



interior of left valve



exterior of right valve

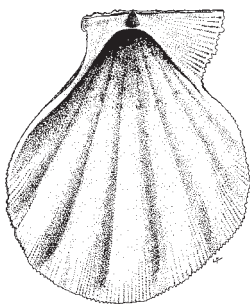


***Manupecten pesfelis* (Linnaeus, 1758)**

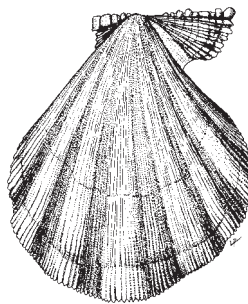
Frequent synonyms / misidentifications: *Chlamys pesfelis* (Linnaeus, 1758) / None.

En – Cat's paw scallop; **Fr** – Pétoncle-gibecière; **Sp** – Mano de gato.

Maximum shell height 7.5 cm, commonly to 5 cm. On various bottoms of rocks, coral rubble or gravels on muddy sand. Shallow subtidal to continental shelf down to 250 m depth or more. May be quite common in the Canaries, but often uncommon to rare offshore in West Africa. Eastern Atlantic, from Bay of Biscay (France) to Senegal, Côte d'Ivoire and Angola; Macaronesian islands (Madeira, Canary and Selvagen Islands) and the Cape Verde Archipelago. Throughout the Mediterranean.



interior of left valve



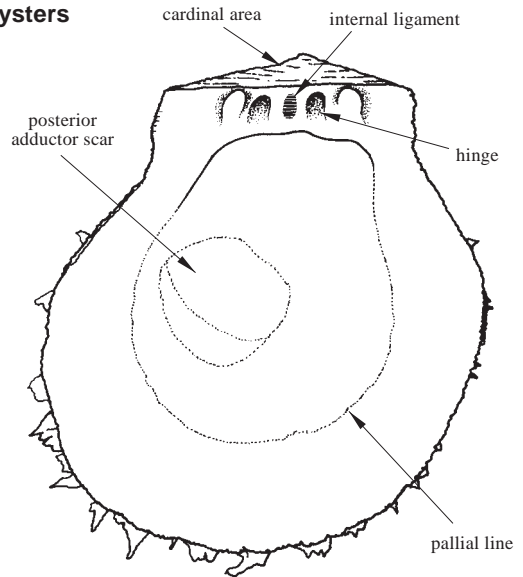
exterior of right valve



SPONDYLIDAE

Thorny oysters

D **Diagnostic characters:** Shell stout, very variable in shape but generally subequilateral, rounded and higher than long; usually **inequivalve** and **cemented to substrate by the right (lower) valve**, which is then higher and more convex than the left (upper) valve. **Hinge line straight**, with a small, more or less equal ear on either side of the median, orthogyrate umbo. Outer surface with more or less spinose to scaly irregular radial ribs, often brightly coloured (at least at the left valve). Umbones on top of a **trigonal cardinal area**, which is usually **higher in the right valve than in the left**. **Ligament mainly internal**, lodged in a deep median pit of the hinge plate. **Hinge stout**, with **2 strong curved teeth and 2 deep sockets in each valve, symmetrically arranged in relation to the internal ligament**. Interior of shell porcelaneous. **A single, rounded posterior adductor muscle scar**. **Pallial line without a sinus**. Gills of filibranchiate type, with folded branchial sheets. Foot reduced, without a byssus in the adult. Siphons absent. Mantle widely open, with marginal tentacles and eyes.



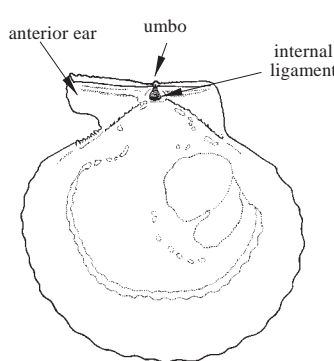
interior of left valve

Habitat, biology, and fisheries: Sedentary animals, living mainly in relatively shallow waters in coralline areas, generally strongly cemented to hard substrates by their right valve. Suspension filter-feeders. Sexes separate, or hermaphrodites. Free-swimming larval stage present. A temporary, postlarval attachment by means of a byssus occurs before the cementation to substrate by the right valve. Thorny oysters are actively collected for food in some areas, where their meat is considered a delicacy. The shell of 1 species was traditionally used as ornament in tropical West Africa, and could reach a very high price. Nowadays, Spodylidae are still exploited for their shell which is used in the shellcraft industry or even as a source of lime industries. The upper (left) valve was traditionally used as ornament for knives or swords, and the brightest red and most regular valves may reach a high price, notably in Côte d'Ivoire. Also actively collected for food in Canary Islands.

Similar families occurring in the area

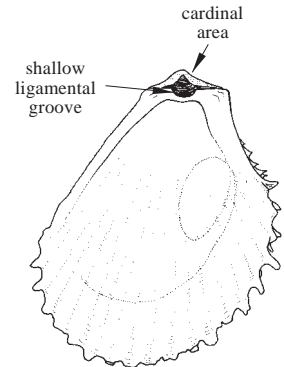
Pectinidae: umbones not separated from dorsal margin by a cardinal area. Right anterior ear often with a byssal notch and a ctenolium.

Limidae: shell equivalve. Cardinal area with a shallow median ligamental furrow. Hinge without teeth.



interior of right valve

Pectinidae



interior of right valve

Limidae

Key to species of interest to fisheries occurring in the area

1a. Outer sculpture and colour usually similar on both valves, bright red with 5 or 6 (up to 12) main radial ribs bearing strong and often spatulate spines; interior of shell whitish, with a conspicuous red marginal rim (Fig. 1). . . . ***Spondylus senegalensis***

1b. Outer sculpture and colour of valves usually dissimilar; left valve typically purple to dull wine red, with 9 or 10 (up to 15) main radial ribs bearing strong and sharp to flattened spines; right valve whitish, mostly with numerous irregular and lamellose concentric ridges; interior of shell whitish, without wide red margins (Fig. 2). . . ***Spondylus gaederopus***



Fig. 1 *Spondylus senegalensis* (exterior)

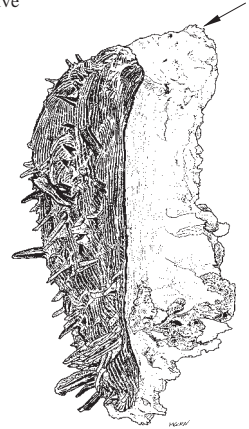


Fig. 2 *Spondylus gaederopus* (exterior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

🐚 *Spondylus gaederopus* Linnaeus, 1758.

🐚 *Spondylus senegalensis* Schreibers, 1793.

References

Lamprell, K. 1987. *Spiny Oyster Shells of the World. Spondylus*. Leiden, Brill & Backhuys: 84 p.

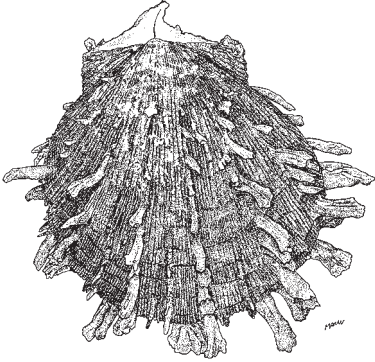
Lamprell, K. 2006. *Spiny Oysters: A Revision of the Living Spondylus Species of the World*. Brisbane, Lamprell: 119 p., 41 pls.

Zavarei, A. 1973. Monographie des Spondylidae (Lamellibranches) actuels et fossiles. *Contributions du Centre d'Études et de Recherches de Paléontologie biostratigraphique*, 4: 1–233, pl.1–16.

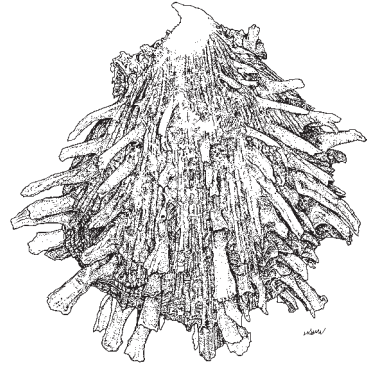
***Spondylus senegalensis* Schreibers, 1793**

Frequent synonyms / misidentifications: *Spondylus inermis* Alvarado & Alvarez, 1964; *S. powelli* E.A. Smith, 1892 / *Spondylus gaederopus* (Linnaeus, 1758).

FAO names: **En** – Powell's thorny oyster; **Fr** – Spondyle guron; **Sp** – Ostra espinosa guron.



left side view of shell



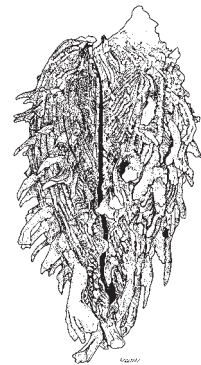
right side view of shell

Diagnostic characters: Shell variable in shape but rather **thick and solid**, about as high as long to slightly higher than long and **irregularly rounded in outline**. **Inequivalve**, right (lower) valve somewhat more convex, thicker and higher than left (upper) valve, with a well developed cardinal area. Ears medium-sized, subequal in shape. Outer surface of valves with numerous, unequal and often tortuous radial ribs and riblets; **left valve with 5 or 6** (up to 12) **main ribs bearing short to long spines, often spatulate and densely set toward the margin, separated by smaller**, smooth to minutely spinose **secondary ribs**; **right valve with similar sculpture**, sometimes with irregular concentric lamellose ridges developed on attachment area. Internal margins of valves crenulated. **Colour:** **outside** of both valves of shell **bright red** or orange to brownish red, often somewhat lighter toward the umbones; cardinal area of right valve whitish. **Interior whitish, with a conspicuous red marginal rim** and often a brownish hue on hinge teeth.

Size: Maximum shell length 15 cm, commonly to 9 cm.

Habitat, biology, and fisheries: Cemented to rocks and to various hard objects on soft bottoms, such as stones, other shells or to oil drilling platforms. Common in sublittoral zone, from shallow waters to about 50 m depths. Actively collected in tropical West Africa, with trawls, dredges or snorkelling, mainly for its shell which is used in the local shellcraft industries. The upper (left) valve was traditionally used as ornament for knives or swords, and the brightest red and most regular valves may reach a high price, notably in Côte d'Ivoire. Also actively collected for food in Canary Islands.

Distribution: Eastern Atlantic, from Senegal to southern Angola; Macaronesian Islands (Madeira and Canary islands), the Cape Verde Archipelago and Gulf of Guinea islands (São Tomé, Ilha do Príncipe, Annobon).



posterior view of shell

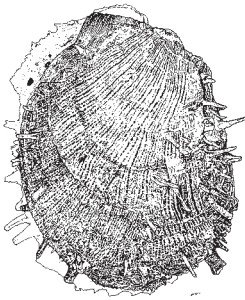


***Spondylus gaederopus* Linnaeus, 1758**

Frequent synonyms / misidentifications: None / *Spondylus senegalensis* Schreibers, 1793.

En – European thorny oyster; **Fr** – Spondyle pied-d'âne; **Sp** – Ostra roja.

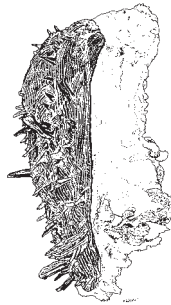
Maximum shell length 13.5 cm, commonly to 8 cm. Cemented to hard substrates on rocky, coralligenous or coarse detritic bottoms. Prefers exposed situations, in areas under the influence of moderate but permanent currents. Sublittoral zone, from about 5 to 50 m depths. A common species, sometimes occurring in banks. Collected with bottoms trawls, dredges or snorkelling in shallow water, both for its attractive shell and its meat which is considered a delicacy. Due to some unknown reasons, Mediterranean populations have strongly declined since the 1980s. Throughout the Mediterranean and in the nearby East Atlantic, from southern Portugal to Morocco.



left side view of shell



right side view of shell



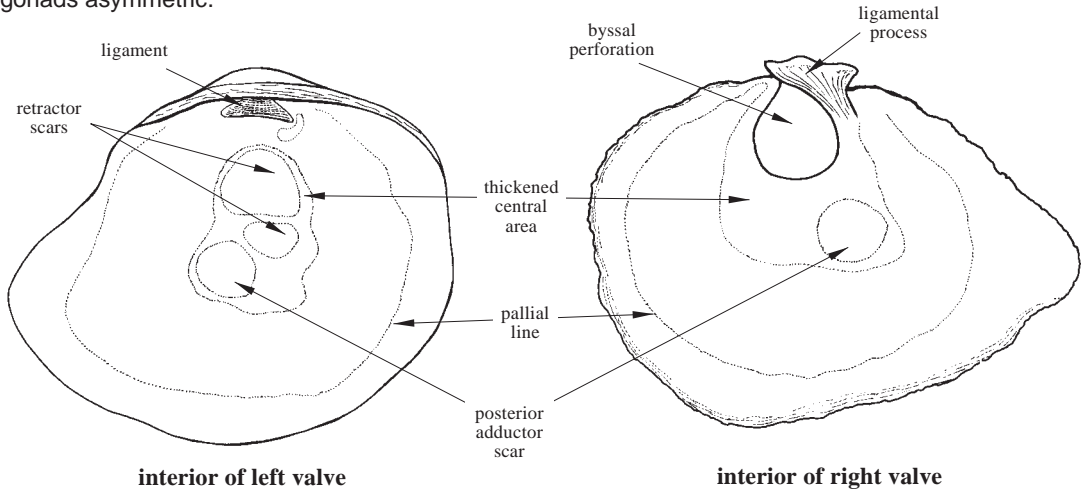
posterior view of shell



ANOMIIDAE

Jingle shells

Diagnostic characters: Shell inequivalve, often very variable and irregular in shape, closely adhering to substrate by mean of a calcified byssus passing through a hole-like embayment of right valve. Left (upper) valve more or less convex, right (lower) valve flattened. Ligament internal, attached to a deep transverse scar in the left valve, and 1 protruding process in the right valve. Hinge without teeth, asymmetric. Interior more or less nacreous, with a thickened central area. Only one (posterior) adductor muscle scar in each valve; left valve also with 1 or 2 retractor muscle scars (for the byssus, and sometimes for the foot) within the central area. No pallial sinus. Filibranchiate type gills, the right one deflected backwards because of the byssus. Mantle without ventral fusion. Sexes separate, gonads asymmetric.



Habitat, biology, and fisheries: Sedentary filter-feeding species, living attached to various hard substrates, including stones, mangrove roots, the shell of dead and living molluscs or corals, their lower valve conforming to the substrate shape. Foot slender and very mobile, used to clear debris from the mantle cavity. Reproduction with a planktonic larval stage. Anomiidae are sometimes locally collected for subsistence purposes by coastal people, but mainly for their attractive shell used in the shellcraft industry.

Similar families occurring in the area

The very special mode of fixation easily distinguishes Anomiidae from other families.

References

Yonge, C.M. 1977. Form and evolution in the Anomiacea (Mollusca: Bivalvia) – *Pododesmus*, *Anomia*, *Patro*, *Enigmonia* (Anomiidae): *Placunanomia*, *Placuna* (Placunidae Fam. Nov.). *Philosophical Transactions of the Royal Society of London B*, 276(950): 453–523.

A single species of interest to fisheries occurring in the area

***Anomia ephippium* Linnaeus, 1758**

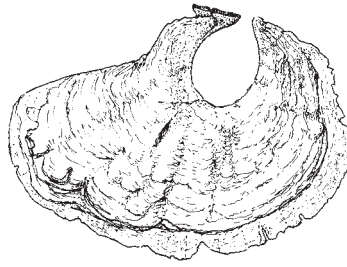
Frequent synonyms / misidentifications: None / None.

En – Common jingle shell; **Fr** – Anomie pelure d'oignon; **Sp** – Ostra de perro.

Maximum shell length 8.5 cm, commonly from 4 to 5 cm. Tightly fixed to various hard substrates, rocks, stones, shells, gorgonians, sea weeds, etc. Low intertidal, sublittoral and shelf zones to depths of 150 m or more; most common from the shore to 20 m depth. Penetrates also in coastal lagoons and areas with reduced salinity. Sometimes very common in trawl or dredge catches, it is mainly collected for its attractive shell with soft colours and nacreous hue. Eastern Atlantic, from Iceland and the British Isles to Guinea, and from Congo to northern Angola; Canary Islands. Throughout the Mediterranean and the Black Sea.



interior of left valve



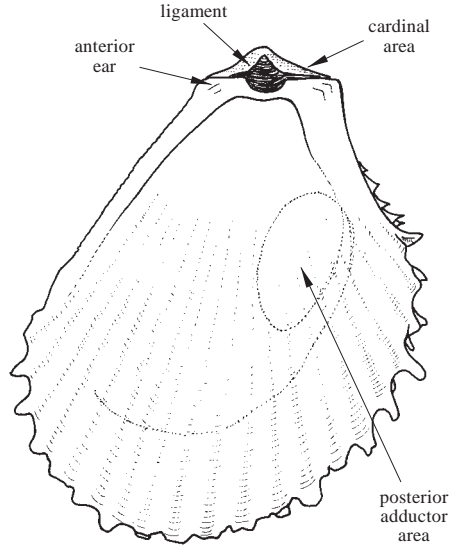
exterior of right valve



LIMIDAE

File shells

Diagnostic characters: Shell inequivalve, higher than long, obliquely elongate ovate to subtrigonal in outline, closed or gaping anteriorly and posteriorly; inequilateral, frequently more or less extended obliquely in an anteroventral direction. Dorsal valve margin with 2 small ears, the anterior one often reduced. Outer surface usually white or cream-coloured, typically with radial ribbing. Umbones well separated, each one on top of a trigonal cardinal area provided with a shallow median ligamental groove. Hinge short and straightish, either toothless, with feeble denticles, or with a few tiny marginal crenulations. Interior of shell porcelaneous. A single (posterior) adductor muscle scar, generally rather obscure. No pallial sinus. Internal margins smooth to crenulate. Gills of eulamellibranchiate type, with folded branchial sheets. Foot short and thick to long and slender, with or without a byssus. Mantle widely open, fringed with many long and retractable tentacles on margins. Soft parts whitish to yellowish red or even brilliant red.



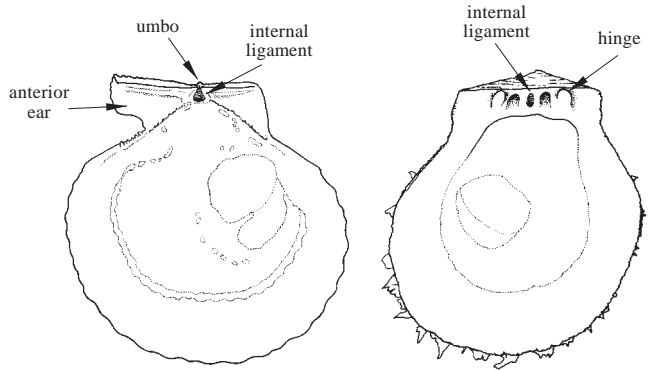
interior of right valve

Habitat, biology, and fisheries: The Limidae are either attached by a byssus or free-living animals, depending on species. They occur in shallow to deep-water habitats, mostly sheltered in rock crevices, under stones and among marine growths, but also in soft substrates, more or less buried or lying on the surface. Some species can build a nest lined with tangled byssal threads. When disturbed, many are capable of swimming by flapping the valves together, expelling jets of water from either side of the hinge, with the commissural plane directed vertically and the pallial tentacles widely spread. To disconcert a predator, the animal can shed at will tentacles that wriggle continuously. Generally of minor importance to fisheries. Large specimens of the genus *Acesta* occasionally caught offshore in prawn trawl nets. However, the family is of great potential interest for aquarium trade in the studied area. File shells are often particularly appreciated by aquarists, because of the bright orange to red colour of the animal, and because of the great number of spectacular, long and frequently vividly coloured tentacles that spread out from the contrasting white shell.

Similar families occurring in the area

Pectinidae: umbones not separated from dorsal margin by a trigonal cardinal area. Anterior ears generally well developed, often with a byssal notch and a ctenolium in right valve. Ligament mostly internal, fitting in a trigonal pit pointing under the umbones.

Spondylidae: shell inequivalve, cemented to substrate by right valve. Cardinal area commonly more developed in right valve than in left. Hinge stout, with 2 strong teeth and 2 deep sockets, symmetrically arranged in relation to the internal ligament.



interior of right valve
Pectinidae

interior of left valve)\ **Spondylidae**

Key to species of interest to fisheries occurring in the area

- 1a. Shell thick; outer surface with prominent scaly radial ribs (Fig. 1) . ***Lima lima***
- 1b. Shell thin; outer surface with fine to ill-defined radial riblets → 2
- 2a. Shell relatively small (less than 6 cm high), widely gaping anteriorly and posteriorly.; ears subequal in size and relatively well developed (Fig. 2) ***Limaria tuberculata***
- 2b. Shell large to very large (attaining 16 cm high or more), narrowly gaping anteriorly and closed posteriorly; ears very unequal and small, the anterior one exteriorly obsolete → 3
- 3a. Shell very large (up to 20 cm high), relatively thick and heavy; outer sculpture of many fine and somewhat wavy radial riblets; lunule not strongly limited; periostracum pale straw coloured to nearly colourless; interior of valves slightly iridescent (Fig. 3) ***Acesta excavata***
- 3b. Shell large, up to 16.5 cm high; relatively thin and fragile; anterior ear visible as a small knob from the outside; posterior ear nearly smooth; outer sculpture smoothish, with poorly defined to obsolete radial riblets; lunule bordered by neat ridge; periostracum brownish to dark brown; interior of valves not iridescent (Fig. 4) ***Acesta angolensis***

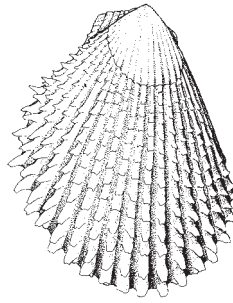


Fig. 1 *Lima lima* (exterior)

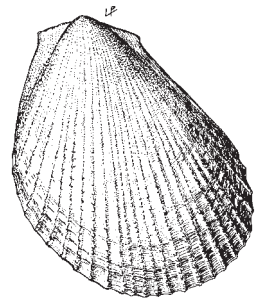


Fig. 2 *Limaria tuberculata* (exterior)

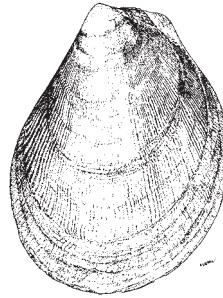


Fig. 3 *Acesta excavata* (exterior)

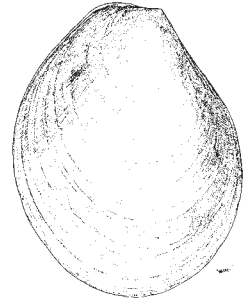


Fig. 4 *Acesta angolensis* (exterior)

List of species of interest to fisheries occurring in the area.

The symbol 🐚 is given when species accounts are included.

- 🐚 *Acesta angolensis* (Adam and Knudsen, 1955).
- 🐚 *Acesta excavata* (Fabricius, 1779).
- 🐚 *Lima lima* (Linnaeus, 1758).
- 🐚 *Limaria tuberculata* (Olivi, 1792).

References

Boss, K.J. 1965. Note on *Lima (Acesta) excavata*. *Nautilus*, 79(2): 54–58.

Lamy, E. 1930a. Révision des Limidae vivants du Muséum national d'Histoire naturelle de Paris. *Journal de Conchyliologie*, 74(2): 89–114.

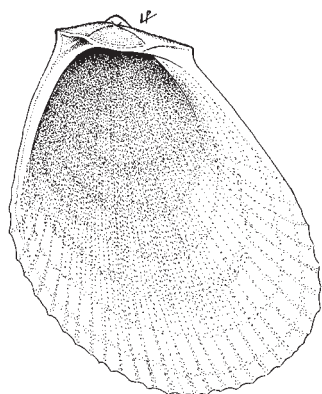
Lamy, E. 1930b. Révision des Limidae vivants du Muséum national d'Histoire naturelle de Paris (Suite). *Journal de Conchyliologie*, 74(3): 169–98, pl.1.

Mikkelsen, P.M. & Bieler, R. 2003. Systematic revision of the western Atlantic clams, *Lima* and *Ctenoides* (Bivalvia: Limoida: Limidae). *Invertebrate Systematics*, 17(5): 667–710.

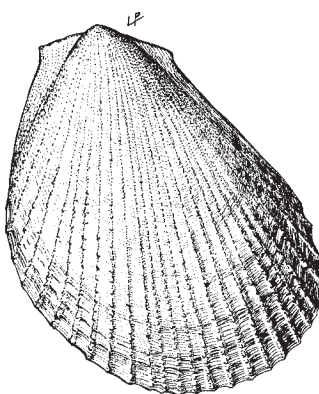
***Limaria tuberculata* (Olivi, 1792)**

Frequent synonyms / misidentifications: *Lima exilis* Wood, 1839; *L. inflata* (Chemnitz, 1784) [Invalid name]; *Mantellum inflatum* (Link, 1807) / *Lima inflata* Locard, 1886 [= *Lima lima*]; *Limaria pellucida* (C.B.Adams, 1848).

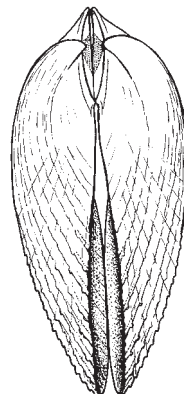
FAO names: En – Inflated file shell; Fr – Lime enflée; Sp – Peine nodoso.



interior of left valve



exterior of right valve



anterior view of entire shell

Diagnostic characters: Shell thin but quite solid, **relatively small** (not exceeding 5 cm high), **rather inflated** and **widely gaping on both anterior and posterior sides**. **Ears relatively well developed and subequal in size**; posterior ear slightly shorter than anterior ear and not distinctly set off from the valve surface. **Outside of valves with numerous fine radial riblets**, often bearing small nodules, and crossed by concentric growth lines and grooves. Periostracum thin, translucent and pale straw coloured to nearly colourless and inconspicuous. Ligamental groove broad. **Hinge completely devoid of teeth**, denticles or marginal crenulations. Internal surface of valves smooth and glossy, slightly undulated by the outer radial sculpture. **Colour:** valves entirely white, externally and interiorly, contrasting with the vivid pink-orange colour of the living animal exhibiting long and translucent white to yellowish mantle tentacles.

Size: Maximum shell length 5.8 cm, commonly from 3 to 4 cm.

Habitat, biology, and fisheries: On rocky bottoms covered with seaweeds, and on sandy bottoms with shell debris and calcareous algae or with eelgrass. Shallow water and sublittoral zone to about 40 m depth. Frequently builds a nest of byssal threads with bits of seaweed, stones and shells, and can actively swim by clapping its valves when necessary. Locally collected in shallow waters where common, this attractive species is of potential interest for the aquarium trade. Outside the studied area, known to be eaten at least on French Mediterranean coasts.

Distribution: Eastern Atlantic, from Portugal to Guinea, and from Gabon to southern Angola; Canary and Cape Verde islands. Throughout the Mediterranean.

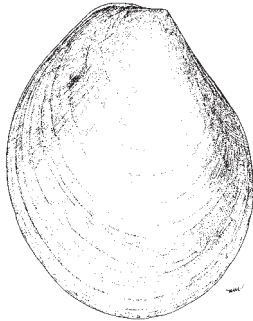


***Acesta angolensis* (Adam and Knudsen, 1955)**

Frequent synonyms / misidentifications: None / *Acesta excavata* (Fabricius, 1779).

En – Angolan giant file shell; **Fr** – Lime géante angolaise; **Sp** – Peine gigante del Angola.

Maximum shell height 16.4 cm, commonly from 12 to 14 cm. Mainly free living, on soft, mostly muddy bottoms. Continental shelf and slope, from about 300 to 1 000 m depth. More common from Pointe-Noire (Congo) to Moçamedes (Angola). May be attacked by boring parasitic foraminifera *Hyrrokkinn carnivora*, causing small rounded deformations of the shell. Occasionally collected by shrimp trawlers operating in deep water, and also found attached to crab traps around Moçâmedes, southern Angola, at about 500 m depth. Eastern Atlantic, from northwestern Gabon to southern Angola.



exterior of right valve

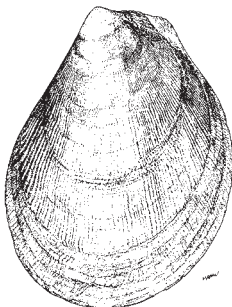


***Acesta excavata* (Fabricius, 1779)**

Frequent synonyms / misidentifications: *Lima excavata* (Fabricius, 1779) / None.

En – European giant file shell; **Fr** – Lime géante européenne; **Sp** – Peine gigante europeo.

Maximum shell height 20 cm, commonly to 14 cm. Attached by strong byssus to rocky bottoms, or to various hard objects on soft bottoms such as stones or deep corals. Continental shelf and slope, from 180 to at least 2 635 m deep. Moderately common locally from about 200 to 800 m depths, on steep rock cliffs with anemones and sponges or associated with deep white corals. Sex changing from male to female during lifetime of the animal. Frequently attacked by boring parasitic foraminifera *Hyrrokkinn sarcophaga*, causing small rounded depression on the outside of shell and callus cast on inner surface, secreted by the mantle against the parasite. Bycatch of shrimp trawlers off Mauritania, Dakar area (Senegal) and Côte d'Ivoire, at about 250 to 450 m depths. Eastern Atlantic, from northern Norway to Senegal, in Côte d'Ivoire, the Canaries and the Azores. Also present in the Mediterranean. Northern Atlantic, west to Iceland, Greenland and Newfoundland.



exterior of left valve

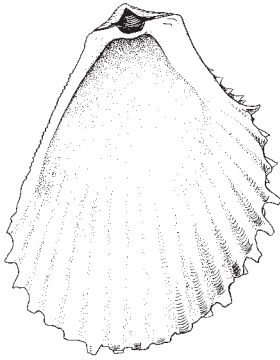


Lima lima (Linnaeus, 1758)

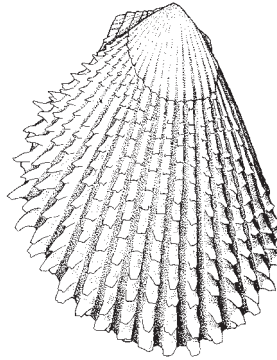
Frequent synonyms / misidentifications: *Lima squamosa* Lamarck, 1801; *Radula lima* (Linnaeus, 1758) / *Lima caribaea* d'Orbigny, 1842; *L. vulgaris* Link, 1807.

En – Spiny file shell; **Fr** – Lime écailleuse; **Sp** – Peine.

Maximum shell height 7 cm, commonly to 5 cm. Byssally attached on various hard substrates of rocky, coarse detritic and coralligenous bottoms. Common in clear water environments. Shallow subtidal zone to continental shelf, from about 2 to 140 m and occasionally deeper. Locally collected for subsistence purposes. The shell is used in making decorative ornaments. Eastern Atlantic, from Portugal to Morocco and in Gabon; Canary and Cape Verde islands. Throughout the Mediterranean. Western Atlantic; north to southeast Florida and Bermuda, throughout the Caribbean and south to Brazil.



interior of right valve



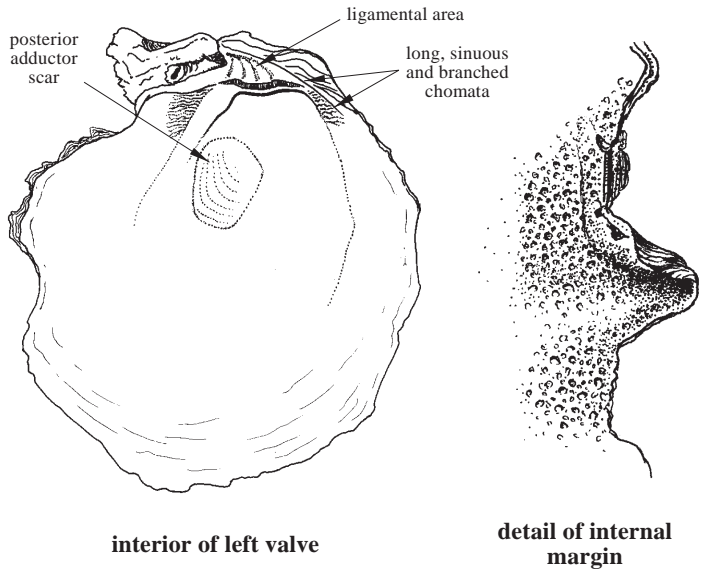
exterior of right valve



GRYPHAEIDAE

Honey-comb oysters

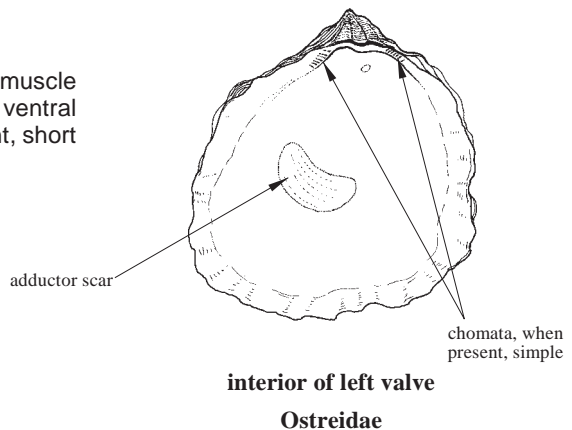
Diagnostic characters: Shell **solid**, often irregularly shaped, **more or less inequivalve**, **cemented to substrate by the left (lower) valve** which is generally somewhat deeper and larger. Both valves convex and similarly sculptured, with large, irregular radial ribs provided with hollow tubular extensions, or right (upper) valve quite flat, with imbricating thin plates of horny material tending to protrude beyond the shell margin. **Shell with a microscopic vesicular structure** (the honeycomb structure), easily seen under a lens on an eroded part of the shell or along peripheral area of the interior. **Ligamental area with a shallow median groove**. **Hinge without teeth**. Umbonal cavity generally very shallow. **A single**, large and **rounded** (posterior) **adductor muscle scar**, placed **closer to the hinge than to the ventral margin**. Pallial line absent. Internal periphery of the valves with a slight inframarginal fold or line. Internal margins with **long, branched, sinuous chomata** on either side of the ligamental area. Gills of eulamellibranchiate type. Pallial lobes free, with marginal tentacles.



Habitat, biology, and fisheries: Suspension filter-feeding animals, living cemented to the substrate by the left valve, either in littoral and shallow subtidal levels, or in deeper waters. Sexes separate. Fertilization external, without an incubatory stage, producing free-swimming planktonic larvae. Though they are collected in many areas, the Gryphaeidae are generally less prized for food than species of the related family Ostreidae.

Similar families occurring in the area

Ostreidae: shell structure not vesicular. Adductor muscle scar median in position or placed nearer to the ventral shell margin than to the hinge. Chomata, if present, short and simple.



Key to species of interest to fisheries occurring in the area

Note: since honey-comb oysters live attached to hard objects and are often gregarious, morphological features of their shell may be exceedingly variable among individuals, sometimes making species identification very difficult. The following key provides a simplified guide to the main shell features that are easily recognisable in the field.

- 1a. Shell thick and heavy, medium-sized to large (up to 10 cm high); both valves convex, left valve slightly more inflated than right valve; surfaces of valves with coarse, irregular radial folds, forming a saw-toothed shell margin and often provided with short, hollow tubular extensions; attachment area usually large (Fig. 1) ***Hyotissa rosea***
- 1b. Shell thin and light, small to medium-sized (up to 8.5 cm high); right valve flat to somewhat concave, left valve strongly convex; surface of valves almost without sculpture, shell margins smooth; attachment area usually small (Fig. 2) ***Neopycnodonte cochlear***

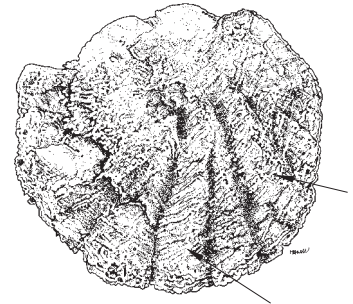


Fig. 1 *Hyotissa rosea* (exterior)

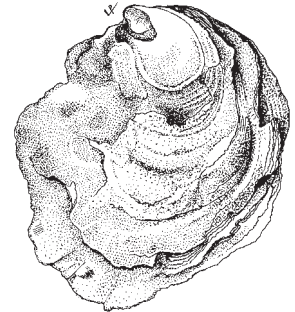


Fig. 2 *Neopycnodonte cochlear* (exterior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Hyotissa rosea* (Gmelin, 1791)
- 🐚 *Neopycnodonte cochlear* (Poli, 1795).

References

Carriker, M.R. & Gaffney, P.M. 1996. A catalogue of selected species of living oysters (Ostreacea) of the world. In V.S. Kennedy, R.I.E. Newell & A.E. Eble, eds. *The Eastern Oyster, Crassostrea virginica*. Maryland Sea Grant, College Park: 1–18.

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***Hyotissa rosea* (Gmelin, 1791)**

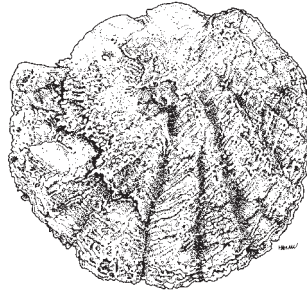
Frequent synonyms / misidentifications: *Hyotissa mcgintyi* (Harry, 1985); *Ostrea thomasi* McLean, 1941 [not of Glenn, 1904]; *Parahyotissa mcgintyi* Harry, 1985 / *Hyotissa hyotis* (Linnaeus, 1758); *Ostrea senegalensis* Gmelin, 1791 [= *Dendostrea senegalensis* (Gmelin, 1791)].

En – McGinty oyster; **Fr** – Pycnodonte vétan; **Sp** – Ostra vetan.

Maximum shell length 10 cm, commonly from 6 to 8 cm. On rocky bottoms, or various soft bottoms with gravels, shells, coral rubble and calcareous algae. Prefers clear waters, from shallow subtidal levels to upper continental shelf, down to about 100 m depth; most common from 3 to about 60 m depths. Has been found abundantly on offshore oil platforms. Occasionally collected by trawlers, but does not seem to be abundant enough for sustained commercial exploitation in West Africa. Tropical to subtropical areas of the Atlantic. Eastern Atlantic from Senegal to southern Angola; in Cape Verde, São Tomé, Ilha do Principe and Annobon Islands. Western Atlantic, from North Carolina throughout the Caribbean to Venezuela, and perhaps further south to Brazil.



detail of internal margins



exterior of right valve

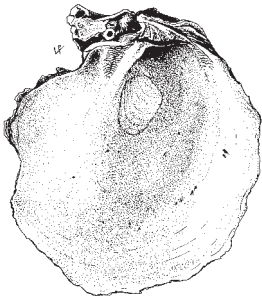


***Neopycnodonte cochlear* (Poli, 1795)**

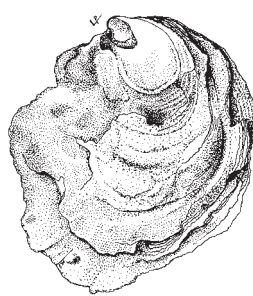
Frequent synonyms / misidentifications: *Notostrea musashiana* (Yokoyama, 1920); *Ostrea cochlear* Poli, 1795; *O. hiranoi* Baker and Spicer, 1930; *Pycnodonta cochlear* (Poli, 1795) / None.

En – Spoon oyster; **Fr** – Pycnodonte-cuillère; **Sp** – Ostra del sur.

Maximum shell length 8.5 cm, commonly to 4.5 cm. Mostly on soft bottoms, attached to secondary hard substrates such as stones, shells, gorgonians, coral pieces or even wrecks. Living both solitary and gregariously, offshore to considerable depths (from about 25 m to more than 2 000 m); most common on continental shelf and upper slope (at 50 to 250 m depths). Occasionally trawled or dredged where common in rather deep waters, but rarely marketed because of its frequently reduced mean size. Eastern Atlantic, from southern Ireland to northern Angola; oceanic islands of Annobon, the Canaries and the Azores. Throughout the Mediterranean. Also widely occurring in the West Atlantic and the Indo-West Pacific, but not in the East Pacific.



interior of left valve



exterior of right valve



OSTREIDAE

Oysters

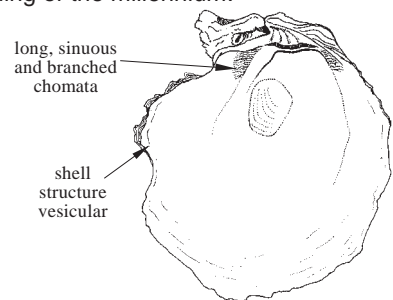
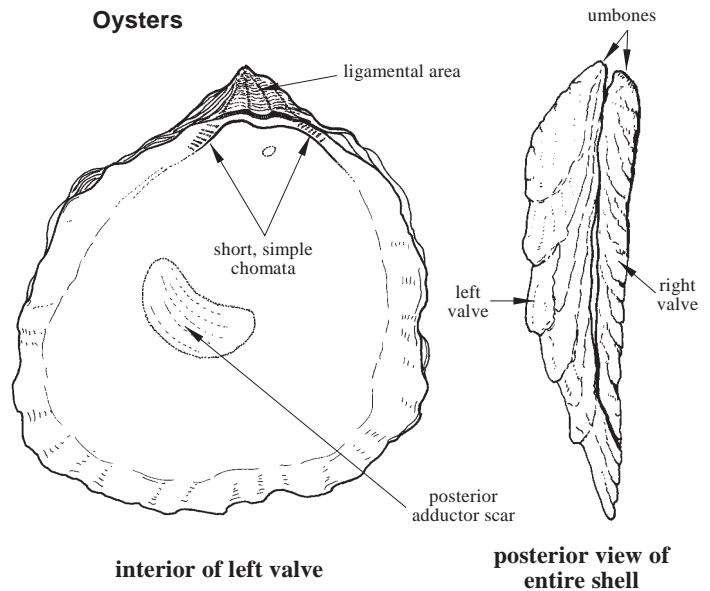
Diagnostic characters: **Shell solid**, often irregularly shaped, **inequivalve**, **cemented to the substrate by the left (lower) valve** which is generally larger and deeper than the right. **Right (upper) valve quite flat**, often with thin, concentrically arranged, imbricating plates of horny material tending to make a protruding fringe beyond the shell margin. At least on left valve, outer surface commonly with radial folds or ribs which may affect the shell margin. **Ligamental area with a shallow median groove and 2 lateral thickenings.** **Hinge without teeth.** A more or less deep umbonal cavity sometimes present. Interior of shell porcelaneous, sometimes with irregular chalky deposits or with a subnacreous tinge. **A single**

(posterior) **adductor muscle scar**, generally **median in position or nearer to the ventral margin** than to the hinge. Pallial line reduced to absent, without a sinus. **Internal margins smooth or with simple short chomata**, which may be restricted to the hinge surroundings. Gills of eulamellibranchiate type, with folded branchial sheets. Foot and byssus atrophied. Pallial lobes free, with marginal tentacles.

Habitat, biology, and fisheries: Suspension filter-feeding animals, living cemented to the substrate by the left valve, mainly in littoral and shallow subtidal areas. Sexes separate, or changing with age of the specimen. Eggs released and fertilized in water, or fertilized and brooded for some time in the mantle cavity before hatching. Ostreidae include some of the most important commercial species of bivalves, and are intensively exploited in many parts of the area, mainly from natural beds. Aquaculture experiments are still presently under progress for a few species only, excepted for Namibia where an active commercial mariculture has developed during the beginning of the millennium.

Similar families occurring in the area

Gryphaeidae: shell structure vesicular, distinguishable under a lens on an eroded part of the shell, or along peripheral area of the interior. Adductor muscle scar nearer to the hinge than to the ventral margin. Chomata long, sinuous, and branched.



interior of left valve

Gryphaeidae

Key to species of interest to fisheries occurring in the area

Note: since oysters live attached to hard objects and are often gregarious, morphological features of their shells may be exceedingly variable among individuals, sometimes making species identification very difficult. Many nominal species have been erected in the past, and systematics of the family is still uncertain. The status of a number of these nominal species remains problematical, and others are thought to represent only ecophenotypical variation. The following key provides a simplified guide to the main shell features that are easily recognisable in the field. In addition, it includes some diagnostic internal characters that should be carefully examined before completing the identification of a specimen.

- 1a. Right valve with irregular, flat concentric lamellae bearing densely-set, minute radiating threads (best visible on young or unworn shells) (Fig. 1) ***Striostrea denticulata***
- 1b. Right valve without radially sculptured, flat concentric lamellae → 2

- 2a. Chomata present, at least on either side of ligamental area (Fig. 2) → 3
- 2b. Chomata completely absent → 6

- 3a. Left valve with recurved spines forming clasping calcareous extensions for attachment of shell to extraneous objects (Fig.3) ***Dendostrea frons***
- 3b. Left valve without recurved spines forming clasping calcareous extensions → 4

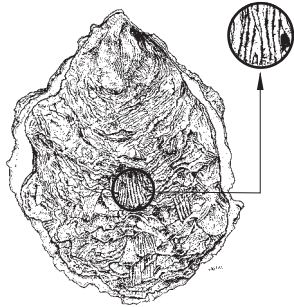


Fig. 1 *Striostrea denticulata* (exterior)

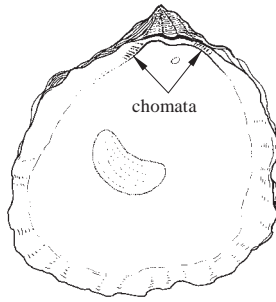


Fig. 2 interior of left valve (*Ostrea*)

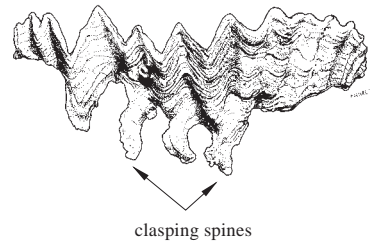


Fig. 3 *Dendostrea frons* (left valve)

- 4a. Chomata present all around the internal shell margins; interior with a crescent-shaped series of small disjunct pallial imprints between the posterior adductor scar and the anterodorsal margin (Fig. 4) ***Saccostrea cucullata***
- 4b. Chomata usually restricted to dorsal half of shell margins. Interior without a crescent-shaped series of pallial scars → 5

- 5a. Shell small to medium-sized (up to 6 cm high); surface of left valve with about a dozen radial ribs or folds disappearing towards the dorsal half of shell; interior frequently tinged with greenish, bluish grey or purplish brown (Fig. 5) ***Ostrea stentina***
- 5b. Shell medium-sized to large (up to nearly 20 cm high); surface of left valve with numerous small radial riblets and grooves; interior whitish, often with irregular patches of chalky white (Fig. 6) ***Ostrea edulis***

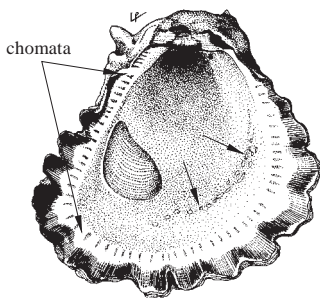


Fig. 4 *Saccostrea cucullata* (interior)



Fig. 5 *Ostrea stentina* (interior)



Fig. 6 *Ostrea edulis* (interior)

6a. Shell large-sized, attaining 45 cm in height. Interior whitish; posterior adductor scar pale-coloured (white, grey or tinged with pale purple) (Fig. 7) . . . *Crassostrea gigas*

6b. Shell medium-sized, not exceeding 14 cm in height. Interior generally with a purplish hue; posterior adductor scar deep purple (Fig. 8) *Crassostrea gasar*



Fig. 7 *Crassostrea gigas* (interior)

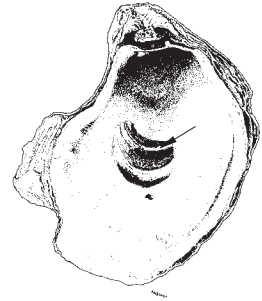


Fig. 8 *Crassostrea gasar* (interior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

🐚 *Crassostrea gasar* (Dautzenberg, 1891).

🐚 *Crassostrea gigas* (Thunberg, 1793).

🐚 *Dendostrea frons* (Linnaeus, 1758).

🐚 *Ostrea edulis* Linnaeus, 1758.

🐚 *Ostrea stentina* Payraudeau, 1826.

🐚 *Saccostrea cucullata* (Born, 1778).

🐚 *Striostrea denticulata* (Born, 1778).

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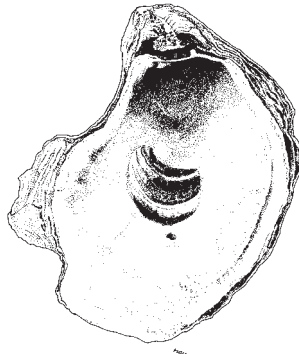
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***Crassostrea gasar* (Dautzenberg, 1891)**

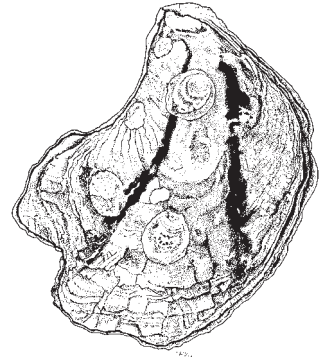
Frequent synonyms / misidentifications: *Gryphaea gasar* (Dautzenberg, 1891); *Ostrea brasiliiana* Lamarck, 1819; *O. gasar* Adanson, 1757 [Invalid name]; *O. tulipa* Lamarck, 1819 / *Ostrea lacerata* Hanley, 1845; *O. parasitica* Gmelin, 1791 [= *Crassostrea rhizophorae* (Guilding, 1828)].

FAO names: **En** – Gasar cupped oyster; **Fr** – Huître creuse gasar; **Sp** – Ostión gasar.

Diagnostic characters: **Shell medium-sized** (up to 14 cm high), **lightweight and rather thin**, extremely variable in shape but generally higher than long, **irregularly rounded** ovate to triangular or **elongate ovate in outline**. **Left (lower) valve**, slightly larger than right (upper) valve, **moderately to strongly convex**, with small to large attachment area. Surface of left valve somewhat lamellate, often **with some irregular, poorly developed radial undulations and/or shallow** to indistinct radial



interior of left valve



right side view of entire shell

grooves that faintly scallop the commissure of valves. Right valve slightly convex to flattish, with lamellar, irregularly concentric growth lines. Umbones well developed, often strong at left valve. Umbonal cavity rather shallow to deep under the hinge margin of left valve, depending upon specimens. Adductor muscle scar rounded ovate, nearly straight dorsally, markedly posterior to midline of valves and a little nearer to ventral margin than to the hinge. **Chomata completely absent from internal margins**. **Colour:** **outside** of shell **pale dirty yellowish brown to greyish or purplish brown**, often in alternate darker and paler radial rays. **Interior shiny, generally with a purplish grey hue** (mostly developed in left valve) and often with irregular areas of chalky white; **posterior adductor scar deep purple**.

Size: Maximum shell height 14 cm, commonly to 8 cm.

Habitat, biology, and fisheries: Very common in mangroves, protected bays, lagoons and estuaries with brackish water conditions. Attached to aerial roots and branches of mangroves in the intertidal zone, and at intertidal or low subtidal levels to rocks and to hard objects such as shells or stones on muddy sand bottoms where it can form banks. Mostly occurring to a depth of about 10 m, but occasionally present deeper offshore and then remaining very small. Species of considerable economic importance in tropical West Africa, providing a cheap source of protein for many coastal communities since prehistoric times. Eaten raw or after it has been cooked or smoked. Traditionally collected by women at low tide by just cutting the mangrove roots to which the oysters are attached in clusters, and then transported to the place of processing. In order to preserve mangrove trees from destructive harvesting methods, strings bearing oyster shells are sometimes hung just in front of the mangroves, for settlement and growth of the oysters. Shells often opened in the fire to shuck the soft parts that are dried in the sun for long time preservation or immediately fried. Often used as spice in popular seafood dishes with rice. Freshly shucked animals commonly sold immediately in local markets. Meat otherwise smoked, using mangrove roots as a source of fuel. Currently market value of oysters increasing with extent to which the oysters have been processed. Shells widely used for the lime industry or for paving in villages, as well as in traditional medicine. Species of great potential interest for industrial farming. Aquaculture experiments in Sierra Leone and Senegal.

Distribution: Tropical East Atlantic, from Senegal to northern Angola; Ilha do Principe. Recently identified by molecular studies in the West Atlantic, from Venezuela to Brazil.

Remarks: Molecular studies recently established some tropical West Atlantic oysters to be identical to this species. Consequently, the name *gasar* used here is provisional and should probably be replaced by one of the older names of Lamarck, *brasiliiana* or *tulipa*.



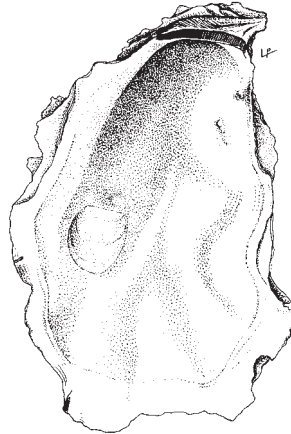
***Crassostrea gigas* (Thunberg, 1793)**

Frequent synonyms / misidentifications: *Crassostrea laperousii* (Schrenck, 1861); *C. talienwhanensis* Crosse, 1862 / *Crassostrea angulata* (Lamarck, 1819); *C. ariakensis* Fujita, 1913; *C. rivularis* (Gould, 1861); *C. sikamea* (Amemiya, 1928).

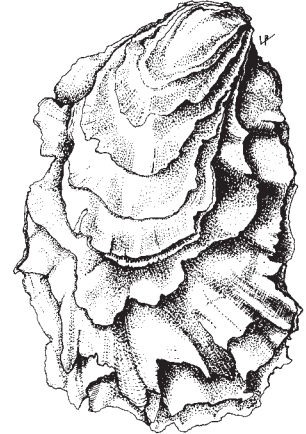
FAO names: **En** – Pacific cupped oyster; **Fr** – Huître creuse du Pacifique; **Sp** – Ostión japonés.

Diagnostic characters: **Shell**

large-sized (up to 45 cm high), **rather thick** and lightweight to heavy in older specimens, extremely variable in shape but generally higher than long, **irregularly rounded ovate** to triangular or **elongate ovate in outline**. **Left** (lower) **valve** slightly larger than right valve, **moderately to strongly convex** and with small to large attachment area. Surface of left valve somewhat lamellate, with some uneven **radial undulations** that usually **slightly** and widely **scallop the commissure** of valves. **Right** (upper) valve slightly convex to flattish and sitting within left, with lamellar, irregularly protruding concentric growth marks. Umbones well developed, often strong and variably recurved at left valve, Umbonal cavity rather shallow to deep under the hinge margin of left valve, depending upon specimens. Adductor muscle scar rounded ovate, nearly straight dorsally, markedly posterior to midline of valves and a little nearer to ventral margin than to the hinge. **Chomata completely absent from internal margins**. **Colour: outside of shell usually dirty white or creamy yellow**, with or without light to deep purplish brown radial streaks usually interrupted in older specimens. **Interior whitish** and shiny, often with irregular patches of chalky white; **posterior adductor scar pale-coloured** (white, grey or tinged with pale purple).



interior of left valve



exterior of right valve

Size: Maximum shell height 45 cm, commonly to 15 cm.

Habitat, biology, and fisheries: On soft or hard bottoms. Intertidal and sublittoral to 15 m depth, in marine to brackish waters. A major commercial species, introduced for aquaculture in many countries all around the world. However, experimental plantings in tropical West Africa have failed, apparently because of the sustained high temperature of the water. Nowadays cultivated in Morocco and Namibia. Artisanal exploitation along the Atlantic coast of Morocco, where the species is produced in Oualidia only; production of about 200 tonnes per year since the beginning of the 1990s. Very successfully cultivated in central Namibia since 1987, with oyster spat first imported from Chile, and then produced in local hatcheries. Produced oysters mainly exported live to South Africa, and more recently frozen to Asian markets. Production greatly increased in the 2000s (up to 700 tonnes in 2007), despite a temporary collapse due to a harmful algal bloom in 2008.

Distribution: Eastern Atlantic and Western Mediterranean; north to the British Isles and south to Morocco and the Canaries; also present in central Namibia. Primarily restricted to the temperate and subtropical western Pacific, this species has been introduced for aquaculture, often successfully, in many parts of the world.



***Ostrea edulis* Linnaeus, 1758**

Frequent synonyms / misidentifications: *Ostrea hippopus* Lamarck, 1819; *O. lamellosa* Brocchi, 1814 / None.

FAO names: En – European flat oyster; Fr – Huître plate européenne; Sp – Ostra europea.



interior of left valve



exterior of right valve

Diagnostic characters: Shell medium-sized to large (up to nearly 20 cm high), very variable in shape but generally **tending to be rounded in outline**. **Left (lower) valve moderately convex**, with often reduced attachment area, rather thin and light but solid, becoming very thick and rather heavy in larger and old specimens (form *hippopus* Lamarck). Surface of left valve **with numerous small radial ribs and grooves** crossed by concentric lamellae. **Right (upper) valve flattish, with concentric grooves** adorned by **imbricating plates of horny material**. Adductor muscle scar kidney-shaped, dorsally concave, about as far from hinge as from ventral margin. Umbonal cavity of left valve generally deep. **Chomata simple**, rather shallow and few in number, **restricted to dorsal half of shell margins** near ligament area. **Colour:** outside greyish to brownish or pale green, more or less blotched brown or purplish. **Interior** smooth and shiny, **whitish**, sometimes slightly tinged on the adductor scar, **often with irregular patches of chalky white**.

Size: Maximum shell height to nearly 20 cm, commonly from 6 to 10 cm.

Habitat, biology, and fisheries: On soft to hard bottoms. Littoral and sublittoral zones and upper continental shelf to about 85 m depth. In the studied area, natural populations living mainly offshore, on muddy sand bottoms with gravels and shells. A popular food, dredged and trawled at artisanal level in Morocco; also produced in limited quantities by aquaculture in central and southern Namibia. This has been a main commercial species in western Europe and the Mediterranean since ancient times. Mostly produced there by aquaculture since the 1930s, after depletion of natural beds caused by overexploitation, climatic variations and bacterial blooms in the preceding years. Successfully introduced for aquaculture in Japan and North America.

Distribution: Eastern Atlantic, Mediterranean and Black Sea; north to Norway and the British Isles and south to Morocco. Introduced in the western Pacific (Japan), eastern Pacific (from British Columbia to California) and western Atlantic (eastern Canada and the United States of America).

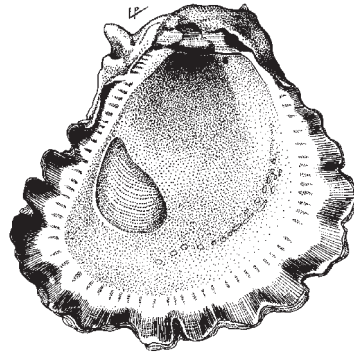


***Saccostrea cucullata* (Born, 1778)**

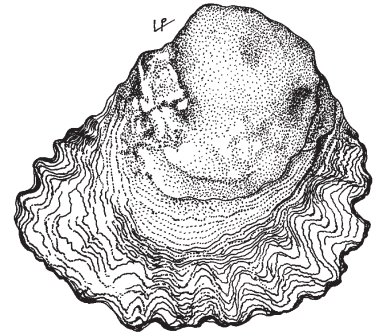
Frequent synonyms / misidentifications: *Crassostrea cucullata* (Born, 1778); *Ostrea cornucopiae* Chemnitz, 1785 [Invalid name]; *O. cornucopiae* Lamarck, 1819; *O. cornucopiaeformis* Saville-Kent, 1893; *O. forskaelii* Chemnitz, 1785 [Invalid name]; *O. forskali* Gmelin, 1791 / None.

FAO names: En – Hooded oyster; Fr – Huitre-capuchon; Sp – Ostión capuchón.

Diagnostic characters: Shell stout, very variable in shape and size, usually medium-sized to small and very inequivalve. Left (lower) valve generally deep (occasionally very shallow), with large attachment area and strong radial ribs towards the periphery. Right (upper) valve flattish, fitting down into the plicate margins of the wider opposite valve. Outer surface of right valve smoothish, sometimes with distinct radial ribs and, when not too much eroded, with concentrically arranged, imbricating plates of horny material.



interior of left valve



exterior of right valve

In specimens not exposed to wave action and living crowded together, right valve may be small and operculiform, and left valve with a greatly elongated, partly coiled ligamental area, giving the shell a slender conical or cornucopia shape (form *cornucopiae* Gmelin, 1791). Adductor muscle scar kidney-shaped, more or less posteroventral in position. Interior of valves with a crescent-shaped series of small disjunct pallial imprints between the posterior adductor scar and the anterodorsal margin. Umbonal cavity of left valve generally deep. Chomata present all around the internal shell margins, forming 1 row of distant ridgelets in right valve, and corresponding pits in left valve. **Colour:** exterior of shell dirty chalky white to greyish brown, often with shades of purple along margins. Interior creamy white, with deep purple margins and frequently subnacreous iridescence. Adductor scar coloration may be darker than the surrounding shell area.

Size: Maximum shell height 12 cm (up to 20 cm in the Indo-Pacific), commonly from 6 to 8 cm.

Habitat, biology, and fisheries: Attached to various hard substrates, in marine, estuarine and mangrove areas, often in dense colonies. Intertidal and shallow subtidal levels to about 5 m depth. In densely-set populations, umbonal area of the lower valve often recurved downward and very long, giving the oyster shell a cornucopia-like shape. Artisanal exploitation from natural beds in the studied area. This species is a major commercial species in many tropical western Pacific countries.

Distribution: Disjunctive distribution in the tropical eastern Atlantic; occurring in the Côte d'Ivoire, from Cameroon to Congo, Ilha do Príncipe and São Tomé islands, and in southern Angola.

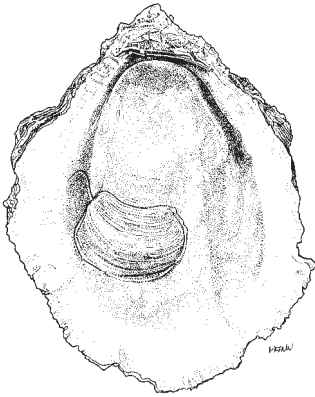
Remarks: Systematics of the genus *Saccostrea* has been much confused in the past and authors still don't agree about the number of living species. *Saccostrea cucullata*, which was described from West African material, is often considered to be the only living species of the genus in the Indo-West Pacific and East Atlantic. However, recent molecular studies tend to consider a number of local Indo-West Pacific forms as distinct species or subspecies, but their relationships with West African oysters is presently not firmly established.



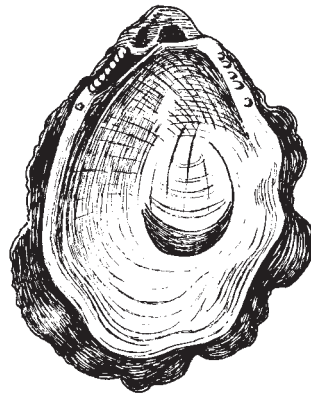
***Striostrea denticulata* (Born, 1778)**

Frequent synonyms / misidentifications: *Ostrea denticulata* Born, 1778; *Ostrea ruscuriana* Lamarck, 1819 / *Striostrea margaritacea* (Lamarck, 1819); *Striostrea prismatica* (Gray, 1825).

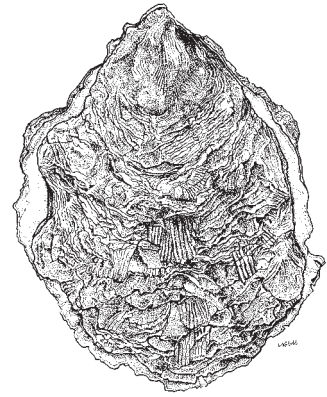
FAO names: En – Denticulate rock oyster; Fr – Huître plate de Guinée; Sp – Ostión denticulado.



interior of left valve



interior of right valve



right side view of entire shell

Diagnostic characters: Shell attaining a large size (up to 22 cm high) and becoming very thick and heavy, variable in shape and inflation, often rather compressed and roughly rounded ovate in outline with length about two-thirds height, inequivalve. Left (lower) valve stout, usually feebly convex and frequently adhering to substrate by most of its surface, its outer edges only becoming free, raised and undulated. Right (upper) valve slightly smaller than left valve, flattish to slightly convex, with many irregular, flat concentric lamellae of horny material bearing densely-set, minute radiating threads (best visible on young or unworn shells). Ligamental area sometimes markedly enlarged on left valve. Adductor muscle scar large, flattish to faintly concave dorsally and widely rounded ventrally, about as far from hinge and from ventral margin. A small umbonal cavity present under the ligamental area in left valve. Chomata well marked, rather widely spaced, present on either side of ligamental area, forming small ridgelets in right valve and corresponding pits in left valve. Colour: outside of shell whitish, with a dark greyish brown to purplish brown, shiny sheet of horny scales on right valve. Interior iridescent, entirely whitish to partially tinged or with brown in right valve, usually deep purplish brown and dark grey with white margins in left valve.

Size: Maximum shell height 22 cm, commonly from 10 to 15 cm.

Habitat, biology, and fisheries: Strongly attached to rocks and stones of the open sea coasts. Lower intertidal zone and shallow subtidal levels to about 10 m depth. Often in areas under the influence of strong surf, but also in calm waters. Locally occurring in dense populations. Actively collected for its highly prized meat, at low tide or snorkelling in shallow water. In Cotonou area (Benin), where rocky bottoms are rare, crevices in the sublittoral oyster beds are known to harbour young of the esteemed royal spiny lobster (*Panulirus regius* De Brito Capello, 1864). Popularly known as “huître des rochers” (rock oyster) in Guinea, “huître de Pointe Noire” (Pointe Noire oyster) in Congo, or simply “ostra” (huître) in Angola, it is commonly eaten raw or in soups, and its shell is frequently used as an ash tray. Tend to be less common nowadays because of pollution and overcollecting.

Distribution: Tropical East Atlantic, from Guinea to northern Angola and in São Tomé Island.

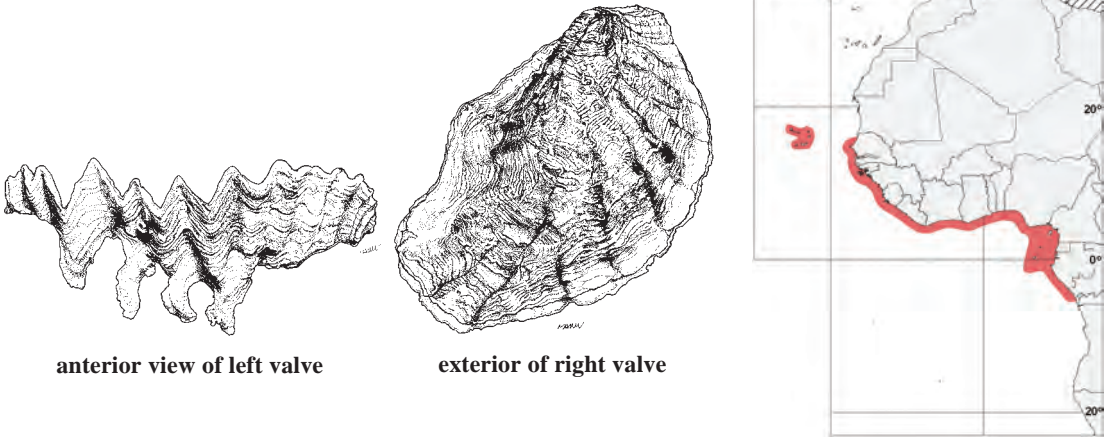


***Dendostrea frons* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Dendostrea senegalensis* (Gmelin, 1791); *Lopha frons* (Linnaeus, 1758); *Ostrea frons* Linnaeus, 1758; *O. limacella* Lamarck, 1819; *O. rubella* Lamarck, 1819; *O. senegalensis* Gmelin, 1791 / *Dendostrea folium* (Linnaeus, 1758); *Lopha cristagalli* (Linnaeus, 1758); *Ostrea lacerata* Hanley, 1845.

En – Frons oyster; **Fr** – Huître fronde; **Sp** – Ostión fronda.

Maximum shell height 8.5 cm, commonly to 6 cm. Attached to various hard objects, mostly to gorgonian stems but also to stones, shells, pieces of wood, buoys or ship hulls. Low intertidal fringe to upper continental shelf, occasionally deeper than 70 m. Locally harvested for food and for its brightly coloured shell, but rarely marketed. Tropical areas of the Atlantic Ocean. Eastern Atlantic, from Senegal to Congo; São Tomé, Ilha do Príncipe, Annobon and Cape Verde Islands. Western Atlantic, from Florida to Brazil, throughout the Gulf of Mexico and the Carribeans. East Atlantic form of *Dendostrea frons* is sometimes considered a distinct sibling species (*D. senegalensis*), but its true genetic relationship has still to be solved.

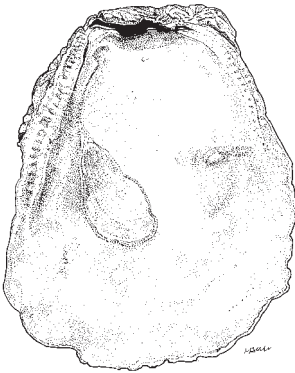


***Ostrea stentina* Payraudeau, 1826**

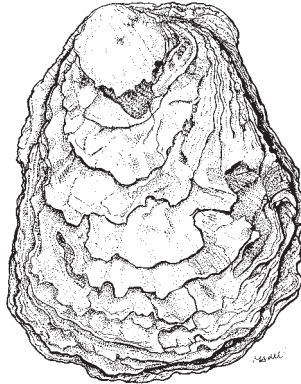
Frequent synonyms / misidentifications: *Lopha stentina* (Payraudeau, 1826); *Ostrea capsa* Fischer von Waldheim, 1807; *O. guineensis* Dunker, 1853; *Ostreola stentina* (Payraudeau, 1826) / *Ostrea lacerans* Hanley, 1856.

En – Garin oyster; **Fr** – Huître garin; **Sp** – Ostra garin.

Maximum shell height 6 cm, commonly to 4 to 5 cm. Tightly attached to various hard substrates such as rocks, stones, pieces of wood, shells, gorgonians or other oysters. Sublittoral and continental shelf, from just below the intertidal zone to about 200 m (most common from 1 to 30 m). Also occurring in protected bays and lagoons, but not in low salinity environments. Locally collected for food on West African coasts, this common oyster is considered too small to justify commercial cultivation. It has been exploited for food since prehistoric times in Mauritania. Eastern Atlantic, from southern Portugal to Ghana, and from Gabon to northern Angola. Canary and Cape Verde islands. Throughout the Mediterranean.



interior of left valve



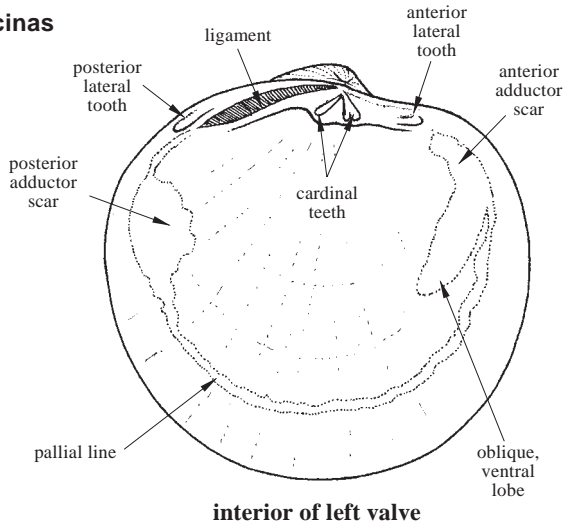
right side view of entire shell



LUCINIDAE

Lucinas

Diagnostic characters: Shell generally **Dequivalve, lenticular** and rounded to subtrapezoidal, **slightly inequilateral**, not gaping. Umbones small and low, prosogyrate, about the midline of shell. Lunule small, often impressed and asymmetrical. Outer sculpture with concentric and/or radial components. Periostracum sometimes scaly and dehiscent. **Ligament** external, **more or less deeply sunken in a groove of posterodorsal margin**. Hinge typically with **2 cardinal teeth**, and anterior and posterior **lateral teeth in either valve**; some or all of the hinge teeth **sometimes reduced to absent**. **Two adductor muscle scars, the anterior narrowly elongate, frequently with an oblique ventral lobe diverging from pallial line. No pallial sinus.** Internal margins smooth or finely crenulate. Gills of eulamellibranchiate type; inner demibranch large, smooth or weakly folded, outer demibranch reduced to absent. Foot long and wormlike, with a mucous gland at the more or less inflated extremity. Mantle with a broad anteroventral gape, a posterodorsal exhalant siphonal tube and a rounded posteroventral inhalant aperture. Pallial margin not papillate, often with an anteroventral accessory gill.

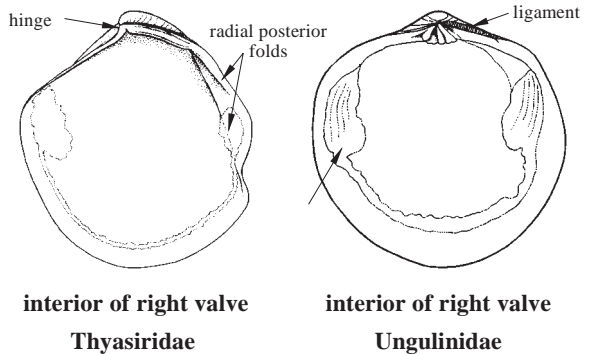


Habitat, biology, and fisheries: Burrowing, detritus-feeding animals, in which the inhalant siphon is usually replaced by an anterior tube lined with mucus and constructed within the substrate by the extensible, wormlike foot. The Lucinidae typically occur in sulphide-containing reduced sediments. The presence of the respiratory pigment haemoglobin enables them to live in these habitats of low oxygen concentration. Symbiotic, sulphur-oxidizing chemoautotrophic bacteria are frequently housed in their thick gills and make a substantial contribution to their nutrition. Some of the larger and most common species are artisanally fished in some areas, and their shells are used in the local shellcraft industry.

Similar families occurring in the area

Thyasiridae: shell thin, trigonal, inequilateral, with 1 or more deep furrows or folds setting off the posterior part of shell. Hinge without teeth.

Ungulinidae: shell shape very similar to Lucinidae. External ligament not sunken in a marginal groove. Anterior adductor muscle scar elongate, but not posteroventrally detached from pallial line.



Key to species of interest to fisheries occurring in the area

- 1a. Shell very inflated to subspherical; anterodorsal and posterodorsal areas well demarcated by sharp radial depressions; lateral hinge teeth strong (Fig. 1) ***Lucina adansoni***
- 1b. Shell moderately inflated to rather compressed laterally; anterodorsal and posterodorsal areas rather poorly marked to absent; lateral hinge teeth feeble. → 2

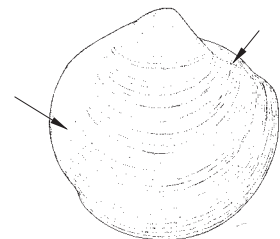


Fig. 1 *Lucina adansoni* (exterior)

- 2a. Ligament oblique, deeply inset and not visible from the outside when valves are closed; outer sculpture with somewhat coarse and irregular concentric growth lines; hinge of the right valve with only 1 cardinal tooth (Fig. 2a)

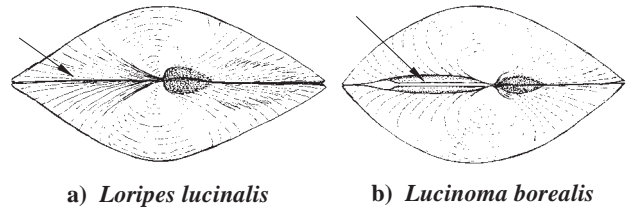


Fig. 2 dorsal view of shell

- ***Loripes lucinalis***
- 2b. Ligament parallel to dorsal margin, well visible from the outside when valves are closed; outer sculpture with concentric ridges. Hinge of the right valve with 2 cardinal teeth (Fig. 2b) ***Lucinoma borealis***

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Loripes lucinalis* (Lamarck, 1818).
 🐚 *Lucina adansoni* (d'Orbigny, 1840).
 🐚 *Lucinoma borealis* (Linnaeus, 1767).

References

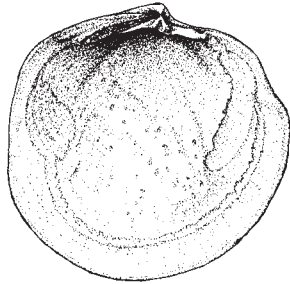
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- Taylor, J.D., Glover, E.A., Smith, L., Dyal, P. & Williams, S.T. 2011. Molecular phylogeny and classification of the chemosymbiotic bivalve family Lucinidae (Mollusca: Bivalvia). *Zoological Journal of the Linnean Society*, 163(1): 15–49.

***Loripes lucinalis* (Lamarck, 1818)**

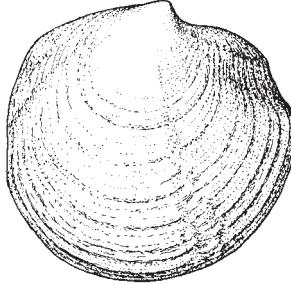
Frequent synonyms / misidentifications: *Loripes desmaresti* (Payraudeau, 1826) / *Loripes lacteus* (Linnaeus, 1758).

En – Pale lucina; **Fr** – Lucine pâle; **Sp** – Lucina pálida.

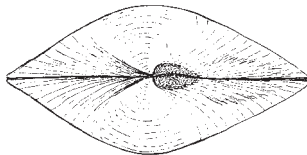
Maximum shell length 3 cm, commonly to 2 cm. Common in various soft bottoms containing a fine sand or mud fraction. Low intertidal zone and offshore, to about 150 m depth. Occurring also in brackish water coastal lagoons. Occasional bycatch of bottom trawls and dredges. Eastern Atlantic, from southwest Great Britain and Ireland to Mauritania; the Canaries and Madeira Islands. Throughout the Mediterranean and Black Sea.



interior of left valve



exterior of right valve



dorsal view of entire shell

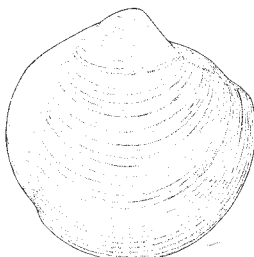


***Lucina adansoni* (d'Orbigny, 1840)**

Frequent synonyms / misidentifications: *Linga adansoni* (d'Orbigny, 1840); *Phacoides adansoni* (d'Orbigny, 1840) / *Linga columbella* (Lamarck, 1819).

En – Adanson's lucina; **Fr** – Lucine d'Adanson; **Sp** – Lucina de Adanson.

Maximum shell length 4 cm, commonly to 3 cm. In coarse sandy bottoms, with or without gravel and shell rubble, or in sandy pockets among rocks. Low intertidal levels and sublittorally to about 35 m depth. Eastern Atlantic, from Mauritania to northern Guinea; the Côte d'Ivoire, Canary and Cape Verde Islands, but not in South Africa. Most common in the northern part of its range, where it is locally collected by coastal people.



exterior of right valve

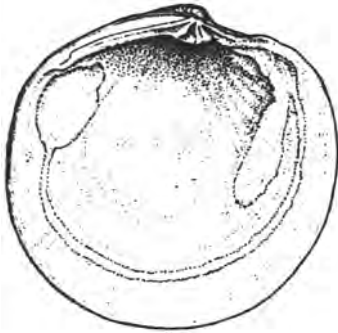


***Lucinoma borealis* (Linnaeus, 1767)**

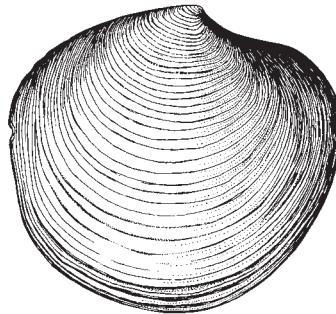
Frequent synonyms / misidentifications: *Phacoides borealis* (Linnaeus, 1767) / None.

En – Northern lucina; **Fr** – Lucine boréale; **Sp** – Lucina boreal.

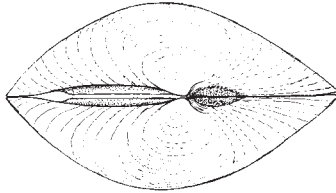
Maximum shell length 5 cm, commonly from 2.5 to 3 cm. In muddy sand or gravel bottoms, from extreme low tide to about 500 m depth. Along West Africa, not occurring at shallower depth than 40 m, and becoming less common toward the southern limit of its range. Occasionally caught in bottom trawls and nets. Eastern Atlantic, from northern Norway and Faeroe Islands, south to Mauritania; Azores and Canary Islands. Western Mediterranean.



interior of left valve



exterior of right valve



dorsal view of entire shell

CARDITIDAE

Carditas

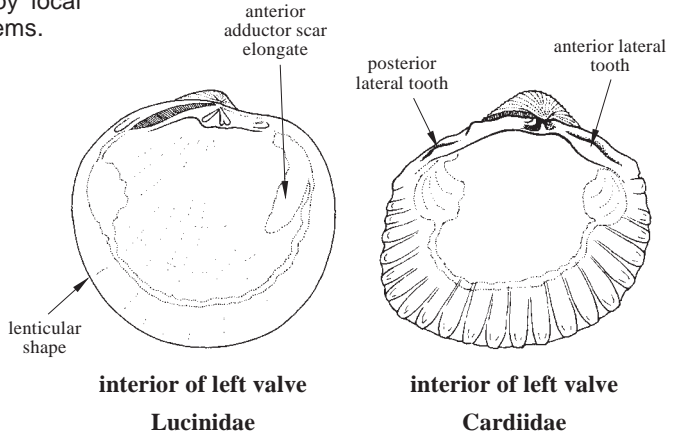
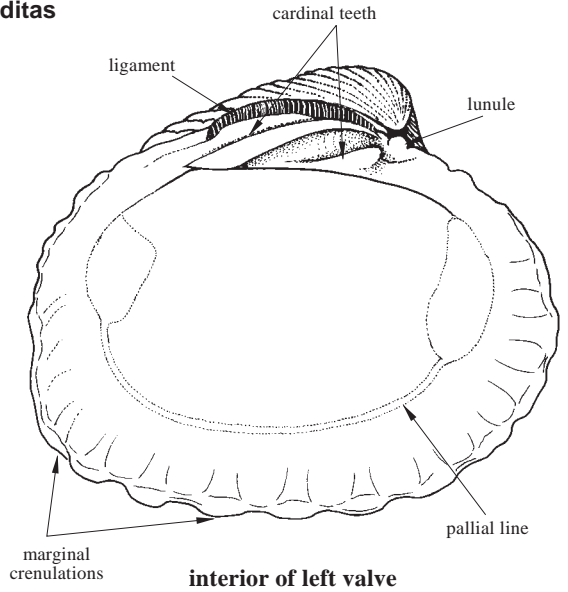
D **Diagnostic characters:** Shell **equivalve**, often **stout and inflated**, trigonal ovate to elongate trapezoidal in outline, **inequilateral**. Umbones generally anterior, prosogyrate and prominent. Lunule short and deep. **Exterior mostly with strong radial ribs**. **Ligament external**, attached behind umbones on well marked nymphs. Hinge strong, usually with **2 cardinal teeth**, **unequal and often with tiny transverse striations**; **lateral teeth frequently** more or less **reduced to absent**. **Two** slightly unequal **adductor muscle scars**. **Pallial line without a sinus**. Internal margins crenulate. Outer colour often with bright and variegated patterns. Gills of eulamellibranchiate type, with smooth branchial sheets. Foot keeled, often byssiferous (at least in the young stages).

Habitat, biology, and fisheries: Suspension-feeding animals, often attached to substrate by their byssus and common in shallow waters. Sexes separate. Eggs generally brooded between inner and outer demibranchs of the gills. Carditidae are collected for subsistence in the studied area, and sometimes marketed locally. Their shells, when colourful, are used by local shellcraft industries to make decorative items.

Similar families occurring in the area

Lucinidae: shell feebly inequilateral (a little more in young stages), lenticular. Outer colour usually dull and pale. Anterior adductor scar elongate, often with an oblique ventral lobe separate from pallial line.

Cardiidae: lunule shallow. Hinge characteristic, with 2 conical cardinal teeth in each valve, cruciform in arrangement; lateral teeth well developed.



Key to species of interest to fisheries occurring in the area

- 1a. Shell much longer than high and strongly expanded posteroventrally; umbones near anterior end of valves (Fig. 1) ***Cardita rufescens***
- 1b. Shell neither much longer than high nor strongly expanded posteroventrally; umbones anterior to midline of valves but well behind anterior end (Fig. 2a) → 2

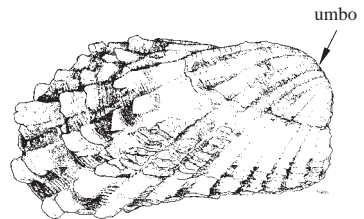
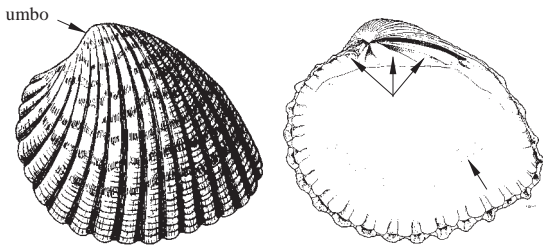


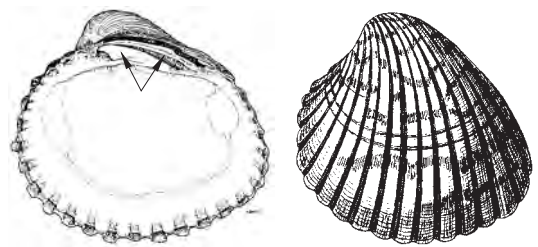
Fig. 1 *Cardita rufescens* (exterior)

- 2a. Hinge with 3 cardinal teeth in right valve and 2 in left valve; pallial line with a slight posteroventral sinuosity (Fig. 2b) ***Cardiocardita ajar***
- 2b. Hinge with 2 cardinal teeth in both valves; pallial line without posteroventral sinuosity (Fig. 3a) → 3



a) exterior of left valve b) interior of right valve

Fig. 2 *Cardiocardita ajar*



a) interior of right valve b) exterior of left valve

Fig. 3 *Cardites tankervillii*

- 3a. Shell relatively large, up to 5 cm long; each valve with about 26 (25 to 28) radial ribs (Fig. 3b) ***Cardites tankervillii***
- 3b. Shell relatively small, up to 3.5 cm long; each valve with about 19 (18 to 21) radial ribs (Fig. 4) ***Cardites antiquatus***

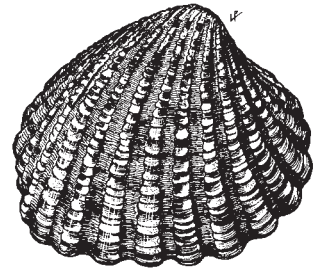


Fig. 4 *Cardites antiquatus* (exterior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Cardiocardita ajar* (Bruguière, 1792).
- 🐚 *Cardita rufescens* Lamarck, 1819.
- 🐚 *Cardites antiquatus* (Linnaeus, 1758).
- 🐚 *Cardites tankervillii* (Wood, 1828).

References

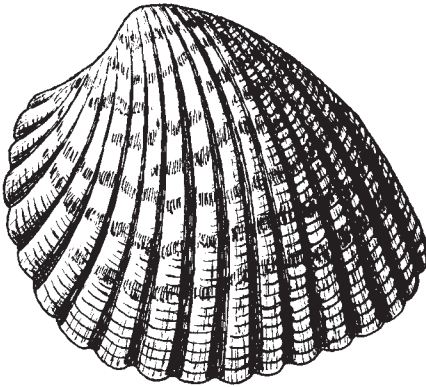
Hain, S. 1985. *Beiträge zur Morphologie, Systematik, Zoogeographie und Phylogenie der Familie Carditidae (Cl. Bivalvia)*. Diplomarbeit am Fachbereich Biologie. Marburg, Philipps-Universität, 352 p.

Lamy, E. 1922. Révision des Carditacea vivants du Muséum national d'Histoire naturelle de Paris (Suite). *Journal de Conchyliologie*, 66(3-4): 218–368, pl. 7–8.

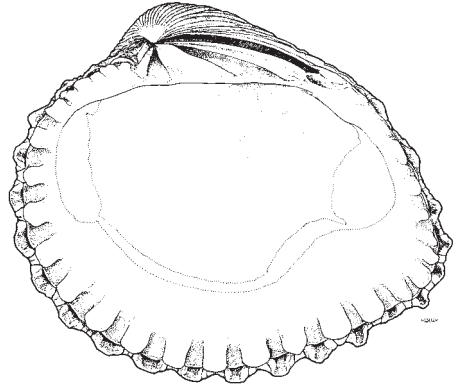
Cardiocardita ajar (Bruguère, 1792)

Frequent synonyms / misidentifications: *Cardita ajar* Bruguère, 1792 / Until recently, this species has been confused with 2 other West African *Cardiocardita* species [*C. gabonensis* Cosel, 1995 and *C. obesa* Cosel, 1995].

FAO names: En – Ajar cardita; Fr – Cardite ajar; Sp – Cardita ajar.



exterior of left valve



interior of right valve

Diagnostic characters: Shell medium-sized (up to 4 cm long), **trigonal ovate in outline** and somewhat longer than high. **Umbones distinctly anterior** to midline of valves **but well behind anterior end**. Anterior and ventral margins rounded, **posterior margin roundly tapering**, determining a rather strongly slanting posterior slope. Lunule well defined, rather small and narrow, depressed and smooth. Outer surface with **about 24 (from 22 to 26) strong radial ribs with rather low transverse nodules** on top, mostly developed **on anterior, posterior and umbonal parts of valves**. **Radial ribs** rather high, seeming narrower than interstices but with slanting broader base, **becoming distinctly narrower along the umbono-posterior flexure** and nearby area of posterior slope. Periostracum rather thin, often eroded on rib nodules and toward the umbones. **Hinge with 2 cardinal teeth in left valve and 3 in right valve**; Lateral teeth obsolete, reduced to hardly distinguishable small tubercles, 1 anterior and 1 posterior at each valve. **Pallial line with a slight posteroventral sinuosity** nearby the posterior adductor scar. Internal margins strongly crenulate. **Colour: outside of shell with variable irregular patterns of reddish brown and whitish** under the dull greyish to yellowish brown periostracum. Interior whitish, often with a light yellowish to pinkish hue in the umbonal cavity and more or less extensively tinged brownish posteriorly.

Size: Maximum shell length 4 cm, commonly to 3 cm.

Habitat, biology, and fisheries: Common to abundant in various sandy bottoms, including sand pockets in rocky environments. Intertidal and sublittoral zones to about 30 m depth. Locally exploited for food where abundant. Meat is consumed in soups, and shell used in local shellcraft industries.

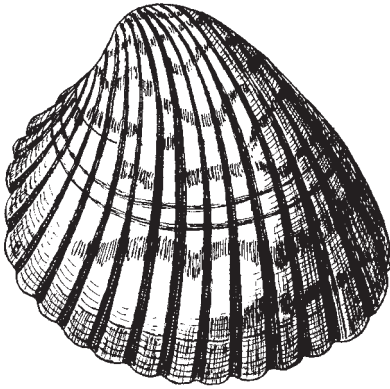
Distribution: Eastern Atlantic, from Mauritania to northern Guinea; perhaps also patchily occurring more in the south, in Côte d'Ivoire, Ghana and Togo.



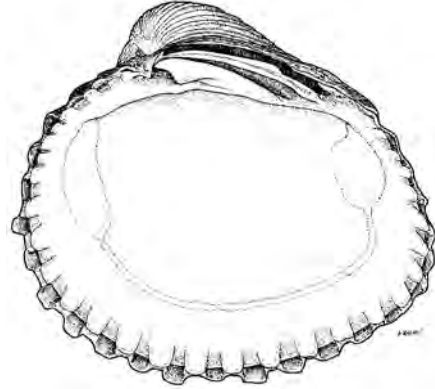
***Cardites tankervillei* (Wood, 1828)**

Frequent synonyms / misidentifications: *Cardiocardita tankervillei* (Wood, 1828); *Cardita tankervillei* Wood, 1828 / *Cardites antiquatus* (Linnaeus, 1758).

FAO names: En – Tankerville's cardita; Fr – Cardite de Tankerville; Sp – Cardita de Tankerville.



exterior of left valve



interior of right valve

Diagnostic characters: Shell relatively large (up to 5 cm long or more), **trignonate in outline** and only slightly longer than high. **Umbones** anterior to midline of valves but **well behind anterior end**. Anterior and ventral margins rounded, posterior margin slightly truncate. Lunule well defined, small, short, smooth and very convex, with a deep marginal groove. Outer surface with **about 26 (25 to 28) strong radial ribs with poorly developed sculpture**. Radial ribs rounded with somewhat flattened tops, about as wide as interspaces, only finely nodose near the umbones and **often with weak transverse threads on anterior part of valves**. Periostracum well developed and minutely ridged radially. **Hinge with 2 cardinal teeth at each valve**; lateral teeth obsolete, reduced to small and shallow tubercles, 1 anterior and 1 posterior in left valve, 1 posterior in right valve. **Pallial line without a sinus**. Internal margins strongly crenulate. **Colour:** outside of shell **cream to light tan** under the light to dark brown periostracum, sometimes more or less extensively tinged brownish posteriorly and **often variegated with darker fawn to brown markings forming isolated spots or zigzag stripes**. Interior milky white.

Size: Maximum shell length to nearly 6 cm, commonly from 4.5 to 5 cm.

Habitat, biology, and fisheries: In various sandy bottoms. Sublittorally, from about 5 to 40 m depths. Collected where common in bottom trawls. Eaten in soups; shell used for making decorative items.

Distribution: Tropical Eastern Atlantic, from Senegal to northern Angola; Ilha do Principe.

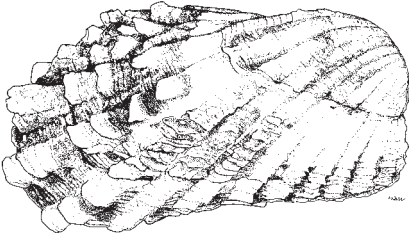


***Cardita rufescens* Lamarck, 1819**

Frequent synonyms / misidentifications: *Cardita senegalensis* Reeve, 1843; *Jesonia senegalensis* (Reeve, 1843) / *Cardita calyculata* (Linnaeus, 1758).

En – Jeson cardita; **Fr** – Cardite jeson; **Sp** – Cardita jeson.

Maximum shell length 4.5 cm, commonly to 3 cm. Byssally attached to rocks, stones and other hard objects. Intertidal and sublittoral zones to about 40 m depth. Locally collected for food and for its often brightly coloured shell. Eastern Atlantic, from Mauritania to Guinea, Côte d'Ivoire to Ghana, and Congo to southern Angola; São Tomé Island.



exterior of right valve

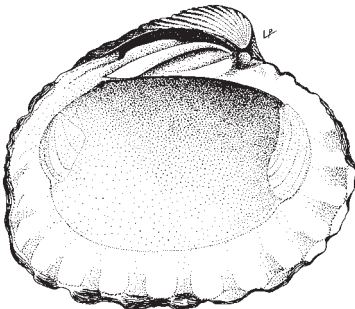


***Cardites antiquatus* (Linnaeus, 1758)**

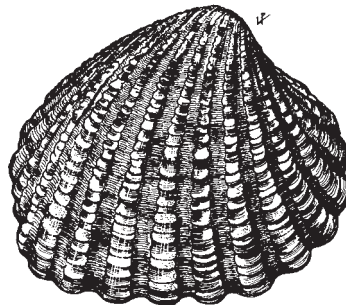
Frequent synonyms / misidentifications: *Cardita sulcata* Bruguière, 1792 [not Solander in Brander, 1766]; *Venericardia antiquata* (Linnaeus, 1758) / None.

En – Antique cardita; **Fr** – Cardite cannelée; **Sp** – Cardita.

Maximum shell length 3.5 cm, commonly to 2.5 cm. In coarse to fine soft bottoms, from low tidal levels to upper continental shelf. Common to about 40 m depth, but also occurring deeper, down to 100 m. Occasionally caught in bottom trawls and dredges, or collected snorkelling in shallow water, both for food and for its attractive shell. Eastern Atlantic, from Portugal to Morocco. Throughout the Mediterranean.



interior of left valve



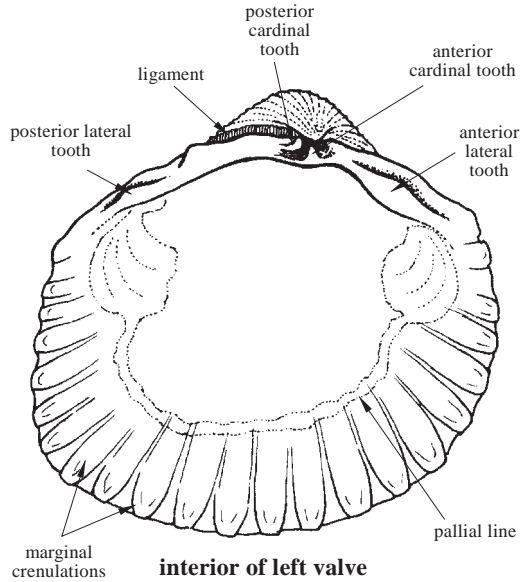
exterior of right valve



CARDIIDAE

Cockles

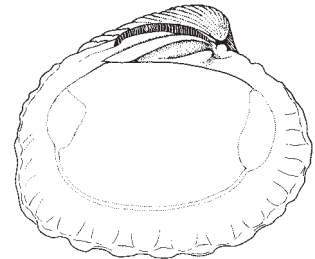
D **Diagnostic characters:** Shell equivalve, inflated, oval to subtrigonal or subquadrate, sometimes with a posterior ridge or angulation. Umbones prosogyrate to orthogyrate, prominent, approximate. External sculpture mostly radial, often more or less differing on posterior slope. Periostracum usually weak to inconspicuous, rarely well developed. Ligament external, a short and prominent arched band behind the umbones. Hinge characteristic, with teeth curving outwards rather than being set on a flat hinge plate; 2 cardinal teeth, and anterior and posterior lateral teeth, typically present in each valve; cardinal teeth cruciform in arrangement, when valves interlock. Two subequal adductor muscle scars. Pallial line without a sinus. Internal margins with crenulations, generally corresponding with the outer sculpture. Gills of eulamellibranchiate type, folded, with dorsoventrally slanting axis. Foot strong and long, sickle-shaped. Mantle widely open ventrally, smooth or papillate, sometimes with marginal eyes. Siphons naked, short and separate, papillate on top.



Habitat, biology, and fisheries: Shallow burrowers in sandy to muddy bottoms, most common in littoral and shallow subtidal waters. The geniculate foot can be used for jumping to escape predators. Sexes generally separate. Development with a free-swimming larval stage. Cockles are collected in the area for human consumption, and their shells may be used to make decorative items in the local craft industries or useful objects such as scoops or ash trays.

Similar families occurring in the area

Characteristic features of the hinge easily differentiate Cardiidae from other radially ribbed eulamellibranchiate bivalves such as the Carditidae.



interior of left valve
Carditidae

Key to species of interest to fisheries occurring in the area

- 1a. Radial ribs low, provided with periostracal fringes (Fig. 1). ***Fulvia fragilis congoensis***
- 1b. Radial ribs low to strong, always devoid of periostracal fringes → 2

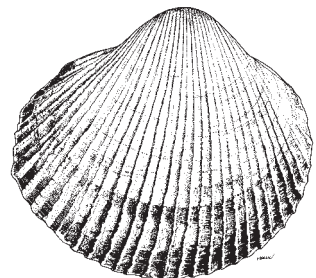


Fig. 1 *Fulvia fragilis congoensis* (exterior)

- 2a. Outer sculpture feeble, of indistinct subsurface radial riblets, not extending to posterior slope of valves (Fig. 2) . . . ***Laevicardium crassum***
- 2b. Outer sculpture prominent, of strong radial ribs, extending to posterior slope of valves → 3

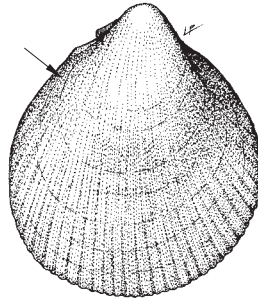


Fig. 2 *Laevicardium crassum* (exterior)

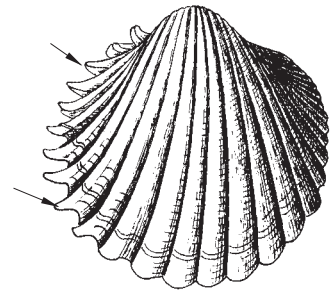


Fig. 3 *Bucardium ringens* (exterior)

- 3a. Radial ribs smooth and forming prominent digitations on posterior margin (Fig. 3) ***Bucardium ringens***
- 3b. Radial ribs usually more or less strongly sculptured; if nearly smooth, ribs not forming prominent digitations on posterior margin → 4
- 4a. Radial ribs of median part of valves bearing each a very strong, longitudinal hollow and sharp median keel → 5
- 4b. Radial ribs of median part of valves devoid of such hollow and sharp median keel (bearing at most a thin and low median ridge) → 6

- 5a. Median keel of ribs becoming much higher posteriorly; ribs of posterior slope low, flattish and forming a thin prominent ridge along their dorsal side, scarcely scalloping posterior margin of shell (Fig. 4) . . . ***Cardium maxicostatum***

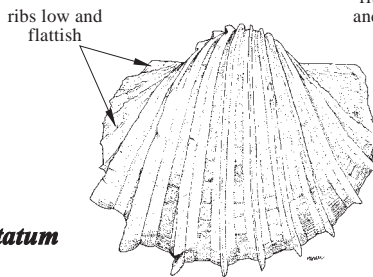


Fig. 4 *Cardium maxicostatum* (exterior)

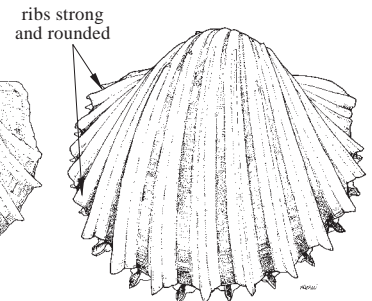


Fig. 5 *Cardium costatum* (exterior)

- 5b. Median keel of ribs of about the same height; ribs of posterior slope rather strong, rounded and smooth, decidedly scalloping posterior margin of shell (Fig. 5) ***Cardium costatum***

- 6a. Shell strongly gaping posteriorly; radial ribs bearing short scaly spines on anterior and median part of valves, and long, slender spines on posterior part. Internal radial ribs hollowed and darker coloured on posterior half of median part of valves (Fig. 6) ***Cardium indicum***

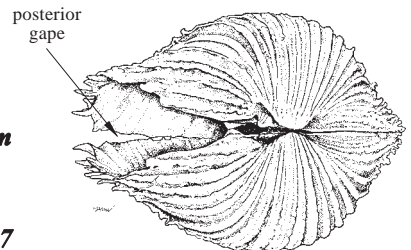


Fig. 6 *Cardium indicum* (dorsal view)

- 6b. Shell slightly gaping or closed posteriorly; radial ribs with a different sculpture. Internal radial ribs never hollowed and darker coloured → 7

7a. Right valve with 2 posterior lateral teeth; sculpture of radial ribs poorly developed, forming at most low transverse threads (Fig. 7a) . . . → 8



a) *Cerastoderma* b) *Acanthocardia*
Fig. 7 hinge of right valve

7b. Right valve with 1 posterior lateral tooth; sculpture of radial ribs well developed (Fig. 7b) → 9

8a. On median part of valves, radial ribs rounded and flattened, close-set or larger than interspaces, with numerous transverse threads (Fig. 8) . ***Cerastoderma edule***

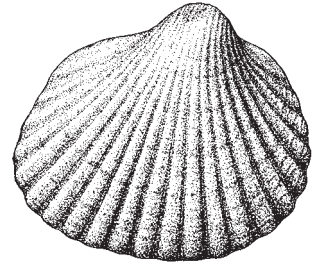
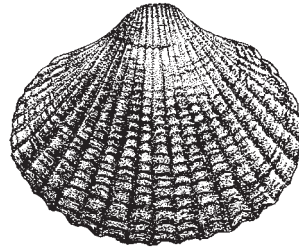


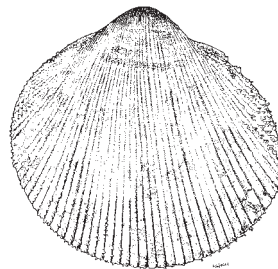
Fig. 8 *Cerastoderma edule* (exterior) Fig. 9 *Cerastoderma glaucum* (exterior)

8b. On median part of valves, radial ribs convex, becoming subcarinate toward posterior slope, generally with a confused and poorly marked ornamentation (Fig. 9) ***Cerastoderma glaucum***

9a. At least 49 radial ribs on each valve → 10

9b. Less than 30 radial ribs on each valve → 11

10a. Shell rather small (up to 3.5 cm long); radial ribs close-set, bearing only scaly nodules (Fig. 10) ***Trachycardium (Dallocardia) serrulatum***



ribs with thin undulated flanges

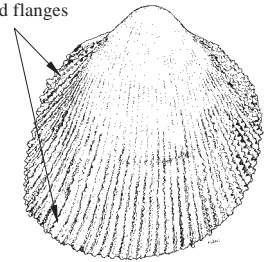
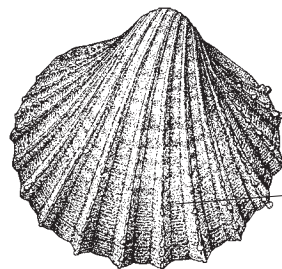


Fig. 10 *Trachycardium serrulatum* (exterior)

Fig. 11 *Europicardium caparti* (exterior)

10b. Shell rather large (up to 5 cm long); radial ribs with flat interspaces, and bearing thin, irregularly undulate flanges on posterior half of each valve (Fig. 11) ***Europicardium caparti***

11a. Radial ribs relatively few (15 to 19 on each valve), with an angular shape (Fig. 12) ***Acanthocardia paucicostata***



transverse shape of rib

Fig. 12 *Acanthocardia paucicostata* (exterior)

11b. Radial ribs relatively numerous (19 or more on each valve), with a different shape (rounded to flattened) . . . → 12

- 12a.** Radial ribs with tubercles or spines (at least in umbonal area on either side of the umbo), not connected by a median ridge (Fig. 13) *Acanthocardia tuberculata*
- 12b.** Radial ribs with tubercles or spines connected by a median ridge → **13**
- 13a.** Shell relatively thin, posteriorly truncate and slightly gaping; spines of radial ribs long and slender, at least in posterior part of valves (Fig. 14) *Acanthocardia aculeata*
- 13b.** Shell relatively thick, not posteriorly truncate nor gaping; spines of radial ribs short and spatulate (Fig. 15) *Acanthocardia echinata*

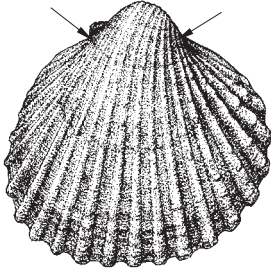


Fig. 13 *Acanthocardia tuberculata* (exterior)

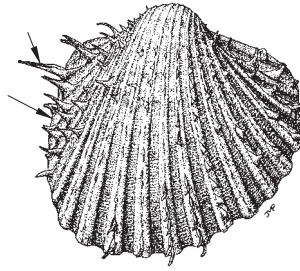


Fig. 14 *Acanthocardia aculeata* (exterior)

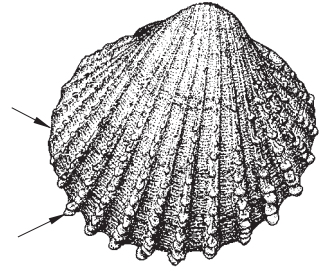


Fig. 15 *Acanthocardia echinata* (exterior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Acanthocardia aculeata* (Linnaeus, 1758).
- 🐚 *Acanthocardia echinata* (Linnaeus, 1758).
- 🐚 *Acanthocardia paucicostata* (G.B. Sowerby II, 1834).
- 🐚 *Acanthocardia tuberculata* (Linnaeus, 1758).
- 🐚 *Bucardium ringens* (Bruguière, 1789).
- 🐚 *Cardium costatum* Linnaeus, 1758.
- 🐚 *Cardium indicum* Lamarck, 1819.
- 🐚 *Cardium maxicostatum* ter Poorten, 2007.
- 🐚 *Cerastoderma edule* (Linnaeus, 1758).
- 🐚 *Cerastoderma glaucum* (Bruguière, 1789).
- 🐚 *Europicardium caparti* (Nicklès, 1955).
- 🐚 *Fulvia fragilis congoensis* Cosel, 1995.
- 🐚 *Laevicardium crassum* (Gmelin, 1791).
- 🐚 *Trachycardium (Dallocardia) serrulatum* (Deshayes, 1855).

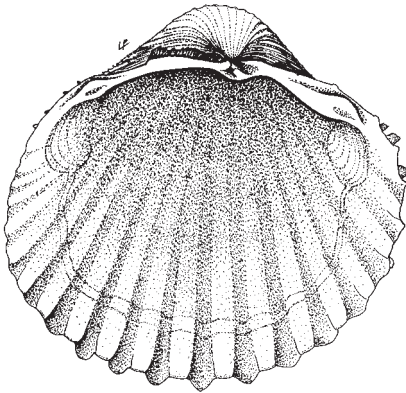
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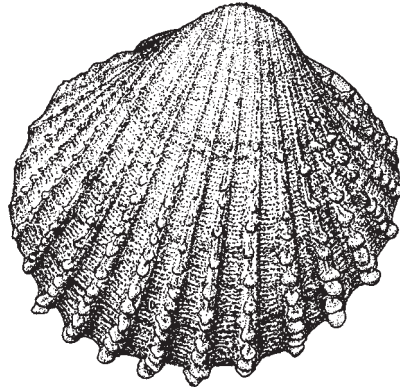
***Acanthocardia echinata* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Cardium duregnei* Monterosato, 1891; *C. echinatum* Linnaeus, 1758; *C. mucronatum* Poli, 1791 / None.

FAO names: **En** – European prickly cockle; **Fr** – Bucarde rouge; **Sp** – Carneiro.



interior of left valve



exterior of right valve

Diagnostic characters: Shell medium-sized (up to 7.5 cm long), **thick and solid**, about as long as high to slightly longer than high and **broadly ovate** in outline, not gaping posteriorly. Outer surface with **18 to 22 prominent radial ribs**, bearing each a row of spines connected at their base by a **low median ridge**; spines short and rather strong, becoming **more or less spatulate** on anterior and ventral parts of valves. Rib interstices with irregular transverse grooves and threads. Periostracum fibrous, easily peeling off. Hinge straightish, with cardinal and lateral teeth at each valve. Cardinal teeth subequal and connected at their bases in left valve, unequal in right valve. Left valve with 1 large anterior and 1 smaller posterior lateral tooth; **right valve with 1 posterior lateral tooth** and 2 anterior lateral teeth (the dorsalmost one much smaller). Interior of valves with well developed radial furrows corresponding with the outer ribbing. Internal margins strongly crenulate. **Colour:** outside of shell **whitish to tan or brownish**, often arranged in **darker and paler concentric zones**. Periostracum dull brown. Interior whitish.

Size: Maximum shell length 7.5 cm, commonly from 4.5 to 5.5 cm.

Habitat, biology, and fisheries: Actively burrowing in various soft bottoms. Lower intertidal zone and continental shelf to about 350 m depth. This common cockle is commercially fished in many areas. Its meat with bright orange foot is much appreciated, and its shell commonly used in local craft industries.

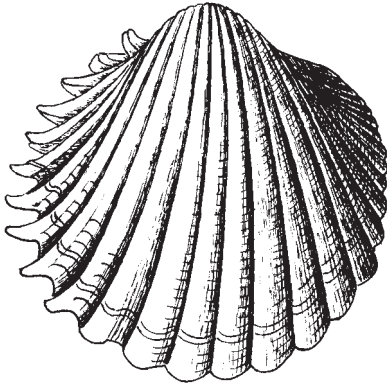
Distribution: Eastern Atlantic, from Iceland, Norway and the Baltic Sea to Morocco and the Canaries. Throughout the Mediterranean.



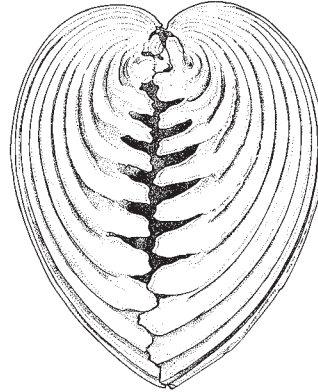
Bucardium ringens (Bruguère, 1789)

Frequent synonyms / misidentifications: *Cardium ringens* Bruguère, 1789; *Ringicardium ringens* (Bruguère, 1789) / None.

FAO names: **En** – Mofat cockle; **Fr** – Bucarde mofat; **Sp** – Berberecho mofat.



exterior of right valve



posterior view of entire shell

Diagnostic characters: Shell medium-sized (up to 7.5 cm long), **rather thick** and solid, **strongly inflated**, nearly equilateral, as long as high and rounded in shape, **not gaping posteriorly but with long and narrow radial openings along the digitate posterior margin** of each valve. Outer surface with **25 to 28** closely spaced, strong and **smooth radial ribs**. Ribs smaller, rounder and most close-set on anterodorsal area of valves; broader, somewhat flattened on top and separated by flat, narrow interspaces on median area; narrower, with rough posteroventral side on posterior slope and forming prominent digitations on posterior margin. Periostracum adherent, very thin, transparent and glowing. **Cardinal teeth** strong, subequal and **arranged parallel to dorsal margin in right valve, more or less perpendicular** in direction in **left valve and strongly unequal** (dorsalmost tooth reduced to a small knob). Posterior lateral teeth closer to cardinals than anterior laterals. Interior of shell with shallow radial undulations corresponding to the outer sculpture. Internal margins strongly crenulated by the outer **radial ribs, forming prominent digitations on posterior margin**. **Colour:** **outside** of shell **cream to pale beige**, sometimes with a greyish green hue posteriorly. **Interior pure white**, plain or slightly tinged with pink or light brown in the umbonal cavity.

Size: Maximum shell length 7.5 cm, commonly to 4 cm.

Habitat, biology, and fisheries: Very common in fine sandy bottoms of open sea areas. Sublittoral, from about 5 to 50 m depths. Frequently cast ashore on sandy beaches. Collected for food in bottom trawls and nets. Used in soups.

Distribution: Eastern Atlantic, from northern Mauritania to southern Angola.

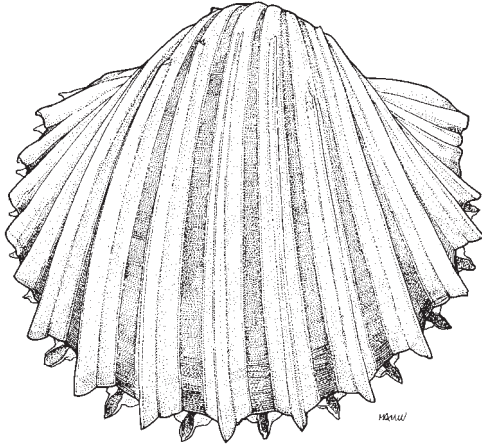
Remarks: This species was not distinguished from *Cardium indicum* in the first edition of this guide (Abbot, 1981). As a consequence, amended FAO names are given here to this species, to avoid further confusion.



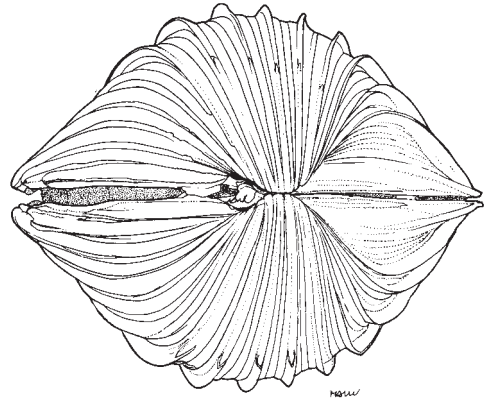
***Cardium costatum* Linnaeus, 1758**

Frequent synonyms / misidentifications: None / Until recently, this species has been confused with the very similar West African species *Cardium maxicostatum* ter Poorten, 2007.

FAO names: **En** – Costate cockle; **Fr** – Bucarde à côtes; **Sp** – Berberecho acostillado.



right side view of entire shell



dorsal view of entire shell

Diagnostic characters: Shell large (up to 10 cm long), rather thin and light for its size, strongly inflated, nearly equilateral, longer than high and quadrate-ovate in shape, moderately gaping posteriorly. Dorsal margin long and straight, ventral margin widely rounded. About 8 or 9 broad radial ribs on median part of shell (from 7 to 10 at each valve), with broad and flat interspaces and bearing each a very strong, hollow and sharp longitudinal keel. Median keels of ribs of about the same height. Anterior part of valves with a series of fine, close-set radial riblets, the dorsal most one usually stronger. Posterior slope with 5 or 6 rather strong, rounded and nearly smooth radial ribs, decidedly scalloping posterior margin of shell. Cardinal teeth subequal and arranged parallel to dorsal margin in right valve, strongly unequal and more or less perpendicular in direction in left valve. Posterior lateral teeth closer to cardinals than anterior laterals. Interior of valves with a well developed radial sculpture corresponding with the outer ribbing. Internal radial ribs somewhat hollowed on more than posterior half of median part of valves. Internal margins crenulated, the posterior one with rather strong points. **Colour:** outside of shell white, interstices of median ribs stained with rusty brown, fading out toward ventral margin. Interior glossy white, often darker coloured on hollowed part of internal radial ribs.

Size: Maximum shell length 10 cm, commonly from 6 to 8 cm.

Habitat, biology, and fisheries: In fine sand and muddy sand bottoms. Lower intertidal zone to continental shelf and upper slope, down to about 360 m. Most common in upper part of continental shelf. Regularly caught by shrimp and fish trawlers. Used in soups and shell trade. In Angola, shell commonly used as ashtray.

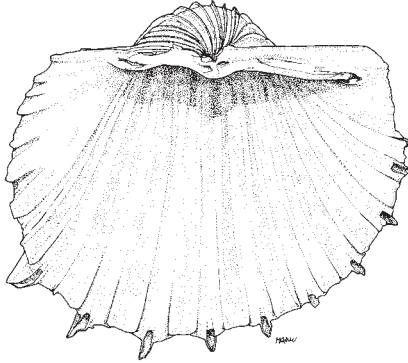
Distribution: Imperfectly known, because of long confusion with *Cardium maxicostatum*. Eastern Atlantic, at least from Senegal to central Angola; occurrence uncertain more in the north and in the south, as well as in Canary and Cape Verde islands.



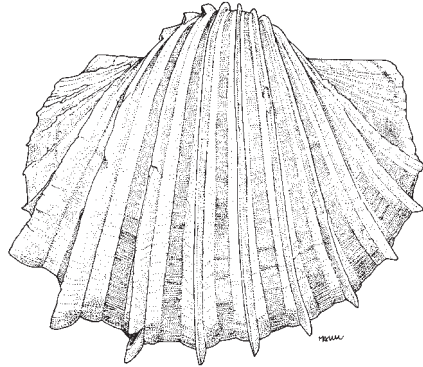
***Cardium maxicostatum* ter Poorten, 2007**

Frequent synonyms / misidentifications: None / *Cardium costatum* Linnaeus, 1758.

FAO names: En – Kaman cockle; Fr – Bucarde kaman; Sp – Berberecho kaman.



interior of left valve



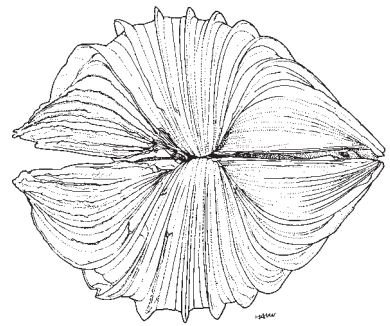
exterior of right valve

Diagnostic characters: Shell very large (up to 13 cm long), rather thin and light for its size, strongly inflated, nearly equilateral, longer than high and quadrate-ovate in shape, moderately gaping posteriorly. Dorsal margin long and straight, ventral margin widely rounded. About 10 to 11 broad radial ribs on median part of shell (from 9 to 13 at each valve), with broad and flat interspaces and bearing each a very strong, hollow and sharp longitudinal keel. Median keels of ribs becoming much higher posteriorly. Anterior part of valves with a series of fine, close-set radial riblets, about equal in size. Posterior slope with 5 or 6 rather low and flattish radial ribs, forming a thin prominent ridge along their dorsal side, and scarcely scalloping posterior margin of shell. Cardinal teeth subequal and arranged parallel to dorsal margin in right valve, strongly unequal and more or less perpendicular in direction in left valve. Posterior lateral teeth closer to cardinals than anterior laterals. Interior of valves with a well developed radial sculpture corresponding with the outer ribbing. Internal radial ribs somewhat hollowed on posterior half of median part of valves. Internal margins crenulated, the posterior one rather feebly scalloped. **Colour:** outside of shell white, interstices of posteromedian ribs stained with rusty brown, fading out toward ventral margin. Interior glossy white, often darker coloured on hollowed part of internal radial ribs.

Size: Maximum shell length 13 cm, commonly from 8 to 10 cm.

Habitat, biology, and fisheries: In fine sand and muddy sand bottoms. Probably from just below intertidal zone to upper continental shelf, down to at least 50 m. Sometimes washed ashore by thousands after storms. Regularly caught in trawls and nets by local fishermen. Used in soups and shell trade. In Angola, shell commonly used as ashtray.

Distribution: Imperfectly known, because of long confusion with *Cardium costatum*. Eastern Atlantic, probably from Mauritania to southern Angola; perhaps occurring also in Canary and Cape Verde islands.



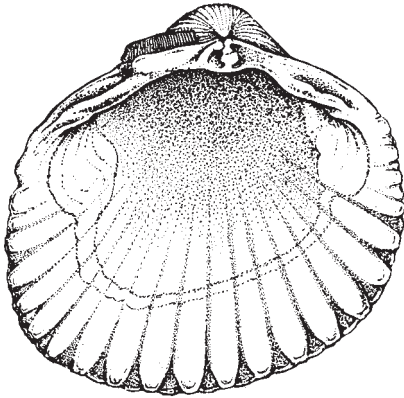
dorsal view of entire shell



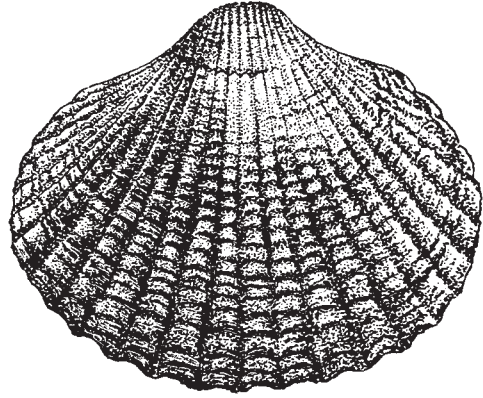
Cerastoderma edule (Linnaeus, 1758)

Frequent synonyms / misidentifications: *Cardium edule* Linnaeus, 1758 / *Cerastoderma glaucum* (Bruguère, 1789).

FAO names: **En** – Common edible cockle; **Fr** – Coque commune; **Sp** – Berberecho común.



interior of left valve



exterior of right valve

Diagnostic characters: Shell strongly inflated, solid, a little longer than high and rather variable in outline, ovate or subquartrate and sometimes somewhat obliquely expanded posteriorly; anterior and ventral margins broadly rounded, posterior margin obliquely rounded to truncated. Umbones slightly to decidedly anterior to midline of valves. Outer surface with about **22 to 28** rather low radial ribs with poorly developed sculpture. Radial ribs rounded and flattened, close-set or decidedly larger than interspaces, with numerous transverse threads on anterior and median part of valves; radial ribs tending to be narrower, smoother and with wider interspaces on posterior slope. Hinge plate slightly bent, with cardinal and lateral teeth at each valve; **right valve with 2 posterior lateral teeth**. Interior of valves with radial furrows corresponding with the outer ribbing and running inside the shell for a short distance only. Internal margins strongly crenulated. **Colour:** outside of shell whitish or dirty greyish yellow to light brown, sometimes more or less tinged with greyish or purplish brown on the umbones and posteriorly. Interior white, usually stained deep chestnut-brown posteriorly (on hinge under and behind the ligament, inside posterior slope and/or along posterior margin).

Size: Maximum shell length 5.3 cm, commonly to 3.5 cm.

Habitat, biology, and fisheries: Common in sandy to muddy bottoms, from midtidal levels to very shallow subtidal depths. Also present in brackish water areas. Can form dense populations. Artisanal exploitation on Mauritanian and Moroccan shores, where it commonly occurs. Unsuccessful trials of introduction for culture to Senegal in the past. A major commercial species in many northeast Atlantic European countries, actively exploited by fishing and by aquaculture.

Distribution: Eastern Atlantic, from western Barents Sea and Norway to Mauritania, and in westernmost Mediterranean. Southern limit of distribution uncertain, perhaps to Dakar area (Senegal).



***Fulvia fragilis congoensis* Cosel, 1995**

Frequent synonyms / misidentifications: None / None.

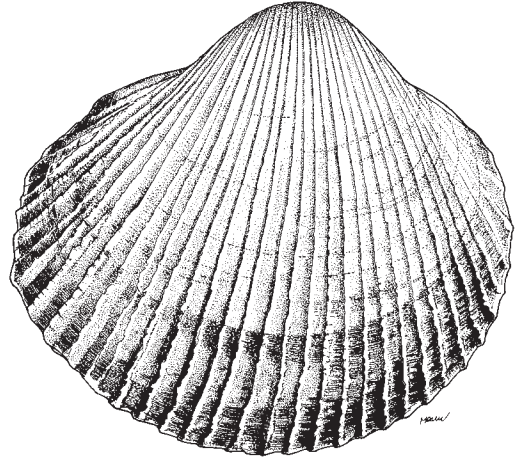
FAO names: En – Congolese cockle; Fr – Bucarde congolaise; Sp – Berberecho congoliño.

Diagnostic characters: Shell thin, as long as high to a little longer than high, **rounded to ovate** in outline and often somewhat obliquely **expanded posteriorly**. Outer sculpture feeble, of **about 32 to 38** smooth and **low radial riblets**, with **periostracal fringes** arising from top of the ribs. Anterodorsal area of valves smooth. Periostracum closely applied to shell, thin and translucent, a little more prominent toward shell margins and forming fringes on ribs. Hinge plate rather narrow and strongly bent. Cardinal teeth of each valve unequal in size; posterior lateral teeth roughly as far to cardinals as anterior laterals. Interior of valves with low radiating undulations corresponding with the outer ribbing. Internal margins finely crenulated. **Colour:** **outside** of shell whitish or **pale yellowish** under light greyish brown periostracum, more or less **tinged with purple on the umbones**, and often with fawn irregular zigzag markings near umbones. **Interior white**, usually **with dark purple areas**, mainly in the umbonal cavity, on hinge under and behind the ligament, and along posterior and posteroventral margins.

Size: Maximum shell length 5 cm, commonly to 3.5 cm.

Habitat, biology, and fisheries: In muddy sand and fine sand bottoms, mostly in protected bays and coastal lagoons, from low tide levels to about 10 m depth. Can survive in environments with somewhat reduced salinity. An opportunistic species, patchily distributed in favourable biotopes where it can occur in dense populations. Southernmost populations only temporary and not reaching sexual maturity in northern Angola. Collected for food by coastal people, as least in Ghana.

Distribution: The tropical East Atlantic, from Côte d'Ivoire to Ghana, and from Congo to northern Angola.



exterior of right valve

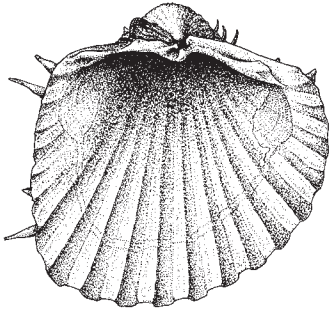


***Acanthocardia aculeata* (Linnaeus, 1758)**

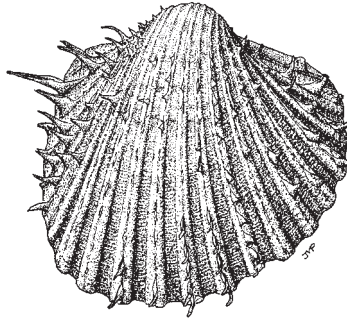
Frequent synonyms / misidentifications: *Cardium aculeatum* Linnaeus, 1758 / None.

En – Spiny cockle; **Fr** – Bucarde aiguillonnée; **Sp** – Marolo.

Maximum shell length 10.5 cm, commonly from 6 to 7 cm. In various detritic bottoms. Shallow subtidal water and continental shelf to about 125 m depth. Occasionally caught in bottom trawls and dredges. Eastern Atlantic, from the southwestern British Isles to Morocco and the Canaries. Throughout the Mediterranean.



interior of left valve



exterior of right valve

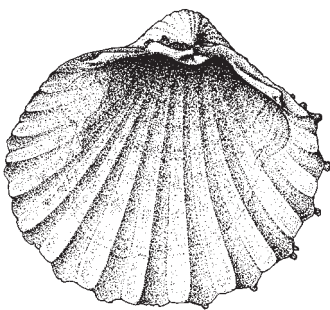


***Acanthocardia paucicostata* (G.B. Sowerby II, 1834)**

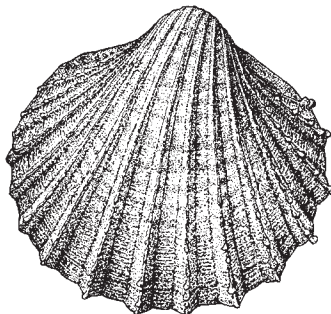
Frequent synonyms / misidentifications: *Cardium paucicostatum* Sowerby, 1834; *Sphaerocardium paucicostatum* (Sowerby, 1834) / None.

En – Poorly ribbed cockle; **Fr** – Bucarde peu côtelée; **Sp** – Gurriato.

Maximum shell length 5 cm, commonly from 2.5 to 3.5 cm. In sandy and muddy bottoms, from extreme low tide levels to about 250 m depth. Occasionally caught by dredges, bottom trawls and nets, or collected snorkelling in shallow waters, this species is rarely marketed. Its attractive shell is used for decorative items. Eastern Atlantic, from the Bay of Biscay (southern France) to Morocco and the Canaries. Mediterranean and Black Sea. Northern limit in the Atlantic uncertain; records from the southern British Isles probably erroneous.



interior of left valve



exterior of right valve

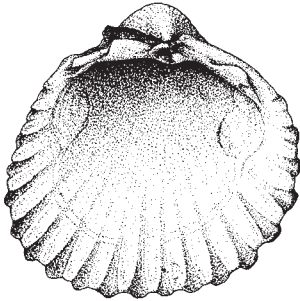


***Acanthocardia tuberculata* (Linnaeus, 1758)**

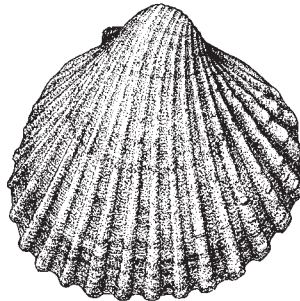
Frequent synonyms / misidentifications: *Cardium tuberculatum* Linnaeus, 1758; *Rudicardium tuberculatum* (Linnaeus, 1758) / *Acanthocardia impedita* (Milaschewitch, 1916) (= *Acanthocardia paucicostata*).

En – Tuberculate cockle; **Fr** – Bucarde tuberculée; **Sp** – Corruco.

Maximum shell length 9 cm, commonly from 5 to 7 cm. Shallowly burrowing in sandy bottoms, pure or mixed with mud or gravels. Intertidal and sublittoral zones to continental shelf, down to about 100 m. Often very common. Collected for food in Morocco. Outside the area, it is commercially fished in western and central Mediterranean. Eastern Atlantic, from the southern British Isles to Morocco; Madeira and Canary islands.



interior of left valve



exterior of right valve

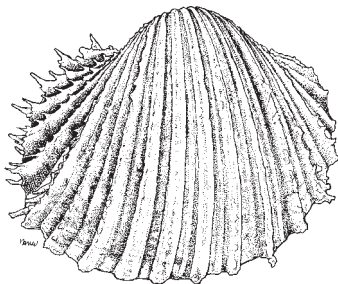


***Cardium indicum* Lamarck, 1819**

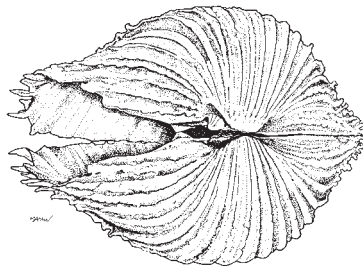
Frequent synonyms / misidentifications: *Cardium hians* Brocchi, 1814 [not of Spengler, 1799] / *Bucardium ringens* (Bruguère, 1789).

En – Gaping cockle; **Fr** – Bucarde bâillante; **Sp** – Berberecho boquiabierto.

Maximum shell length 10 cm, commonly to 7.5 cm. In fine sandy bottoms often mixed with mud, shell rubble and stones. Offshore, from about 30 to 200 m depths. Most frequent at 40 to 50 m and occasionally taken in bottom trawls and nets. Highly prized by European shell collectors due to its rarity in the Mediterranean. Sometimes used as food in West African countries, but too rare to support commercial fishing. Eastern Atlantic, from the Straits of Gibraltar to Senegal, Côte d'Ivoire to Ghana, and Congo to northern Angola; Canary Islands. Western Mediterranean.



exterior of right valve



dorsal view of entire shell

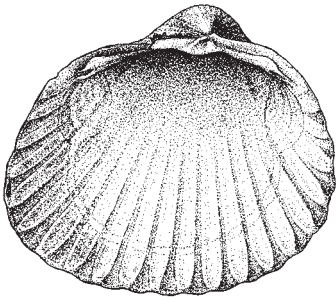


***Cerastoderma glaucum* (Bruguière, 1789)**

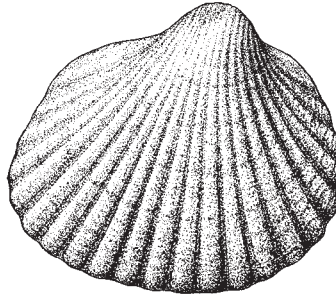
Frequent synonyms / misidentifications: *Cardium glaucum* Poirlet, 1789; *C. lamarcki* Reeve, 1844 / *Cerastoderma edule* (Linnaeus, 1758).

En – Olive green cockle; **Fr** – Coque glauque; **Sp** – Berberecho verde.

Maximum size of shell length 5.5 cm, commonly from 3 to 4 cm. In sandy to muddy bottoms. Intertidal to shallow subtidal levels, mostly in brackish water areas of sheltered bays, estuaries and coastal lagoons. Can occur in dense populations. Commercially fished and cultured for food in many parts of Europe and North Africa, especially in the Mediterranean where it replaces the very similar *Cerastoderma edule*. Eastern Atlantic, from Norway and Baltic Sea to Morocco. Throughout the Mediterranean and the Black Sea. Also occurring in Caspian Sea and northern Red Sea.



interior of left valve



exterior of right valve



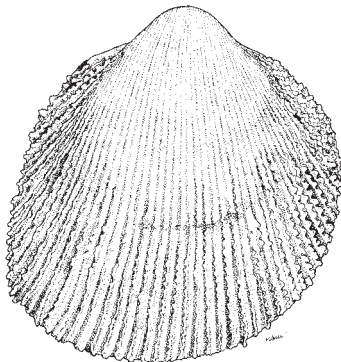
***Europocardium caparti* (Nicklès, 1955)**

Frequent synonyms / misidentifications: *Cardium caparti* Nicklès, 1955; *Fulvia caparti* (Nicklès, 1955) / *Cardium caparti* of authors (not Nicklès, 1955) (= *Europocardium nolfi* Swinnen, 2010); *C. kobelti* Maltzan, 1885 [= *Trachycardium serrulatum* (Deshayes, 1855)].

En – Nicklès cockle; **Fr** – Bucarde de Nicklès; **Sp** – Berberecho de Nicklès.

Maximum shell length 5 cm, commonly from 3 to 4 cm. In fine soft bottoms (fine sands, muddy sands or sandy muds) of continental shelf, from about 40 to 110 m depths. Incidental bycatch of shrimp and fish trawlers. Eastern Atlantic, from Senegal to Congo and in Angola; Cape Verde and Annobon islands.

Remarks: In Angola, *Europocardium caparti* was long confused with another, very similar species, *Europocardium nolfi* Swinnen, 2010.



exterior of right valve

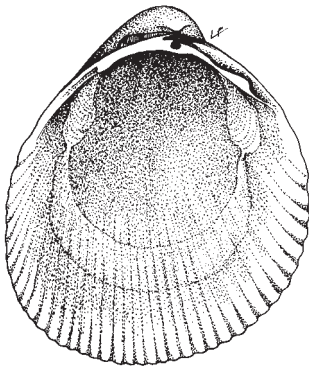


***Laevicardium crassum* (Gmelin, 1791)**

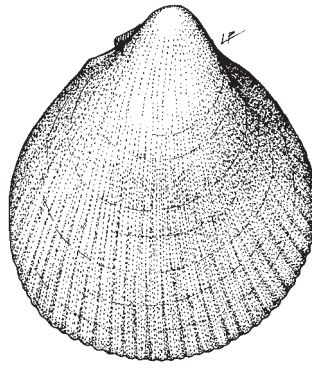
Frequent synonyms / misidentifications: *Laevicardium norvegicum* (Spengler, 1799); *L. oblongum gibba* (Jeffreys, 1864); *L. o. senegalense* (Dautzenberg, 1891) / *Laevicardium oblongum* (Gmelin, 1791); *L. o. castaneum* Vidal, 2005 [= *L. castaneum* (Vidal, 2005)].

En – Norwegian egg cockle; **Fr** – Coque lisse norvégienne; **Sp** – Berberecho de Noruega.

Maximum shell length 8 cm (up to only 5 cm in the tropical East Atlantic), commonly to 4 cm. In various soft bottoms from low in the intertidal zone to about 180 m depth. Along West African coasts, only occurring between 10 and 80 m. West African populations reach a smaller size and belong to subspecies *senegalense* (Dautzenberg, 1891). Incidental bycatch of shrimp and fish trawlers. Eastern Atlantic, from Norway to southern Angola; Canary and Cape Verde islands. Throughout the Mediterranean.



interior of left valve



exterior of right valve



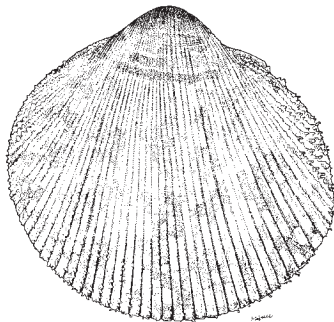
***Trachycardium (Dallocardia) serrulatum* (Deshayes, 1855)**

Frequent synonyms / misidentifications: *Cardium kobelti* Maltzan, 1885; *Europicardium serrulatum* (Deshayes, 1855); *Fulvia serrulata* (Deshayes, 1855) / None.

En – Kobelt's cockle; **Fr** – Bucarde serrulée; **Sp** – Berberecho serrulado.

Maximum shell length 3.5 cm, commonly 2 cm. In various sandy bottoms, often together with *Mosambicarca hians*, *Cardites tankervillei*, *Bucardium ringens* and *Maetra glabrata*. Sublittorally, from about 5 to 50 m depths. Often collected with the other edible bivalves living in the same environments. Eastern Atlantic, from Mauritania to northern Angola.

Remark: *Dallocardia* should probably be considered a genus distinct from *Trachycardium*.



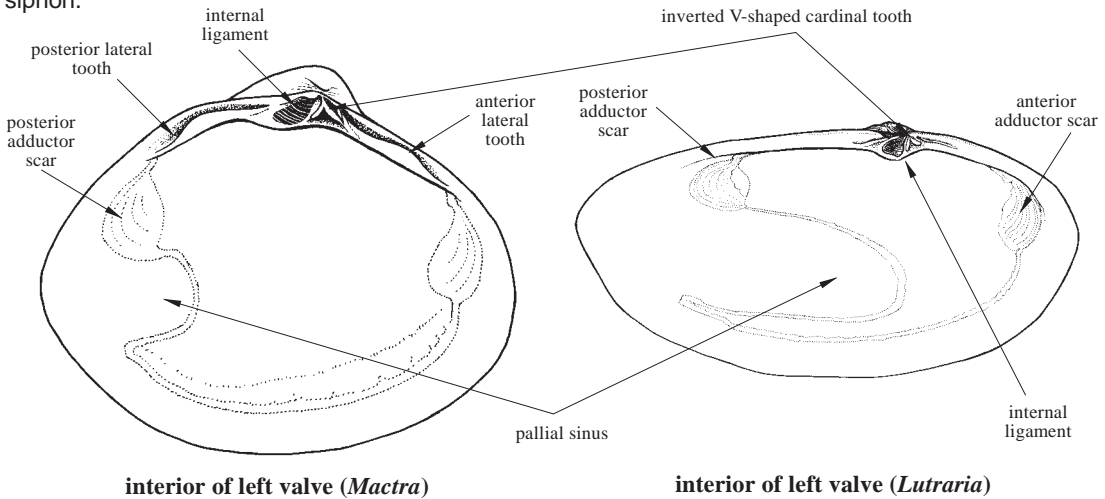
exterior of left valve



MACTRIDAE

Trough-shells

D **Diagnostic characters:** **Shell** equivalve, ovate or trigonal to transversely elongated, closed to somewhat gaping posteriorly. **Umbones** **prosoogyrate**, more or less prominent. Outer surface smooth or mostly concentrically sculptured, often with an obvious periostracum. External ligament short and not prominent, just behind the umbones; **internal ligament well developed**, set in each valve in a deep **trigonal pit of the hinge plate** and pointing towards the umbo. **Hinge characteristic**, each valve with **2 cardinal teeth** and smooth or striated, more or less developed, **lateral teeth**; **cardinal teeth of the left valve forming an inverted V-shaped process**; delicate additional cardinal lamellae often present in either valve. Interior of shell porcelaneous. **Two**, often subequal, **adductor muscle scars**. **Pallial line with a well developed sinus**. Internal margins usually smooth. Gills of eulamellibranchiate type, with generally smooth branchial sheets; outer demibranch expanded above the ctenidial axis. Foot large and compressed, heeled, without a byssus. Siphons united, generally rather short, naked or sheathed with an expansion of the periostracum, papillate on top. Mantle margins smooth, more or less cuticularly united or fused ventrally, with a large pedal opening anteriorly and an additional aperture beneath the inhalant siphon.



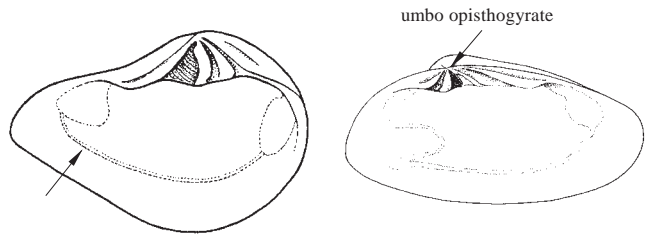
examples showing diversity of shape

Habitat, biology, and fisheries: Active burrowers of sandy to muddy bottoms. Suspension filter-feeding animals. Sexes separate. Development with a free-swimming larval stage. Mactridae generally represent species of secondary importance in the harvest of edible bivalves for the studied zone, though a few species are quite regularly fished locally.

Similar families occurring in the area

Crassatellidae: no inverted V-shaped process in hinge of left valve. Pallial line without a sinus.

Mesodesmatidae: umbones opisthogyrate. No inverted V-shaped process in the hinge of left valve. Siphons separate. Branchial sheets folded.



interior of left valve
Crassatellidae

interior of left valve
Mesodesmatidae

Key to species of interest to fisheries occurring in the area

- 1a. Median part of valves with numerous, coarse, unequal radial threads. Internal ventral margin crenulated (Fig. 1) ***Eastonia rugosa***
- 1b. Median part of valves without radial threads. Internal ventral margin smooth → 2

- 2a. Shell relatively low (height about one-half of the length); pallial sinus deep, extending anteriorly well beyond midline of valve (on about two-thirds of shell length); siphons of the animal covered to tips with rough epidermis, not entirely retractile within the shell (Fig. 2a) → 3
- 2b. Shell relatively high (height about three-fourths to four-fifths of the length); pallial sinus moderately deep to shallow, usually not attaining midline of valve (extending at most on 55% of shell length); siphons of the animal naked, entirely retractile within the shell (Fig. 2b) → 6

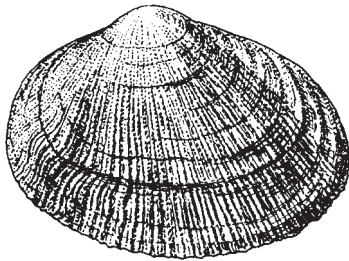


Fig. 1 *Eastonia rugosa* (exterior)

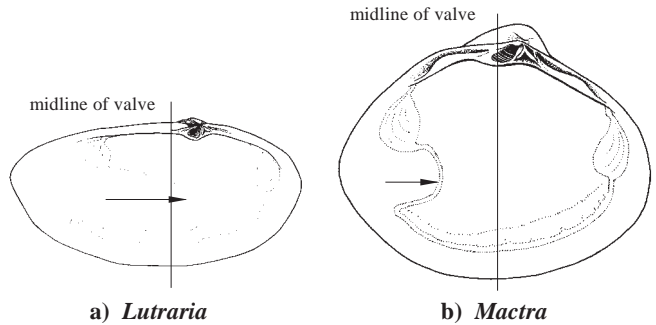


Fig. 2 interior of left valve

- 3a. Posterodorsal margin concave; anterior cardinal tooth of the right valve longitudinally bifid (Fig. 3) ***Lutraria magna***
- 3b. Posterodorsal margin straightish to slightly convex; anterior cardinal tooth of the right valve not longitudinally bifid (Fig. 4) → 4

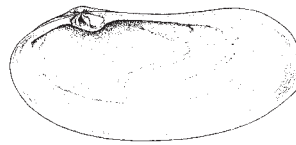


Fig. 3 *Lutraria magna* (interior)

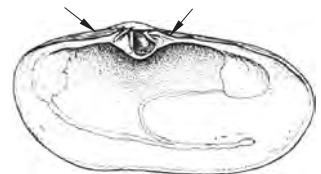


Fig. 4 *Lutraria angustior* (interior)

- 4a. Outer sculpture visible interiorly on either side of umbo (Fig. 4) ***Lutraria angustior***
- 4b. Outer sculpture not visible interiorly on either side of umbo (Figs 5 & 6) → 5

- 5a. Ventral branch of pallial sinus separated from pallial line by a wedge-shaped area (Fig. 5) ***Lutraria lutraria***
- 5b. Ventral branch of pallial sinus widely confluent with pallial line in its posterior half (Fig. 6) ***Lutraria senegalensis***

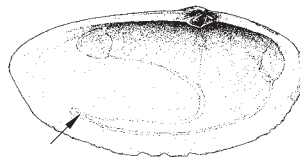


Fig. 5 *Lutraria lutraria* (interior)

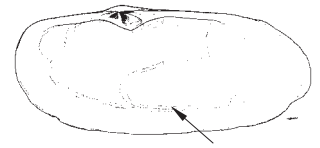


Fig. 6 *Lutraria senegalensis* (interior)

- 6a. Internal ligament pit opening to the exterior via a crescent-shaped to V-shaped slit between the umbones (Fig. 7) → 7
- 6b. Internal ligament pit not opening to the exterior via a slit between the umbones → 9

- 7a. Shell length reaching a large size (up to 11.5 cm); umbones widely separated from each other (Fig. 7) *Scissodesma spengleri*
- 7b. Shell length medium sized (not extending beyond 7 cm); umbones rather approximate → 8

- 8a. Anterodorsal and posterodorsal areas of valves with fine regular concentric grooves; pallial sinus relatively shallow, extending forward to about one-third of shell length (Fig. 8) *Scissodesma nitida*
- 8b. Anterodorsal and posterodorsal areas of valves without concentric grooves; pallial sinus relatively deep, extending forward to nearly half of shell length (Fig. 9) *Scissodesma angolensis*

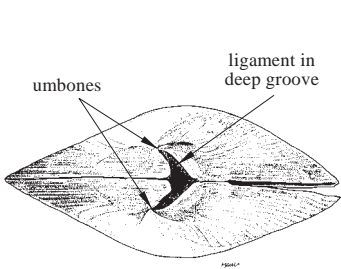


Fig. 7 *Scissodesma spengleri* (dorsal view)

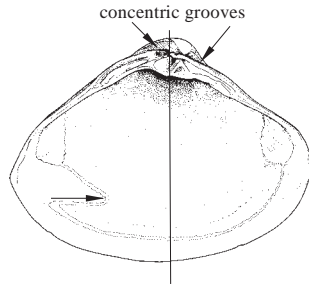


Fig. 8 *Scissodesma nitida* (interior)

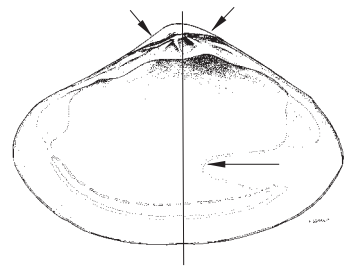


Fig. 9 *Scissodesma angolensis* (interior)

- 9a. Lateral hinge teeth transversally striated, on their inner surface in right valve, on their dorsal and ventral surfaces in left valve (Fig 10a) *Spisula subtruncata*
- 9b. Lateral hinge teeth not transversally striated (Fig. 10b) → 10

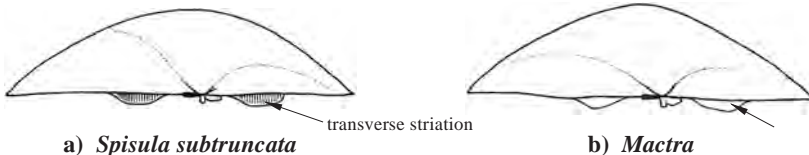


Fig. 10 dorsal view of left valve

- 10a. Surface of valves with low concentric ridges developed toward the umbones; external and internal ligaments not separated by a small calcareous septum (Fig. 11) *Leptospisula nivea*
- 10b. Surface of valves without low concentric ridges toward the umbones; external and internal ligaments separated by a small calcareous septum (Fig. 12) → 11

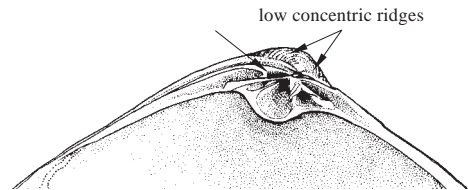


Fig. 11 *Leptospisula nivea* (hinge of left valve)

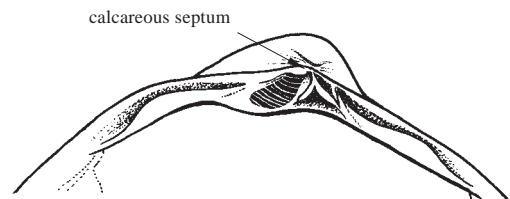


Fig. 12 *Mactra* (hinge of left valve)

- 11a. Outer surface of valves partly covered with fine, regular concentric grooves (Fig. 13) ***Maclra glabrata***
- 11b. Outer surface of valves without concentric grooves → 12

- 12a. Shell higher than long, with prominent umbones; a low radial ridge forming a rounded angle at posteroventral margin (Fig. 14) ***Barymaclra rostrata***
- 12b. Shell longer than high, with rather low umbones; posteroventral margin not angular (Fig. 15) ***Maclra stultorum***

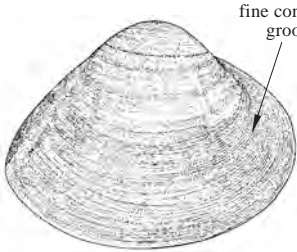


Fig. 13 *Maclra glabrata* (exterior)

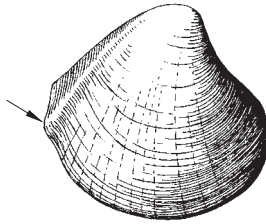


Fig. 14 *Barymaclra rostrata* (exterior)

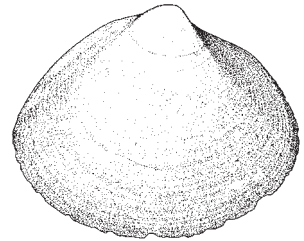


Fig. 15 *Maclra stultorum* (exterior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Barymaclra rostrata* (Spengler, 1802).
- 🐚 *Eastonia rugosa* (Helbling, 1779).
- 🐚 *Leptospisula nivea* (Gmelin, 1791).
- 🐚 *Lutraria angustior* Philippi, 1844.
- 🐚 *Lutraria lutraria* (Linnaeus, 1758).
- 🐚 *Lutraria magna* (da Costa, 1778).
- 🐚 *Lutraria senegalensis* Gray, 1837.
- 🐚 *Maclra glabrata* Linnaeus, 1767.
- 🐚 *Maclra stultorum* (Linnaeus, 1758).
- 🐚 *Scissodesma angolensis* (Cosel, 1995).
- 🐚 *Scissodesma nitida* (Gmelin, 1791).
- 🐚 *Scissodesma spengleri* (Linnaeus, 1767).
- 🐚 *Spisula subtruncata* (da Costa, 1778).

References

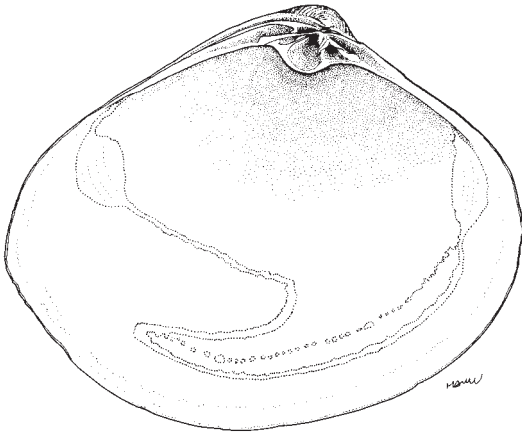
Lamy, E. 1917. Révision des Maclridae vivants du Muséum d'Histoire naturelle de Paris. *Journal de Conchyliologie*, 63(3): 173–275.

Lamy, E. 1918. Révision des Maclridae vivants du Muséum d'Histoire naturelle de Paris (Suite). *Journal de Conchyliologie*, 63(4): 291–414.

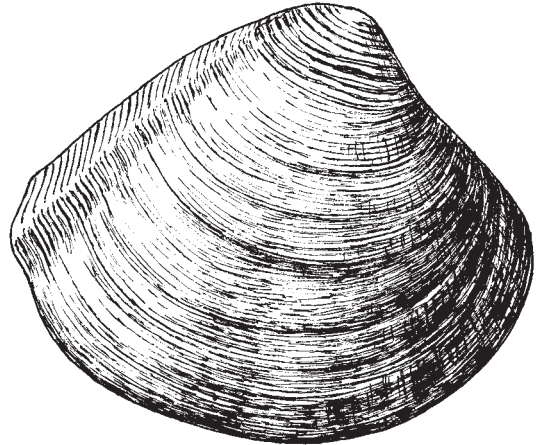
***Leptospisula nivea* (Gmelin, 1791)**

Frequent synonyms / misidentifications: *Mactra striatella* Lamarck, 1818; *Spisula striatella* (Lamarck, 1818); *Standella nivea* (Gmelin, 1791) / None.

FAO names: **En** – Snowy maetra; **Fr** – Douceron striolé; **Sp** – Mactra estriada.



interior of left valve



exterior of left valve

Diagnostic characters: Shell large (up to 14 cm long) but relatively thin, inflated, **subtrigonal** ovate and rather high in outline, **somewhat gaping at posterior end**. **Umbo**nes prominent, **well in front of midline** of valves. Anterior margin broadly rounded, **posterior margin subtruncate**. Posterior slope of valves set off by an obtuse angulation radiating from umboes to posteroventral end. Outside of shell with numerous, irregular, concentric growth lines and marks, coarser anteriorly and posteriorly, and with roughly **concentric smooth and low ridges developed toward the umboes**. Lunule and escutcheon areas smoothish. Periostracum thin and adherent. **Hinge plate short**, with broad ligament pit and teeth concentrated under the umboes. **Lateral teeth** not transversally striated, **short and very close to cardinal teeth**, with 1 anterior and 1 posterior lateral teeth in left valve, 2 anterior and 2 posterior in right valve; anterior lateral tooth of left valve and dorsal anterior lateral of right valve aligned with small anterior cardinal teeth. **Pallial sinus** broad and rounded, **relatively deep**, extending to the midline. Internal margins smooth. **Colour:** **outside of shell white** under the translucent, relatively thin, pale yellowish periostracum. Interior milky white.

Size: Maximum shell length 14 cm, commonly to 9 cm.

Habitat, biology, and fisheries: Very common in clean sandy bottoms, in shallow subtidal waters, probably to about 10 m depth. This species has been traditionally collected for food for at least 4 000 years in Senegal. Also known from prehistoric kitchen middens in southern Western Sahara, where it is now probably extinct.

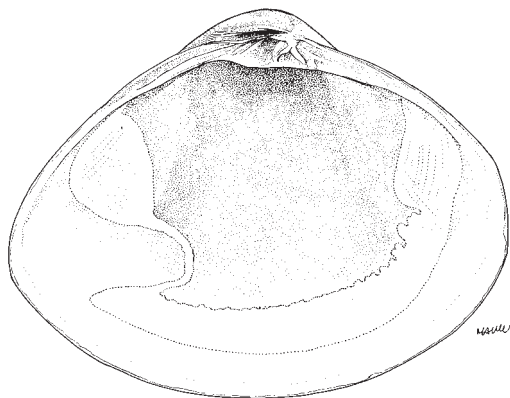
Distribution: Restricted to Senegal in the tropical East Atlantic; perhaps occurring sparsely north to Mauritania.



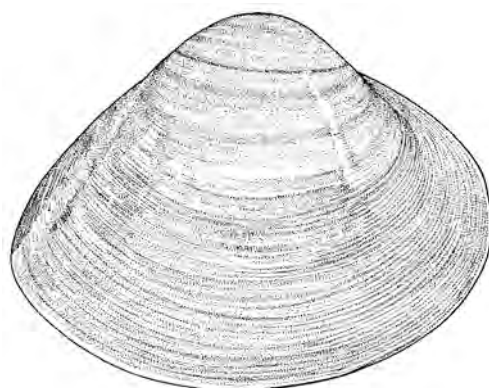
***Mactra glabrata* Linnaeus, 1767**

Frequent synonyms / misidentifications: *Mactra adansonii* Philippi, 1849; *Mactra largillierti* Philippi, 1849 / None.

FAO names: En – Smooth mactra; Fr – Mactre lisse; Sp – Mactra lisa.



interior of left valve



exterior of right valve

Diagnostic characters: Shell large (up to more than 11 cm long), **inflated**, rather variable in shape and thickness, **roughly trigonal ovate** in outline and nearly equilateral to slightly inequilateral. **Umbones often a little in front of the midline** of valves. Dorsal margin sloping on either side of umbo. Anterior and ventral margins regularly rounded, **posterior margin roundly pointed**. A low rounded fold radiating from the umbones to slightly gaping posteroventral end. Outer surface of valves smooth and glossy, with **fine, regular concentric grooves on anterodorsal, posterodorsal and anteroventral areas**. Periostracum thin and adherent. **External and internal ligaments separated by a small calcareous septum**. **Lateral hinge teeth well developed** and elongated, 1 anterior and 1 posterior in left valve, 2 anterior and 2 posterior in right valve. **Pallial sinus rather broad and shallow, rounded anteriorly** and about as long as high. Internal margins smooth. **Colour: outside of shell variable, usually cream to fawn, plain or with a pattern of unequal darker and lighter radial and/or concentric lines or bands**; umbones frequently stained with purplish. Periostracum smooth and glossy, yellowish or greyish brown. **Interior whitish**, often more or less intensely **flushed with brownish to deep purple**.

Size: Maximum shell length 11.4 cm, commonly from 5 to 6 cm.

Habitat, biology, and fisheries: Burrowing mostly in fine or muddy sand bottoms, sometimes with shell rubble. In intertidal sand banks of sheltered areas, mostly at shallow subtidal levels where it can form abundant populations, down to nearly 40 m depth. Most abundant in the northern and southern parts of its range, it is uncommon in the typical tropical region and rare from Sierra Leone to Liberia, and from Nigeria to Cameroon. Commonly collected for food in the area, by hand at low tide or with trawls and dredges in shallow water. Specimens of southern populations tend to be thicker shelled and to reach a larger size (formerly known as *Mactra largillierti*). Consumed in soup and in dishes with rice.

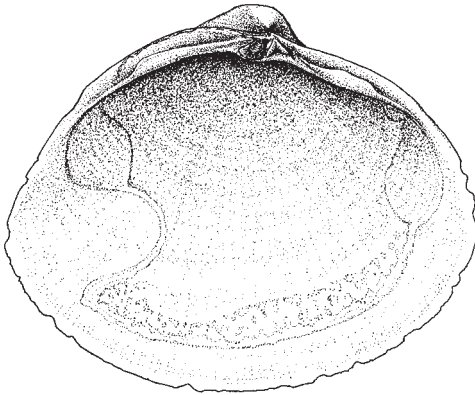
Distribution: Widely distributed in the Eastern Atlantic, from Mauritania to South Africa, eastward to Eastern Cape; the Canaries, Cape Verde Islands, São Tomé, Ilha do Principe and Annobon Islands.



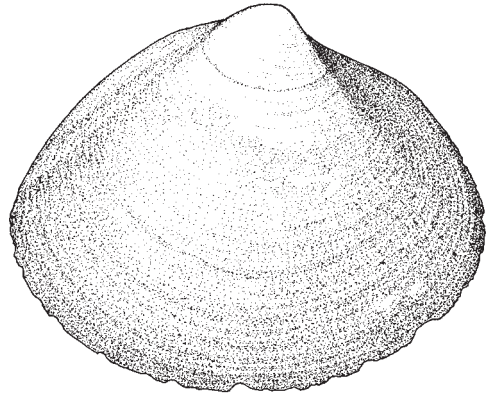
Macra stultorum (Linnaeus, 1758)

Frequent synonyms / misidentifications: *Macra cinerea* Montagu, 1808; *M. cinerea* var. *lignaria* Monterosato, 1878; *M. corallina* (Linnaeus, 1758) / None.

FAO names: **En** – Rayed trough-shell; **Fr** – Mactre coralline; **Sp** – Pechina coralina.



interior of left valve



exterior of right valve

Diagnostic characters: **Shell** medium sized (up to 7 cm long), relatively thin and **inflated, trigonal-ovate** in outline and **a little longer than high**, slightly gaping posteriorly, **feebly inequilateral**. **Umboes rather low**, slightly in front of midline of valves. Dorsal margins smoothly convex and sloping on either side of the umbo. Anterior margin rounded, **posterior margin obtusely truncate**. Ventral margin broadly rounded. A weak fold radiating from umboes to posteroventral end. **Outer surface** of shell **smoothish**, devoid of concentric grooves or threads on anterodorsal and posterodorsal areas. Periostracum rather thin and adherent, often more or less eroded on the umboes and becoming thicker and more fibrous toward the margins. **External and internal ligaments separated by a small calcareous septum**. **Hinge with well developed lateral teeth**, 1 anterior and posterior in left valve, 2 anterior and 2 posterior in right valve. **Anterior cardinal tooth of right valve nearly parallel to dorsal hinge margin**. **Pallial sinus** relatively **shallow, broadly rounded** and higher than long. Internal margins smooth. **Colour:** **outside** of shell **creamy white to tan with a purplish hue** on umbonal area and **with lighter and deeper brown radiating rays**. Periostracum yellowish to greyish brown. **Interior whitish**, more or less deeply **tinged purplish**, with the outer colour pattern showing through.

Size: Maximum shell length 7 cm, commonly from 4.5 to 5.5 cm.

Habitat, biology, and fisheries: Often very common in clean to muddy sand bottoms, from lower intertidal zone to shallow subtidal levels. May also occur deeper, down to about 60 m. Collected for food in dredges and trawls. Outside the studied zone, it is regularly exploited in the Western Mediterranean and frequently occurs in Italian markets.

Distribution: Eastern Atlantic, from Norway and the Baltic to Morocco and the Canaries. Throughout the Mediterranean and the Black Sea. Southern limit imperfectly known; perhaps extending further south to Mauritania, but records from Senegal most probably erroneous.

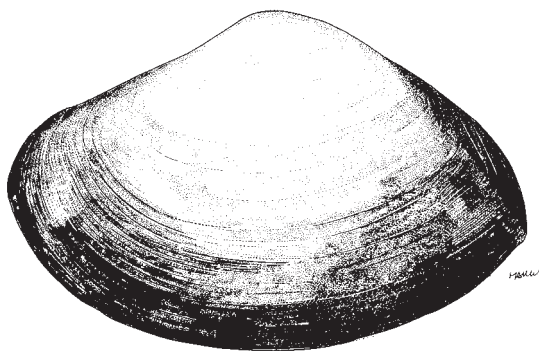
Remarks: Recent molecular analyses have shown that *Macra stultorum* could represent a complex of sibling species, and that the white coloured Mediterranean form is genetically distinct. Pending to studies on Atlantic populations, *M. stultorum* is here considered in its traditional wide sense.



***Scissodesma angolensis* (Cosel, 1995)**

Frequent synonyms / misidentifications: *Maetra angolensis* Cosel, 1995 / *Scissodesma nitida* (Gmelin, 1791).

FAO names: **En** – Angolan trough-shell; **Fr** – Mactre angolaise; **Sp** – Mactra angoleña.



exterior of left valve



interior of right valve

Diagnostic characters: Shell medium sized (up to 7 cm long), moderately inflated, **trigonal ovate** and relatively elongate in outline, closed and subequilateral. **Umbones submedian** or a little in front of midline of valves. Dorsal margin sloping on either side of umbo. Anterior margin narrowly rounded, **posterior margin subangulate**. **Posterodorsal slope of valves set off by a smooth keel** radiating from umbones to posteroventral end. **Outer surface of shell smoothish**, devoid of concentric threads on anterodorsal and posterodorsal areas. Periostracum thin. **Internal ligament pit opening to the exterior via a narrow, V-shaped slit between the umbones**. **Lateral hinge teeth rather short but well developed**, 1 anterior and 1 posterior in left valve, 2 anterior and 2 posterior in right valve. **Pallial sinus horizontal, longer than high, trigonal and relatively deep, extending forward nearly to level of the umbo**. Internal margins smooth. **Colour: outside of shell white** occasionally flushed with **pale yellowish hue** towards the umbones. **Periostracum pale to dark greyish olive**. Interior dull white.

Size: Maximum shell length 7 cm, commonly from 4.5 to 5.5 cm.

Habitat, biology, and fisheries: Locally common in pure fine to heterogeneous sand bottoms. Shallow subtidal water, from about 1 to 5 m depths. Frequently cast ashore in great numbers on sandy beaches after storms. Collected for food where common, and mainly eaten in soups.

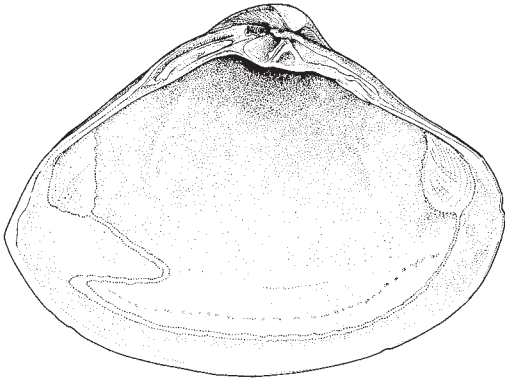
Distribution: Eastern Atlantic, from Congo to southern Angola.



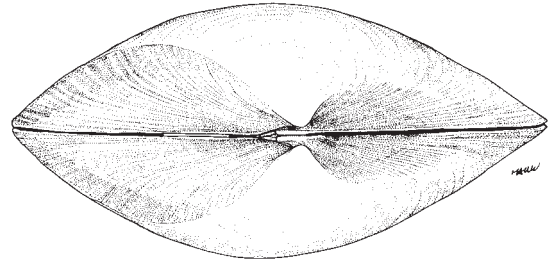
***Scissodesma nitida* (Gmelin, 1791)**

Frequent synonyms / misidentifications: *Mactra nitida* Gmelin, 1791 / Until recently, several other species have been mixed up under the name "*Mactra nitida*" [*Scissodesma angolensis* is one of them].

FAO names: **En** – Polished mactra; **Fr** – Mactre polie; **Sp** – Mactra pulida.



interior of left valve



dorsal view of shell

Diagnostic characters: Shell rather small to medium sized (up to 6 cm long), moderately inflated, **trigonal ovate** and relatively elongate in outline, closed and subequilateral. **Umbones submedian** or a little in front of midline of valves. Dorsal margin sloping on either side of umbo. Anterior margin narrowly rounded, **posterior margin subangulate** and obtusely truncate. **Posterodorsal slope of valves set off by a sharpe keel** radiating from umbones to posteroventral end. **Outer surface** of shell rather smooth medially, **with fine regular concentric grooves on anterodorsal and posterodorsal areas; ventral part of posterodorsal slope** separated from its grooved dorsal part by a narrow radial thread and **covered by densely set and rather coarse, irregular concentric lines**. Periostracum thin and adherent, often becoming thicker on margin of larger specimens. **Internal ligament pit opening to the exterior via a narrow, V-shaped slit between the umbones**. **Lateral hinge teeth** rather short but **well developed**, 1 anterior and 1 posterior in left valve, 2 anterior and 2 posterior in right valve. **Pallial sinus** horizontal, **trigonal and relatively shallow, not extending forward near to level of the umbo**. Internal margins smooth. **Colour:** **outside of shell white** under the translucent, **pale yellowish brown to grey periostracum**. Interior porcelaneous white, sometimes with pale greyish hue.

Size: Maximum shell length to nearly 6 cm, commonly to 4 cm.

Habitat, biology, and fisheries: In clean fine sand bottoms, mostly in partially closed bays and in flattish areas of open coasts. Low intertidal and sublittoral zones to about 10 m depths. Abundant in southern Senegal, Guinea and Cameroon where it is frequently collected for food. Used in soups or in rice dishes.

Distribution: The tropical East Atlantic, from Senegal to southern Congo.

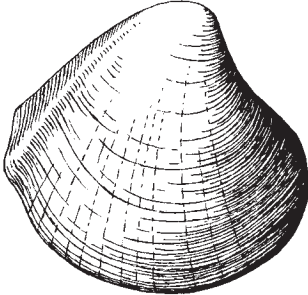


***Barymaetra rostrata* (Spengler, 1802)**

Frequent synonyms / misidentifications: *Mactra cumingiana* Petit de la Saussaye, 1853; *M. rostrata* Spengler, 1802 / None.

En – Rostrate mactra; **Fr** – Mactre à rostre; **Sp** – Mactra puntiaguda.

Maximum shell length 8.5 cm, commonly to 6 cm. In sandy muddy sublittoral bottoms, from about 3 to 20 m depths. Occasionally caught in shrimps nets. Consumed locally in soups, mainly by fishermen families. The tropical East Atlantic, from Gambia to northern Angola.



exterior of right valve

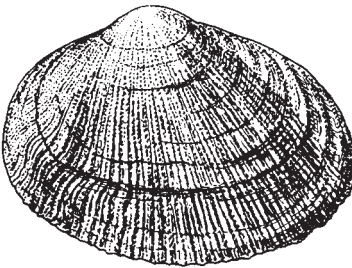


***Eastonia rugosa* (Helbling, 1779)**

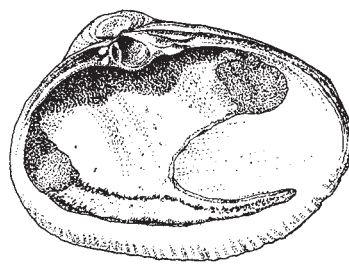
Frequent synonyms / misidentifications: *Standella rugosa* (Helbling, 1779) / None.

En – Rugose mactra; **Fr** – Eastonie rugueuse; **Sp** – Pechina rugosa.

Maximum shell length 11 cm, commonly to 7 cm. In mud and sand sublittoral bottoms, from shallow water levels to about 30 m depth. May be locally common, but becoming rare south of Mauritania. Collected with bottom trawls or dredges where common. Eastern Atlantic, from northern Portugal to Senegal and the Canaries. Western Mediterranean, north to eastern Spain, and east to Sicily and western Lybia.



exterior of left valve



interior of right valve

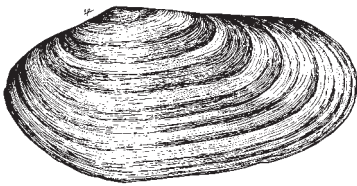


***Lutraria angustior* Philippi, 1844**

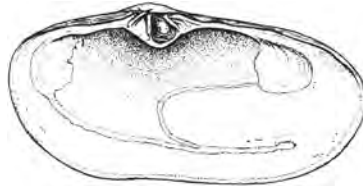
Frequent synonyms / misidentifications: *Lutraria elliptica* Lamarck, 1818 [not of Lamarck, 1801] / *Lutraria lutraria* (Linnaeus, 1758).

En – Narrow otter shell; **Fr** – Lutraire étroite; **Sp** – Pechina estrecha.

Maximum shell length 11 cm, commonly from 8 to 9 cm. In various soft bottoms. Lower intertidal and sublittoral zones to 55 m depth. Collected at low tide or occasionally caught in bottom trawls and dredges. Eaten locally, but rarely marketed. Eastern Atlantic, from the English Channel to Morocco. Southern limit of distribution uncertain because of recurrent confusion with similar species; tropical West African records probably refer to *Lutraria senegalensis*, and South African records to *Lutraria capensis* Reeve, 1854.



exterior of left valve



interior of right valve

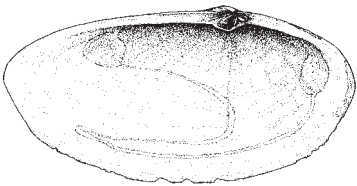


***Lutraria lutraria* (Linnaeus, 1758)**

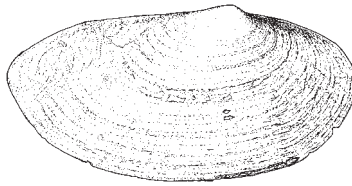
Frequent synonyms / misidentifications: *Lutraria elliptica* Lamarck, 1801 / None.

En – Common otter shell; **Fr** – Lutraire elliptique; **Sp** – Arola.

Maximum shell length 13 cm, commonly from 9 to 10 cm. Deeply burrowing in sandy mud, sand, gravel and coralligenous bottoms. Low intertidal zone to continental shelf, down to about 100 m depth. Collected for food by coastal people (at low tide in the north, in shallow water in the south), and occasionally caught in bottom trawls or dredges. Distribution imperfectly known because of confusion with other *Lutraria* species. Eastern Atlantic, from Norway to Morocco and perhaps to Mauritania; throughout the Mediterranean. Records from more in the south most probably refer to *Lutraria senegalensis* (tropical West Africa) or to *Lutraria capensis* Reeve, 1854 (South Africa).



interior of left valve



exterior of right valve

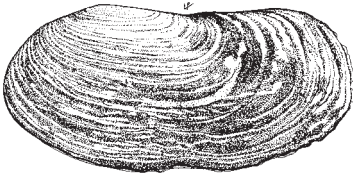


Lutraria magna (da Costa, 1778)

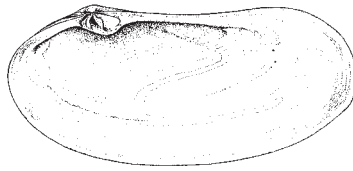
Frequent synonyms / misidentifications: *Lutraria oblonga* (Gmelin, 1791); *Psammophila magna* (da Costa, 1778) / None.

En – Oblong otter shell; **Fr** – Lutraire oblongue; **Sp** – Pechina oblonga.

Maximum shell length 15 cm, commonly to 10 cm. Deeply burrowing in sandy or muddy sand bottoms, from extreme low tide to 30 m deep or more. Incidental bycatch in bottom trawls and dredges. Eastern Atlantic, from the southwestern British Isles to Morocco and the Canaries. Southern limit of distribution uncertain because of confusion with *Lutraria senegalensis*; perhaps also occurring along West African coasts, south to Senegal.



exterior of left valve



interior of right valve

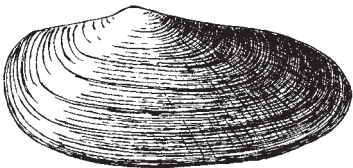


Lutraria senegalensis Gray, 1837

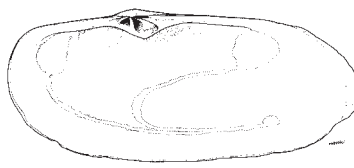
Frequent synonyms / misidentifications: None / *Lutraria angustior* Philippi, 1844; *Lutraria elongata* Gray, 1837; *Lutraria lutraria* (Linnaeus, 1758); *Lutraria magna* (da Costa, 1778).

En – Senegalese otter shell; **Fr** – Lutraire sénégalaise; **Sp** – Pechina de Senegal.

Maximum shell length 11 cm, commonly to 8 cm. In fine sandy muddy bottoms, also with shell rubble. Sublittoral zone, from shallow water to about 35 m depth. Incidental catch of dredging and trawling. Eaten locally in soups. Eastern Atlantic, from Mauritania to Guinea, and from Gabon to southern Angola.



exterior of left valve



interior of right valve

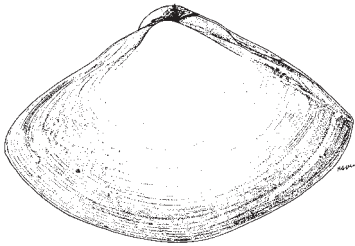


***Scissodesma spengleri* (Linnaeus, 1767)**

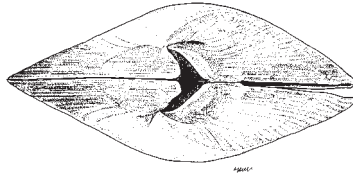
Frequent synonyms / misidentifications: *Schizodesma spengleri* (Linnaeus, 1767) [Incorrect spelling]; *Spisula spengleri* (Linnaeus, 1767) / None.

En – Spengler's maetra; **Fr** – Schizodème de Spengler; **Sp** – Maetra de Spengler.

Maximum shell length 11.5 cm, commonly to 9 cm. Shallowly burrowing in clean sand bottoms, from low down in the surf zone to about 8 m depth. Very common in the southern part of its range. No data on fisheries in the studied zone, but used locally for food and for bait in South Africa. Eastern Atlantic, from southern Angola to South Africa; also occurring in the southwestern Indian Ocean coasts of South Africa, east to Eastern Cape.



left side view of shell



dorsal view of shell

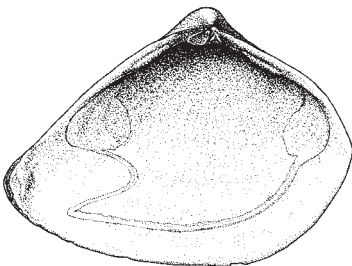


***Spisula subtruncata* (da Costa, 1778)**

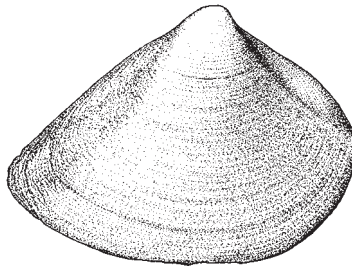
Frequent synonyms / misidentifications: *Spisula triangula* (Brocchi, 1814) / None.

En – Subtruncate surf clam; **Fr** – Douceron triangulaire; **Sp** – Pechina triangular.

Maximum shell length 3.3 cm, commonly to 2 cm. Shallow burrower of sandy or muddy-sand bottoms, in the open sea and in brackish coastal lagoons. Lower intertidal zone to continental shelf, to about 200 m depth. Often occurring in very dense communities, but tending to live deeper and to become less common in the south of its geographic range. Trawled off Morocco and Mauritania, where common. Eastern Atlantic, from Norway to Senegal and the Canaries. Throughout the Mediterranean and Black Sea.



interior of left valve



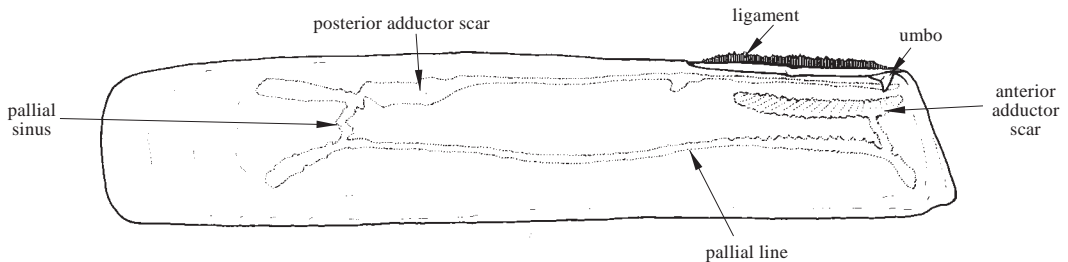
exterior of right valve



SOLENIIDAE

Razor shells

Diagnostic characters: **Shell equiwide**, laterally compressed to subcylindrical in cross section, **with a narrowly elongate**, often sword-like or razor-like **shape**, very inequilateral and **gaping at both ends**. **Umbones** not prominent, **at or near anterior end** of dorsal margin. Outside of shell essentially with concentric growth marks, often changing abruptly in direction along a diagonal line running from the umbones to the posteroventral end of valves. Periostracum frequently prominent and shiny, folding over the valve margins. **Ligament external**, set in an elongate linear groove of posterodorsal margin. **Hinge feeble**, with **one peg-like cardinal tooth in each valve**, but without lateral teeth. Interior of shell porcelaneous. **Two** dorsally placed, narrowly elongate to rounded, **adductor muscle scars**, the **anterior one** commonly larger and **elongate**. **Pallial sinus relatively shallow**, its ventral and even sometimes dorsal limbs largely confluent with pallial line. Internal margins smooth. Gills of eulamellibranchiate type, posteriorly placed, with smooth or folded branchial sheets. Foot long and narrow, often terminally swollen. Siphons naked, short to long, completely fused, with transverse constrictions. Mantle margins widely fused ventrally, with an anterior to anteroventral opening.



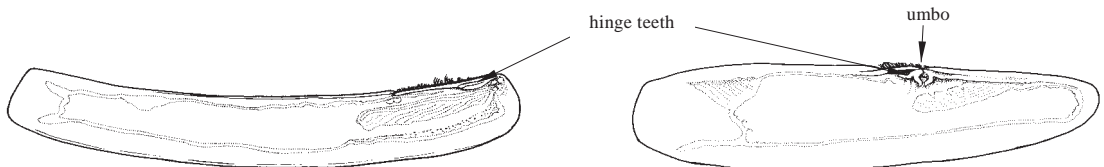
interior of left valve

Habitat, biology, and fisheries: Filter-feeding animals, living in a more or less vertical position in sediments. Razor shells are adapted to swift and deep burrowing in soft bottoms with their powerful foot, capable of swelling at the end and protruding anteriorly through the narrowly elongate shell. Out of their burrows, many species can leap in the free water by bending their extensible foot, or by expelling a jet of water through their siphons. When disturbed, razor clams can drop the distal end of their siphons by autotomy, as a defence against predators. Intertidal species of Solenidae are sometimes actively exploited for human consumption or for bait by anglers. At low tide, they can be detected by the roughly keyhole-shaped opening of their burrow at the surface of the sediment, and are usually captured by means of a piece of hooked, sharpened wire, that is thrust into the burrow. A pinch of salt dropped into the burrow opening often brings them to the surface, where they can be rapidly taken off the sediment before they swiftly descend again.

Remarks: Recent studies have shown that some razor clams belong to a closely related family the Pharidae (formerly Cultellidae), distinct from the Solenidae both on morphological and anatomical grounds. This view is followed herein.

Similar families occurring in the area

Pharidae: At least 2 teeth in each valve. Umbones sometimes subcentral.



interior of left valve (*Ensis*)

Pharidae

interior of left valve (*Pharus*)

Key to species of interest to fisheries occurring in the area

- 1a. Anterior margin of valves bordered by a marked dorsoventral furrow, immediately anterior to the umbones; outer colour of shell whitish, with yellowish to pale brownish growth zones (Fig. 1) ***Solen marginatus***
- 1b. Anterior margin of valves without a marked dorsoventral furrow in front of the umbones; outer colour of shell white and pinkish purple in alternating growth zones (Fig. 2) ***Solen guinensis***

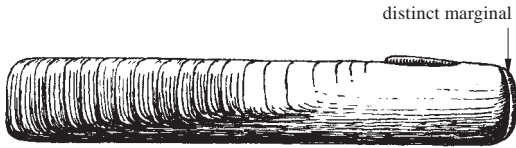


Fig. 1 *Solen marginatus*
(exterior)



Fig. 2 *Solen guinensis*
(exterior)

List of species of interest to fisheries occurring in the area.

The symbol 🐚 is given when species accounts are included.

🐚 *Solen guinensis* Hanley, 1842.

🐚 *Solen marginatus* Pulteney, 1799.

References

Cosel, R. von 1990. An introduction to the razor shells (Bivalvia: Solenacea). In B. Morton, ed. *The Bivalvia – Proceedings of a Memorial Symposium in Honour of Sir Charles Maurice Yonge, Edinburgh, 1986*. Hong Kong University, Hong Kong: 283–311.

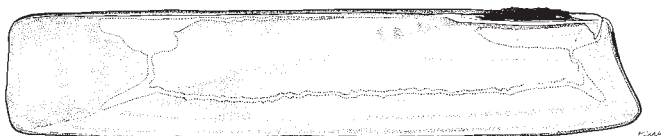
Cosel, R. von 1993. The razor shells of the eastern Atlantic. Part 1: Solenidae and Pharidae I (Bivalvia: Solenacea). *Archiv für Molluskenkunde*, 122: 207–321.

***Solen guinensis* Hanley, 1842**

Frequent synonyms / misidentifications: *Solen guinaicus* Cosel, 1993 / *Solen guineensis* Wood, 1815 [= *Tagelus adansonii* (Bosc, 1801)].

FAO names: **En** – Guinean razor shell; **Fr** – Couteau de Guinée; **Sp** – Longueirón de Guinea.

Diagnostic characters: **Shell elongate** rectangular in outline (from 4 to 5.5 times longer than high), with straight, almost parallel dorsal and ventral margins; **anterior margin** truncate, slightly oblique, **only with a narrow and slight dorsoventral depression in front of the umbones**. Periostracum thin, often eroded on the anterodorsal area. Anterior adductor scar almost parallel to dorsal margin, not reaching posterior end of ligamental margin. **Posterior adductor scar widely confluent with dorsal branch of pallial sinus**. **Colour:** **outside** of shell **white and pinkish purple in alternating concentric zones, with a large deep brownish red blotch on umbonal area**; periostracum greyish yellow, translucent and glossy. Interior whitish, with the outer colour pattern showing through.



interior of left valve



exterior of right valve

Size: Maximum shell length 14 cm, commonly to 8 cm.

Habitat, biology, and fisheries: In clean to muddy fine sand, mainly in rather protected areas. Intertidal and sublittoral zones, from extreme low water to about 20 m depth. A rather common species, occurring locally in dense populations, but becoming quite rare in northernmost and southernmost parts of its range. Collected at low tide for human consumption, at least in Gabon, by means of a hooked wire. Eaten fried or in soups.

Distribution: Eastern Atlantic, from Mauritania to South Angola

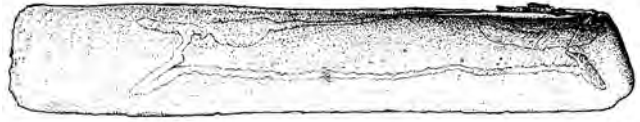


***Solen marginatus* Pulteney, 1799**

Frequent synonyms / misidentifications: *Solen gladius* Röding, 1798; *Solen rotundatus* Spengler, 1794 [Invalidated, forgotten names] / *Solen vagina* (Linnaeus, 1758).

FAO names: **En** – European razor shell; **Fr** – Couteau droit d'Europe; **Sp** – Longueirón.

Diagnostic characters: Shell very **elongate** rectangular in outline (from 5.5 to 7 times longer than high), with nearly straight, almost parallel dorsal and ventral margins; **anterior margin** truncate, slightly oblique, **bordered by a marked dorsoventral furrow immediately anterior to the umbones**. Periostracum thin and poorly resistant, often partially eroded. Anterior adductor scar almost parallel to dorsal margin, nearly reaching but not extending posteriorly beyond posterior end of ligamental margin. **Posterior adductor scar** close to but **separate from pallial sinus**. **Colour:** **outside of shell whitish, with yellowish to pale brownish growth zones;** periostracum light olive brown and glowy. Interior whitish.



interior of left valve



exterior of right valve

Size: Maximum shell length 17 cm, commonly from 9 to 11 cm.

Habitat, biology, and fisheries: In pure or muddy sand bottoms. Commonly occurring from midtidal and shallow subtidal levels to about 20 m depths. Collected at low tide, both for food and for fish baiting. Consumed fried or in soups in the studied area. It is also actively exploited in southwestern European countries, in the Atlantic as well as in the Mediterranean.

Distribution: Eastern Atlantic, from Great Britain and western Ireland to Mauritania; not in Senegal. Throughout the Mediterranean and the Black Sea.

Remarks: Authorship of *Solen marginatus* often erroneously attributed to Pennant (1777). *Solen vagina* (Linnaeus, 1758) is possibly a different Indo-Pacific species.

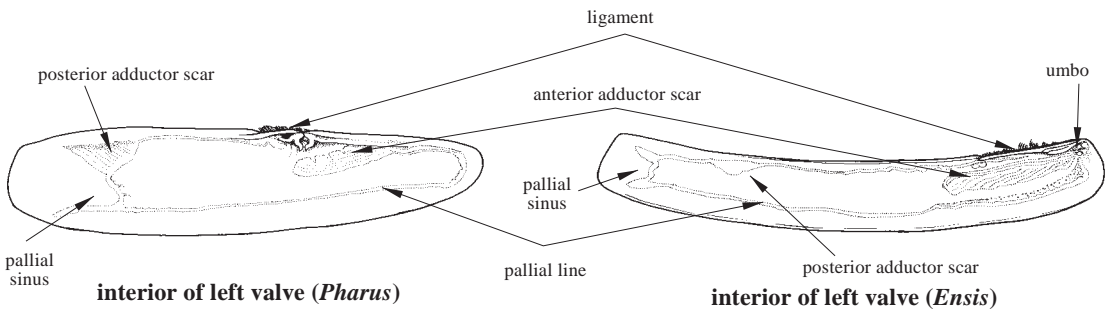


PHARIDAE

(= CULTELLIDAE)

Razor shells, knife clams, bean solens

Diagnostic characters: Shell equi-**valve**, more or less compressed laterally, with a **narrowly elongate**, often sword-like or razor-like **shape**, very inequilateral and **gaping at both ends**. **Umbones** not prominent, **subcentral** in position **or near anterior end** of dorsal margin. Outside of shell essentially with concentric growth marks, often changing abruptly in direction along a diagonal line running from the umbones to the posteroventral end of valves. Periostracum prominent, frequently glossy, folding over the valve margins. **Ligament external**, set in an elongate linear groove of posterodorsal margin. **Hinge feeble**, with **2 teeth in right valve**, and **3 or 4 teeth in left valve**. Interior of shell porcelaneous, sometimes with a reinforcement radial ridge both in front of and behind the hinge area. **Two** dorsally placed, narrowly elongate to rounded or trigonal **adductor muscle scars**, the **anterior one** commonly **larger**. **Pallial sinus** usually **relatively shallow**, its ventral and sometimes even dorsal limb largely confluent with pallial line. Internal margins smooth. Gills of eulamellibranchiate type, posteriorly placed, with smooth or folded branchial sheets. In some species, blood of a red colour, due to the presence of the respiratory pigment haemoglobin. Foot long and narrow, laterally compressed and obliquely truncate at anterior end. Siphons naked, short to long, fused at least at their bases, sometimes with surrounding tentacles. Mantle margins widely fused ventrally, with an anterior to anteroventral opening.



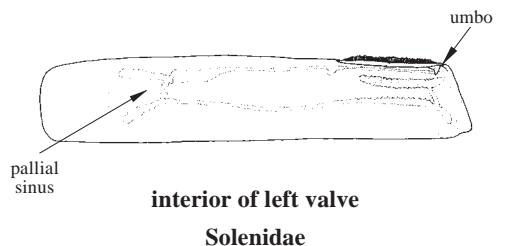
examples showing diversity of shape

Remarks: Until recently, Pharidae (formerly Cultellidae) were usually merged with other razor clams within the single family Solenidae, some species being excluded because of supposed tellinoid affinities. However, recent studies have shown that Pharidae constitute a distinct family from the Solenidae, both on morphological and anatomical grounds, and the previously excluded species (*Pharus* and the related genera) are reinstated within the family. This new appraisal of razor clam systematics is followed herein.

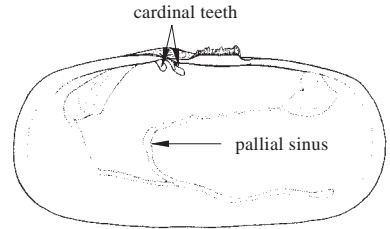
Habitat, biology, and fisheries: Filter-feeding animals, adapted to swift and deep burrowing in soft bottoms with their powerful foot, capable of swelling at the end and protruding anteriorly through the narrowly elongate shell. Like the very similar Solenidae, intertidal species are actively collected, with similar techniques, both for human consumption and for bait by anglers. Sublittoral species are dredged or trawled where common.

Similar families occurring in the area

Solenidae: umbones always at or near anterior end of dorsal margin. Only 1 peg-like tooth in each valve.



Solecurtidae: hinge with only 2 teeth in either valve. Pallial sinus deep. Cruciform muscle scars generally obscure, but cruciform muscles always present.



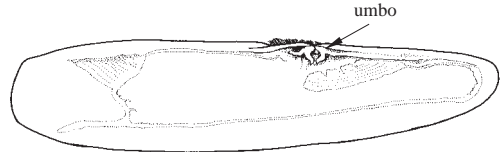
interior of right valve
Solecurtidae

Key to species of interest to fisheries occurring in the area

- 1a. Umbones nearly at anterior end of shell (Fig. 1a) → 2
- 1b. Umbones distinctly posterior to anterior end of shell (Fig. 1b) → 4
- 2a. Dorsal and ventral margins of valves straightish (Fig. 2) *Ensis minor*
- 2b. Dorsal and ventral margins of valves widely arched → 3
- 3a. Outer shell colour with distinctive dark purplish spots on a whitish ground (Fig. 3) *Ensis goreensis*
- 3b. Outer shell colour with only slight pale brownish red markings on a whitish ground (Fig. 4) *Ensis ensis*



a) *Ensis*



b) *Pharus*

Fig. 1 exterior of left valve

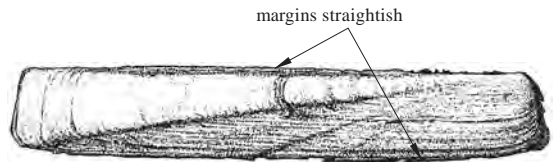


Fig. 2 *Ensis minor* (exterior)



Fig. 3 *Ensis goreensis* (exterior)



Fig. 4 *Ensis ensis* (exterior)

- 4a. Umbones markedly distant from anterior end of shell → 5
- 4b. Umbones moderately distant from anterior end of shell (i.e. situated within the anterior one-fourth) → 6

- 5a. Anterior part of shell long and tapering (umbones situated at the anterior two-fifths); pallial line roughly parallel to dorsal margin and far from ventral margin in its anterior part, more oblique and closer to ventral margin posteriorly; anterior end of pallial sinus rather broad (Fig. 5) ***Pharus legumen***
- 5b. Anterior part of shell moderately long and broad (umbones situated at the anterior one-third); pallial line roughly parallel to dorsal margin and far from ventral margin throughout. Anterior end of pallial sinus rather narrow (Fig. 6) ***Pharus chenui***



Fig. 5 *Pharus legumen* (interior)

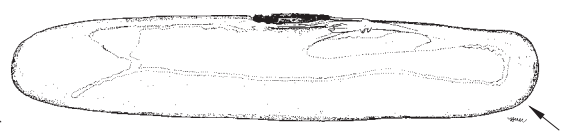


Fig. 6 *Pharus chenui* (interior)

- 6a. Interior of valves with both anterior and posterior reinforcement ridges radiating from the umbones; pallial line irregularly rounded anteriorly, extending forward beyond the long and narrow anterior adductor scar (Fig. 7) ***Sinupharus africanus***
- 6b. Interior of valves with only a short anterior reinforcement ridge radiating from the umbones; pallial line squared anteriorly, not extending forward beyond the short and broadly ovate anterior adductor scar (Fig. 8) ***Sinucultellus atlanticus***

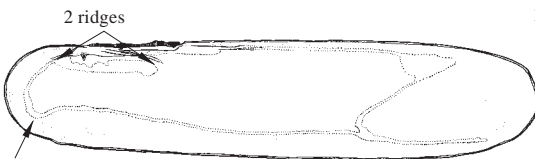


Fig. 7 *Sinupharus africanus* (interior)



Fig. 8 *Sinucultellus atlanticus* (interior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Ensis ensis* (Linnaeus, 1758).
- 🐚 *Ensis goreensis* (Clessin, 1888).
- 🐚 *Ensis minor* (Chenu, 1843).
- 🐚 *Pharus chenui* Cosel, 1993.
- 🐚 *Pharus legumen* (Linnaeus, 1758).
- 🐚 *Sinucultellus atlanticus* Cosel, 1993.
- 🐚 *Sinupharus africanus* (Chenu, 1843).

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- Yonge, C.M. 1959. On the structure, biology and systematic position of *Pharus legumen* (L.). *Journal of the marine biological Association of the United Kingdom*, 38: 277–290.

***Ensis goreensis* (Clessin, 1888)**

Frequent synonyms / misidentifications: None / None.

FAO names: **En** – Goree razor clam; **Fr** – Couteau de Gorée; **Sp** – Navaja de Gorea.

Diagnostic characters: **Shell medium sized** (up to 9 cm long), very long and narrow (about 7 to nearly 9.5 times longer than high), rather thin and brittle, **sword-like** in outline, **with** regularly and **widely arched** and nearly parallel **dorsal and ventral margins**; anterior margin somewhat truncate, with well rounded corners; posterior margin truncate and slightly convex. **Umbones nearly at the anterodorsal end of shell.** Ligament rather short, stretching along about one-sixth the length of dorsal margin. Pallial line not closer to anterior than to ventral shell margin. **Pallial sinus short and broad, with its ventral and dorsal limbs largely confluent with pallial line.**

Anterior adductor scar long and very slender, feebly oblique to dorsal margin of shell, extending posteriorward markedly

beyond ligament area, to more than one-third the shell length; **posterior adductor scar** moderately small, **markedly anterior to pallial sinus**, situated at a distance of 1.5 to 2.5 times its own length.

Colour: **outside of shell whitish** to pale mauve **with distinctive dark purplish spots** and mottlings mainly developed on the anteroventral area of valves, under a thin and yellowish green periostracum.

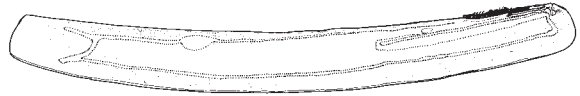
Size: Maximum shell length 9 cm, commonly to 7 cm.

Habitat, biology, and fisheries: Rather common in sandy bottoms. Shallow water to offshore, from about 3 to 50 m. Because of its compressed shape and rather small size, this species is rarely targeted by fishing boats; sometimes locally dredged where common and consumed fried in palm oil or in soups with other small bivalves.

Distribution: Eastern Atlantic, from Rio de Oro, Western Sahara to northern Angola; perhaps also present in Cape Verde Islands.



exterior of right valve



interior of left valve



Ensis minor (Chenu, 1843)

Frequent synonyms / misidentifications: *Solen minor* Chenu, 1843 / *Ensis minor* Dall, 1899 [= *E. megistus* Pilsbry and McGinty, 1943]; *E. siliqua* (Linnaeus, 1758).

FAO names: **En** – Minor razor shell; **Fr** – Couteau de Chenu; **Sp** – Muergo de Chenu.

Diagnostic characters: **Shell relatively large** (up to 17.5 cm long), elongate **rectangular** in outline (about 5.5 to 7.5 times longer than high), **with nearly straight dorsal and ventral margins**; anterior margin truncate, usually slightly oblique; posterior margin truncate.

Umboes nearly at the anterodorsal end of shell.

Posterior aperture of shell compressed in outline, much narrower than the anterior aperture.

Ligament stretching along about one-fourth the length of dorsal margin. Pallial line decidedly closer to anterior than to ventral shell margin. **Pallial sinus short and broad**, with its **ventral and dorsal limbs largely confluent with pallial line**.

Anterior adductor scar elongate, slightly oblique to dorsal margin of shell, extending posteriorward markedly beyond ligament area, to less than one-third the shell length; **posterior adductor scar moderately large, markedly anterior to pallial sinus**, situated at a distance of 1.5 to 2 times its own length. **Colour: outside of shell whitish to beige, with brown-red spots and streaks, under a glossy, yellow olive to brown olive periostracum**. Interior whitish to light blue-grey.

Size: Maximum shell length 17.5 cm, commonly from 11 to 12 cm.

Habitat, biology, and fisheries: In fine, mostly clean sand bottoms. Common from lower intertidal zone to shallow sublittoral levels, down to a depth of about 10 m. Collected for food and for bait where abundant, with dredges or at low tide by hand, with hooks and spades.

Distribution: Eastern Atlantic, from the northern British Isles to Morocco. Throughout the Mediterranean.



exterior of right valve



interior of left valve

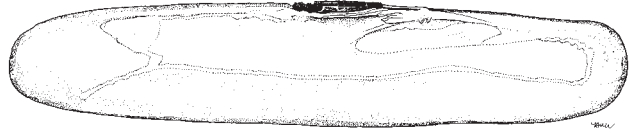


***Pharus chenui* Cosel, 1993**

Frequent synonyms / misidentifications: None / *Pharus legumen* (Linnaeus, 1758).

FAO names: En – Chenu's bean solen; Fr – Cératisole de Chenu; Sp – Navallón de Chenu.

Diagnostic characters: **Shell rather large** (up to 15 cm long), moderately thin but solid, **compressed and elongated**, about 4.5 to 5.5 times longer than high. **Anterior and posterior margins rounded.** Ventral margin straightish medially, becoming convex anteriorly and posteriorly, roughly parallel to dorsal margin. **Umbones low, situated at the anterior one-third of valves.** Outer surface of valves glossy, with irregular concentric growth lines. **Interior of shell structure reinforced with a thin, shallow ridge radiating obliquely from the umbones** toward posterior third of ventral margin, and gradually fading away ventrally. Anterior adductor scar very long, extending posteriorly well beyond the umbones, oblique and subelliptical in outline; posterior adductor scar rather large and triangular. **Pallial line roughly parallel to dorsal margin and far from ventral margin throughout. Pallial sinus relatively short and triangular, rather narrow at anterior end, with reduced dorsal limb and long, oblique ventral limb wholly confluent with the pallial line.** **Colour:** outside of shell plain **milky white or light brownish pink** with anterior part pale reddish brown; **periostracum thin and yellowish green to dark greenish brown.** Interior whitish to light orange brown.



interior of left valve



exterior of right valve

Size: Maximum shell length 15 cm, commonly from 8 to 10 cm.

Habitat, biology, and fisheries: A long unrecognised and still imperfectly known species, living together with *Pharus legumen* in Morocco, and replacing it gradually in the south. Burrowing in fine, clean sand bottoms offshore at moderate depths, from about 15 to 30 m; probably occurring shallower in the north of its range, up to low tide levels. Occasionally taken in bottom trawls. Potentially interesting for its large size, but apparently patchily distributed and not yet found in exploitable concentrations.

Distribution: Eastern Atlantic, from central Morocco to Senegal.

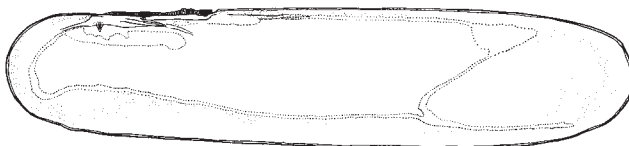


***Sinupharus africanus* (Chenu, 1843)**

Frequent synonyms / misidentifications: *Cultellus politus* (Dunker, 1862); *C. tenuis* (Gray, 1834); *Solen tenuis* Gray in Griffith and Pidgeon, 1834 [not of Wood, 1828] / Until recently, a complex of partly sympatric species have been mixed up under the name "*Cultellus tenuis* (Gray)".

FAO names: **En** – African knife shell; **Fr** – Petit couteau africain; **Sp** – Navaja africana.

Diagnostic characters: **Shell medium sized** (up to 7.5 cm long), rather thin and brittle, very **compressed and elongated**, about 4 to 5 times longer than high. **Anterior and posterior margins rounded. Ventral margin more or less straight** medially, becoming slightly convex anteriorly and posteriorly, **roughly parallel to dorsal margin. Umbones low, moderately distant from anterior end** of shell (situated within the anterior one-sixth of length). Outer surface of valves glossy, with fine irregular concentric growth lines. **Interior of valves with** variably developed **anterior and posterior reinforcement ridges radiating from the umbones**. Anterior adductor scar long and narrow, posterior adductor scar rather large and triangular. Pallial line irregularly rounded anteriorly, extending forward well beyond the anterior adductor scar. **Pallial sinus trigonal and moderately deep, extending anteriorly beyond** the ventralmost part of **posterior adductor scar** (to the posterior one-third of shell length); dorsal limb of pallial sinus well developed and oblique, **ventral limb** wholly confluent with the pallial line and **parallel to ventral shell margin**. **Colour:** outside of shell white to cream under the glossy, light green to brownish periostracum. Interior whitish.



interior of right valve



exterior of left valve

Size: Maximum shell length 7.5 cm, commonly to 5 cm.

Habitat, biology, and fisheries: In more or less fine sandy bottoms, mostly in rather protected situations. Lower intertidal and shallow subtidal zones, to a few meters depths. Moderately common. Collected locally at low tide or in shallow dredging operations. Consumed mainly in soups.

Distribution: Eastern Atlantic, from Senegal to Guinea, and from Cameroon to northern Angola.



***Ensis ensis* (Linnaeus, 1758)**

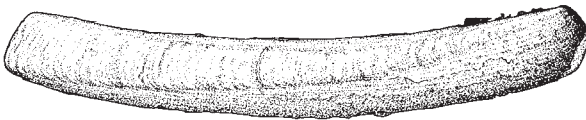
Frequent synonyms / misidentifications: None / None.

En – Pod razor shell; **Fr** – Couteau-sabre; **Sp** – Navaja.

Maximum shell length 13 cm, commonly from 7 to 10 cm. In pure to somewhat muddy fine sand. Most common from low intertidal levels to shallow subtidal depths, but also occurring deeper to about 80 m. Collected for food or for bait where abundant with dredges, but also at low tide in the north. Outside the studied area, it is heavily exploited in central Mediterranean and in Cyprus. Eastern Atlantic, from Norway and the Baltic Sea to Morocco. Throughout the Mediterranean.



interior of left valve



exterior of right valve



***Pharus legumen* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Ceratisolen legumen* (Linnaeus, 1758); *Ceratisolen leguminiformis* Locard, 1886 / None.

En – Bean solen; **Fr** – Cératissole-gousse; **Sp** – Navallón.

Maximum shell length 13.5 cm, commonly from 6 to 8 cm. A deposit-feeding species, living in pure sand bottoms. Low tide and shallow sublittoral waters to about 20 m depth. Locally used for human consumption or for fish bait. Collected by hand and with rakes at low tide, or with dredges or bottoms trawls offshore. Eastern Atlantic, from Great Britain and Ireland to Morocco and the Canaries. Throughout the Mediterranean.



interior of left valve



exterior of right valve

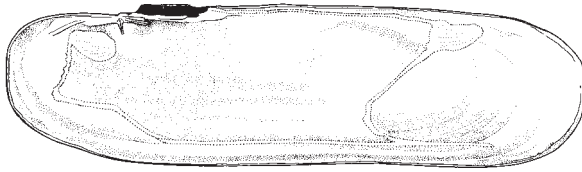


***Sinucultellus atlanticus* Cosel, 1993**

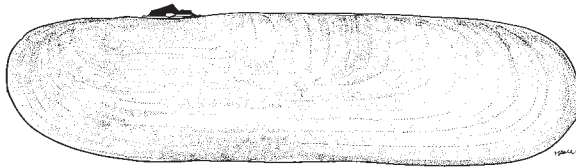
Frequent synonyms / misidentifications: None / *Cultellus tenuis* (Gray, 1834) [= *Sinupharus africanus*].

En – Atlantic knife clam; **Fr** – Petit couteau de l'Atlantique; **Sp** – Navaja atlantica.

Maximum shell length 5 cm, commonly to 3.5 cm. Buries very rapidly in muddy bottoms with less than 10% sand. Shallow subtidal zone (at 3 to 5 m) and offshore to about 20 m or more, in protected coastal as well as in open areas. Locally common to abundant and in dense populations. Frequently collected in bottom trawls or dredges, this species was often mistaken for young *Sinupharus africanus*. Probably represents one of the main food sources for nurseries of bottom fishes in muddy areas. Discontinuous distribution in the tropical East Atlantic; from Senegal to Guinea, in Côte d'Ivoire, and from Congo to northern Angola.



interior of right valve



exterior of left valve



TELLINIDAE

Tellins

Diagnostic characters: Shell variable in shape, usually elongate-ovate or suborbicular, **rather thin and somewhat laterally compressed, often slightly inequivalve (with a rightwards flexure on posterior end)**. Umbones low. Outer surface often brightly coloured; sculpture not strong, chiefly concentric, sometimes feeble.

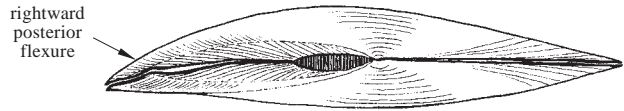
Ligament external, arched, extending behind umbones. Hinge with **2 small cardinal teeth** (one of which is generally bifid) **in either valve**; **lateral teeth** often present, generally better developed in the right valve, with the anterior lateral tending to be proximal to the cardinal teeth. Interior of shell porcelaneous. **Two adductor muscle scars**, the anterior more or less elongated, the posterior somewhat rounded or quadrate. **Pallial sinus deep**, sometimes of a different shape in the 2 valves, often largely confluent ventrally with the pallial line. **Cruciform muscles leaving small paired round scars near the posteroventral end of pallial line**. Internal margins smooth. Gills of eulamellibranchiate type, with smooth branchial sheets, the outer one raised and sometimes reduced. Foot strong, laterally compressed. Long, narrow, separate and mobile naked siphons, with 6 lobes on top. Cruciform muscles present. Mantle margins widely open anteroventrally.

Habitat, biology, and fisheries: Active burrowers of soft substrates in which they may constitute dense communities, sucking up organic matter from the sea floor with their long siphons. Frequently lie in a horizontal position within the substrate, with the left valve uppermost. Sexes generally separate. Development with a free swimming larval stage. Tellins are collected for food by coastal populations in many areas, and their delicate and often colourful shells are frequently used to make decorative items.

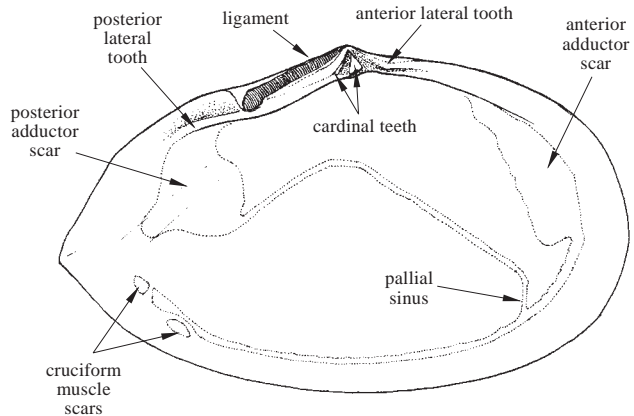
Similar families occurring in the area

Donacidae: trigonal to wedge-shaped shell with opisthogyrate umbones usually markedly posterior in position. Hinge with cardinal and lateral teeth. Cruciform muscle scars obscure. Siphons quite short.

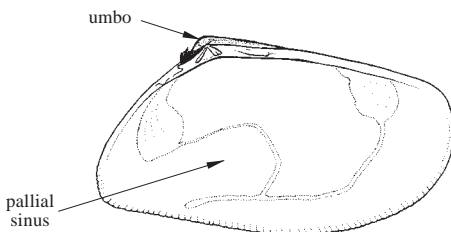
Psammobiidae: ovate to subelliptical or trapezoidal shell, weakly gaping at both ends. Lateral teeth weak to absent. External ligament set on projecting nymphs.



dorsal view of entire shell

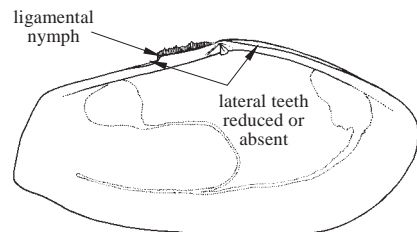


interior of left valve



interior of left valve

Donacidae

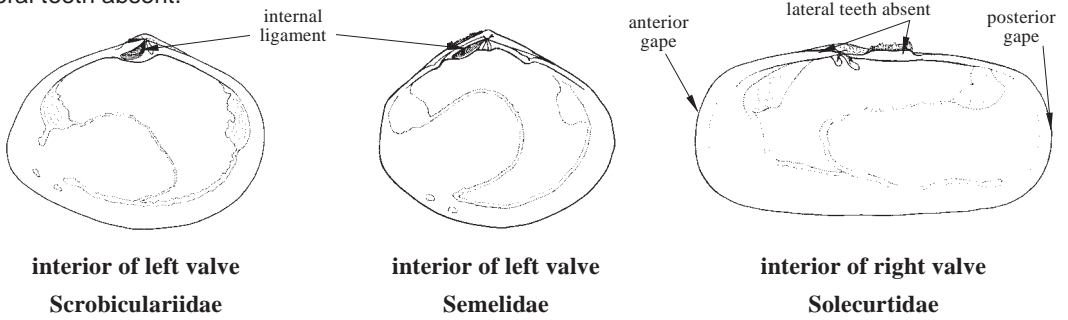


interior of left valve

Psammobiidae

Scrobiculariidae and Semelidae: a large, internal ligament, lodged in an oblique groove of the hinge plate in either valve.

Solecurtidae: shell elongate subrectangular, usually widely gaping at both ends. No posterior flexure. Lateral teeth absent.



Key to species of interest to fisheries occurring in the area

- 1a. Hinge with cardinal teeth, but without lateral teeth (Fig. 1a) → 2
- 1b. Hinge with cardinal and lateral teeth, at least in right valve (Fig. 1b). → 8

- 2a. Shell strongly folded posteriorly (Fig. 2) . *Apolymetis papyracea*
- 2b. Shell not strongly folded posteriorly → 3



Fig. 1 hinge of left valve

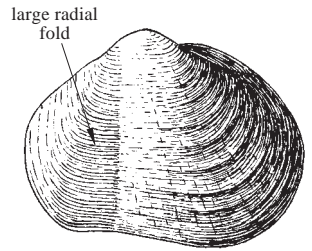


Fig. 2 *Apolymetis papyracea* (exterior)

- 3a. Shell rounded-ovate in outline, truncate and not drawn out posteriorly; outer surface smooth, with only concentric growth marks → 4
- 3b. Shell trigonal-ovate to quadrangular-ovate in outline, drawn out posteriorly.; outer surface with concentric ridges and more or less visible fine radiating lines, in addition to the concentric growth marks → 5

- 4a. Umbones situated about midline of valves; ventral branch of pallial sinus entirely confluent with the pallial line (Fig. 3) *Macoma innominata*

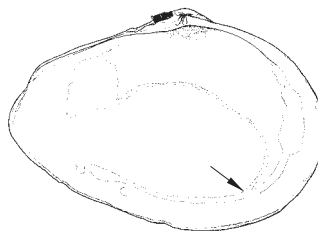


Fig. 3 *Macoma innominata* (interior)

- 4b. Umbones situated posterior to midline of valves; ventral branch of pallial sinus confluent with the pallial line in its posterior half (Fig. 4) *Macoma cumana*

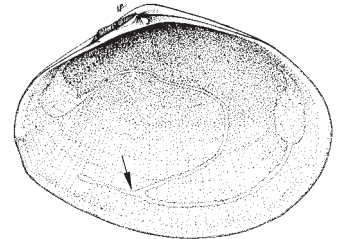
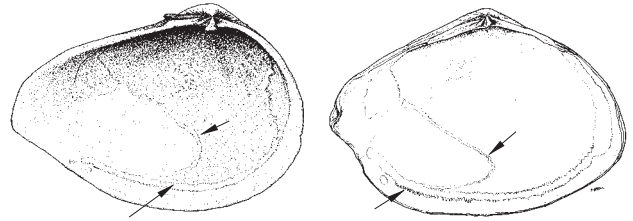


Fig. 4 *Macoma cumana* (interior)

5a. Shell relatively small, up to 4.5 cm long; pallial sinus tongue-shaped, broadly rounded at anterior end and strongly oblique ventrally and widely confluent with the pallial line (Fig. 5a) → 6



a) *Gastrana* b) *Macoma (Rostrimacoma)*

Fig. 5 interior of left valve

5b. Shell relatively large, up to 9 cm long or more; pallial sinus wedge-shaped, narrowly rounded at anterior end and subhorizontal ventrally and confluent with the pallial line over a short distance only (Fig. 5b) → 7

6a. Posterior end of shell obviously truncate; concentric ridges rather coarse and far apart (Fig. 6) *Gastrana matadoa*

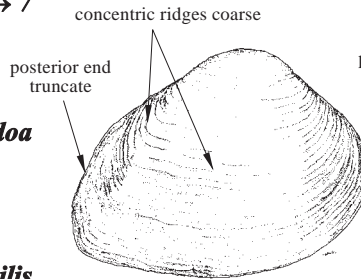


Fig. 6 *Gastrana matadoa* (exterior)

6b. Posterior end of shell more or less produced and rounded; concentric ridges moderately fine and rather closely set (Fig. 7) *Gastrana fragilis*

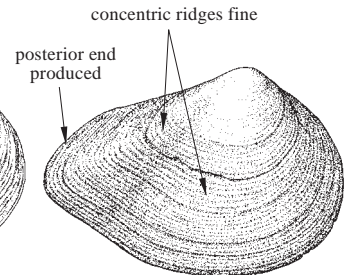


Fig. 7 *Gastrana fragilis* (exterior)

7a. Shell elongate, about twice as long as high; dorsal margin weakly sloping on either side of the umbo; ventral margin straightish to slightly concave medially (Fig. 8) *Macoma (Rostrimacoma) cancellata*

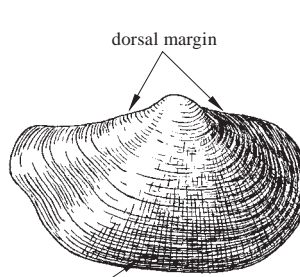


Fig. 8 *Macoma (Rostrimacoma) cancellata* (exterior)

7b. Shell moderately elongate, about one and a half times as long as high; dorsal margin decidedly sloping on either side of the umbo; ventral margin widely convex medially (Fig. 9) . . . *Macoma (Rostrimacoma) ventricosa*

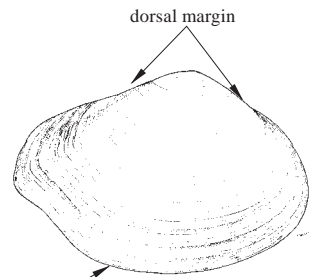


Fig. 9 *Macoma (Rostrimacoma) ventricosa* (exterior)

8a. Shell slightly longer than high, rounded ovate in shape → 9

8b. Shell markedly longer than high, differently shaped → 10

9a. Shell rather thick and large (up to 8.5 cm long); pallial sinus very deep, nearly touching anterior adductor muscle scar (Fig. 10) *Tellina senegambiensis*

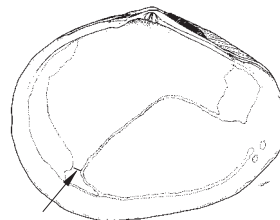


Fig. 10 *Tellina senegambiensis* (interior)

9b. Shell rather thin and small (up to 3.3 cm long); pallial sinus deep, rather distant from anterior adductor muscle scar (Fig. 11) . *Tellina tenuis*

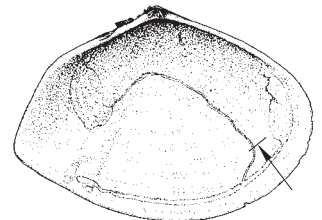


Fig. 11 *Tellina tenuis* (interior)

- 10a. Posterior end of shell acutely rostrate; anterior lateral tooth in right valve distant from cardinal teeth → **11**
- 10b. Posterior end of shell at most bluntly rostrate; anterior lateral tooth in right valve close to cardinal teeth → **12**

11a. Shell at least twice as long as high, with a feebly arched ventral margin; umbones distinctly posterior to midline of valves (Fig. 12) . . ***Tellina pulchella***

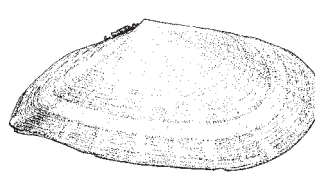


Fig. 12 *Tellina pulchella* (exterior)

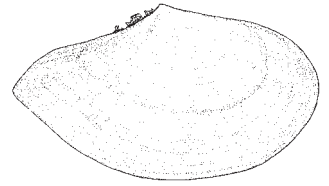
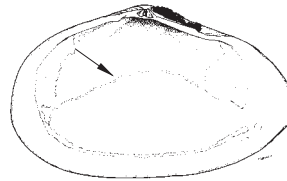


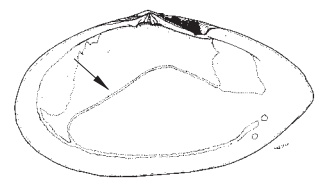
Fig. 13 *Tellina incarnata* (exterior)

11b. Shell less than twice as long as high, with a widely rounded ventral margin; umbones close to midline of valves (Fig. 13) . ***Tellina incarnata***

12a. Inner shell colour bright pink; pallial sinus rather low, feebly ascending dorsalward in its posterior part (Fig. 14a) ***Tellina madagascariensis***



a) *Tellina madagascariensis*



b) *Tellina strigosa*

Fig. 14 interior of right valve

12b. Inner shell colour whitish to pale orange; pallial sinus rather high, decidedly ascending dorsalward in its posterior part (Fig. 14b) → **13**

13a. Posterior margin somewhat rostrate (Fig. 15) ***Tellina strigosa***

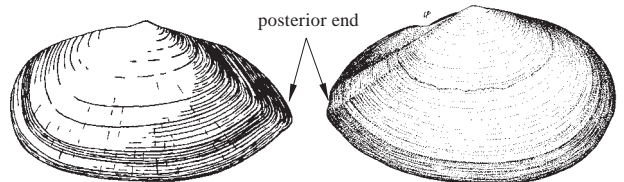


Fig. 15 *Tellina strigosa* (exterior)

13b. Posterior margin not rostrate (Fig. 16) . . ***Tellina planata***

Fig. 16 *Tellina planata* (exterior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Apolymetis papyracea* (Gmelin, 1791).
- 🐚 *Gastrana fragilis* (Linnaeus, 1758).
- 🐚 *Gastrana matadoa* (Gmelin, 1791).
- 🐚 *Macoma cumana* (Costa, 1830).
- 🐚 *Macoma innominata* Bertin, 1878.
- 🐚 *Macoma (Rostrimacoma) cancellata* (G.B. Sowerby I, 1853).
- 🐚 *Macoma (Rostrimacoma) ventricosa* (Deshayes, 1855).
- 🐚 *Tellina incarnata* Linnaeus, 1758.
- 🐚 *Tellina madagascariensis* Gmelin, 1791.
- 🐚 *Tellina planata* Linnaeus, 1758.
- 🐚 *Tellina pulchella* Lamarck, 1818.
- 🐚 *Tellina senegambiensis* Salisbury, 1934.
- 🐚 *Tellina strigosa* Gmelin, 1791.
- 🐚 *Tellina tenuis* da Costa, 1778.

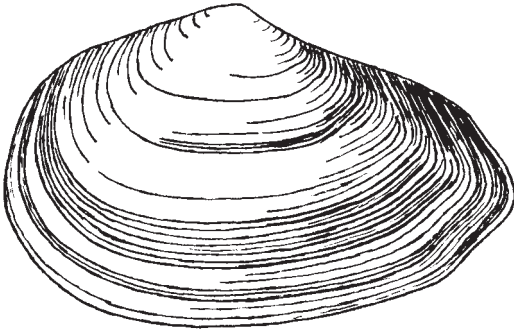
References

- Afshar, F. 1969. Taxonomic Revision of the Superspecific Groups of the Cretaceous and Cenozoic Tellinidae. *Geological Society of America Memoirs*, 119: I–XV, 1–215.

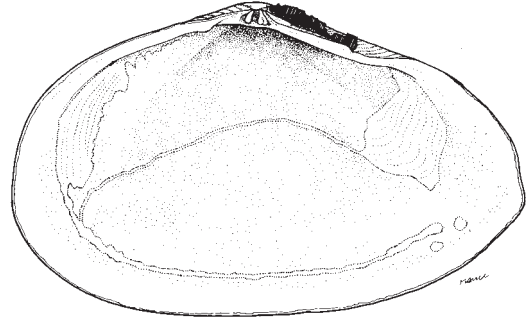
***Tellina madagascariensis* Gmelin, 1791**

Frequent synonyms / misidentifications: *Peronaea madagascariensis* (Gmelin, 1791); *Tellina capsicum* Römer, 1872 / None.

FAO names: En – Case tellin; Fr – Telline étui; Sp – Telina estuche.



exterior of left valve



interior of right valve

Diagnostic characters: Shell compressed, markedly longer than high, elongate ovate in outline, well rounded anteriorly and attenuated posteriorly. **Posterior margin narrowly rounded** to somewhat truncate. **Umbones submedian**, slightly anterior to the midline. Outer surface smoothish, with irregular concentric growth lines and marks, and tiny radiating lines (easily seen under a lens); posterior slope with a low radial fold on right valve and faint depression on left valve. **Hinge with cardinal teeth and weak lateral teeth**; anterior lateral tooth in right valve close to cardinal teeth. **Pallial sinus very deep and rather low, feebly ascending dorsalward in its posterior part**, extending anteriorly to a short distance to anterior adductor scar, **with its ventral lobe entirely confluent with the pallial line**. **Colour:** outside pink, often more deeply coloured on concentric bands and toward the umbones. **Interior bright pink.**

Size: Maximum shell length 9 cm, commonly from 6 to 7 cm.

Habitat, biology, and fisheries: Rather common in clean sandy bottoms. Intertidal and shallow subtidal levels, to about 5 m depth. Collected for food at low tide, or in shallow water with bottom trawls. Consumed mainly in soups. Shell used for decorative items in local shellcraft industries.

Distribution: Eastern Atlantic, from Congo to southern Angola.

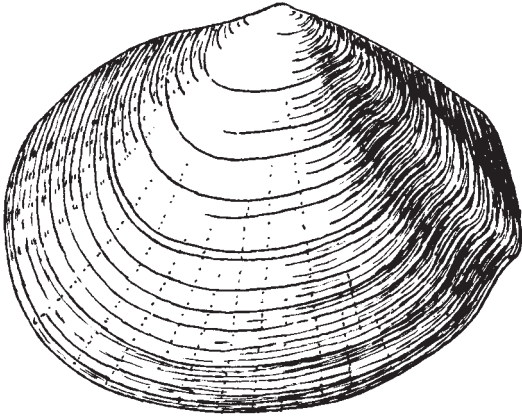
Remarks: Because this species neither occurs in Madagascar nor in East Africa at all, the name “Case tellin” is here substituted for the misleading name “Madagascar tellin” used in the first edition of this guide (Abbott, 1981).



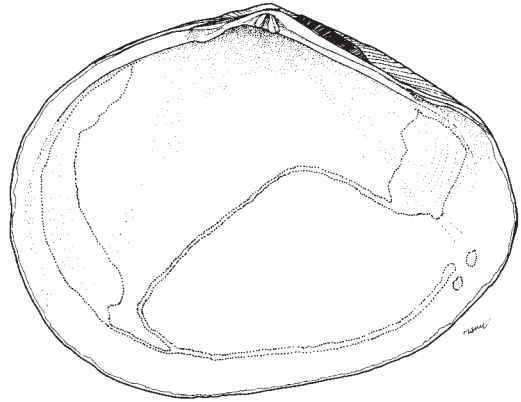
***Tellina senegambiensis* Salisbury, 1934**

Frequent synonyms / misidentifications: *Lacolina senegambiensis* (Salisbury, 1934); *Tellina listeri* Hanley, 1844 [not of Röding, 1798] / None.

FAO names: En – Senegambian tellin; Fr – Telline de Sénégal; Sp – Telina de Senegambia.



exterior of left valve



interior of right valve

Diagnostic characters: Shell rather inflated and thick, slightly longer than high, rounded ovate in outline, well rounded anteriorly, somewhat tapering posteriorly and rounded truncate at posterior end. Rightwards flexure of valves moderately strong, forming a depressed radial fold on posterodorsal slope. **Umbones submedian**, situated on slightly anterior to the midline. Outer surface smoothish, with irregular concentric growth lines and marks, and very fine radiating threads on umbonal area. **Hinge with cardinal teeth** in either valve, and small **lateral teeth** in right valve; anterior lateral tooth rather distant from cardinals. **Pallial sinus very deep and rather broad in its posterior part**, with its anterior end nearly touching the anterior adductor scar, and with most of its ventral lobe confluent with the pallial line.

Size: Maximum shell length 8.5 cm, commonly from 5 to 6 cm.

Habitat, biology, and fisheries: In fine sandy bottoms. Sublittoral zone, from about 3 to 20 m depths. Rather common locally. Collected for food in bottom trawls or dredges where common. Used in soups.

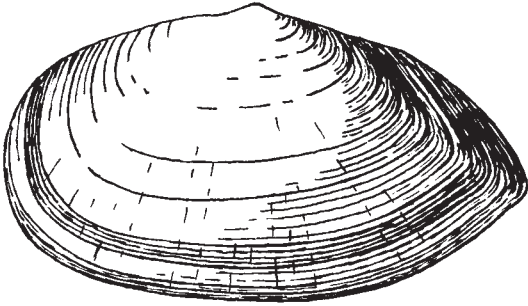
Distribution: Eastern Atlantic, from Senegal to northern Angola; northern limit of distribution imperfectly known, perhaps extending to Mauritania.



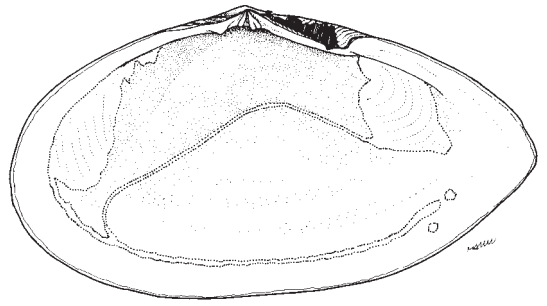
***Tellina strigosa* Gmelin, 1791**

Frequent synonyms / misidentifications: *Peronaea strigosa* (Gmelin, 1791) / None.

FAO names: En – Thin tellin; Fr – Telline jaunâtre; Sp – Telina delgada.



exterior of left valve



interior of right valve

Diagnostic characters: Shell compressed, markedly longer than high, elliptical ovate in outline, well rounded anteriorly, somewhat attenuated posteriorly. **Posterior margin bluntly truncate to somewhat rostrate. Umbones submedian**, slightly anterior to the midline. Outer surface glossy, with irregular concentric growth lines and marks, tiny radiating lines (easily seen under a lens) and slight radial folds on posterior slope. **Hinge with cardinal teeth and weak lateral teeth**; anterior lateral tooth in right valve close to cardinal teeth. **Pallial sinus very deep and rather high, decidedly ascending dorsalward in its posterior part**, extending anteriorly to a short distance to anterior adductor scar, **with its ventral lobe entirely confluent with the pallial line**. **Colour:** outside whitish to straw coloured, sometimes suffused with pale pink on umbonal area. **Interior whitish to pale orange** toward the umbones.

Size: Maximum shell length 7.5 cm, commonly to 5 cm.

Habitat, biology, and fisheries: In clean sandy bottoms, at intertidal and shallow subtidal levels, down to about 5 m depth. Common to abundant from Mauritania to Senegal, where it is frequently collected for food since prehistoric times. Used mainly in soups.

Distribution: Eastern Atlantic, from Mauritania to Guinea.

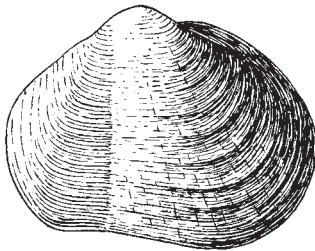


***Apolymetis papyracea* (Gmelin, 1791)**

Frequent synonyms / misidentifications: *Apolymetis lacunosa* (Schröter, 1788) [Invalid name]; *Capsa lacunosa* (Reeve, 1866); *Florimetis papyracea* (Gmelin, 1791); *Pilsbrymetis papyracea* (Gmelin, 1791); *Psammotreta papyracea* (Gmelin, 1791) / *Apolymetis ephippium* (Spengler, 1798).

En – Paper tellin; **Fr** – Telline papier; **Sp** – Telina papyracea.

Maximum shell length 9 cm, commonly to 6.5 cm. Locally moderately common in fine to coarse sand bottoms. Sublittoral, from about 3 to 20 m depths. Collected as a bycatch in bottom trawls and dredges. Used in soups. Eastern Atlantic, from Mauritania to northern Angola.



exterior of right valve

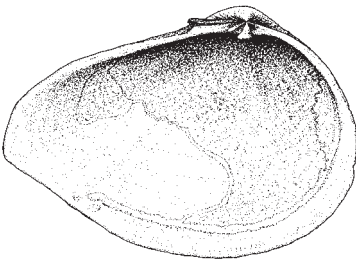


***Gastrana fragilis* (Linnaeus, 1758)**

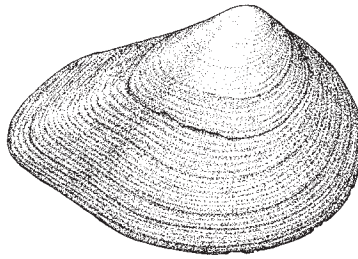
Frequent synonyms / misidentifications: *Capsa fragilis* (Linnaeus, 1758) / None.

En – Fragile tellin; **Fr** – Fragilie de Linné; **Sp** – Telina frágil.

Maximum shell length 4.5 cm, commonly to 3 cm. In muddy detritic bottoms. Intertidal and shallow subtidal zones. A very common species, also occurring in coastal lagoons. Collected locally for subsistence purposes where common. Sometimes appearing in local markets, mixed with other small bivalves. Eastern Atlantic, from Norway and the Baltic Sea to Morocco; Canary Islands. Throughout the Mediterranean and Black Sea.



interior of left valve



exterior of right valve

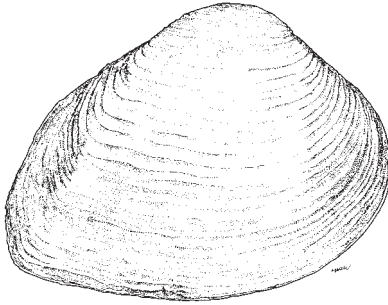


Gastrana matadoa (Gmelin, 1791)

Frequent synonyms / misidentifications: *Gastrana abildgaardiana* (Spengler, 1798); *Gastrana guineaica* (Schröter, 1788) [Invalid name] / None.

En – Matadoa tellin; **Fr** – Fragilie d'Afrique; **Sp** – *Telina matadoa*.

Maximum shell length 4.5 cm, commonly to 3 cm. Mainly in coarse sand, or sand with shells and stones. Sublittoral zone and offshore, from about 1 to 50 m depths. A common species, locally collected for subsistence purposes and for its attractive orange-tinged shell. Eastern Atlantic, from Mauritania to Namibia, and in southernmost part of South Africa; Cape Verde and São Tomé Islands. Also in southwestern Indian Ocean, from southwestern South Africa, east to Mozambique.



exterior of right valve

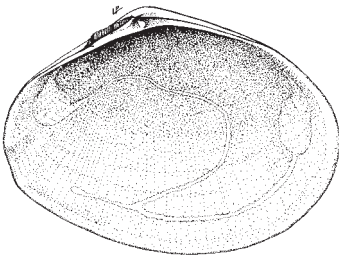


Macoma cumana (Costa, 1830)

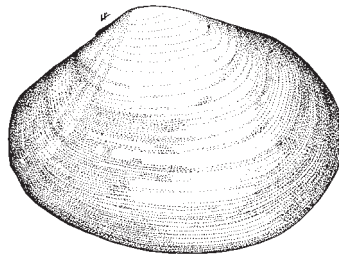
Frequent synonyms / misidentifications: *Macoma senegalensis* Bertin, 1878 / None.

En – Cumes' macoma; **Fr** – Macome de Cumes; **Sp** – Macoma de Cumes.

Maximum shell length 5 cm, commonly to 3 cm. Common to abundant in fine sand or muddy sand bottoms. Sublittoral zone from about 1 to 30 m depth. Locally collected where abundant in shallow water. Eastern Atlantic, from southern Spain to southern Angola; Canary Islands. Throughout the Mediterranean.



interior of left valve



exterior of right valve

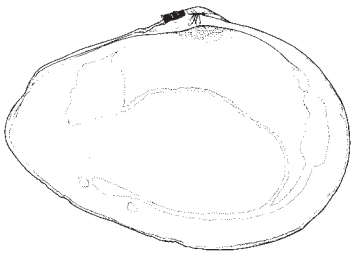


***Macoma innominata* Bertin, 1878**

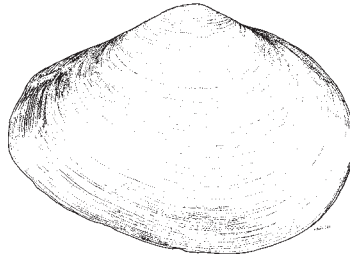
Frequent synonyms / misidentifications: *Tellina nymphalis* Hanley, 1846 [not of Lamarck, 1818] / *Tellina nymphalis* Lamarck, 1818.

En – Unnamed tellin; **Fr** – Macome sans nom; **Sp** – Macoma anónima.

Maximum shell length 6 cm, commonly from 4 to 5 cm. In fine and muddy sand bottoms of protected bays, coastal lagoons and areas near mangroves, often in waters of varying salinity. Common to locally abundant at low tide and shallow subtidal waters, to about 5 m depths. Collected for food by coastal people. Eastern Atlantic, from Mauritania to southern Angola.



interior of left valve



exterior of right valve



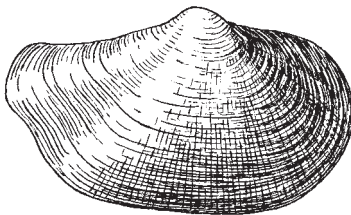
***Macoma (Rostrimacoma) cancellata* (G.B. Sowerby I, 1853)**

Frequent synonyms / misidentifications: *Amphidesma cancellata* Sowerby I in Reeve, 1853 [not of d'Orbigny, 1853]; *Panopea cancellata* Sowerby, 1873 / None.

En – Cancellate macoma; **Fr** – Macome quadrillée; **Sp** – Macoma cuadrilla.

Maximum shell length 15.5 cm, commonly from 10 to 12 cm. Deeply buried in soft muddy or sandy muddy bottoms. Sublittoral zone, from about 2 to 10 m depths. Collected for food in various localities, but due to its deeply buried mode of life (recalling somewhat that of a *Panopea*), this very large species is relatively difficult to obtain. Mainly consumed in soups. Tropical East Atlantic, from Senegal to northern Angola.

Remark: This species was erroneously attributed to family Hiatellidae (genus *Panopea*) in the first edition of this guide (Abbott, 1981); as a consequence, amended FAO names are given here to this species which was previously referred as “Cancellate panope” (English), “Panope quadrillée” (French) and “Panope cuadrilla” (Spanish).



exterior of right valve

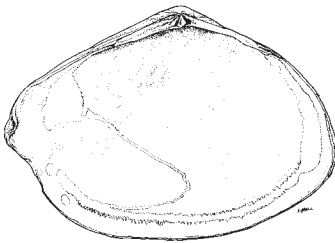


***Macoma (Rostrimacoma) ventricosa* (Deshayes, 1855)**

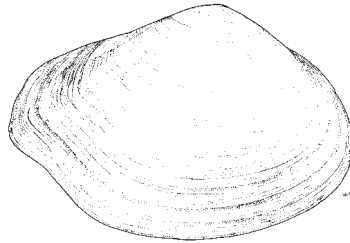
Frequent synonyms / misidentifications: *Tellina chudeaui* Dautzenberg, 1910 / None.

En – Ventricose tellin; **Fr** – Macome ventrue; **Sp** – Macoma ventruda.

Maximum shell length 9 cm, commonly to 7.5 cm. Deeply buried in sandy mud to fine muddy sand bottoms. Sublittoral zone, from about 3 to 20 m depths. Due to its usually deeply buried mode of life, this moderately common species is only occasionally collected in bottom trawls or dredges. Used mainly in soups. Eastern Atlantic, from Mauritania to northern Angola.



interior of left valve



exterior of right valve



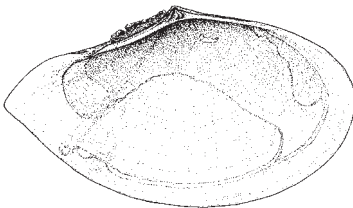
***Tellina incarnata* Linnaeus, 1758**

Frequent synonyms / misidentifications: *Angulus incarnatus* (Linnaeus, 1758); *Laciolina incarnata* (Linnaeus, 1758); *Tellina squalida* Pulteney, 1799 / None.

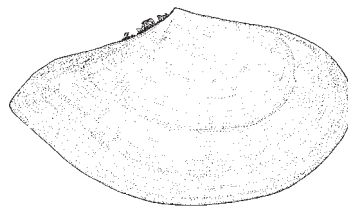
En – Fleshly tellin; **Fr** – Telline pourpre; **Sp** – Telina encarnada.

Maximum shell length 4.5 cm, commonly to 3.5 cm. In sand or muddy sand bottoms, with or without gravel, shells, rubble or calcareous algae. Sublittoral zone and upper continental shelf, from about 2 to 85 m depths; also occurring low in the intertidal zone in northern part of its range. A rather common species, collected with bottom trawls or dredges, and occasionally appearing in some local markets, mixed with other small bivalves. Used for human consumption or for bait. Eastern Atlantic, from the British Isles to Sierra Leone, and from Gabon to southern Angola; Macaronesian Islands (the Azores and the Canaries) and Cape Verde Archipelago. Throughout the Mediterranean. Northwestern Indian Ocean.

Remarks: Atlantic forms often considered as a distinct species under the name *Tellina squalida* Pulteney, 1799. *Tellina incarnata* may be a complex of closely related species, or a variable, widely distributed species with geographical differentiation. It is considered herein in its wide sense.



interior of left valve



exterior of right valve

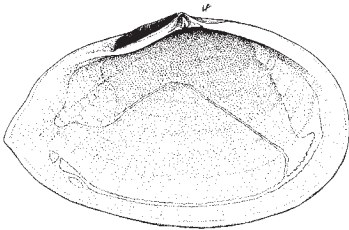


***Tellina planata* Linnaeus, 1758**

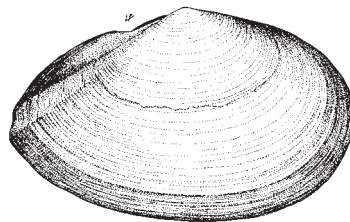
Frequent synonyms / misidentifications: *Peronaea planata* (Linnaeus, 1758); *Peronidia planata* (Linnaeus, 1758); *Tellina planata afroccidentalis* Cosel, 1995 / None.

En – Flat tellin; **Fr** – Telline aplatie; **Sp** – Telina plana.

Maximum shell length 8 cm, commonly from 5 to 6 cm. In fine sand and gravel, in lower intertidal and sublittoral zones, to about 20 m depth; along West African coasts, only sublittorally, from 10 to 20 m. An edible species, occasionally collected in the studied zone with bottom trawls and dredges. Rather heavily exploited in some parts of the Mediterranean. Distribution imperfectly known and probably discontinuous in West Africa, because of confusion with similar species. Eastern Atlantic, from southern Portugal to Guinea and Cape Verde Islands, and from Côte d'Ivoire to Gabon. Throughout the Mediterranean. Occurrence unconfirmed in Western Sahara, from Sierra Leone to Liberia, from Togo to Cameroon.



interior of left valve



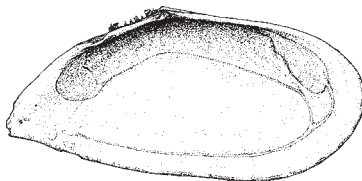
exterior of right valve

***Tellina pulchella* Lamarck, 1818**

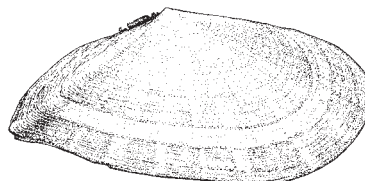
Frequent synonyms / misidentifications: *Tellinella pulchella* (Lamarck, 1818) / None.

En – Beautiful tellin; **Fr** – Telline gentille; **Sp** – Telina hermosa.

Maximum shell length 3.2 cm, commonly to 2.5 cm. In clean fine sand bottoms. Most common in shallow subtidal levels, from just below low tide marks onward, probably down to about 30 m. Mainly collected for its attractive shell. Mediterranean and the nearby Atlantic, from southern Portugal to Morocco.



interior of left valve



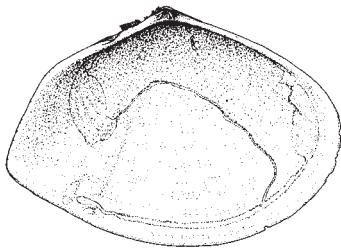
exterior of right valve

Tellina tenuis da Costa, 1778

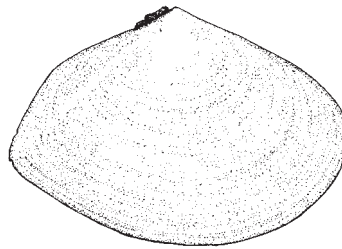
Frequent synonyms / misidentifications: *Angulus tenuis* (da Costa, 1778); *Macoma tenuis* (da Costa, 1778) / None.

En – Delicate tellin; **Fr** – Telline délicate; **Sp** – Telina delicada.

Maximum shell length 3.3 cm, commonly from 2 to 2.5 cm. In fine sand. Often abundant at low tide and shallow subtidal depths, down to about 10 m. Occurring also in coastal lagoons. The delicate and vividly coloured shell of this small species is commonly used in the shellcraft industries to make decorative items. It may be cast ashore in great number after storms, and it is popularly known by the widely open paired valves of its empty shell looking like a butterfly. Eastern Atlantic, from Norway and the Baltic Sea to Mauritania. Throughout the Mediterranean and the Black Sea.



interior of left valve



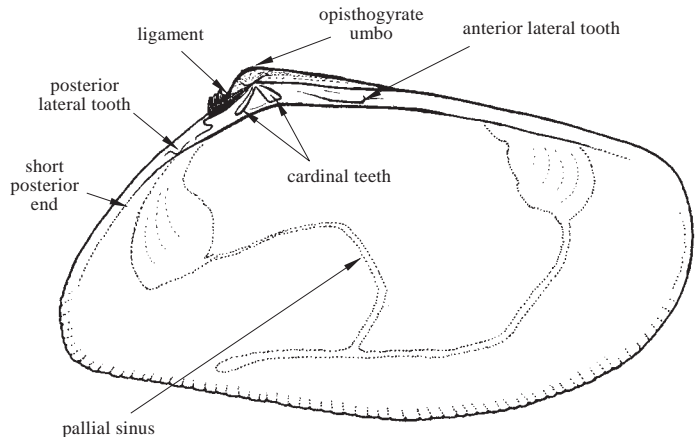
exterior of right valve



DONACIDAE

Donax clams

Diagnostic characters: Shell **equivalve** or nearly so, usually solid, compressed, **trigonal to wedge-shaped**, not gaping; inequilateral, with a **shorter** and somewhat obliquely truncate **posterior end**. **Umbones opisthogyrate**. Posterodorsal slope often differently sculptured than the rest of the shell. **Ligament external**, in a groove behind umbones. Hinge with **2 small cardinal teeth** in each valve, the strongest commonly bifid, and more or less developed **lateral teeth**. Interior of shell porcelaneous. **Two adductor muscle scars**, about equal in size. **Pallial sinus deep**, largely confluent ventrally with the pallial line. **Cruciform muscle scars obscure**. Internal margins crenulated or smooth. Gills of eulamellibranchiate type, smooth or folded. Foot strong, laterally compressed. Siphons quite short, naked, separated to their base, with 6 lobes on top. Cruciform muscles present. Mantle margins widely open anteroventrally.



interior of left valve

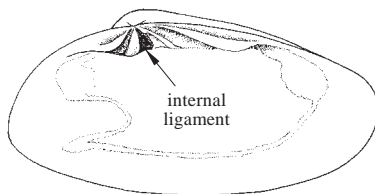
Habitat, biology, and fisheries: Quick shallow burrowers living in sandy bottoms, often under the influence of surf. Both suspension and deposit feeding animals. Sexes separate. Development with a free swimming larval stage. Some species (genera *Iphigenia* and *Galatea*) adapted to brackish or nearly fresh waters of estuaries. Donacidae are locally exploited for food in many areas. Shells of the larger and most common species also used as a source of lime.

Remarks: West African Donacidae are often poorly known, and distribution or even identity of a number of species occurring in some areas is still questionable. Due to the paucity of available information and material, main problems encountered in preparing this document concern distribution of northern temperate species of *Donax*, and biodiversity in genera *Galatea* and *Iphigenia*. The information provided on these topics must be considered provisional.

Similar families occurring in the area

Mesodesmatidae: hinge with a large socket-like pit bearing an internal ligament.

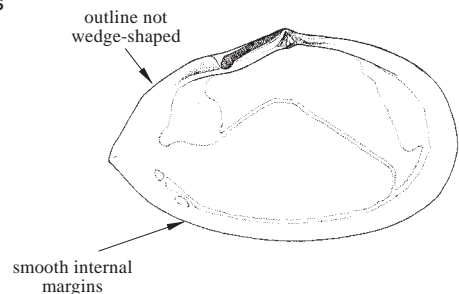
Tellinidae: shell not wedge-shaped, often with a rightwards flexure on posterior end. Internal margins never crenulated. Cruciform muscle scars usually well-marked. Siphons elongated.



interior of left valve
Mesodesmatidae



dorsal view



interior of left valve
Tellinidae

Key to species of interest to fisheries occurring in the area

- 1a. Internal margins smooth (Fig. 1a) → 2
- 1b. Internal margins crenulated (Fig. 1b). → 9

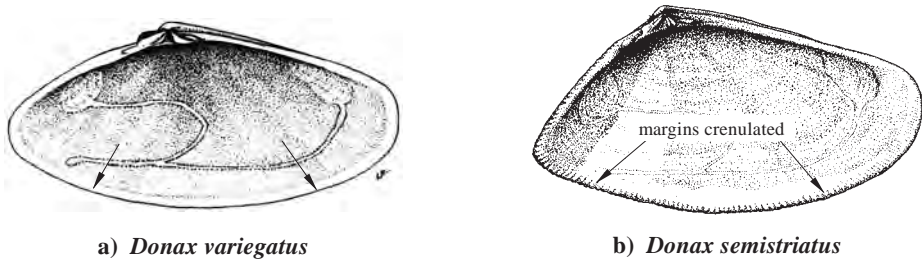


Fig. 1 interior of left valve

- 2a. Shell wedge-shaped (height less than one-half the length); umbones well behind the midline of valves → 3
- 2b. Shell trigonal ovate (height at least two-thirds the length); umbones submedian → 4
- 3a. Posterodorsal margin widely convex, giving posterior end of shell a rather blunt shape; posterior slope with fine incised grooves, slightly oblique to growth lines (Fig. 2) . . . *Donax burnupi*
- 3b. Posterodorsal margin straightish, giving posterior end of shell a relatively acute shape; posterior slope smooth, without slightly oblique grooves (Fig. 3) *Donax variegatus*

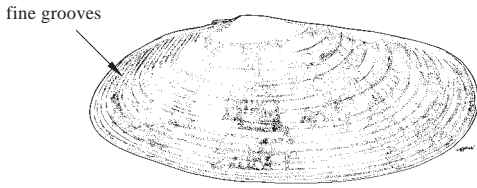


Fig. 2 *Donax burnupi* (exterior)

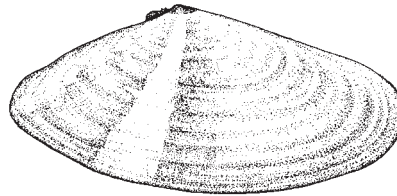


Fig. 3 *Donax variegatus* (exterior)

- 4a. Pallial sinus relatively long, extending past midline of valves; hinge plate narrow (Fig. 4a) → 5
- 4b. Pallial sinus relatively short, not extending as far as midline of valves; hinge plate broad (Fig. 4b) → 7

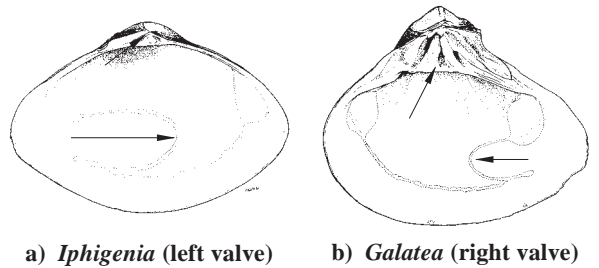


Fig. 4 interior view

- 5a. Shell strongly inflated (inflation equalling about two-thirds the length) (Fig. 5a) *Iphigenia curta*
- 5b. Shell moderately inflated (inflation equalling less than one-half the length) (Fig. 5b) → 6

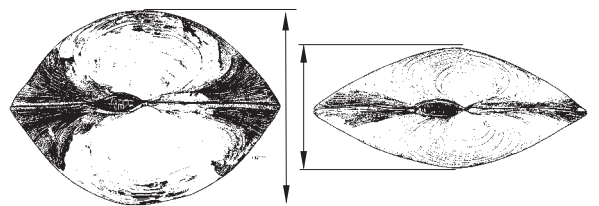


Fig. 5 dorsal view of shell

- 6a. Shell small (up to 3 cm long); posterodorsal area clearly separated by a rounded angle; ventral branch of pallial sinus confluent with the pallial line in its anterior half (Fig. 6)
 ***Iphigenia delessertii***
- 6b. Shell large (up to 8.5 cm long); posterodorsal area not clearly separated; ventral branch of pallial sinus meeting the pallial line in its posterior third (Fig. 7). . . ***Iphigenia laevigata***
- 7a. Shell rather elongate, with distinctly anterior umbones; median cardinal tooth of the right valve often reduced, slanting posteroventralward; pallial sinus relatively long and narrow (Fig. 8) ***Galatea bernardii***
- 7b. Shell rather short, with submedian umbones; median cardinal tooth of the right valve strong, not slanting posteroventralward; pallial sinus relatively short and wide → 8

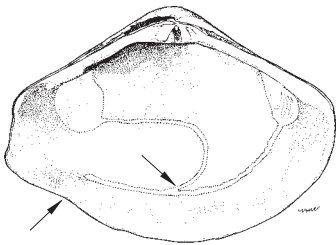


Fig. 6 *Iphigenia delessertii* (interior)

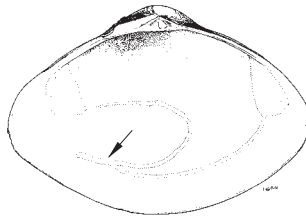


Fig. 7 *Iphigenia laevigata* (interior)

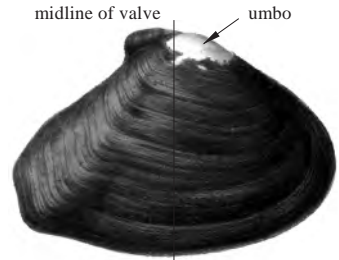


Fig. 8 *Galatea bernardii* (exterior)

- 8a. Shell trigonal ovate, with moderately prominent umbones; posterior radial ridge poorly developed; ventral half of valves always devoid of broad radial undulations; right valve anterior lateral tooth high (Fig. 9)
 ***Galatea paradoxa***

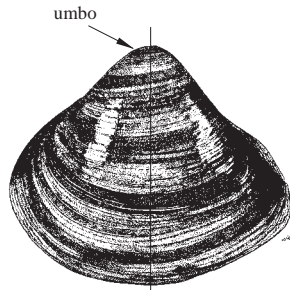


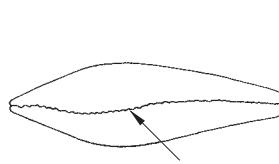
Fig. 9 *Galatea paradoxa* (exterior)

- 8b. Shell triangular, with very prominent umbones; posterior radial ridge strong; ventral half of valves in larger specimens (exceeding 4 to 5 cm long) often with a few broad radial undulations with concentrically wrinkled intervals; right valve anterior lateral tooth weak (Fig. 10) ***Galatea congica***

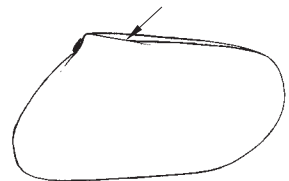


Fig. 10 *Galatea congica* (exterior)

- 9a. Shell slightly inequivalve. Interior of posterodorsal margin without crenulations (smooth to the touch) (Fig. 11)
 ***Donax trunculus***



a) ventral view



b) lateral view

Fig. 11 *Donax trunculus* (exterior of shell)

- 9b. Shell equivalve. Interior of posterodorsal margin with crenulations (rough to the touch) → 10

10a. Marginal crenulations much stronger, more widely spaced and sharply projecting at posterior end of shell (Fig. 12). ***Donax serra***

10b. Marginal crenulations not strongly different at posterior end of shell. → 11

11a. Ligament deeply sunken; pallial sinus ascending anteriorly (Fig. 13) ***Donax rugosus***

11b. Ligament not sunken; pallial sinus not ascending anteriorly → 12

12a. Posterior slope always with strong concentric grooves, set off from the rest of the shell by a distinct radial fold; concentric grooves confined to posterior slope, or extending over the posterior two-thirds of shell → 13

12b. Posterior slope smooth or with shallow concentric grooves, connected without discontinuity with the rest of the shell; concentric grooves sometimes extending over the posterior half of shell (Fig. 14) ***Donax vittatus***

13a. Surface of valves with a cancellate sculpture over the posterior two-thirds, except for the posterior slope (Fig. 15) ***Donax semistriatus***

13b. Surface of valves without a cancellate sculpture (Fig. 16). ***Donax venustus***

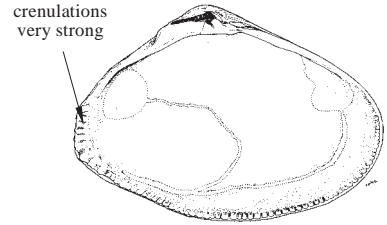


Fig. 12 *Donax serra* (interior)

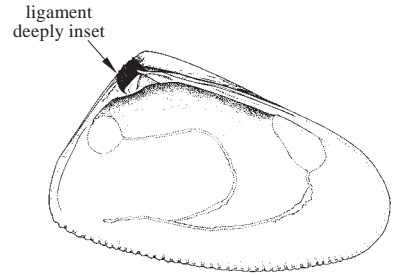


Fig. 13 *Donax rugosus* (interior)

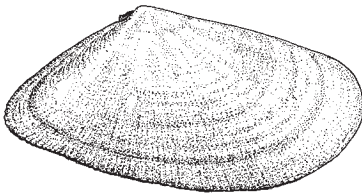


Fig. 14 *Donax vittatus* (exterior)

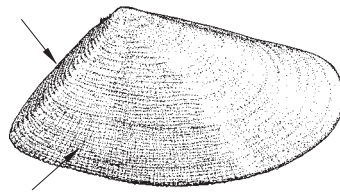


Fig. 15 *Donax semistriatus* (exterior)

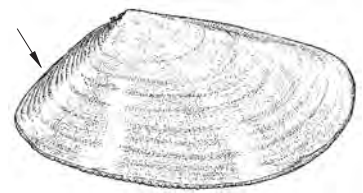


Fig. 16 *Donax venustus* (exterior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Donax burnupi* G.B. Sowerby III, 1894.
- 🐚 *Donax rugosus* Linnaeus, 1758.
- 🐚 *Donax semistriatus* Poli, 1795.
- 🐚 *Donax serra* Röding, 1798.
- 🐚 *Donax trunculus* Linnaeus, 1758.
- 🐚 *Donax variegatus* (Gmelin, 1791).
- 🐚 *Donax venustus* Poli, 1795.

- 🐚 *Donax vittatus* (da Costa, 1778).
- 🐚 *Galatea bernardii* Dunker 1857.
- 🐚 *Galatea congica* Boettger, 1885.
- 🐚 *Galatea paradoxa* (Born, 1780).
- 🐚 *Iphigenia curta* (Dunker, 1867).
- 🐚 *Iphigenia delessertii* (Bernardi, 1860).
- 🐚 *Iphigenia laevigata* (Gmelin, 1791).

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- Ansell, A.D.** 1983. The biology of the genus *Donax*. In A. Mclachlan & E. Erasmus, eds. *Sandy Beaches as Ecosystems Developments in Hydrobiology*. Vol. 19. Springer, The Hague, Netherlands: pp. 607–636.
- Bernardi, A.C.** 1860. *Monographie des genres Galatea et Fischeria*. Paris, Tinterlin, 48 p., 9 pls.
- Pilsbry, H.A. & Bequaert, J.** 1927. The aquatic mollusks of the Belgian Congo. With a geographical and ecological account of Congo malacology. *Bulletin of the American Museum of Natural History*, 53(2): 69–602.
- Salas-Casanova, C.** 1987. The Donacidae of the Bay of Malaga (Spain). Taxonomy. *Basteria*, 51: 33–50.

***Donax burnupi* G.B. Sowerby III, 1894**

Frequent synonyms / misidentifications: *Capsella burnupi* (G.B. Sowerby III, 1894); *Donax longissimus* Jaeckel, 1931; *Tentidonax burnupi* (G.B. Sowerby III, 1894) / *Donax (Capsella) owenii* Hanley, 1843.

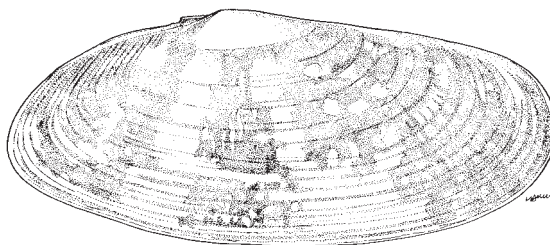
FAO Names: **En** – Rangy donax; **Fr** – Flion élançé; **Sp** – Coquina alargada.

Diagnostic characters: Shell rather thin and small (up to 3.5 cm long), laterally compressed and variable in shape, equivalve, roughly **elongate** ovate and only **moderately inequilateral**. Umbones small, situated a rather short distance behind the midline. **Posterodorsal margin widely convex, giving posterior end of shell a rather blunt shape.** Posterior part of shell produced, not set off from lateral faces of valves by an umbonoposterior angle. **Outer surface of valves nearly smooth; posterior slope produced, tapering and rounded, not distinctly set off from the lateral sides of valves, smooth or with a series of weak, slightly oblique concentric grooves.** Periostracum thin glossy and persistent. Lateral hinge teeth feeble. **Pallial sinus deep, not ascending dorsally and extending slightly beyond midline of valves anteriorly. Internal margins smooth.** **Colour: outside of shell variable, usually whitish or cream to pale fawn with slightly darker brown rays, more rarely deep violet. Interior whitish and variably coloured with yellow, brown or purple, with a purplish mark on ligament margin of the hinge plate, and with the outer colour pattern showing through.**

Size: Maximum shell length 3.5 cm, commonly to 2.5 cm.

Habitat, biology, and fisheries: Common in fine silty sand bottoms, sometimes mixed with coarse sand or shell rubble, mainly in sheltered bays or in tidal pools. Intertidal zone and sublittorally to about 40 m depth. Locally collected for food or for its pretty shell. Subtidal populations in Mauritania may be potentially exploited at artisanal level.

Distribution: In the East Atlantic, known from Mauritania to Senegal, and in South Africa; east to Natal, southwestern Indian Ocean.



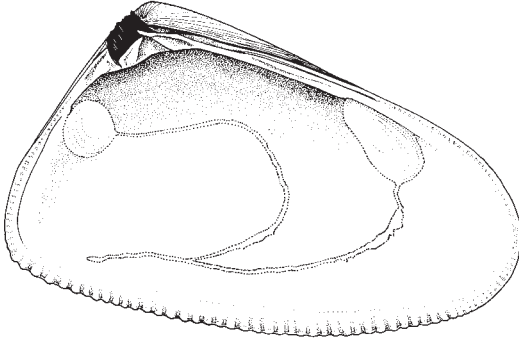
exterior of right valve



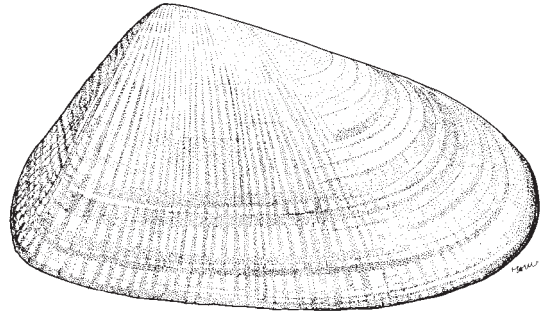
***Donax rugosus* Linnaeus, 1758**

Frequent synonyms / misidentifications: *Donax interruptus* Deshayes, 1855 / None.

FAO names: **En** – Rugose donax; **Fr** – Flion rugueux; **Sp** – Coquina rugosa.



interior of left valve



exterior of right valve

Diagnostic characters: Shell thick and solid, **medium sized** (up to 6 cm long), somewhat inflated, **very inequilateral**, anteriorly **elongate** ovate and posteriorly **wedge-shaped** in outline. Umbones small, situated well behind the midline. Posterodorsal margin markedly shorter and much more slanting than anterodorsal margin; anterior margin rounded, ventral margin slightly convex becoming nearly straight posteriorly, meeting the somewhat truncate posterior margin at a blunt angle. **Posterior slope set off** from lateral faces of valves **by** a distinct **umbonoventral angulation**. **Outer surface** of lateral faces **rather smooth in appearance**, with only fine concentric growth marks and shallow radial grooves, which become deeper posteriorly and fade out anteriorly. **Posterior slope with** irregular, **wavy concentric ridges crossed by** many **fine radiating threads**, forming dense granulations (posterior slope of subspecies *interruptus* Deshayes with sharper umbonoposterior angle and much finer sculpture). **Ligament** very short, **deeply sunken** in hinge margin and not protruding above the shell surface. **Hinge** with small **lateral teeth**, 1 anterior and 2 posterior laterals in right valve, against 1 anterior and 1 posterior laterals in left valve; posterior lateral tooth of left valve very short and prominent, situated just behind the ligament. Periostracum thin and translucent, often extensively eroded. **Pallial sinus deep and broad**, reaching midline of valves anteriorly, and **ascending dorsally**. **Internal ventral and posterior margins crenulated**; crenulations roughly equal sized throughout on ventral margin, sometimes only a little coarser but not strongly different at posterior end of shell. **Colour:** **outside** of shell very **variable, whitish** or yellowish more or less variegated **with** radial and **concentric patterns of orange, purple or brownish**. Interior white, often with yellow, orange, pink or purple areas.

Size: Maximum shell length 6 cm, commonly from 3 to 4 cm.

Habitat, biology, and fisheries: In fine to coarse sand bottoms, mostly in the surf zone of open coasts. Intertidal and shallow sublittoral zone to about 3 m depth. May form dense populations. Specimens from Ghana to Congo also living in sheltered bays and often considered a morphologically distinct subspecies (*Donax rugosus interruptus* Deshayes, 1855). An abundant species, actively collected for food in tropical West Africa. Often collected in great quantities on the shore at the incoming tide, when the bivalve migrates toward the surface of the sediment and becomes very easy to find.

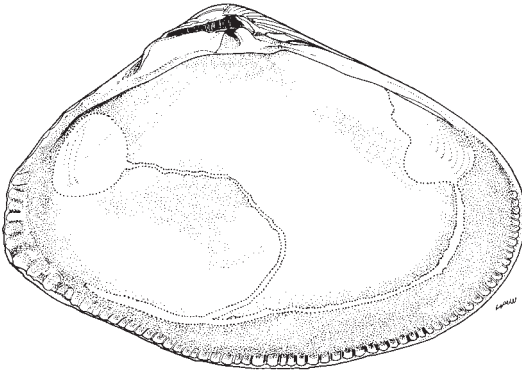
Distribution: The tropical East Atlantic, from Mauritania to southern Angola.



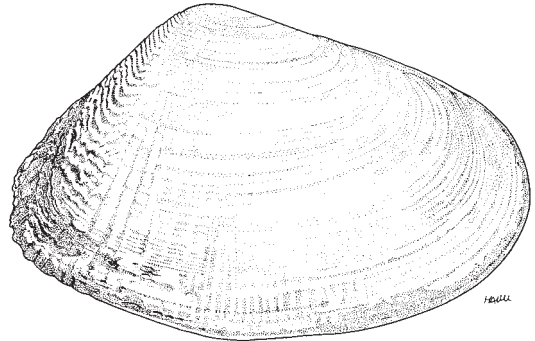
***Donax serra* Röding, 1798**

Frequent synonyms / misidentifications: *Donax serra* Chemnitz, 1782 [Invalid name] / None.

FAO names: En – Saw donax; Fr – Flion scie; Sp – Coquina sierra.



interior of left valve



exterior of right valve

Diagnostic characters: Shell thick and **solid, large sized** (up to 9 cm long), laterally compressed, **wedge-shaped** to elongate trigonal ovate in outline, **inequilateral**. Umbones small, situated well behind the midline. Posterodorsal margin markedly shorter and more slanting than anterodorsal margin. Posterior slope without a distinct umboventral angulation. **Outer surface of lateral faces rather smooth in appearance**, with only fine concentric growth marks and very shallow radial grooves, which become deeper posteriorly. Sculpture of **posterior slope with coarse, wavy concentric ridges crossed by finer radiating threads**. Periostracum thin and adherent, often eroded around the umbones and becoming thicker towards valve margins of large specimens. **Ligament not sunken**, attached behind umbones on projecting nymphs. **Lateral hinge teeth indistinct**. Pallial sinus deep and very broad, not ascending dorsally, extending about half way inside the shell. **Internal margins crenulated**. Marginal **crenulations much stronger, more widely spaced and sharply projecting at posterior end** of shell. **Colour:** outside of shell **whitish to pale purple**, tinged with pink or purple on the umbones, periostracum olive brown. **Interior whitish, suffused purple or salmon-pink** and often **more deeply coloured on adductor muscle scars and marginal area** outside the pallial line.

Size: Maximum shell length nearly 9 cm, commonly from 6 to 7 cm.

Habitat, biology, and fisheries: In clean, moderately coarse sand bottoms, from middle intertidal zone to shallow subtidal levels, down to about 3 m depth. Largest concentrations occurring in the most exposed situations, especially near river mouths. Sexual maturity at about 2 years. Reproduction with a large winter spawning and a small one in summer. This common edible species is also popularly used for angling in South Africa where strict fishing regulations are imposed to protect the resource.

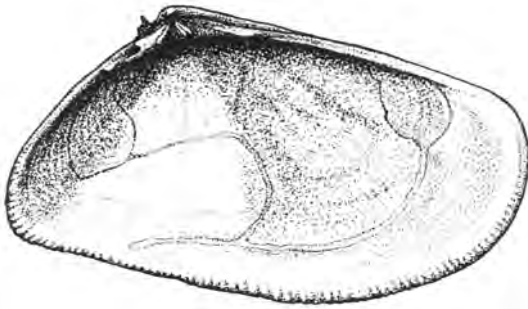
Distribution: Southeast Atlantic and southwest Indian Ocean; north to Angola and east to western Transkei (South Africa).



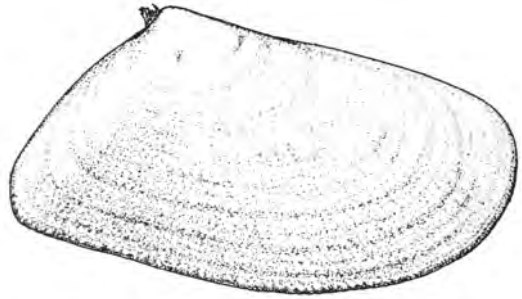
***Donax trunculus* Linnaeus, 1758**

Frequent synonyms / misidentifications: *Donax julianae* Krynicky, 1837 / *Donax anatinus* Lamarck, 1818 [= *Donax vittatus*].

FAO names: **En** – Truncate donax; **Fr** – Flion tronqué; **Sp** – Coquina truncada.



interior of left valve



exterior of right valve

Diagnostic characters: **Shell** solid, laterally compressed and **elongated**, trigonal ovate in outline, strongly slanting posterior to the umbones and truncate at posterior end, **very inequilateral**; **slightly inequivalve**, anterior dorsal margin of left valve slightly higher than corresponding margin of right valve, commissural plane somewhat flexuous ventrally. Umbones small, situated well behind the midline. **Outer surface** of valves **nearly smooth** and devoid of strong sculpture on posterior slope. Periostracum adherent, translucent and glossy. **Hinge** with small **lateral teeth**, 1 anterior and 2 posterior laterals in right valve, against 1 anterior and 1 posterior laterals in left valve. **Pallial sinus deep and broad**, reaching midline of valves anteriorly, and **a little ascending dorsally**. **Internal ventral margin crenulated**, but **posterodorsal margin** without crenulations and **smooth to the touch**. **Colour:** **outside** of shell **yellowish to brownish white, uniform or with** variably developed, more or less **purplish, concentric bands and / or radiating rays**. Interior white, often widely maculated with purple, brownish or orange on 2 unequal areas.

Size: Maximum shell length 5 cm, commonly from 2.5 to 3.5 cm.

Habitat, biology, and fisheries: Common to abundant in bottoms of clean, fine to medium grain sand, intertidally and at shallow subtidal levels, down to 15 m depth. Reproduction in summer. Exploited at artisanal level in Morocco. A popular food actively collected in the Mediterranean. Used fresh or canned. Consumed raw, steamed, in salads or cooked with tomatoes, garlic and olive oil.

Distribution: Imperfectly known, because of confusion with other *Donax* species. Brittany (France) to at least Morocco. Throughout the Mediterranean and Black Sea. Southernmost limit of distribution uncertain in West Africa, perhaps to Mauritania but probably not to Senegal.



***Galatea congica* Boettger, 1885**

Frequent Synonyms / Misidentifications: *Egeria congica* (Boettger, 1885); *Galatea duponti* (Dautzenberg, 1891); *G. rubrotincta* Preston, 1909; *G. tuckeyi* (Dautzenberg, 1891) / *Galatea paradoxa* (Born, 1778).

FAO Names: **En** – Congolese galatea clam; **Fr** – Egérie congolaise; **Sp** – Almeja congoliña.

Diagnostic characters: Shell very large (up to 13 cm long), inflated, **thick and heavy, high triangular in outline** and about as high as long (slightly longer than high in larger specimens), equivalve, **subequilateral. Umbones submedian**, rounded and **very prominent. Posterior radial ridge strong**. Outer surface of valves with well developed concentric growth lines and marks. **Ventral half of valves in larger specimens** (exceeding 4 to 5 cm long) **often with about 6 broad and low radial undulations with concentrically wrinkled intervals** (radial undulations sometimes inconspicuous). Ligament short, very thick and prominent. **Hinge plate very broad and thick, with well developed cardinal teeth** on both valves, **lateral teeth weak; median cardinal tooth valve strong** and triangular but usually poorly bifid **in right valve**, anterior and posterior cardinals prominent in left valve. Adductor muscle scars deeply impressed. **Pallial sinus relatively short** and wide, **not extending as far as midline** of valves. **Internal margins smooth. Colour: outside of shell usually plain white** (several greenish rays sometimes present in young stages) **under the olive-brown periostracum. Interior porcelaneous white**, rarely with purple stains near posterior adductor scar; interior often considerably stained with pink or purple in young specimens.



exterior of right valve
(from Pilsbry and Becquaert, 1927)

Size: Maximum shell length 14.6 cm, commonly from 9 to 10 cm.

Habitat, biology, and fisheries: Very common in the tidal waters of the Zaire estuary. Populations living nearer to the sea reach smaller size than those in strongly reduced salinity environments. Extensively used for food. Shells traditionally used to produce whitewash and mortar.

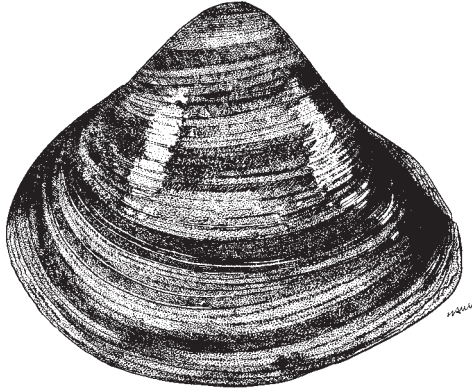
Distribution: Restricted to Congo River estuary.



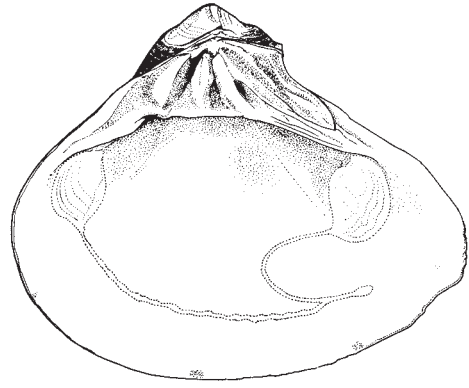
***Galatea paradoxa* (Born, 1778)**

Frequent Synonyms / Misidentifications: *Egeria paradoxa* (Born, 1778); *Galathea concamerata* Duval, 1840; *G. radiata* Lamarck, 1804; *Galatea truncata* Dunker, 1857; *Potamophila radiata* (Lamarck, 1804) / None.

FAO Names: **En** – Common galatea clam; **Fr** – Donace peigne; **Sp** – Almeja galatea.



exterior of left valve



interior of right valve

Diagnostic characters: Shell very large (up to 11 cm long), inflated, **thick and heavy**, **trigonal ovate in outline** and a little longer than high, equivalve, **subequilateral**. **Umbones** **about median or slightly anterior** to midline, rounded and **very prominent**. Anterior margin rounded, posterior margin narrowly rounded, sometimes slightly produced. **Posterior radial ridge poorly developed**. **Outer surface** of valves **smoothish**, with well developed concentric growth lines and marks becoming more irregular and prominent on posterior slope. Ligament short, very thick and prominent. **Hinge plate very broad and thick, with cardinal and lateral teeth** on both valves; **median cardinal tooth valve strong** and widely bifid **in right valve**, **anterior lateral well developed** and fitting in deep socket of left valve; anterior and posterior cardinals prominent in left valve, median cardinal lower and ridged. Adductor muscle scars deeply impressed. **Pallial sinus relatively short** and wide, **not extending as far as midline** of valves. **Internal margins smooth**. **Colour:** **outside** of shell **whitish**, usually with **narrow bluish purple radial bands under the olive-brown periostracum**. **Interior porcelainous white**, with the outer **purplish rays** showing through **on ventral margin**, and often with **some irregular purplish stains** mainly developed on posterior adductor scar and ligament area of the hinge.

Size: Maximum shell length 11 cm, commonly from 7 to 9 cm.

Habitat, biology, and fisheries: Burrowing in muddy sandy bottoms of estuaries, in low salinity environments. May be exceedingly abundant in suitable environments. Spawns once a year during the peak of the rainy season (June to October), so that young larvae can feed on the high plankton biomass during the ensuing dry season. Regularly collected for food and locally marketed in many places. Shells exploited for the lime industry since prehistoric times, mainly from shell middens and Quaternary deposits.

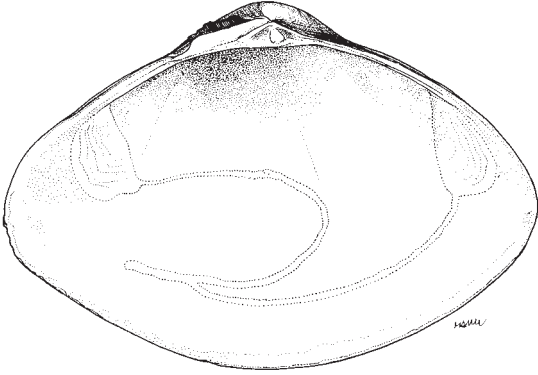
Distribution: Tropical East Atlantic, distribution imperfectly known because of confusion with similar species living in the area; probably from Guinea to Cameroon, perhaps also extending south to Congo.



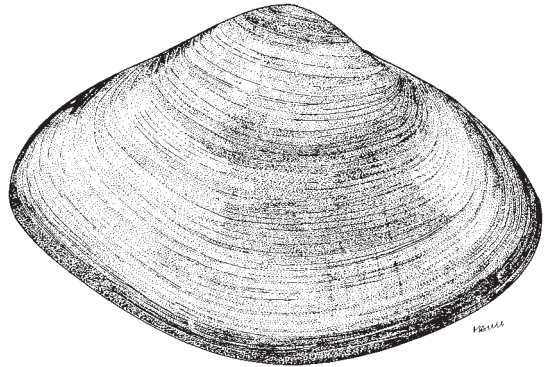
***Iphigenia laevigata* (Gmelin, 1791)**

Frequent synonyms / misidentifications: *Iphigenia rostrata* Römer, 1869 / None.

FAO names: En – Smooth false donax; Fr – Flion lisse; Sp – Coquina rostrada.

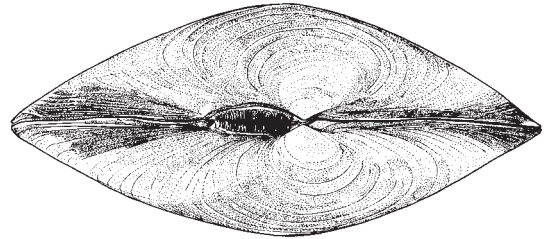


interior of left valve



exterior of right valve

Diagnostic characters: Shell relatively large (up to 8.5 cm long), solid, moderately inflated (inflation equalling less than one-half the length), trigonal ovate in outline, dorsal margin strongly slanting both anterior and posterior to the umbones, nearly equilateral. Umbones submedian to a little behind the midline. Ventral margin widely convex, a little flattened to sinuate in its posterior one-fourth. **Posterodorsal area not clearly set off** from lateral sides of valves by a rounded angle. **Outer surface** of valves smoothish, with concentric growth marks. **Periostracum well developed**, often thicker near valve margins and eroded around the umbones. **Hinge plate narrow, with 1 elongate and low anterior lateral tooth in right valve**; other lateral teeth indistinct. Pallial sinus deep, tongue shaped, extending beyond the midline anteriorly. **Internal margins smooth.** **Colour:** outside of shell whitish or cream to light bluish grey under the olive brown periostracum. Interior white or light to dark purple to brownish purple.



dorsal view of shell

Size: Maximum shell length 8.5 cm, commonly from 5 to 6 cm.

Habitat, biology, and fisheries: In fine sandy bottoms. Protected bays, often in areas with slightly reduced salinities, as well as in estuaries, but apparently not offshore in true marine environments. Lower intertidal and shallow subtidal zones, to about 5 m depths. May locally be very common. Collected for food at low tide, or subtidally with bottom trawls.

Distribution: Tropical East Atlantic, from Senegal to northern Angola; northern limit of distribution imperfectly known, perhaps extending to Mauritania.

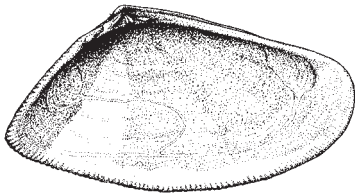


***Donax semistriatus* Poli, 1795**

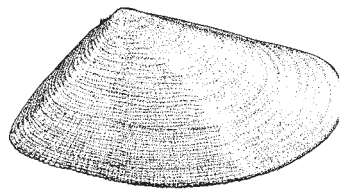
Frequent synonyms / misidentifications: None / *Donax anatinus* Lamarck, 1818 [= *Donax vittatus*]; *D. vittatus* (da Costa, 1778).

En – Half-striated donax; **Fr** – Flion semistrié; **Sp** – Tellerina.

Maximum shell length 3.5 cm, commonly from 2 to 3 cm. Common in fine clean sand bottoms at extreme low tide and in shallow subtidal water, to about 10 m depth. In the Atlantic, also occurring deeper, down to 55 m. Reproduction in summer. Actively exploited in the Mediterranean and in Morocco with bottom trawls, dredges or rakes, or collected by hand. Often marketed with other common small bivalves. Mediterranean and the nearby Atlantic, from Spain to Morocco.



interior of left valve



exterior of right valve

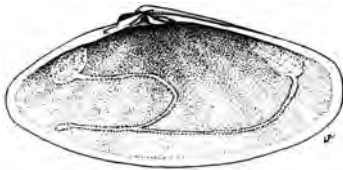


***Donax variegatus* (Gmelin, 1791)**

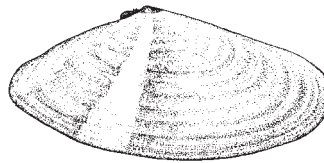
Frequent synonyms / misidentifications: *Capsella variegata* (Gmelin, 1791); *Donax complanatus* Montagu, 1803; *Donax politus* (Poli, 1791) / None.

En – Smooth donax; **Fr** – Flion aplati; **Sp** – Coquina lisa.

Maximum shell length nearly 4 cm, commonly to 3 cm. In coarse clean sandy bottoms. Littoral to shallow subtidal water. Locally common on infralittoral sand dunes under the influence of strong currents. Reproduction in summer. Occasionally collected for food where common, but rarely marketed. A small species appreciated for its delicate taste, but not abundant enough to be of commercial importance. Consumed steamed or in salad with olive oil. Eastern Atlantic, from south coasts of the British Isles to Morocco. Throughout the Mediterranean, but not in the Black Sea.



interior of left valve



exterior of right valve



ventral view of entire shell

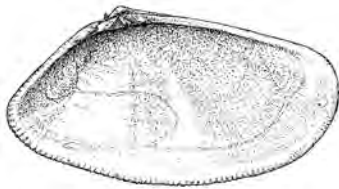


***Donax venustus* Poli, 1795**

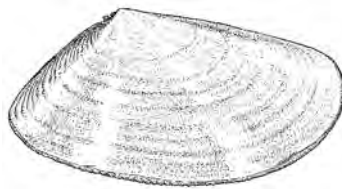
Frequent synonyms / misidentifications: *Donax radiatus* Krynicky, 1837 / *Donax vittatus* (da Costa, 1778).

En – Lovely donax; **Fr** – Flion gracieux; **Sp** – Coquina deliciosa.

Maximum shell length 4 cm, commonly to 3 cm. In clean fine sand bottoms, in shallow subtidal water. Locally common. Reproduction in summer. Collected for food where common, with rakes and dredges. Occasionally marketed locally mixed with other species of small bivalves. Used steamed, in soups or in salads. Eastern Atlantic, probably from southern Portugal to Morocco and Canary Islands; perhaps also south to Mauritania, and in Madeira and Cape Verde islands. Throughout the Mediterranean and in the western Black Sea.



interior of left valve



exterior of right valve

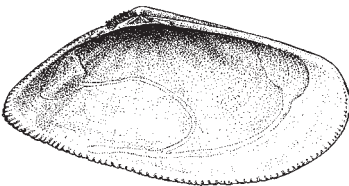


***Donax vittatus* (da Costa, 1778)**

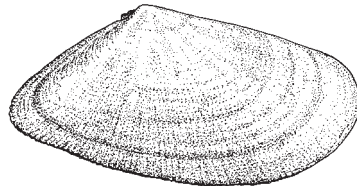
Frequent synonyms / misidentifications: *Donax anatinus* Lamarck, 1818 / *Donax semistriatus* Poli 1795; *D. trunculus* Linnaeus, 1758; *D. venustus* Poli, 1795.

En – Banded donax; **Fr** – Flion des canards; **Sp** – Coquina de patos.

Maximum shell length 4 cm, commonly to 3 cm. Common in clean sandy bottoms. Low intertidal and shallow subtidal levels, down to about 20 m depth. Can form dense populations in sand banks of open sea areas, with a maximum density at about 5 m depth. Reproduction in summer. Locally collected at low tide by hand or with rakes, or subtidally with dredges. Appearing in local markets. Eastern Atlantic, from Norway to Mauritania; perhaps also in the westernmost Mediterranean.



interior of left valve



exterior of right valve



***Galatea bernardii* Dunker, 1857**

Frequent synonyms / misidentifications: *Egeria bernardii* (Dunker, 1857); *Galatea cumingii* (Dunker in Bernardi, 1860); *Galateia quanzae* Brito Capello, 1878 / None.

En – Bernardi's galatea clam; **Fr** – Egérie de Bernardi; **Sp** – Almeja de Bernardi.

Maximum shell length 13.3 cm, commonly to 7 cm. In sandy mud bottoms. Mouth of rivers, in area of low salinities. Collected for food where common. Eastern Atlantic, distribution imperfectly known because of confusion with similar species living in the area; known from Gabon, perhaps extending south to Angola.



interior of left valve
(from Bernardi, 1860)



exterior of right valve
(from Bernardi, 1860)

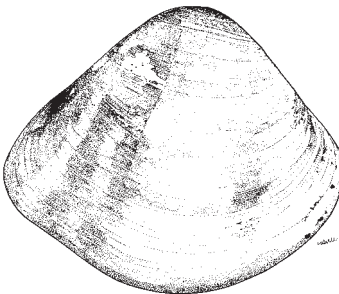


***Iphigenia curta* (Dunker, 1867)**

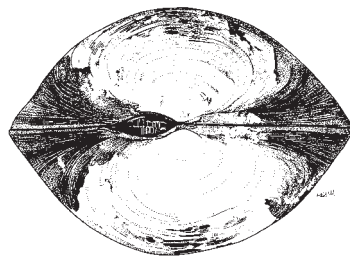
Frequent synonyms / misidentifications: *Fischeria curta* Dunker, 1867; *F. globosa* Preston, 1909; *Iphigenia tumida* (Martens, 1876); *Profischeria curta* (Dunker, 1867) / None.

En – Globose false donax; **Fr** – Donace globuleuse; **Sp** – Coquina globulosa.

Maximum shell length about 3.5 cm, commonly from 2 to 3 cm. In sandy bottoms, mostly in coastal lagoons, estuaries, probably in areas of somewhat reduced salinities. Low tide and shallow subtidal levels. Collected for food on sand banks at low tide. Tropical East Atlantic, from Côte d'Ivoire and Gabon to Angola.



exterior of right valve



dorsal view of entire shell

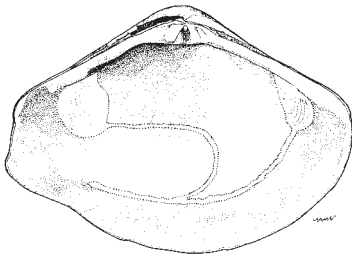


Iphigenia delessertii (Bernardi, 1860)

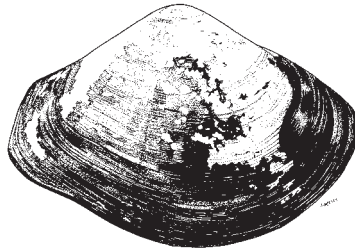
Frequent synonyms / misidentifications: *Fischeria approximans* Preston, 1909; *F. delessertii* Bernardi, 1860; *F. messengeri* Preston, 1909; *Iphigenia truncata* (Martens, 1877); *Profischeria delessertii* (Bernardi, 1860) / None.

En – Delessert's false donax; **Fr** – Flion de Delessert; **Sp** – Coquina de Delessert.

Maximum shell length 3.5 cm, commonly to 2.5 cm. In sandy bottoms. Shallow subtidal waters of coastal lagoons and estuaries. Locally collected for food where common. Eastern Atlantic, from Sierra Leone to Côte d'Ivoire and probably also to northern Angola.



interior of left valve



exterior of right valve

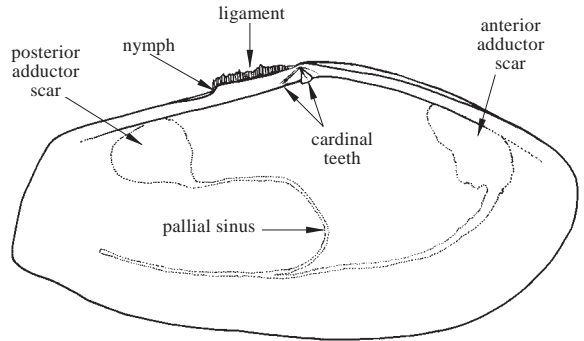


PSAMMOBIIDAE

(= GARIIDAE)

Sunset clams

Diagnostic characters: Shell inequilateral, **D**ovate to subelliptical or trapezoidal in outline, laterally compressed, **somewhat gaping**, equivalve to feebly inequivalve because of a slight posterior flexure. Umbones not very prominent, generally near the midline of valves. Outer surface of shell smoothish or with a mainly concentric sculpture, sometimes also with developed radial elements on posterior slope. Periostracum generally conspicuous, horny and dehiscent. **Ligament external** and prominent, attached behind umbones **on projecting nymphs**. Hinge with **2 small cardinal teeth in either valve**; lateral teeth absent. Interior of shell porcelaneous. **Two adductor muscle scars**, unequal in shape. **Pallial sinus deep**. **Cruciform muscle scars** present, though **often quite obscure**. Internal margins smooth. Gills of eulamellibranchiate type, with folded branchial sheets; outer demibranch expanded above the ctenidial axis, but smaller than inner demibranch. Foot strong, laterally compressed and pointed. Siphons naked, long and separate to their base, with 6 lobes or tentacles at the end. Mantle margins papillate, fused ventrally, with a broad anteroventral opening.

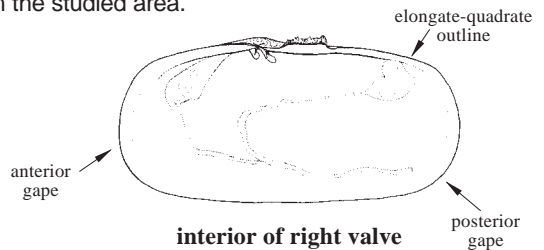


interior of left valve

Habitat, biology, and fisheries: Deposit or suspension feeding animals, generally lying buried at an oblique angle to the surface, with tips of siphons reaching the sea bottom. Can actively burrow in soft substrates with their strong foot. Sexes separate. Development with a free-swimming larval stage. The most common species of Psammobiidae are locally collected for food in the studied area.

Similar families occurring in the area

Solecurtidae: shell equivalve, elongate-quadrate in shape, widely gaping at both ends. A strongly oblique sculpture sometimes present.



interior of right valve

Solecurtidae

Key to species of interest to fisheries occurring in the area

- 1a. Posterior margin of valves obliquely truncate and sharply angular posteroventrally; a strong ridgelike fold radiating from umbo to posteroventral end of valve → 2
- 1b. Posterior margin of valves more or less rounded, sometimes bluntly angled posteroventrally. Radial posteroventral fold obsolete to absent → 3

2a. Posterior slope with about 8 fine radial riblets, crossing the concentric ridges and producing a cancellate pattern (Fig. 1) **Gari fervensis**

2b. Posterior slope with only 1 conspicuous radial rib crossing the concentric ridges (Fig. 2) . **Gari jousseaumeana**

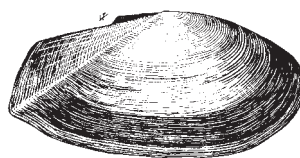


Fig. 1 *Gari fervensis* (exterior)

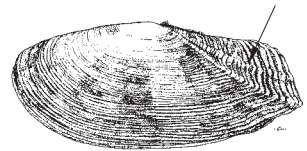


Fig. 2 *Gari jousseaumeana* (exterior)

3a. Surface of valves smoothish, with only concentric growth marks → 4

3b. Surface of valves with numerous coarse, somewhat irregular concentric ridges, in addition to growth marks (Fig. 3). ***Gari virgata***

4a. Shell shape relatively high; surface of valves often with conspicuous, tent-shaped lilac markings (Fig. 4) ***Gari castrensis***

4b. Shell shape relatively low; surface of valves devoid of tent-shaped markings (Fig. 5) ***Gari depressa***

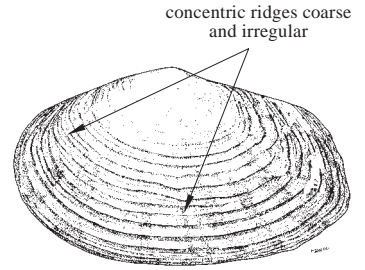


Fig. 3 *Gari virgata* (exterior)

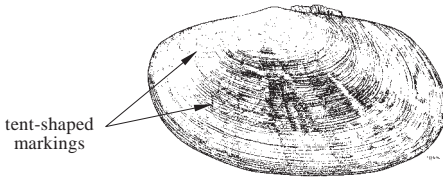


Fig. 4 *Gari castrensis* (exterior)

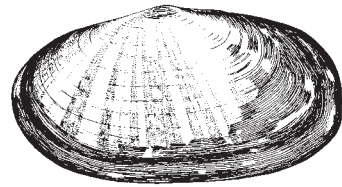


Fig. 5 *Gari depressa* (exterior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

🐚 *Gari castrensis* (Spengler, 1794).

🐚 *Gari depressa* (Pennant, 1777).

🐚 *Gari fervensis* (Gmelin, 1791).

🐚 *Gari jousseaumeana* Bertin, 1880.

🐚 *Gari virgata* (Lamarck, 1818).

References

Cosel, R. von. 1989. Taxonomy of tropical West African bivalves. II. Psammobiidae. *Bulletin du Muséum National d'Histoire Naturelle*, (4)11A (4): 693–731.

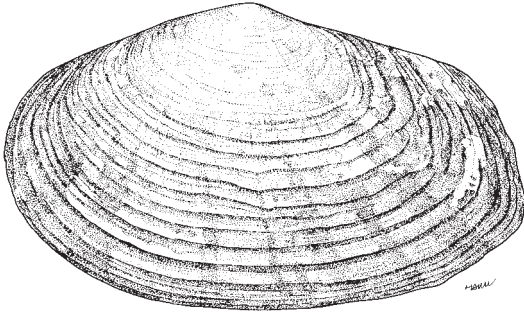
Matsukuma, A. 1989. Taxonomy and geographical distribution of southwestern Japanese species of *Grammatomya*, *Dysmea* and *Kermadysmea* (Bivalvia: Psammobiidae). *Memoirs of the national Science Museum*, 22: 97–118.

Willan, R.C. 1993. Taxonomic Revision of the Family Psammobiidae (Bivalvia: Tellinoidea) in the Australian and New Zealand Region. *Records of the Australian Museum*, Suppl., 18: 1–132.

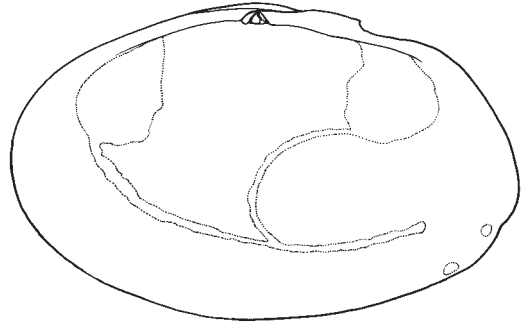
***Gari virgata* (Lamarck, 1818)**

Frequent synonyms / misidentifications: *Gari intermedia* (Deshayes, 1855); *Psammobia costata* Hanley, 1843; *P. intermedia* Deshayes, 1855; *P. virgata* Lamarck, 1818 / None.

FAO names: **En** – Deshayes sunset clam; **Fr** – Psammobie de Deshayes; **Sp** – Gario de Deshayes.



exterior of left valve



interior of right valve

Diagnostic characters: Shell elongate, rather thick and solid, quite inflated, rather variable in shape, usually subovate in outline. Anterior margin rounded. Posterior margin oblique, with rounded angles. Ventral margin widely convex, often with a slight sinuosity near posteroventral angle. Umbones slightly in front of midline of valves. A weak, rounded fold radiating from umbones to posteroventral end. Outer surface of valves with numerous coarse, somewhat irregular concentric ridges, in addition to growth marks. Periostracum strong, usually worn off from umbones. Pallial sinus rounded anteriorly, extending just in front of level with umbones. Ventral limb of pallial sinus widely confluent with pallial line. Colour: outside of shell whitish, with pinkish radiating and concentric bands. Periostracum greenish to greyish brown. Interior pale purple to pinkish, occasionally deep purple or reddish.

Size: Maximum shell length 6 cm, commonly to 4 cm.

Habitat, biology, and fisheries: In various, mostly coarse, sand bottoms. Sublittoral, from about 1 to 25 m depths. A common species, collected as a bycatch in trawls and dredges. Eaten in soups, or mixed with other bivalves in sea food dishes.

Distribution: Eastern Atlantic, from Portugal to Senegal; Canary and Cape Verde Islands. Southwestern Mediterranean, east to Algeria and Andalusia, Spain.

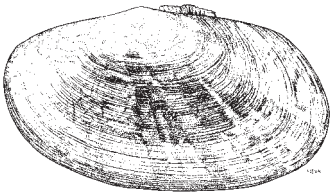


***Gari castrensis* (Spengler, 1794)**

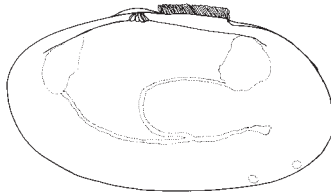
Frequent synonyms / misidentifications: None / *Gari depressa* (Pennant, 1777); *Psammobia oriens* Deshayes, 1855.

En – Camp sunset clam; **Fr** – Psammobie campement; **Sp** – Gario de campo.

Maximum shell length 6 cm, commonly to 4 cm. Locally moderately common in various sand bottoms, sometimes with gravel and shell rubble. Sublittoral zone and offshore, from about 3 to 50 m depths; most frequent from 10 to 25 m. Occasionally caught as a bycatch by trawlers. The tropical East Atlantic, from Guinea to Gabon.



exterior of left valve



interior of right valve

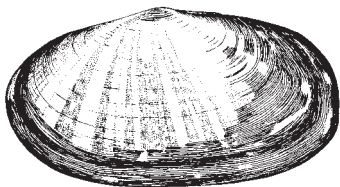


***Gari depressa* (Pennant, 1777)**

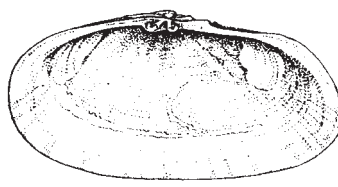
Frequent synonyms / misidentifications: *Psammobia vespertina* (Gmelin, 1791); *Psammocola depressa* (Pennant, 1777) / *Gari maculosa* (Lamarck, 1818).

En – Depressed sunset clam; **Fr** – Psammobie vespertinale; **Sp** – Almeja vespertina.

Maximum shell length 7 cm, commonly to 4.5 cm. In sandy or muddy bottoms, with or without coarse material, from extreme low tide levels to about 100 m depths. A common edible species, mostly occurring in shallow water, down to 10 m. Sometimes in pools at low tide. Traditionally collected for food in the Canaries. Widely distributed in the East Atlantic, but not in tropical areas of West Africa; northern part of distribution ranging from the British Isles to Morocco, Canary Islands and throughout the Mediterranean; southern range in Angola and South Africa, and from southern tip of West African coasts, eastward to Eastern Cape (southwestern Indian Ocean).



exterior of left valve



interior of right valve

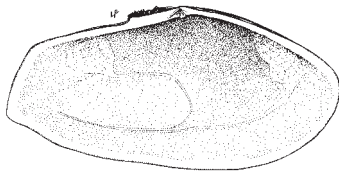


***Gari fervensis* (Gmelin, 1791)**

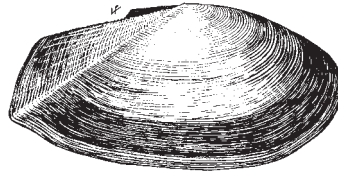
Frequent synonyms / misidentifications: *Gari bornii* (Gmelin, 1791); *Psammobia faeroensis* (Chemnitz, 1782) [Invalid name] / Until recently, a complex of very similar species have been mixed under "*Gari fervensis*".

En – Faeroe sunset clam; **Fr** – Psammobie boréale; **Sp** – Gario boreal.

Maximum shell length 6 cm, commonly to 3 cm. In various soft bottoms, often with a coarse fraction. Sublittoral and upper shelf zones, from about 1 to 50 m depths or more; in West Africa, mostly occurring from 10 to 30 m. Collected as a bycatch in bottom trawls and dredges. Mostly consumed in soups. Shell locally used to make decorative items. Eastern Atlantic, from Norway and Faeroe Islands to southern Angola; Canary Islands; throughout the Mediterranean.



interior of left valve



exterior of right valve

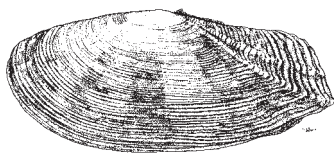


***Gari jousseaumeana* Bertin, 1880**

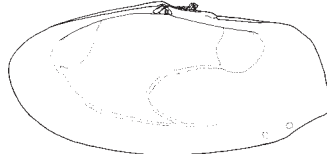
Frequent synonyms / misidentifications: None / *Gari fervensis* (Gmelin, 1791).

En – Jousseaume's sunset clam; **Fr** – Psammobie de Jousseaume; **Sp** – Gario de Jousseaume.

Maximum shell length 6.5 cm, commonly to 4 cm. In various clean sand bottoms, often with shell or calcareous algae. Sublittoral zone, from about 10 to 60 m depths (mostly at 35 to 45 m). A rather uncommon species, long misidentified as *Gari fervensis*. Occasionally collected in bottom trawls and dredges. Discontinuous distribution in the East Atlantic; north from Mauritania to Guinea, and south in Angola.



exterior of left valve



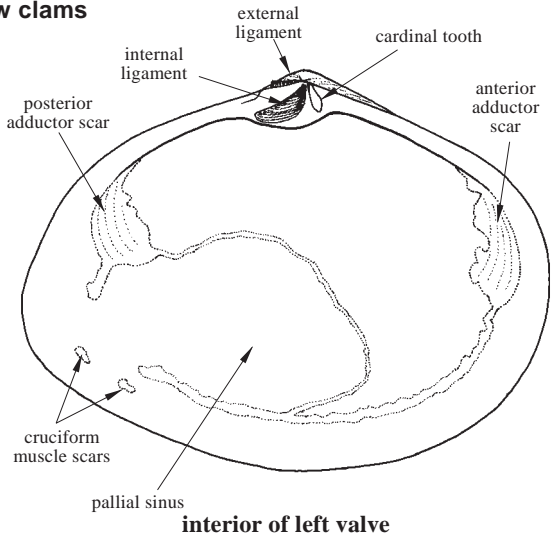
interior of right valve



SCROBICULARIIDAE

Furrow clams

D **Diagnostic characters:** Shell almost inequivalve, rounded to trigonal ovate in shape, rather thin and laterally compressed, slightly gaping anteriorly and posteriorly. Umbones small, orthogyrate. Outer sculpture reduced, mainly composed of concentric growth marks. Periostracum poorly developed, somewhat fibrous. External ligament small, inserted behind the umbones on slightly protruding nymphs. **Internal ligament** well developed, lodged in a pit of the hinge plate in either valve. **Hinge** without lateral teeth, with **2 cardinal teeth in right valve and one cardinal tooth in left valve**. Interior of shell porcelaneous. **Two adductor muscle scars**, the anterior small or less elongated, the posterior somewhat rounded or quadrate. **Pallial sinus wide and deep**, more or less constricted posteriorly, partly confluent ventrally with the pallial line. **Cruciform muscles leaving small paired round scars near** the posteroventral end of **pallial line**. Internal margins smooth. Gills of eulamellibranchiate type, with smooth branchial sheets. Foot strong, laterally compressed, without a byssus. Long, narrow, separate and mobile naked siphons, often of unequal size. Cruciform muscles present. Mantle margins widely open anteroventrally.

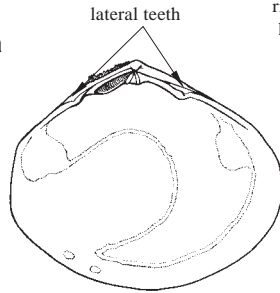


Habitat, biology, and fisheries: Burrowing, deposit feeding animals, collecting organic matter on the surface of the sediment by means of their long and highly extensible siphons. Mainly living gregariously in fine soft bottoms of coastal areas, often near estuaries and in littoral, submarine lagoons with varying salinity. In some areas, they are sought by coastal population for local consumption.

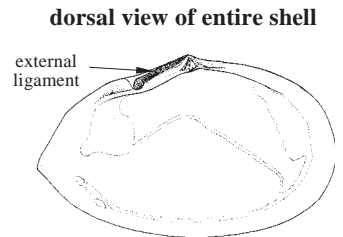
Similar families occurring in the area

Semelidae: shell often slightly inequivalve, with a rightwards flexure posteriorly. Hinge with lateral teeth in either valve.

Tellinidae: shell often slightly inequivalve, with a rightwards flexure on posterior end. Ligament only external. Lateral hinge teeth often present.



interior of left valve
Semelidae



interior of left valve
Tellinidae

References

Lamy, E. 1914. Révision des Scrobiculariidae vivants du Muséum d'Histoire Naturelle de Paris. *Journal de Conchyliologie*, 61(3): 243–368, pl.8.

Poutiers J.-M. 1978. Introduction à l'étude faunistique des Bivalves du littoral français: les espèces marines du golfe d'Aigues-Mortes. *Contributions du Centre d'Études et de Recherches de Paléontologie Biostratigraphique*, 15: 1–563, pl.1–6.

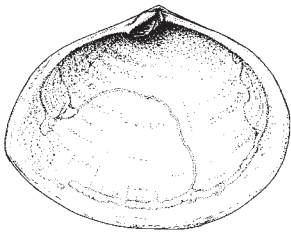
A single species of interest to fisheries occurring in the area.

Scrobicularia plana (da Costa, 1778)

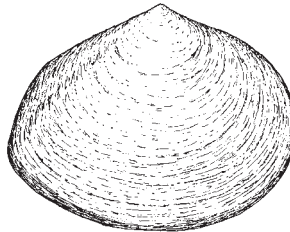
Frequent synonyms / misidentifications: *Scrobicularia piperata* (Poiret, 1789) / None.

En – Peppery furrow; **Fr** – Lavignon poivré; **Sp** – Almeja de perro.

Maximum shell length 6.5 cm, commonly from 4 to 5 cm. In sandy mud, clay or mud of protected bays, estuaries and coastal lagoons where it can form dense populations. Prefers to colonize areas with abundant organic matter, where fresh water flows into the sea producing conditions of varying salinity. Most common in the intertidal zone and shallow subtidal levels, but also occurring down to about 30 m depth. Locally collected where common, for its meat with a peppery taste. Occasionally appearing in local markets, especially in the western Mediterranean. Eastern Atlantic, from Norwegian Sea and the Baltic to Morocco, but not southward to Senegal; Canary Islands. Throughout the Mediterranean.



interior of left valve



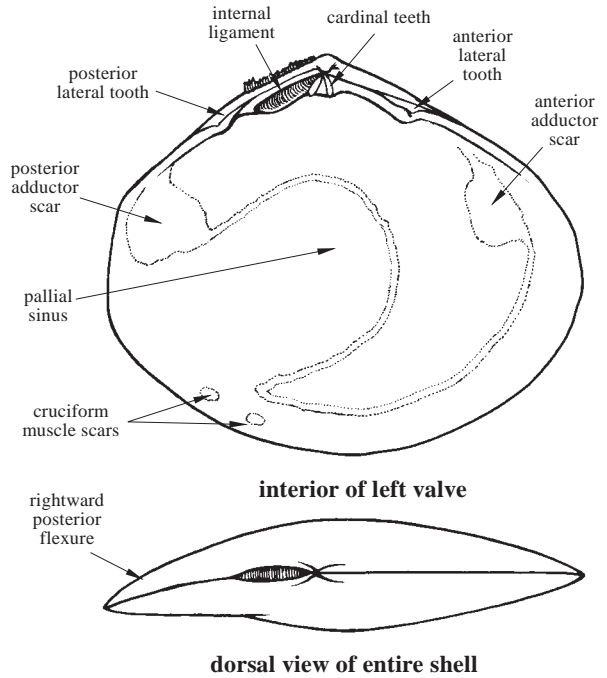
exterior of right valve



SEMELIDAE

Semeles

DDiagnostic characters: Shell rather thin to solid, somewhat laterally compressed, often slightly inequivalve, with a rightwards flexure posteriorly. Umbones low. Sculpture not strong, chiefly concentric, sometimes feeble and reduced to growth marks. External ligament small, inserted behind the umbones on slightly protruding nymphs. **Internal ligament** lodged in a small pit of the hinge plate in either valve. **Hinge with 2 small cardinal teeth** in either valve and well developed **lateral teeth**, at least in right valve. Interior of shell porcelaneous. **Two adductor muscle scars** subequal in size, the anterior often more or less elongated and the posterior somewhat rounded or quadrate. **Pallial line with a deep sinus**. **Cruciform muscles leaving small paired round scars** near the posteroventral end of **pallial line**. Internal margins smooth. Gills of eulamellibranchiate type, with folded branchial sheets. Foot strong, laterally compressed, without a byssus. Long, narrow, separate and mobile naked siphons, often of unequal size. Cruciform muscles present. Mantle margins widely open anteroventrally.

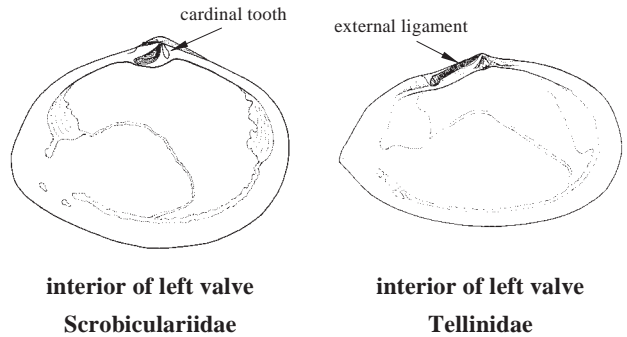


Habitat, biology, and fisheries: Active burrowers of soft substrates, collecting organic matter on the surface of the sediment by means of their long siphons. Sexes generally separate. Development with a free swimming larval stage. In some areas, they are collected by coastal populations for local consumption.

Similar families occurring in the area

Scrobiculariidae: shell almost equivalve, without a rightwards flexure posteriorly. Hinge without lateral teeth.

Tellinidae: ligament only external.



References

Lamy, E. 1914. Révision des Scrobiculariidae vivants du Muséum d'Histoire Naturelle de Paris. *Journal de Conchyliologie*, 61(3): 243–368, pl.8.

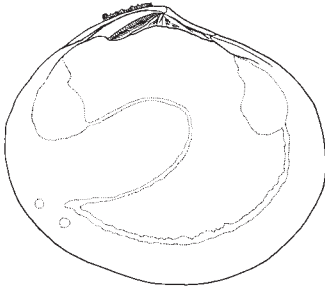
A single species of interest to fisheries occurring in the area.

Semele lamyi Nicklès, 1955

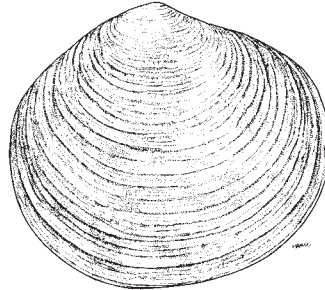
Frequent synonyms / misidentifications: *Semele obliqua* Lamy, 1914 / *Semele purpurascens* (Gmelin, 1791).

En – Lamy's semele; **Fr** – Sémélé de Lamy; **Sp** – Almeja de Lamy.

Maximum shell length 3.5 cm, commonly to 2.5 cm. In sandy bottoms, often with shells and stones, from low tide levels to about 30 m depth. Locally collected for subsistence where common. Eastern Atlantic, from Mauritania to northern Angola.



interior of left valve



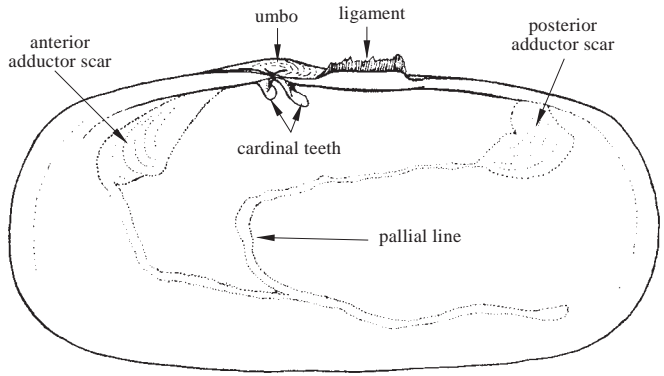
exterior of right valve



SOLECURTIDAE

Short razor clams

D **Diagnostic characters:** Shell **equivalve, elongate-quadrate** in outline, **widely gaping at both ends**, slightly inequilateral. **Umbones** not prominent, **subcentral** to more or less anterior. Outside of shell smoothish or with a low sculpture, mainly concentric or oblique. Periostracum well developed. **Ligament external** and prominent, attached behind umbones **on projection nymphs**. Hinge plate rather weak, usually with **2**, more or less pedunculated, **cardinal teeth in either valve**. Interior of shell porcelaneous. **Two adductor muscle scars**, unequal in shape. **Pallial sinus deep**. Cruciform muscle scars present but often obscure. Internal margins smooth. Gills of eulamellibranchiate type, with folded branchial sheets; outer demibranch somewhat shortened and expanded over the ctenidial axis. Foot tongue-shaped. Siphons naked, long and separate to their base, with 6 lobes or tentacles at the end. Cruciform muscles somewhat anteriorly displaced. Mantle margins generally fused ventrally, with a rather reduced anteroventral opening.



interior of right valve

Habitat, biology, and fisheries: Suspension or deposit feeding animals, actively burrowing in soft bottoms with their powerful foot. Sexes separate. Free swimming larval stage present. Generally collected for subsistence purpose by coastal populations in the studied area.

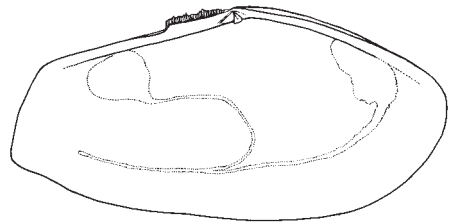
Remarks: Systematics of the Solecurtidae has long been confused. Recent advances have shown they are related to tellinoideans, but the family urgently needs a worldwide revision of genera and species.

Similar families occurring in the area

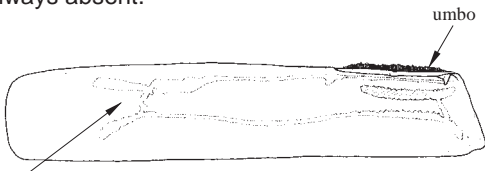
Psammobiidae: shell inequilateral, ovate to subelliptical or trapezoidal in outline, less widely gaping and sometimes slightly flexed posteriorly.

Solenidae: shell narrowly elongate, very inequilateral. Umbones near the anterodorsal end of valves. Pallial sinus relatively shallow. Siphons generally quite short, fused at their base. Cruciform muscles always absent.

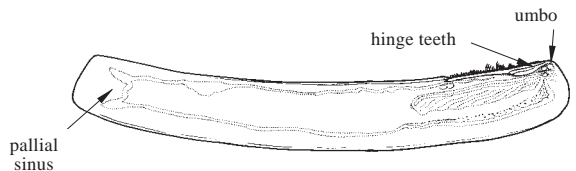
Pharidae: shell narrowly elongate, sometimes very inequilateral with umbones often near the anterodorsal end of valves. Hinge with more than 2 teeth in left valve. Pallial sinus relatively shallow. Cruciform muscles always absent.



**interior of left valve
Psammobiidae**



**interior of left valve
Solenidae**



**interior of left valve
Pharidae**

Key to species of interest to fisheries occurring in the area

- 1a. Outer surfaces of valves with incised oblique grooves in their median and posterior parts → 2
- 1b. Outer surfaces of valves devoid of such oblique sculpture → 3
- 2a. Umbones relatively close to anterior end (at a distance roughly equal to one-third the total shell length) (Fig. 1) *Solecurtus afroccidentalis*
- 2b. Umbones relatively far from anterior end (at a distance roughly equal to two-fifths the total shell length) (Fig. 2) *Solecurtus strigilatus*
- 3a. Umbones anterior to midline of valves; a shallow, radial depression running obliquely from umbones to ventral margin which is slightly depressed in the middle (Fig. 3) . . . *Azorinus chamasolen*
- 3b. Umbones posterior to midline of valves; no shallow, radial depression running obliquely from umbones to ventral margin, which is straight (Fig. 4) *Tagelus adansonii*

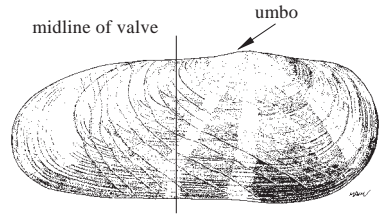


Fig. 1 *Solecurtus afroccidentalis* (exterior)

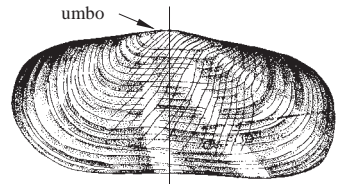


Fig. 2 *Solecurtus strigilatus* (exterior)

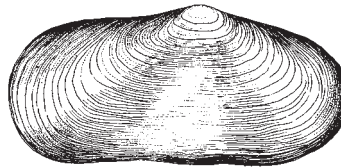


Fig. 3 *Azorinus chamasolen* (exterior)

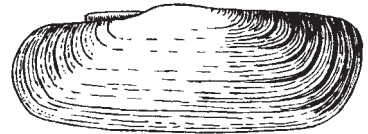


Fig. 4 *Tagelus adansonii* (exterior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Azorinus chamasolen* (da Costa, 1778).
- 🐚 *Solecurtus afroccidentalis* Cosel, 1989.
- 🐚 *Solecurtus strigilatus* (Linnaeus, 1758).
- 🐚 *Tagelus adansonii* (Bosc, 1801).

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Cosel, R. von 1989. Taxonomy of tropical West African bivalves. I. Four new species of eulamellibranchiate bivalves. *Bulletin du Muséum National d'Histoire Naturelle*, (4)11A(2): 315–331.

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Sowerby, G.B.II. 1874. Monograph of the genus *Solecurtus*. In L.A.Reeve, ed. *Conchologia Iconica: or, illustrations of the shells of molluscous animals*. Vol. 19. London, Reeve: pl.1–8.

Yonge, C.M. 1949. On the structure and adaptations of the Tellinacea, deposit-feeding Eulamellibranchia. *Philosophical Transactions of the Royal Society of London*, (B) 234: 29–76.

***Solecurtus afroccidentalis* Cosel, 1989**

Frequent synonyms / misidentifications: None / *Solecurtus strigilatus* (Linnaeus, 1758).

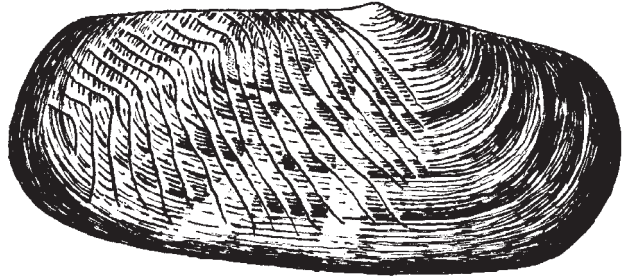
FAO names: En – African short razor; Fr – Solécourte africain; Sp – Mango de cuchillo africano.

Diagnostic characters: Shell solid, inflated, about 2.5 longer than high, roughly elongate-quadrate in outline with rounded anterior and posterior margins, widely gaping at both ends, somewhat inequilateral. Umbones situated at a distance roughly equal to one-third the total shell length. Outer surfaces of valves with numerous, strong concentric growth lines, intersected by incised oblique grooves in their median and posterior parts. Periostracum well developed, more or less strongly worn off. Hinge with 2 curved, hook-shaped cardinal teeth in either valve. Pallial sinus broad and deep, extending anteriorly beyond level of the umbones. **Colour:** outside of shell salmon pink or very pale pinkish, with 2 submedian white radial rays. Inside whitish to pinkish, with 2 ventral dashes corresponding with the outer rays.

Size: Maximum shell length 8 cm, commonly from 5 to 6 cm.

Habitat, biology, and fisheries: In various sand bottoms, with or without a coarse fraction or calcareous algae. Sublittoral zone, from about 1 to 45 m depth. This species is regularly but not abundantly found in certain regions where it is collected for human consumption. Mainly used in soups.

Distribution: The tropical East Atlantic, from Senegal to Côte d'Ivoire, and from Gabon to northern Angola; Cape Verde Islands.



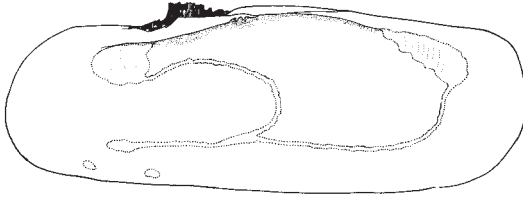
exterior of right valve



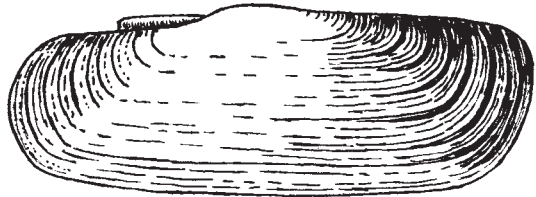
***Tagelus adansonii* (Bosc, 1801)**

Frequent synonyms / misidentifications: *Solecurtus angulatus* G.B.Sowerby II, 1874 / None.

FAO names: En – Adanson's tagelus; Fr – Tagal d'Adanson; Sp – Tagelo de Adanson.



interior of left valve



exterior of right valve

Diagnostic characters: Shell solid and inflated, **variable elongate-subrectangular in outline**, about 3 times longer than high, somewhat inequilateral. **Umboes posterior to the midline, anterior part** of valves **somewhat higher than posterior part**; anterior margin truncate, posterior margin more rounded, ventral margin straight and roughly parallel to dorsal margin. **Outer surface smooth, except for numerous unequal concentric growth marks**. Periostracum thick, often more or less worn away around the umboes, sometimes persisting only on marginal areas. Hinge with 2 small cardinal teeth in either valve, often more or less eroded on larger specimens. **Pallial sinus deep**, extending to or slightly beyond the midline anteriorly. **Colour: outside whitish**, sometimes with pale rusty brown towards the umboes, **under an olive brown periostracum**. Interior porcelaneous white.

Size: Maximum shell length 7 cm, commonly to 5 cm.

Habitat, biology, and fisheries: Common to locally abundant in fine muddy sand bottoms of creeks, estuaries and coastal lagoons. Intertidal and shallow subtidal levels to about 2 m depth. Collected for food in certain regions (since prehistoric times in Mauritania). Consumed mostly in soups.

Distribution: Tropical East Atlantic, from Mauritania to southern Angola; Cape Verde Islands, Ilha do Príncipe and São Tomé Island.

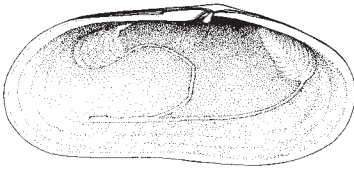


***Azorinus chamasolen* (da Costa, 1778)**

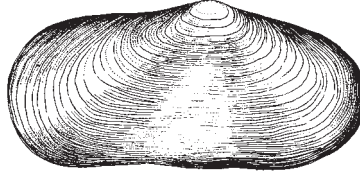
Frequent synonyms / misidentifications: *Solenocurtus antiquatus* (Pulteney, 1799) / None.

En – Antique razor clam; **Fr** – Solécourte rétréci; **Sp** – Navallón estrecho.

Maximum shell length 6.5 cm, commonly from 3 to 4 cm. In mud, sandy mud and muddy gravel bottoms. Subtidal and continental shelf from about 5 to 20 m depth or more. Occasionally taken as a bycatch in bottom trawls or dredges. Eastern Atlantic, from the British Isles to Côte d'Ivoire, and from Gabon to northern Angola; Canary Islands. Throughout the Mediterranean.



interior of left valve



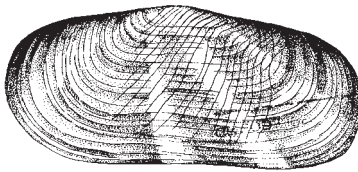
exterior of right valve

***Solecurtus strigilatus* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Solenocurtus strigillatus* (Linnaeus, 1758) / None.

En – Rasp short razor; **Fr** – Solécourte rose; **Sp** – Mango de cuchillo.

Maximum shell length 10 cm, commonly from 5 to 7 cm. In fine sand, muddy sand or gravel bottoms. Infralittoral zone from about 2 to 15 m depths. Live in permanent burrows with 4 distinct sections: an upper V-shaped section beginning at the sediment surface and enclosing the separate siphons; a wider oblique main section for the huge posterior extension of the mantle cavity; a third narrower section containing the shell; and a lowest section where the foot is anchored, enabling escape without burrowing when the animal is disturbed; escape reaction continued by a rapid digging into the sediment, supported by an anteriorly directed jet of water which assists the foot in penetrating the sediment. Collected for food, diving in shallow water or with bottom trawls and dredges. Throughout the Mediterranean and in the nearby East Atlantic; north to Portugal, and south to Morocco and the Canaries. Southern limit of distribution uncertain, but not extending to Senegal.



exterior of left valve



interior of right valve

GLOSSIDAE

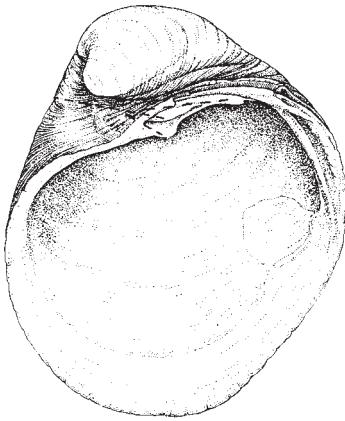
Heart clams

A single species of interest to fisheries occurring in the area.

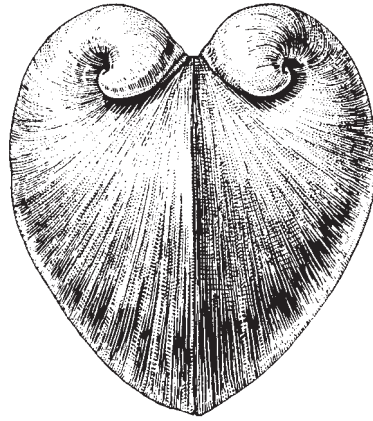
Glossus humanus (Linnaeus, 1758)

Frequent synonyms / misidentifications: *Isocardia cor* (Linnaeus, 1967) / None.

FAO names: **En** – Oxheart cockle; **Fr** – Isocardie globuleuse; **Sp** – Corazón de buey.



interior of right valve



anterior view of entire shell

Diagnostic characters: **Shell** **equivalve**, solid but light in weight, inequilateral, **globular** in shape and **appearing heart-shaped** when viewed **from the anterior side**. **Umbones prosogyrate**, in the anterior half of valves, recurved away from the hinge line and **spirally enrolled**. Lunule concave, wide and poorly defined. Outer sculpture composed of concentric growth marks and very fine radiating lines. Periostracum adherent and fibrous, red-brown to dark-brown in colour in the adult, often greenish-yellow in juvenile stages. Ligament external, a prominent arched band extending from the posterior limit of the lunule half-way to posterior end of valves. **Hinge teeth more or less parallel to dorsal margin**, with 3 cardinal teeth and a posterior lateral tooth in each valve. **Two subequal** in size **adductor muscle scars**. **Pallial line without a sinus**. Internal margins smooth. **Colour:** **outside dirty white to fawn**, often with numerous, small red-brown streaks, and frequently with a greenish tinge toward the umbones. Interior white, sometimes suffused with pink or beige in the bottom.

Size: Maximum shell length 12 cm, commonly from 6 to 8 cm.

Similar species occurring in the area

The characteristic globular and heart-shaped shell, with strongly enrolled umbones, easily distinguishes this species from all other bivalves living in the area.

Habitat, biology, and fisheries: A relatively sedentary, shallow burrower of soft sandy to muddy bottoms. Sublittoral and continental shelf zones, from about 5 to 250 m depth (occurrence in deeper zones erroneous, or referring to dead material only). The deeply plicated gills of this suspension filter feeder are specialized for dealing with large volumes of water, making it capable of living in quiet water containing little suspended organic material. Sometimes common in patches. Mostly abundant offshore, in soft mud. Main spawning period in autumn, when temperatures of the water are higher. Planktonic larval stage present. Occasional bycatch in bottom trawls and dredges, sometimes also found by diving. Shells often used as decorative items. Rarely appearing in local markets.

Distribution: Eastern Atlantic, from Norway and Iceland to Morocco; the Azores and Canary Islands. Throughout the Mediterranean.



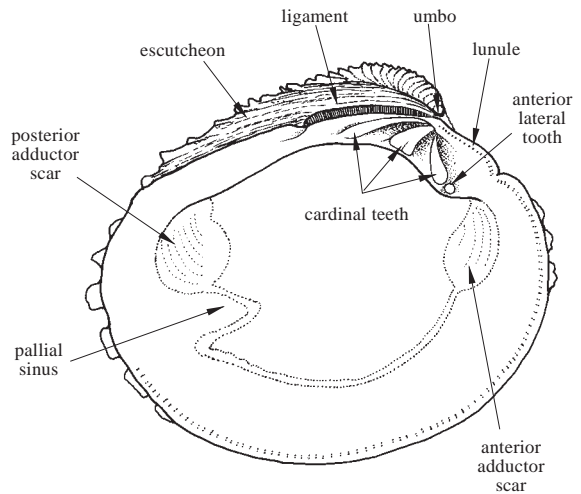
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VENERIDAE

Venus clams

Diagnostic characters: Shell mostly **solid, equivalve** or subequivalve, obliquely rounded, or ovate to subtrigonal in outline and usually not gaping; **inequilateral**, with generally prominent, **prosogyrate umbones**, at or in front of the midline of shell. **Lunule and/or escutcheon usually present.** Sculpture only concentric, or with a radial component. Periostracum usually inconspicuous. **Ligament external**, behind the umbones, often inset in a deep groove. Hinge with **three** usually radially disposed **cardinal teeth in each valve** (1 or more of which may be grooved or bifid), **anterior lateral teeth sometimes present.** Interior of shell porcelaneous. **Two** more or less equal **adductor muscle scars**, the posterior sometimes slightly larger. **Pallial sinus usually present.** Internal margins smooth to denticulate. Gills of eulamellibranchiate type, with folded branchial sheets; outer demibranch smaller than the inner, expanded and almost flat above the axis. Foot large and rather short, hatched-shaped, rarely byssate in the adult. Mantle broadly open ventrally. Siphons short to long, naked, fused or separate, with simple tentacles on tips and inside the inhalent opening to strain out large particles.



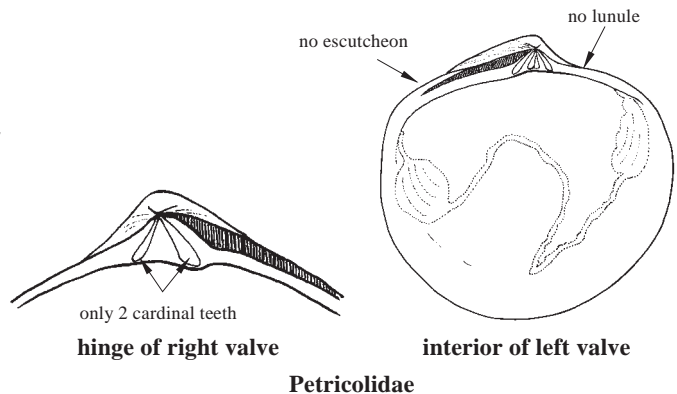
interior of left valve

Habitat, biology, and fisheries: Active burrowers of various soft bottoms, sometimes nestling in rock crevices or among marine growth. Most common in low intertidal to shallow subtidal depths, especially in areas where organic debris is present in high concentration. Suspension feeders, filtering planctonic algae and organic matter from the water. Sexes generally separate. Eggs numerous, giving free-swimming pelagic larvae. In the area, many species of Veneridae are actively collected for food, and sometimes occur in large enough quantities to be fished commercially.

Remarks: West African Veneridae remain often imperfectly known and their systematics is still in a state of flux. Consequently, taxonomy of a number of species must be considered as provisional; pending to a revision of the group, genera *Venerupis* and *Venus* are here used only in a very broad sense, and thus includes some less typical species.

Similar families occurring in the area

Petricolidae: no lunule nor escutcheon. Hinge with cardinal teeth only (sometimes reduced): 3 in the left valve, 2 in the right; lateral teeth always absent. Pallial sinus deep.



Petricolidae

Key to species of interest to fisheries occurring in the area

- 1a. Left valve with an anterior lateral tooth or denticle (Fig. 1). → 2
- 1b. Left valve without an anterior lateral tooth or denticle → 20

- 2a. Internal margins crenulated (Fig. 1) → 3
- 2b. Internal margins smooth. → 11

- 3a. Concentric ridges prominent and rather close-set, forming warty tubercles toward anterior and posterior margins of valves; radial sculpture of low but distinct riblets (Fig. 2) ***Venus verrucosa***
- 3b. Concentric ridges, if prominent, not forming warty tubercles. Radial sculpture absent or inconspicuous (scarcely visible under magnification) → 4

- 4a. Concentric ridges thick and rounded, flattened throughout, forming slightly more prominent, irregular and more or less interrupted tubercular threads anteriorly and posteriorly (Fig.3) ***Venus (s.l.) crebrisulca***
- 4b. Concentric ridges not rounded and flattened throughout, nor forming irregular tubercular threads anteriorly and posteriorly. → 5

- 5a. Concentric ridges widely spaced → 6
- 5b. Concentric ridges more or less closely spaced → 7

- 6a. Shell relatively large (up to 8.5 cm long); concentric ridges lamellate, not strongly recurved dorsalward nor broadly interrupted near their posterior end but forming a double radial row of high undulate expansions; posterodorsal slope of valves distinct, with an obtuse fold radiating from umbones to posteroventral end of valves (Fig.4) ***Circomphalus foliaceolamellosus***
- 6b. Shell relatively small (up to 4 cm long); concentric ridges strongly recurved dorsalward, becoming higher, lamellate, not recurved and with a broad radial interruption near their posterior end; posterodorsal slope of valves indistinct (Fig.5). ***Venus (s.l.) subrosalina***



Fig. 1 hinge of left valve

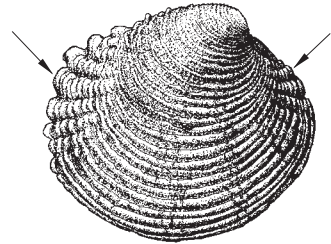


Fig. 2 *Venus verrucosa* (exterior)

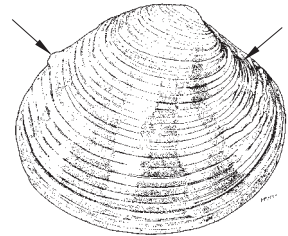


Fig. 3 *Venus (s.l.) crebrisulca* (exterior)

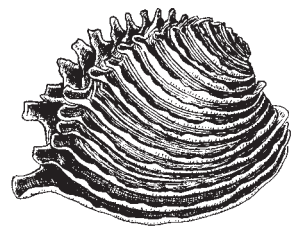


Fig. 4 *Circomphalus foliaceolamellosus* (exterior)

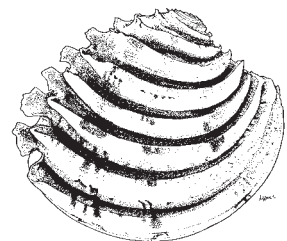


Fig. 5 *Venus (s.l.) subrosalina* (exterior)

- 7a. Elements of concentric sculpture alternatively larger and smaller → 8
- 7b. Elements of concentric sculpture all about the same strength → 9

8a. Concentric sculpture of irregularly sized and spaced lamellae, some higher (at least posteriorly), the intervening ones somewhat smaller and more closely spaced; lamellae often strongly bent dorsalward in anterior half of valves, appearing lower and more or less flattened (Fig.6) . ***Venus (s.l.) casina***

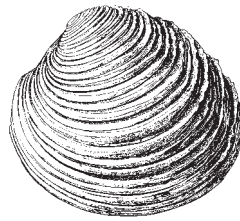


Fig. 6 *Venus (s.l.) casina* (exterior)

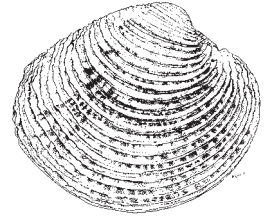


Fig. 7 *Venus declivis* (exterior)

8b. Concentric sculpture of regularly sized and spaced lamellae, with a thin and low concentric cord in each interstice (at least in the young stages); lamellae neither bent nor flattened in anterior half of valves (Fig.7) ***Venus declivis***

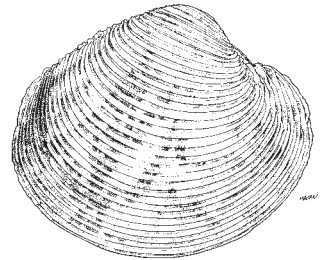


Fig. 8 *Venus lyra* (exterior)

9a. Shell surface somewhat glossy, with dense brown zigzag markings and brown lunule; concentric lamellae moderately high and thick, rounded on top (Fig.8) ***Venus lyra***

9b. Shell surface not glossy, whitish throughout; concentric lamellae high and thin, sharp on top → 10

10a. Concentric lamellae closely set throughout the outer surface (Fig.9) ***Venus nux***



Fig. 9 *Venus nux* (exterior)

10b. Concentric lamellae more widely spaced toward the umbones (Fig. 10) ***Venus chevreuxi***

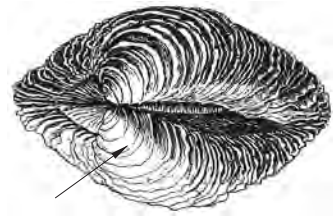
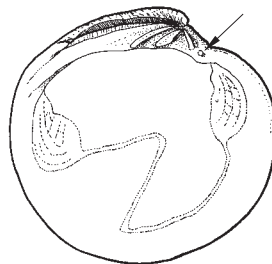


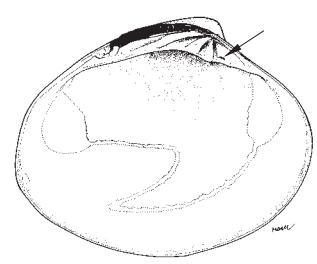
Fig. 10 *Venus chevreuxi* (exterior)

11a. Outline of shell subcircular; anterior lateral tooth of left valve low and tubercle-shaped (Fig. 11a) → 12

11b. Outline of shell rounded to elongate ovate or trigonal; anterior lateral tooth of left valve prominent and elongate (Fig. 11b) → 14



a) *Dosinia*



b) *Pitar*

Fig. 11 interior of left valve

12a. Shape of posterodorsal margin of valves obliquely truncate; escutcheon bordered by a distinct rounded ridge; outer surface glossy, with numerous, fine concentric threads → 13

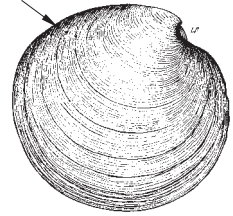


Fig. 12 *Dosinia exoleta* (exterior)

12b. Shape of posterodorsal margin of valves not obliquely truncate; escutcheon inconspicuous; outer surface not glossy, with numerous, relatively strong concentric ridges (Fig. 12) *Dosinia exoleta*

13a. Shell relatively thin, light and laterally compressed; colour uniform white to very pale yellowish; hinge plate rather narrow (Fig. 13) *Dosinia lupinus*

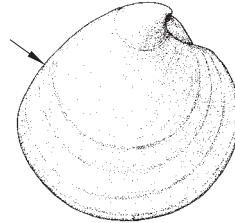


Fig. 13 *Dosinia lupinus* (exterior)

13b. Shell relatively thick, heavy and inflated; colour whitish frequently tinged with yellow, light greyish or purple brown exteriorly and interiorly; hinge plate rather wide (Fig. 14) *Dosinia orbigny*

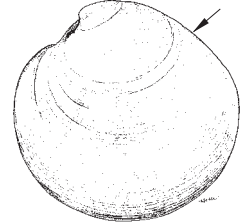
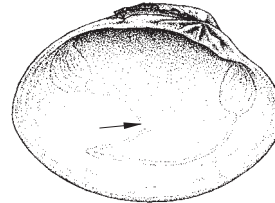
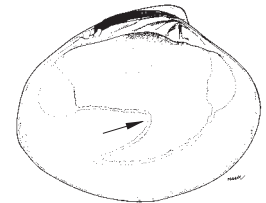


Fig. 14 *Dosinia orbigny* (exterior)

14a. Shell rounded to elongate ovate, with anterior umbones. 3 cardinal teeth in each valve → 15



a) *Callista*



b) *Pitar*

Fig. 15 interior of left valve

14b. Shell trigonal, with submedian umbones. 4 cardinal teeth in each valve. → 19

15a. Pallial sinus distinctly pointed at anterior end (Fig. 15a) → 16

15b. Pallial sinus more or less rounded at anterior end (Fig. 15b). → 17

16a. Shell relatively large (often widely exceeding 5 cm long), elliptical ovate in outline; outer surface nearly smooth throughout (Fig. 16) *Callista chione*

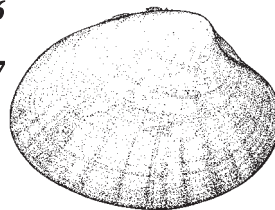


Fig. 16 *Callista chione* (exterior)

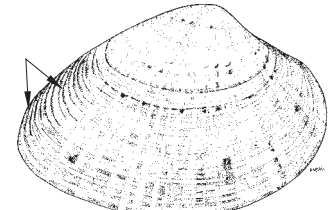


Fig. 17 *Lepidocardia floridella* (exterior)

16b. Shell relatively small (hardly exceeding 3 cm long), trigonal ovate in outline; outer surface with narrow and regular concentric grooves posteriorly (Fig. 17) *Lepidocardia floridella*

17a. Surface of valves with close set, somewhat irregular concentric ridges, in addition to growth marks (Fig. 18) . . . *Pitar virgo*



Fig. 18 *Pitar virgo* (exterior)

17b. Surface of valves only with irregular, sometimes prominent concentric growth marks. → 18

18a. Shell triangular ovate in outline, obtusely pointed posteriorly; ventral margin more strongly convex in the middle, becoming less curved to nearly straight posteriorly; lunule well marked, decidedly depressed at periphery (Fig. 19) ***Pitar elatus***

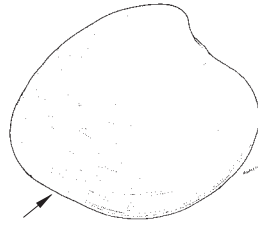


Fig. 19 *Pitar elatus* (exterior)

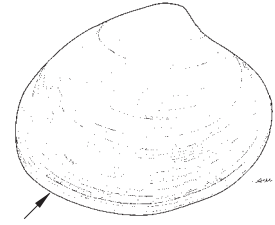


Fig. 20 *Pitar tumens* (exterior)

18b. Shell rounded ovate in outline, not pointed posteriorly; ventral margin evenly curved throughout; lunule poorly distinct, level with the surrounding surface (Fig. 20) ***Pitar tumens***

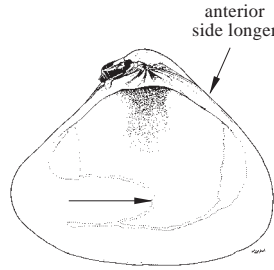


Fig. 21 *Tivela tripla* (interior)

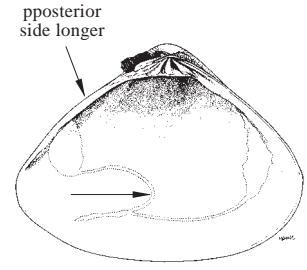


Fig. 22 *Tivela bicolor* (interior)

19a. Shell rather thick and heavy, with anterior side slightly longer than posterior side; pallial sinus relatively large (Fig. 21) ***Tivela tripla***

19b. Shell rather thin and light, with anterior side slightly shorter than or almost equal to posterior side; pallial sinus relatively small (Fig. 22) ***Tivela bicolor***

20a. Inner margins crenulated (Fig. 23) . . . ***Chamelea striatula***

20b. Inner margins smooth → 21

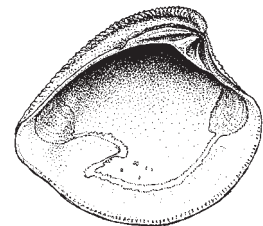


Fig. 23 *Chamelea striatula* (interior)

21a. Outer sculpture only concentric → 22

21b. Outer sculpture concentric and radial → 23

22a. Umbones slightly in front of midline of valves; surface of valves with rounded, close-set and regular concentric ridges throughout; pallial sinus relatively deep, extending beyond midline (Fig. 24) ***Venerupis (s.l.) dura***

22b. Umbones markedly in front of midline of valves; surface of valves with flattened, somewhat irregular concentric ridges, often less well marked in the middle and more or less confluent anteriorly and posteriorly; pallial sinus relatively shallow, not attaining midline (Fig. 25) ***Venerupis (s.l.) rhomboides***

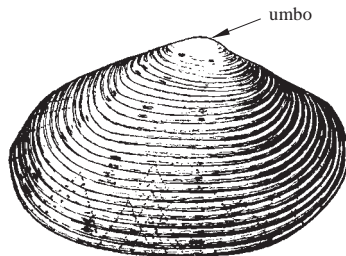


Fig. 24 *Venerupis (s.l.) dura* (exterior)

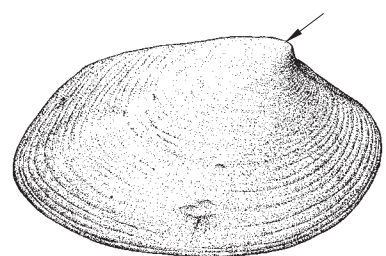
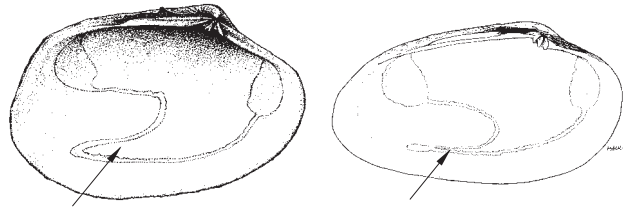


Fig. 25 *Venerupis (s.l.) rhomboides* (exterior)

23a. Ventral lobe of pallial sinus and pallial line not confluent before their posterior end, separated by a rather wide wedge-shaped space (Fig. 26a) . . . → 24

23b. Ventral lobe of pallial sinus and pallial line confluent for a short distance before their posterior end, separated by a rather narrow wedge-shaped space (Fig. 26b) . . . *Venerupis corrugata*



a) *Ruditapes decussatus* b) *Venerupis corrugata*

Fig. 26 interior of left valve

24a. Outer sculpture mainly concentric; radial elements only composed of very fine lines that are never strong enough to give a decussate pattern (Fig. 27) *Venerupis (s.l.) aurea*

24b. Outer sculpture concentric and radial, strongly impressed toward anterior and posterior sides of the valves, giving a characteristic decussate pattern (Fig. 28) . . . *Ruditapes decussatus*

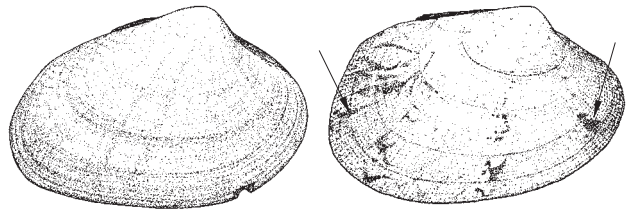


Fig. 27 *Venerupis (s.l.) aurea* (exterior) Fig. 28 *Ruditapes decussatus* (exterior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Callista chione* (Linnaeus, 1758).
- 🐚 *Chamelea striatula* (da Costa, 1778).
- 🐚 *Circomphalus foliaceolamellosus* (Dillwyn, 1817).
- 🐚 *Dosinia exoleta* (Linnaeus, 1758).
- 🐚 *Dosinia lupinus* (Linnaeus, 1758).
- 🐚 *Dosinia orbigny* Dunker, 1845.
- 🐚 *Lepidocardia floridella* (Gray, 1838).
- 🐚 *Pitar elatus* (G.B. Sowerby III, 1908).
- 🐚 *Pitar tumens* (Gmelin, 1791).
- 🐚 *Pitar virgo* (Gray, 1838).
- 🐚 *Ruditapes decussatus* (Linnaeus, 1758)
- 🐚 *Tivela bicolor* Gray, 1838.^{1/}
- 🐚 *Tivela tripla* (Linnaeus, 1771).

^{1/} *Tivela bicolor* is considered by the World Register of Marine Species to be a synonym of *T. tripla* but it is recognized by many as differing in form enough to be considered separately in this guide.

- 🐚 *Venerupis (s.l.) aurea* (Gmelin, 1791).
- 🐚 *Venerupis corrugata* (Gmelin, 1791).
- 🐚 *Venerupis (s.l.) dura* (Gmelin, 1791).
- 🐚 *Venerupis (s.l.) rhomboides* (Pennant, 1777).
- 🐚 *Venus (s.l.) casina* Linnaeus, 1758.
- 🐚 *Venus chevreuxi* Dautzenberg, 1891.
- 🐚 *Venus (s.l.) crebrisulca* Lamarck, 1818.
- 🐚 *Venus declivis* G.B. Sowerby II, 1853.
- 🐚 *Venus lyra* Hanley, 1845.
- 🐚 *Venus nux* Gmelin, 1791.
- 🐚 *Venus (s.l.) subrosalina* Tomlin, 1923.
- 🐚 *Venus verrucosa* Linnaeus, 1758.

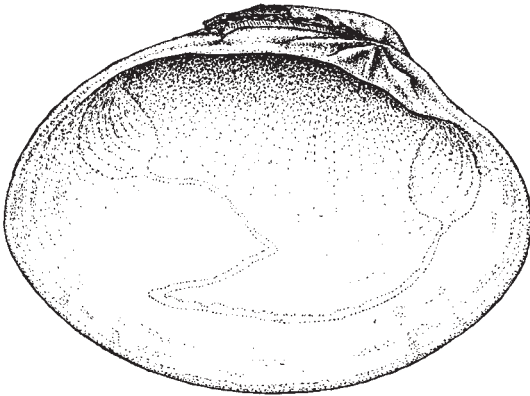
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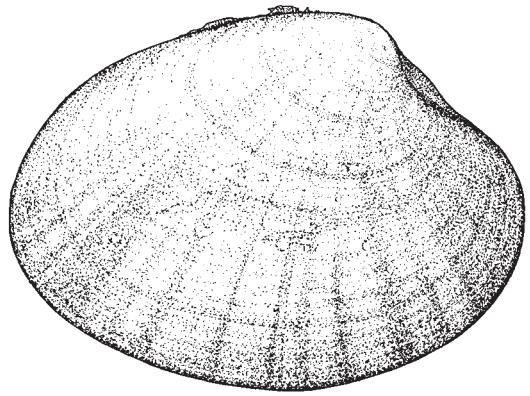
Callista chione (Linnaeus, 1758)

Frequent synonyms / misidentifications: *Cytherea chione* (Linnaeus, 1758); *Meretrix chione* (Linnaeus, 1758) / None.

FAO names: En – Smooth callista; Fr – Vernis fauve; Sp – Almejón.



interior of left valve



exterior of right valve



hinge of right valve

Diagnostic characters: Shell relatively large (up to 11 cm long), solid and elongate, **elliptical ovate in outline** with anterior umbones. Lunule elongate, with a shallow but well defined limit, **escutcheon indistinct**. **Outer surface glossy, nearly smooth throughout**, periostracum strongly adhering to shell, translucent and varnish like. **Hinge with 3 irregularly diverging cardinal teeth in each valve and well developed anterior lateral teeth**; 1 prominent and elongate lateral tooth in left valve, and 2 teeth with a deep socket between them in right valve. **Pallial sinus deep, not ascending anteriorward, pointed at anterior end**. **Internal margins smooth**. **Colour:** outside of shell **glossy tawny brown** to pinkish brown, often forming concentric and radial bands of variable intensity; in umbonal area, radial bands tending to form quadrangular brown spots at intersection with concentric bands. Interior whitish.

Size: Maximum shell length 11 cm, commonly from 6 to 8 cm.

Habitat, biology, and fisheries: In surface layers of rather clean sands, at low tide levels, in sublittoral zone and continental shelf to about 200 m depth. Actively collected for food, especially in the southern part of its range, by hand or with rakes on the shore, with dredges, bottom trawls or nets offshore. Outside the studied area, aquaculture trials are being conducted in Italy, to counteract depletion of natural beds. Frequently marketed in Morocco, and in north-western European countries in the Mediterranean.

Distribution: East Atlantic, from southern British Isles to Morocco; Canary Islands and the Azores. Throughout the Mediterranean.



***Circumphalus foliaceolamellosus* (Dillwyn, 1817)**

Frequent synonyms / misidentifications: *Venus foliaceo lamellosa* Schröter, 1788 [Invalid name]; *V. foliaceolamellosa* Dillwyn, 1817; *V. plicata* Gmelin, 1791 [not Barbut, 1788] / None.

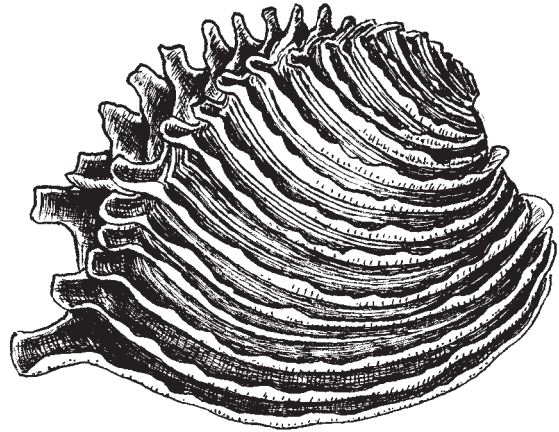
FAO names: **En** – Plicate venus; **Fr** – Praire ondulée; **Sp** – Venus plegada.

Diagnostic characters: Shell relatively large (up to 8.5 cm long), **ovate subtriangular**, rather thick, solid and **laterally compressed, with decidedly anterior umbones**; anterodorsal margin very short and markedly sloping, posterior end of shell shortly truncate. Lunule large and well defined; **escutcheon smoothish and depressed, well developed in both valves**, contrasting with the highly sculptured nearby area. **Outer surface with an obtuse fold radiating from umbones to posteroventral end of valves and determining a distinct posterodorsal slope.** Sculpture composed of **widely spaced, thin and fragile lamellate concentric ridges**, not strongly recurved dorsalward but **forming a double radial row of high undulate expansions on posterodorsal slope.** Hinge very broad, with 3 diverging cardinal teeth at each valve and **a slight anterior knob-like lateral tooth in left valve.** Pallial sinus rather short, trigonal. **Internal margins finely crenulate.** **Colour:** **outside of shell whitish or beige, often with light fawn or pink areas and sometimes more deeply coloured posteriorly.** Interior entirely white.

Size: Maximum shell length 8.5 cm, commonly from 5 to 6 cm.

Habitat, biology, and fisheries: In sandy bottoms, often with calcareous algae and shell rubble. Sublittoral zone, from about 10 to 30 m depths. A rather common edible species, caught in bottom trawls and nets. Consumed mostly in soups. The attractive shell may be used for decorative purposes.

Distribution: Tropical East Atlantic, from Rio de Oro, Western Sahara to northern Angola and in Cape Verde Islands.



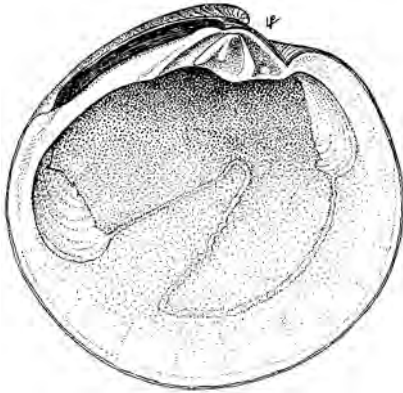
exterior of right valve



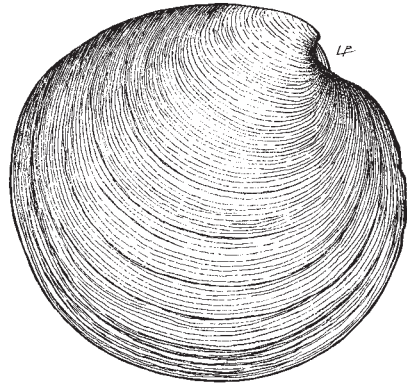
***Dosinia exoleta* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Arthemis exoleta* (Linnaeus, 1758) / None.

FAO names: En – Mature dosinia; Fr – Montre radiée; Sp – Reloj.

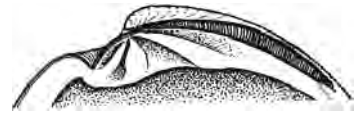


interior of left valve



exterior of right valve

Diagnostic characters: Shell solid, with a flattened, discoid shape, subcircular in outline, with a relatively high and widely curved posterodorsal margin. Lunule short and rather sunken, escutcheon inconspicuous. Outer surface not glossy, with numerous, relatively strong concentric grooves and ridges. Ligament deeply inset, elongated. Hinge with 3 diverging cardinal teeth in each valve, and with a tubercle-shaped anterior lateral tooth in left valve. Pallial sinus triangular, very deep and rather narrow, ascending forward. Internal margins smooth. **Colour:** outside of shell dirty white to light fawn, often with variable patterns blotches, rays or zigzag of brown or pink. Interior whitish, sometimes more or less flushed with pinkish brown.



hinge of right valve

Size: Maximum shell length 6 cm, commonly from 3 to 4 cm.

Habitat, biology, and fisheries: In coarse, muddy, gravely or shelly sands. Low tide and sublittoral to about 80 m depth; in West Africa, mainly from 3 to 20 m. Artisanal exploitation where common, notably in Senegal.

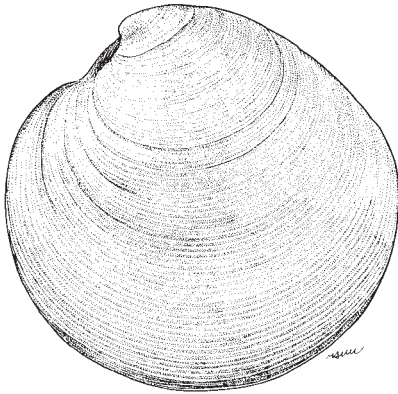
Distribution: Eastern Atlantic, from Norway to Gabon; Cape Verde Islands. Throughout the Mediterranean.



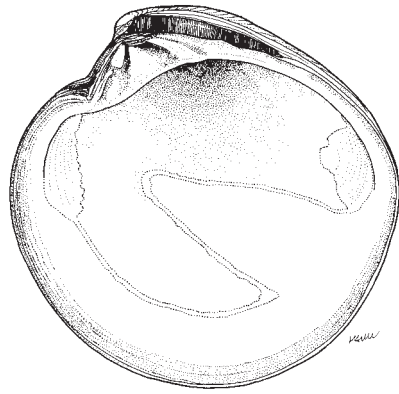
***Dosinia orbigny* Dunker, 1845**

Frequent synonyms / misidentifications: *Dosinia lupinus orbigny* (Dunker, 1845) / *Dosinia lupinus* (Linnaeus, 1758).

FAO names: En – Orbigny's dosinia; Fr – Montre de d'Orbigny; Sp – Reloj de Orbigny.



exterior of left valve



interior of right valve

Diagnostic characters: Shell solid, rather thick and heavy, inflated, subcircular in outline, with a relatively low and obliquely truncate posterodorsal margin. Lunule short and rather sunken, escutcheon narrow, bordered by a distinct rounded ridge. Outer surface glossy, with numerous, fine and regular concentric grooves and threads. Ligament deeply inset, moderately elongated. Hinge with 3 diverging cardinal teeth in each valve, and with a tubercle-shaped anterior lateral tooth in left valve. Pallial sinus trigonal, very deep, ascending forward. Internal margins smooth. **Colour:** outside of shell whitish to cream or light grey, often tinged with yellowish brown or light purple on umbones. Interior white, frequently more or less tinged yellow or brownish purple.

Size: Maximum shell length 5 cm, commonly from 2.5 to 3 cm.

Habitat, biology, and fisheries: Burrowing in clean sandy bottoms of open coasts. Intertidal and sublittoral zones to continental shelf, down to about 160 m depth. A common species (uncommon north of the equator), becoming abundant in Congo, Angola and southward to South Africa, frequently cast ashore on beaches after storms. Collected for food, at low tide by hand or with rakes, or trawled and dredged subtidally.

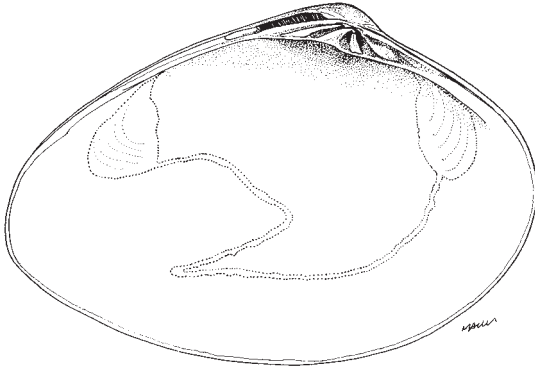
Distribution: Eastern Atlantic and southwestern Indian Ocean, from Senegal to Cape Point, South Africa; east to Eastern Cape (South Africa).



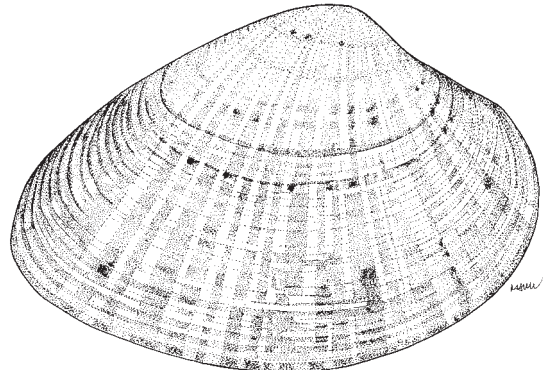
***Lepidocardia floridella* (Gray, 1838)**

Frequent synonyms / misidentifications: *Callista africana* (Philippi, 1863); *C. floridella* (Gray 1838); *Pitaria (Lepidocardia) floridella* (Gray, 1838) / None.

FAO names: **En** – African callista; **Fr** – Vernis fleurette; **Sp** – Almejón florecilla.



interior of left valve



exterior of right valve

Diagnostic characters: Shell relatively small (hardly exceeding 3 cm long), trigonal to rhomboidal ovate in outline with decidedly anterior umbones and attenuate posterior end. Lunule elongate, with a shallow but distinct limit, **escutcheon indistinct**. **Outer surface glossy and nearly smooth, with narrow and regular concentric grooves posteriorly**; periostracum thin and transparent, nearly colourless. **Hinge with 3 irregularly diverging cardinal teeth in each valve and well developed anterior lateral teeth**; 1 prominent and elongate lateral tooth in left valve, and 2 teeth with a deep socket between them in right valve. **Pallial sinus deep, not ascending anteriorward, pointed at anterior end**. **Internal margins smooth**. **Colour:** outside of shell with very variable irregular or geometric patterns of brown or purple brown to grey on a cream to light brown ground. **Interior orange to vermilion**, paler coloured to whitish toward margins and sometimes tinged purple in posterodorsal area.

Size: Maximum shell length 3.2 cm, commonly from 2.0 to 2.5 cm.

Habitat, biology, and fisheries: In various fine sandy bottoms, (from clean to muddy sand, or heterogeneous sand mixed with gravels or shell debris), on the open coast as well as in protected bays, or in littoral lagoons and estuaries with variable salinities. Common to abundant in shallow waters, from about 2 to 25 m depth. This very common species is locally collected for food by coastal inhabitants, but it seems too small for being commercially exploited at a larger scale.

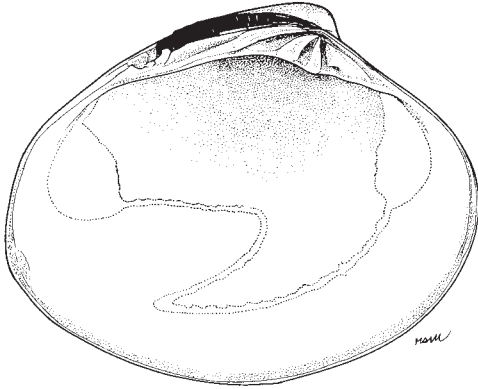
Distribution: Eastern Atlantic, from Mauritania to northern Angola.



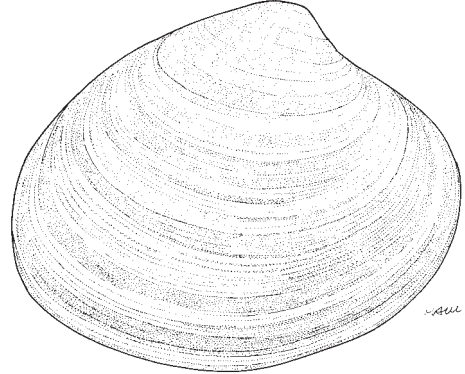
***Pitar tumens* (Gmelin, 1791)**

Frequent synonyms / misidentifications: *Pitaria tumens* (Gmelin, 1791) / This species has been frequently confused with similar *Pitar* species, notably *Pitar elatus* (G.B. Sowerby III, 1908) and *Pitar virgo* (Gray, 1838).

FAO names: **En** – Swollen venus; **Fr** – Vénus bombée; **Sp** – Almeja bombacha.



interior of left valve



exterior of right valve

Diagnostic characters: Shell medium-sized (up to 6 cm long), relatively thick, solid and rather compressed to moderately inflated, **quite variable in outline but usually broadly suboval** with anterior umbones. **Lunule poorly distinct, level with the surrounding surface** and with a faint peripheral groove; **escutcheon indistinct**. Outer **surface of valves** rather smoothish, only **with numerous and irregular, coarse to fine growth marks**. **Hinge with 3** irregularly diverging cardinal teeth in each valve and **well developed anterior lateral teeth**, 1 prominent and elongate lateral tooth in left valve, and 2 teeth with a deep median socket between them in right valve. **Pallial sinus deep**, poorly ascending anteriorward, a little narrowed and **rounded to bluntly pointed at anterior end**. **Internal margins smooth**. **Colour: outside of shell creamy white to yellowish or ochre**. Interior white to light orange throughout, sometimes more densely coloured between pallial line and ventral margin.

Size: Maximum shell length 6 cm, commonly to 4 cm.

Habitat, biology, and fisheries: In clean sandy bottoms, mostly in more or less protected areas. Intertidal and shallow sublittoral zones to about 10 m depth. This common to abundant species has been exploited for a long time in many areas for human consumption. Eaten raw, in soup or in seafood dishes with rice. In some areas, concentrations of empty shells are abundant enough to be used for road pavement or chalk burning.

Distribution: Restricted in the East Atlantic to northern part of West African coasts, from Morocco to Senegal. Not occurring southwards.



Pitar virgo (Gray, 1838)

Frequent synonyms / misidentifications: *Pitar erubescens* (Dunker, 1853); *Pitaria römeri* Tomlin and Shackelford, 1913 / *Pitar belcheri* (G.B. Sowerby II, 1851); *P. tumens* (Gmelin, 1791).

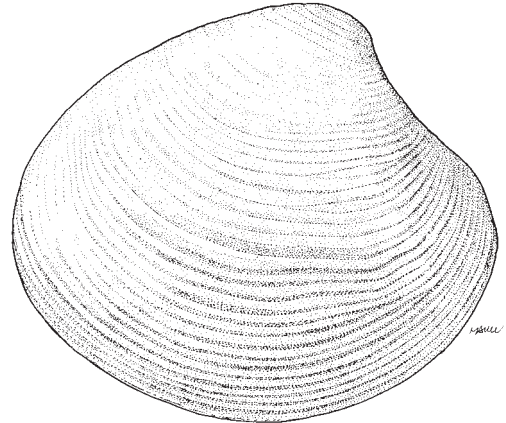
FAO names: **En** – Reddening pitar venus; **Fr** – Pitar rosé; **Sp** – Pitar rósea.

Diagnostic characters: Shell medium-sized (up to 5 cm long), **very variable in shape and thickness**, varying from rounded subtrigonal to elongate subovate in outline, with anterior umbones. **Lunule nearly smooth, marked off** from rough nearby area by a deep peripheral groove; **escutcheon indistinct**. Outer surface with numerous, densely set concentric grooves often more developed on anterior part of valves, **in addition to** many fine irregular growth marks. **Hinge with 3** irregularly diverging cardinal teeth in each valve and **well developed anterior lateral teeth**, 1 prominent and elongate lateral tooth in left valve, and 2 teeth with a deep median socket between them in right valve. **Pallial sinus** rather deep, **somewhat ascending anteriorward, rounded at anterior end**. **Internal margins smooth**. **Colour:** outside of shell **creamy white to yellowish, orange or pink**. Interior creamy white, **often partly tinged with orange or pink** inside the umbonal cavity or posteriorly.

Size: Maximum shell length 5 cm, commonly from 3.5 to 4 cm.

Habitat, biology, and fisheries: In various sandy bottoms, including clean or muddy sands, sand pockets in rocky areas, with or without a coarse fraction of stones, gravel or shell rubble. In open sea areas as well as in protected bays and estuaries with greatly varying salinities. Low intertidal and sublittoral zones, to about 25 m depth. A common species sometimes occurring in mixed populations with *Pitar tumens* in the northern part of its range; most common in shallow waters to about 10 m deep. Exploited where abundant for food, and consumed in similar manner to *Pitar tumens*.

Distribution: Tropical East Atlantic, from Mauritania to northern Angola, and in Gulf of Guinea islands (São Tomé and Ilha do Príncipe).



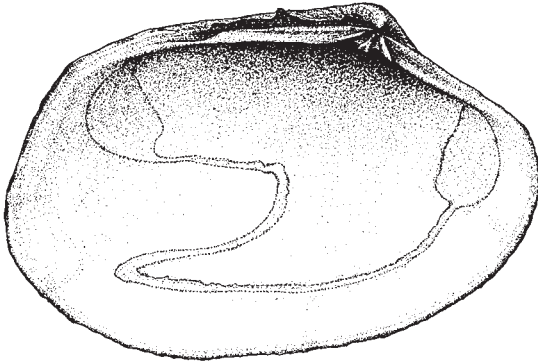
exterior of right valve



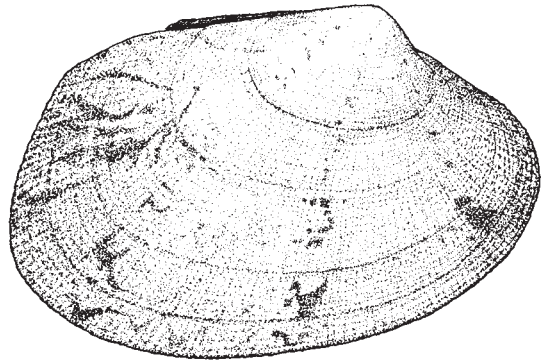
Ruditapes decussatus (Linnaeus, 1758)

Frequent synonyms / misidentifications: *Amygdala decussata* (Linnaeus, 1758); *Tapes decussatus* (Linnaeus, 1758); *Venerupis decussata* (Linnaeus, 1758) / None.

FAO names: **En** – Grooved carpet shell; **Fr** – Palourde croisée d'Europe; **Sp** – Almeja fina.



interior of left valve



exterior of right valve

Diagnostic characters: Shell moderately solid and inflated, **elongate subquadrate** in outline. Umbones low, markedly anterior to midline of valves. Posterior margin obliquely truncate, with rounded dorsal and ventral ends. Lunule shallow, bordered by a fine groove. Escutcheon indistinct. **Outer sculpture** with numerous fine **radial riblets and concentric** grooves, more **strongly impressed toward anterior and posterior sides** of the valves, **giving a characteristic decussate pattern**. Hinge plate narrow, bearing under the umbo 3 close-set, diverging cardinal teeth in each valve, **devoid of lateral teeth**. **Pallial sinus rather deep**, not extending beyond midline of valves, **forming a blunt angle at anterior end**; ventral lobe of **pallial sinus and pallial line not confluent before their posterior end**, separated by a rather wide wedge-shaped space. **Internal margins smooth**. **Colour:** **outside of shell whitish to light brown, plain or with various patterns of deeper brown**. Interior white to yellowish, often purple along ligamental margin.

Size: Maximum shell length 8 cm, commonly from 4 to 5 cm.

Habitat, biology, and fisheries: In sand, muddy sand and gravel, or mud, mostly in more or less protected areas, as well as near estuaries or in coastal lagoons. Common at low tide and shallow subtidal waters to about 10 m depth. Reproduction period from June to September. An edible species of high commercial value, collected by hand, with fork, rake or spade at low tide, diving or with dredge subtidally. It has been collected for food since prehistoric times in Mauritania.

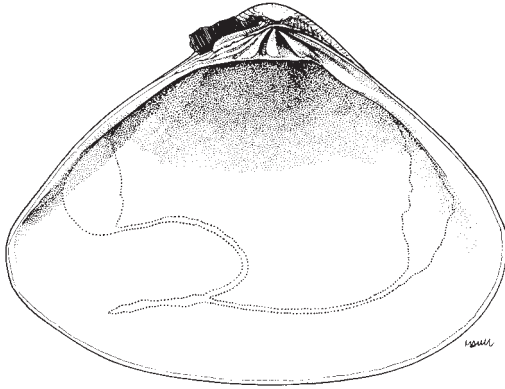
Distribution: Eastern Atlantic, from the British Isles to Mauritania. Throughout the Mediterranean. Probably also occurring through the Suez Canal in the Gulf of Suez (northern Red Sea). Southern limit of distribution in the Atlantic uncertain (reports from Senegal and Congo probably erroneous).



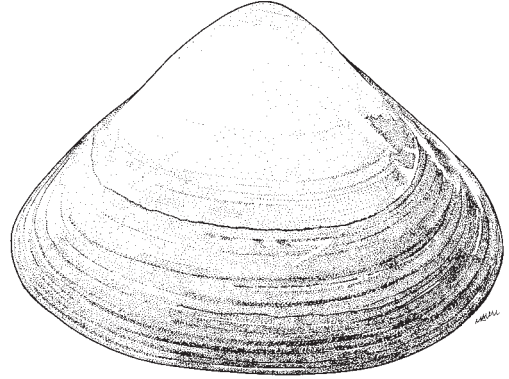
***Tivela bicolor* Gray, 1838**

Frequent synonyms / misidentifications: None / *Tivela tripla* (Linnaeus, 1771).

FAO names: En – Bicoloured venus; Fr – Tivel bicolore; Sp – Tivela bicolore.



interior of left valve



exterior of right valve

Diagnostic characters: Shell rather thin and light, **trigonal** in outline with **subcentral umbones** on top of strongly sloping anterodorsal and posterodorsal margins. **Anterior side** usually **slightly shorter than or almost equal to posterior side**. Lunule large and shallow, marked off by a thin marginal line; **no escutcheon**. **Outer surface smooth** but for concentric growth marks; **periostracum** adherent, **with a thin calcareous covering** of microscopic needles **giving a velvety and mat aspect**. Ligament short and prominent. **Hinge with 4 diverging cardinal teeth in either valve and large anterior lateral teeth**, 1 in left valve and 2 with a deep median socket in right valve. **Pallial sinus relatively short**, usually not reaching midline of valves. **Internal margins smooth**. **Colour:** **outside of shell creamy white**, often tinged with purple-brown on lunular margin near the umbones, **under the mud stained calcareous covering of periostracum**. Interior white, frequently maculated with purple to brown on posterior side.

Size: Maximum shell length 3.5 cm, commonly to 2.5 cm.

Habitat, biology, and fisheries: In clean and rather fine sand bottoms of more or less protected areas, including those of slightly reduced salinity. Low tide levels and shallow sublittoral waters to about 10 m depth. Common and locally abundant in favourable environments. Collected for food in some localities, and potentially interesting for commercial exploitation where abundant.

Distribution: Tropical East Atlantic, from Mauritania to Gabon.

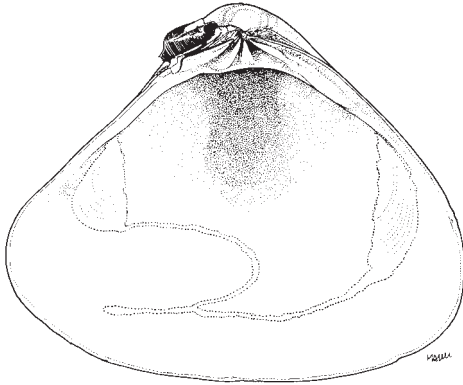
Remarks: *Tivela bicolor* is considered by the World Register of Marine Species to be a synonym of *T. tripla*, but it is recognized by many as differing in form enough to be considered separately in this guide.



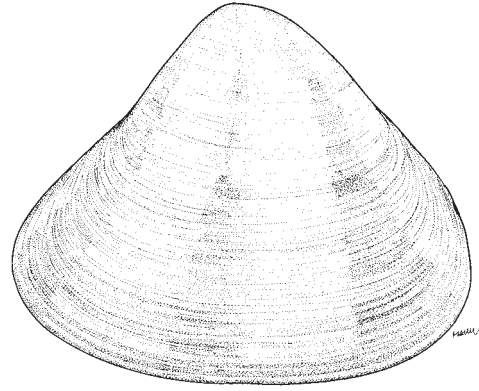
Tivela tripla (Linnaeus, 1771)

Frequent synonyms / misidentifications: None / *Tivela bicolor* Gray, 1838.

FAO names: En – Triple venus; Fr – Vénus triple; Sp – Tivela triple.



interior of left valve



exterior of right valve

Diagnostic characters: Shell rather thick and heavy, **trigonal** in outline with **subcentral umbones** on top of strongly sloping anterodorsal and posterodorsal margins. **Anterior side** usually **slightly longer than posterior side**. Lunule large and shallow, marked off by a thin marginal line; **no escutcheon**. **Outer surface smooth** but for concentric growth marks; **periostracum varnish-like**, adherent. Ligament short and prominent. **Hinge with 4 diverging cardinal teeth in either valve and large anterior lateral teeth**, 1 in left valve and 2 with a deep median socket in right valve. **Pallial sinus relatively large**, often slightly extending beyond midline of valves. **Internal margins smooth**. **Colour:** **outside of shell creamy white and glossy, often with purple-brown rays**. Interior white, usually tinged with purple.

Size: Maximum shell length 4 cm, commonly from 2 to 3 cm.

Habitat, biology, and fisheries: In medium-sized to coarse clean sand of open coasts, mostly in areas under the influence of strong surf. Lower intertidal zone and shallow subtidal depths. Often occurring abundantly and together with *Donax rugosus*. A popular food mainly collected at low tide and sold in local markets. Consumed in soups or in sea food dishes.

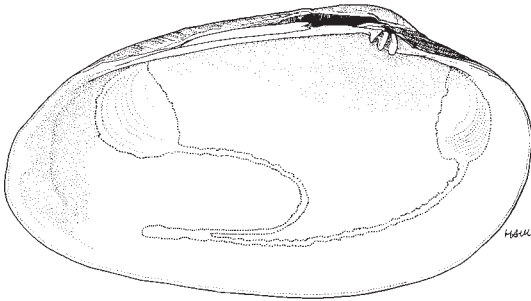
Distribution: Tropical East Atlantic, from Mauritania to southern Angola.



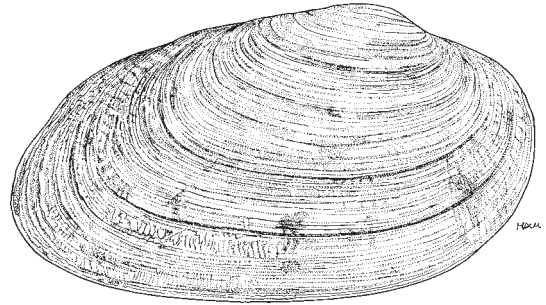
***Venerupis corrugata* (Gmelin, 1791)**

Frequent synonyms / misidentifications: None / This species belongs to a complex of forms including the European Atlantic *Venerupis pullastra* (Montagu, 1803). The taxonomic status of these forms is still unclear, though they are generally considered as separate subspecies or species. The latter opinion is followed here.

FAO names: En – Corrugated venus; Fr – Palourde ridée; Sp – Margarita arrugada.



interior of left valve



exterior of right valve

Diagnostic characters: Shell moderately solid, very variable in shape but generally rather inflated, **oblong, rectangular subovate** in outline; shape of specimens nestling in rock crevices sometimes strongly distorted. Umbones low, markedly anterior to midline of valves. Lunule and escutcheon poorly distinct. **Outer surface dull, with** extremely variable, both **concentric and radial sculpture**, composed of numerous radial grooves and fine to coarse, irregular concentric threads, strongest posteriorly and **sometimes so wavy as to produce a rugose surface**. **Hinge** plate narrow, bearing under the umbo 3 close-set, poorly diverging cardinal teeth in each valve, and **devoid of lateral teeth**. **Pallial sinus deep**, reaching midline of valves or slightly extending beyond it, rounded at anterior end; ventral lobe of **pallial sinus and pallial line confluent for a short distance before their posterior end**, separated by a rather narrow wedge-shaped space. **Internal margins smooth**. **Colour:** outside of shell cream or buff to light brown, either uniform or with various patterns of deeper brown. **Interior white, often more or less stained with deep purplish blue on posterior side**.

Size: Maximum shell length 7.7 cm, commonly from 4 to 5 cm.

Habitat, biology, and fisheries: Commonly burrowing in sandy bottoms, or nestling in rock crevices, empty holes of boring bivalves, or among mussels living on sand-covered rocks. Intertidal and sublittoral zones to about 25 m depth. A common edible species, collected by coastal inhabitants at low tide on sand banks, or in shallow waters.

Distribution: Eastern Atlantic, from Morocco to Senegal, and from northern Angola to South Africa; east to Natal (South Africa); the Canaries and Cape Verde Islands.

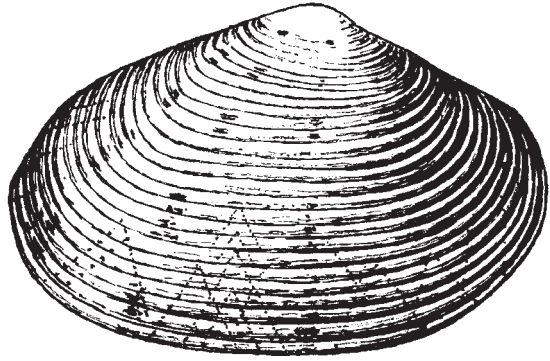


Venerupis (s.l.) dura (Gmelin, 1791)

Frequent synonyms / misidentifications: *Callistotapes durus* (Gmelin, 1791); *Paphia dura* (Gmelin, 1791); *Polittitapes durus* (Gmelin, 1791); *Tapes durus* (Gmelin, 1791) / None.

FAO names: **En** – Durable venus; **Fr** – Clovisse durable; **Sp** – Margarita dura.

Diagnostic characters: Shell rather solid, moderately inflated, **elongate** and **elliptical ovate** in outline. Lunule shallow, bordered by a fine groove enhanced by the interruption of valve sculpture; escutcheon poorly distinct, reduced to a smooth and depressed border along posterodorsal margin. Umbones slightly in front of midline of valves. **Outer surface glossy, with concentric sculpture only**, composed of many smooth and rounded regular concentric ridges and narrow grooves throughout. **Hinge** plate narrow, bearing under the umbo 3 close-set, strongly diverging cardinal teeth in each valve, and **devoid of lateral teeth**. **Pallial sinus relatively deep**, extending slightly beyond midline of valves, rounded at anterior end; ventral lobe of **pallial sinus and pallial line not confluent before their posterior end**, separated by a rather wide wedge-shaped space. **Internal margins smooth**. **Colour:** outside of shell **glossy cream to light fawn, often with** more or less developed slight zigzag markings and with 4 **interrupted radial bands of dark brown**. Interior porcelaneous white, sometimes flushed with light yellow or pink in the umbonal cavity.



exterior of right valve

Size: Maximum shell length 7.5 cm, commonly to 5 cm.

Habitat, biology, and fisheries: In various sandy bottoms, with or without mud, but with a preference for clean medium-to-coarse sand and gravel. Sublittoral, mostly from 10 to 40 m depths. Common to abundant from Mauritania to Senegal and artisanally exploited there for human consumption.

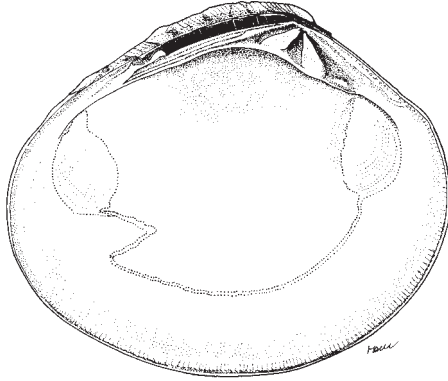
Distribution: Eastern Atlantic, from Morocco to Ghana, and from Gabon to northern Angola; Canary Islands.



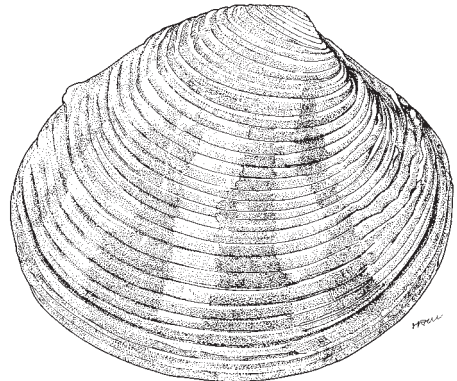
***Venus (s.l.) crebrisulca* Lamarck, 1818**

Frequent synonyms / misidentifications: *Circomphalus crebrisulcus* (Lamarck, 1818); *C. rosalina* (Rang, 1834); *Venus rosalina* Rang, 1834 / *Venus crebrisulca* (G.B. Sowerby II, 1853) [= *Globivenus toreuma* (Gould, 1850)].

FAO names: **En** – African venus; **Fr** – Praire africaine; **Sp** – Almeja africana.



interior of left valve



exterior of right valve

Diagnostic characters: Shell relatively small to medium-sized (up to 5.7 cm long), thick and solid, rather inflated, **broadly suboval** in outline, with moderately anterior umbones; anterodorsal and posterodorsal margins sloping on both sides of umbo and shallowly convex, anterior, posterior and ventral margins widely rounded. Lunule large, elongate ovate and well defined; **escutcheon well developed** in both valves, somewhat smoother on left valve. Outer surface sculptured with densely spaced **concentric ridges, thick and rounded, flattened throughout, forming slightly more prominent, irregular and more or less interrupted tubercular threads anteriorly and posteriorly.** Hinge with 3 diverging cardinal teeth at each valve, and a **small anterior** tubercle-shaped **lateral tooth in left valve.** Pallial sinus short, trigonal. **Internal margins finely crenulate.** **Colour:** outside of shell cream to **light tan**, uniform or **often with various purplish fawn** patterns usually arranged in 3 **rather large radial rays** and a narrower ray near posterior end of ridges; lunule usually light tan to fawn, escutcheon with transverse brownish stripes at left valve. Interior white, sometimes with a mauve hue on ventral side of posterior part of hinge plate.

Size: Maximum shell length 5.7 cm, commonly to 4 cm.

Habitat, biology, and fisheries: In various sandy bottoms, sometimes in seagrass areas. Sublittoral zone, from about 5 to 25 m depths. Reproduction occurring mainly from October to December in Mauritania. Often forming dense, exploitable populations. Commercially dredged in Mauritania, and perhaps of potential interest in Senegal.

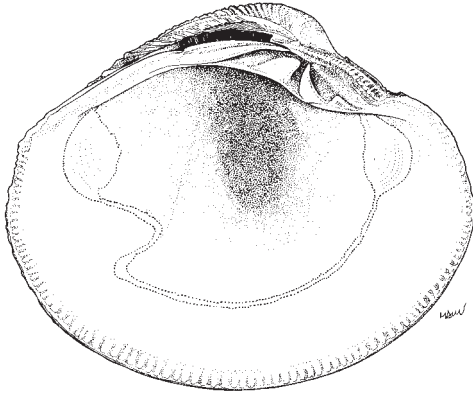
Distribution: Eastern Atlantic, from Rio de Oro to Senegal, and perhaps also in Côte d'Ivoire.



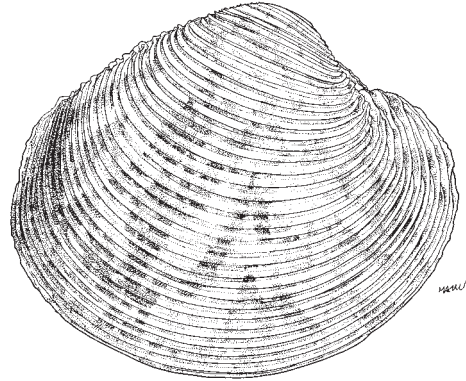
***Venus lyra* Hanley, 1845**

Frequent synonyms / misidentifications: *Ventricoloidea lyra* (Hanley, 1845) / *Venus nux* Gmelin, 1791.

FAO names: En – Lirate venus; Fr – Praire lyre; Sp – Almeja lira.



interior of left valve



exterior of right valve

Diagnostic characters: Shell rounded ovate, thick and solid, inflated, with decidedly anterior umbones and slightly truncate at posterior end. Lunule broad and well defined, **escutcheon distinct and more developed in left valve** than in right valve where it is bordered by a broad rounded fold. Outer surface with many regular **concentric lamellae, moderately high and thick, rounded on top** and becoming slightly sharper toward anterior and posterior end of valves. Hinge with 3 diverging cardinal teeth at each valve, and **an anterior tubercle-shaped lateral tooth in left valve**, fitting at right valve into a small socket. Pallial sinus short, trigonal. **Internal margins finely crenulate.** **Colour:** outside of shell **somewhat glossy, whitish with dense brownish zigzag markings and purplish brown lunule.** Interior white, umbonal cavity hued with pink.

Size: Maximum shell length 4 cm, commonly to 3 cm.

Habitat, biology, and fisheries: Common in sand bottoms between rocks, or with calcareous algae and shell rubble. Intertidal and sublittoral zones to about 20 m depths. An edible localised species, potentially interesting commercially.

Distribution: Endemic of the Gulf of Guinea islands, São Tomé, Annobon and Ilha do Principe.



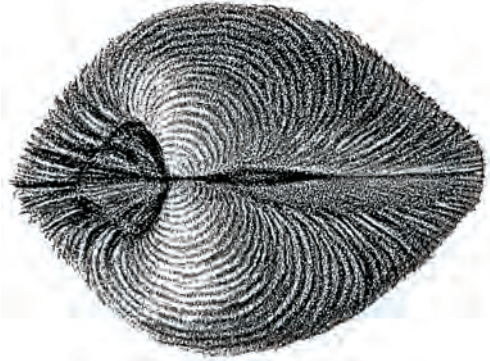
Venus nux Gmelin, 1791

Frequent synonyms / misidentifications: *Ventricoloidea nux* (Gmelin, 1791); *Venus multilamella* (Lamarck, 1818); *Venus nuciformis* Locard, 1886 [unjustified emendation of the name] / None.

FAO names: **En** – Nut venus; **Fr** – Praire noisette; **Sp** – Almeja avellana.



exterior of left valve
(from Hidalgo, 1870)



dorsal view of entire shell
(from Hidalgo, 1870)

Diagnostic characters: Shell rounded ovate, moderately thick and solid, inflated, with decidedly anterior umbones. Lunule broad and well defined, **escutcheon more distinct in left valve** than in right valve. **Outer surface densely covered throughout with many high, thin and sharp on top concentric lamellae.** Hinge with 3 diverging cardinal teeth at each valve, **an elongated, rather strong anterior lateral tooth in left valve**, fitting at right valve into a corresponding socket with a small tubercle-shaped denticle above. Pallial sinus short, trigonal. **Internal margins finely crenulate.** **Colour: outside of shell not glossy**, pale cream to **whitish throughout**, often chalky white on the abraded umbones. Interior white.

Size: Maximum shell length 4.5 cm, commonly to 3.5 cm.

Habitat, biology, and fisheries: In sand and mud bottoms. Infralittoral to continental shelf and slope, down to about 700 m depth. Most common at moderate depths, from 40 to 150 m. Regularly trawled in Morocco and southern Spain where it is sold in local markets.

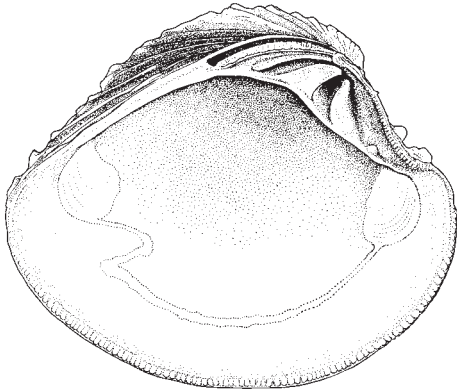
Distribution: Southwestern Mediterranean and the nearby Atlantic, from Portugal to Morocco.



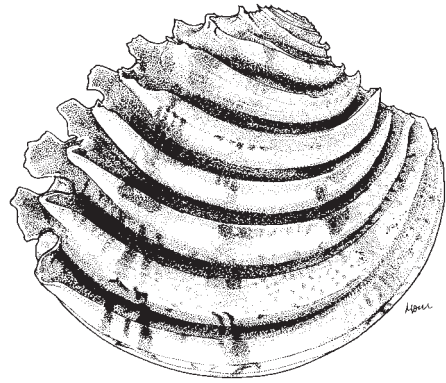
***Venus (s.l.) subrosalina* Tomlin, 1923**

Frequent synonyms / misidentifications: *Circomphalus erroneus* (Fischer-Piette, 1975); *Ventricoloidea subrosalina* Tomlin, 1923; *Venus affinis* G.B. Sowerby II, 1853 [not of Gmelin, 1791]; *V. erronea* Fischer-Piette, 1975 / *Venus rosalina* Rang, 1834 [= *V. crebrisulca* Lamarck, 1818].

FAO names: **En** – Fischer's venus; **Fr** – Praire de Fischer; **Sp** – Almeja de Fischer.



interior of left valve



exterior of right valve

Diagnostic characters: Shell relatively small (up to 4 cm long), **trigonal ovate**, thick and solid, rather inflated; anterodorsal margin rather short and slightly concave, posterodorsal margin long, straightish and strongly sloping, ventral margin widely convex. Lunule large, depressed and well defined; **scutcheon** long and wide, smoothish, **well developed in both valves** (a little larger in left valve). Outer surface with smooth **widely spaced concentric ridges**, which are **broad, rounded and strongly recurved dorsally** in shape, **becoming lamellate, higher, not recurved and with a broad radial interruption near their posterior end**. Hinge with 3 diverging cardinal teeth at each valve, and a **small anterior tubercle-shaped lateral tooth in left valve**. Pallial sinus short, trigonal. **Internal margins** finely crenulate. **Colour:** outside of shell **glossy light cream** with various patterns of **pinkish to fawn dots or lines** usually **arranged in a few radial rays**, and sometimes with a light pink hue on concentric ridges; **lunule** usually **light tan to fawn**, scutcheon with transverse pinkish to orange brown stripes, sometimes entirely fawn coloured. Interior milky white.

Size: Maximum shell length 4 cm, commonly to 3 cm.

Habitat, biology, and fisheries: In various sand bottoms, at rather shallow sublittoral levels, from about 5 to 20 m depths. A common edible species in the northern part of its range, forming exploitable banks. Commercially dredged and trawled in Mauritania.

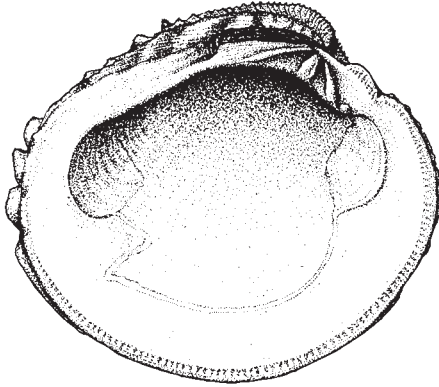
Distribution: Tropical East Atlantic, from Mauritania to Guinea, and in Ghana.



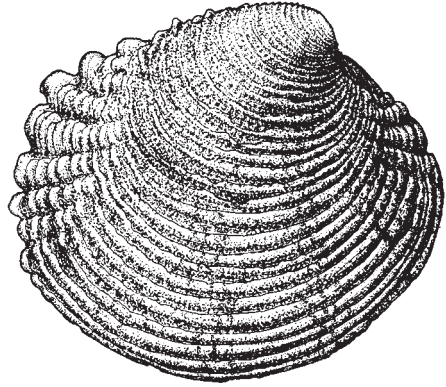
***Venus verrucosa* Linnaeus, 1758**

Frequent synonyms / misidentifications: *Venus simulans* G.B.Sowerby I, 1844 / None.

FAO names: En – Warty venus; Fr – Praire commune; Sp – Escupiña grabada.



interior of left valve



exterior of right valve

Diagnostic characters: Shell rounded ovate, very thick and solid, inflated to very inflated (ssp. *simulans*). Lunule broad and well defined, **escutcheon distinct and more developed in left valve** than in right valve. Outer surface strongly sculptured with **prominent, lamellose and rather close-set concentric ridges**, bent dorsalward and **forming** obliquely diverging rows of **warty tubercles toward anterior and posterior margins** of valves. **Radial sculpture of low but distinct riblets**, most visible in the umbonal region. Hinge with 3 diverging cardinal teeth at each valve, and **an anterior tubercle-shaped lateral tooth in left valve**. Pallial sinus short, trigonal. **Internal margins finely crenulate. Colour:** **outside of shell dirty white to brown**, uniform or with pinkish to brown markings; lunule brown, **escutcheon with transverse brown stripes at left valve**. Interior white, often maculated with brown posteriorly.

Size: Maximum shell length 7 cm, commonly from 3.5 to 5 cm.

Habitat, biology, and fisheries: In pure, muddy or gravely sands, or in eelgrass prairies, from low tide levels to continental shelf, down to about 155 m depth. A highly prized edible species in western and southern European countries, heavily exploited in Italy and France where strict fishery regulation is imposed to protect the resource. Common in northern and southern parts of the studied zone where it is collected for food. Used raw, fried or in soups. Dense, commercially exploitable populations are known in Mauritania.

Distribution: Widely distributed in the East Atlantic, from the British Isles to Guinea, the Canaries, Cape Verde and Madeira Islands, and from Congo to the southern tip of West African coasts, South Africa. Throughout the Mediterranean and in the northern Red Sea. Also occurring in southwestern Indian Ocean, east to southern Mozambique.

Remark: *Venus simulans*, a common form of Cape Verde Islands generally considered a subspecies or local form of *Venus verrucosa*, could perhaps be a distinct endemic species.



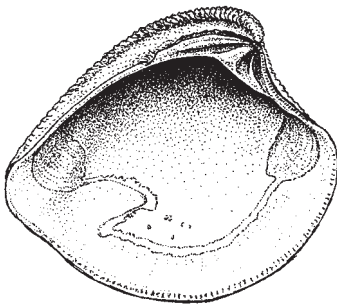
Chamelea striatula (da Costa, 1778)

Frequent synonyms / misidentifications: *Chamelea gallina striatula* (da Costa, 1778); *Venus striatula* (da Costa, 1778) / *Chamelea gallina* (Linnaeus, 1758); *Venus gallina* Linnaeus, 1758.

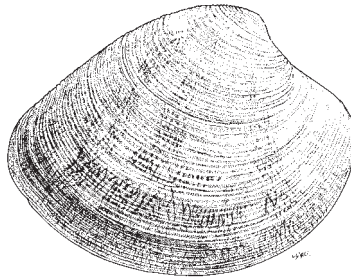
En – Atlantic striped venus; **Fr** – Gallinette de l'Atlantique; **Sp** – Chirla atlantica.

Maximum shell length 4.5 cm, commonly to 3 cm. Shallow burrower of clean or muddy fine sands. Intertidal and sublittoral zones to about 55 m depth. Often occurring in dense populations at shallow depths. Actively collected for human consumption. Outside the studied area, it is exploited at a semi-industrial level on French Atlantic coasts. Eastern Atlantic, from northern Finmark, Norway and the British Isles to Morocco. Perhaps also occurring in Mauritania and the Canary Islands, but absent from the Mediterranean.

Remarks: Until recently, this species was confused with the very similar form of the Mediterranean and Black Sea under the name *Chamelea gallina*. New investigations on this species complex revealed that it is composed of 2 reproductively isolated species, distinguishable on morphological, anatomical and genetic grounds even in the South Iberian Atlantic populations where they occur sympatrically. In consequence, new FAO names are given here for the Atlantic species (*Ch. striatula*); to avoid any confusion, names of the Mediterranean species (*Ch. gallina*) must also be amended to "Mediterranean striped venus" (English), "Gallinette de Méditerranée" (French) and "Chirla mediterranea" (Spanish).



interior of left valve



exterior of right valve



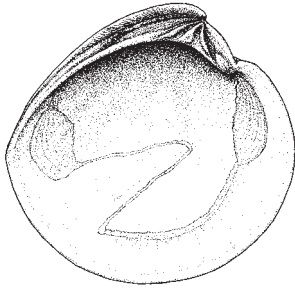
***Dosinia lupinus* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Dosinia afra* (Gmelin, 1791); *D. lincta* (Pulteney, 1799) / *Dosinia lupinus orbigny* (Dunker, 1845) [= *Dosinia orbigny* Dunker, 1845].

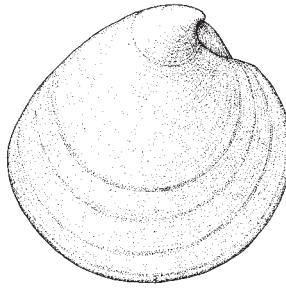
En – Smooth dosinia; **Fr** – Montre brillante; **Sp** – Reloj brillante.

Maximum shell length 4 cm, commonly to 2.5 cm. In various sand bottoms. Intertidal and sublittoral zones to continental shelf, down to about 200 m depth. Most common in shallow waters to about 20 m. Collected in several areas by local fishermen using small boats and canoes, together with other small edible bivalves. Eastern Atlantic, from Iceland and northern Norway to Ghana, and from Gabon to northern Angola, but not in South Africa, Canary and Azore islands. Throughout the Mediterranean.

Remarks: This species belongs to a complex of forms generally understood as geographic subspecies: *Dosinia lupinus lincta* in the European Atlantic to Morocco; *D. lupinus lupinus* in the Mediterranean; *D. lupinus afra* in West Africa. New data show that the southwest African form *D. orbigny* belongs to a distinct species.



interior of left valve



exterior of right valve

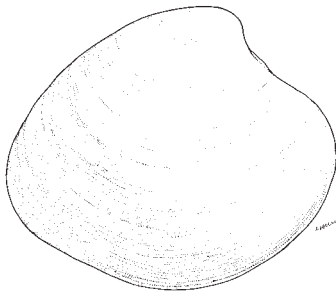


***Pitar elatus* (G.B. Sowerby III, 1908)**

Frequent synonyms / misidentifications: *Pitaria elatus* G.B. Sowerby III, 1908 / *Pitar tumens* (Gmelin, 1791); *Pitar virgo* (Gray, 1838).

En – Lofty pitar venus; **Fr** – Pitar élevé; **Sp** – Pitar elevada.

Maximum shell length 4.5 cm, commonly to 3 cm. In bottoms of fine to medium grain sand, with or without mud or shell rubble, mostly in open sea environments. Sublittoral zone, from about 5 to 30 m depth. A moderately common to uncommon species, occasionally caught in bottom trawls or nets of local fishermen. Used as food. Tropical East Atlantic, from Senegal to Congo and perhaps to northern Angola.



exterior of right valve

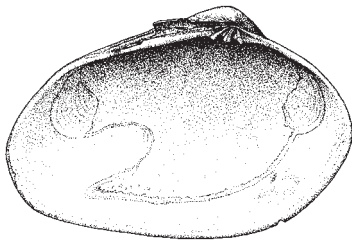


***Venerupis (s.l.) aurea* (Gmelin, 1791)**

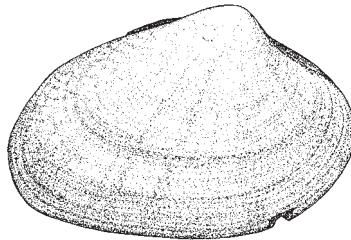
Frequent synonyms / misidentifications: *Paphia aurea* (Gmelin, 1791); *Polittapes aurea* (Gmelin, 1791); *P. petalina* (Lamarck, 1818); *Tapes aureus* (Gmelin, 1791); *T. texturatus* (Lamarck, 1806) / None.

En – Golden carpet shell; **Fr** – Palourde jaune; **Sp** – Almeja dorada.

Maximum shell length 5 cm, commonly from 2 to 3 cm. In various more or less muddy soft bottoms, at mid-tide levels and sublittorally to about 35 m depth. Also occurring in coastal lagoons and other areas of varying salinity. This very common species is a popular food source, notably in the Mediterranean where it is intensely exploited. Eastern Atlantic, from Norway to Morocco and perhaps Rio de Oro. Throughout the Mediterranean and the Black Sea; also occurring in the Suez Canal, but probably not in the Gulf of Suez.



interior of left valve



exterior of right valve

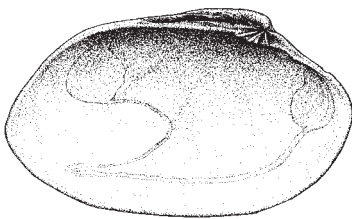


***Venerupis (s.l.) rhomboides* (Pennant, 1777)**

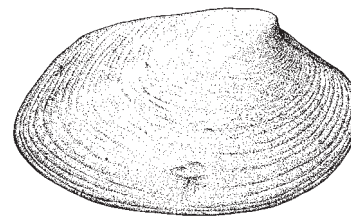
Frequent synonyms / misidentifications: *Callistotapes rhomboides* (Pennant, 1777); *Paphia rhomboides* (Pennant, 1777); *Polittapes rhomboides* (Pennant, 1777); *Tapes rhomboides* (Pennant, 1777) / *Polittapes virgineus* (Linnaeus, 1758) [a dubious species, corresponding either to *Venerupis aurea* or to the Mediterranean *Venerupis geographica* (Gmelin, 1791)].

En – Banded carpet shell; **Fr** – Palourde rose; **Sp** – Almeja rubia.

Maximum shell length 6.5 cm, commonly from 3.5 to 4.5 cm. In various soft bottoms, often with mud and coarse fraction. Low tide, sublittoral and continental shelf to about 180 m depth. May occur in large populations, sometimes mixed with *Venus verrucosa*. A popular edible species, mainly collected subtidally by dredging. Exploitation recently increasing along European Atlantic coasts. Eastern Atlantic, from Norway to Morocco and in the Mediterranean.



interior of left valve



exterior of right valve

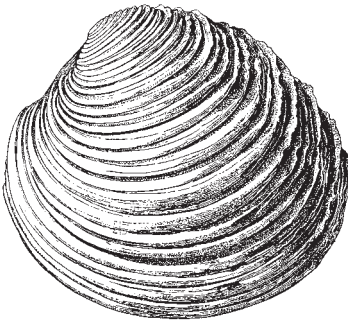


***Venus (s.l.) casina* Linnaeus, 1758**

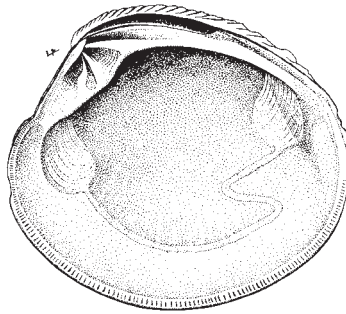
Frequent synonyms / misidentifications: *Circomphalus casina* (Linnaeus, 1758) / None.

En – Chamber venus; **Fr** – Praire chambrière; **Sp** – Almeja casera.

Maximum shell length to about 5 cm, commonly from 3 to 4 cm. In various soft bottoms. Sublittoral zone and continental shelf, from about 5 to 200 m depths. Occasionally collected by trawlers, but probably not abundant enough to be commercially exploited. Eastern Atlantic, from southern Norway to Ghana; Canary Islands, Cape Verde Archipelago and Gulf of Guinea islands (São Tomé, Ilha do Príncipe). Throughout the Mediterranean.



exterior of left valve



interior of right valve



***Venus chevreuxi* Dautzenberg, 1891**

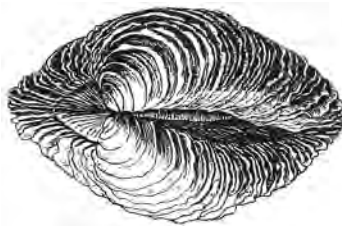
Frequent synonyms / misidentifications: *Ventricoloidea chevreuxi* (Dautzenberg, 1891) / *Venus nux* Gmelin, 1791.

En – Chevreux' venus; **Fr** – Praire de Chevreux; **Sp** – Almeja de Chevreux.

Maximum shell length to 5.5 cm, commonly to 3.5 cm. In fine sandy to muddy soft bottoms, offshore on continental shelf and upper slope, from about 40 to 300 m depths. Collected in bottom trawls and dredges where common. Eastern Atlantic, from Mauritania to northern Angola.



exterior of left valve
(from Nicklès, 1955)



dorsal view of entire shell
(from Nicklès, 1955)

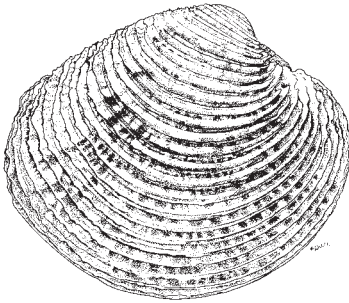


***Venus declivis* G.B. Sowerby II, 1853**

Frequent synonyms / misidentifications: *Ventricoloidea declivis* (G.B. Sowerby II, 1853) / None.

En – Sloping venus; **Fr** – Praire déclive; **Sp** – Almeja inclinada.

Maximum shell length 4 cm, commonly to 3 cm. In bottoms of clean, fine to medium grain sand, often with calcareous algae and shell rubble. Sublittoral and upper continental shelf, from about 5 to 60 m depths. A moderately common edible species, collected occasionally in trawls or dredges, but probably not forming commercially exploitable banks. Eastern Atlantic, from Guinea to northern Angola.



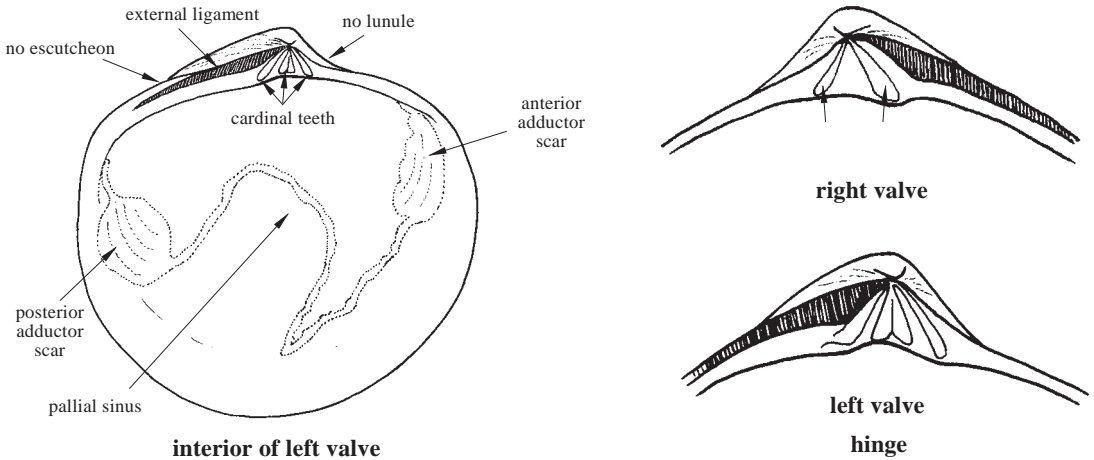
interior of right valve



PETRICOLIDAE

False lucines, petricola clams

Diagnostic characters: Shell **equivalve**, from rounded to elongate ovate in outline, often distorted due to nestling or boring habits; frequently **inequilateral, with prosogyrate** and mostly anterior **umbones**. **No lunule nor escutcheon**. Sculpture variable, only concentric, or with a radial component, or divaricating. Periostracum usually inconspicuous. Ligament external, behind the umbones. Hinge with **3 cardinal teeth in left valve and only 2 in right valve; lateral teeth always wanting**. Interior of shell porcelaneous. **Two** more or less equal **adductor muscle scars**, the posterior often slightly larger. **Pallial sinus well developed** and deep. Internal margins smooth or denticulate by the outer radial sculpture. Gills of eulamellibranchiate type, with folded branchial sheets. Foot large and rather short, hatchet-shaped, rarely byssate in the adult. Mantle broadly open ventrally. Siphons long.

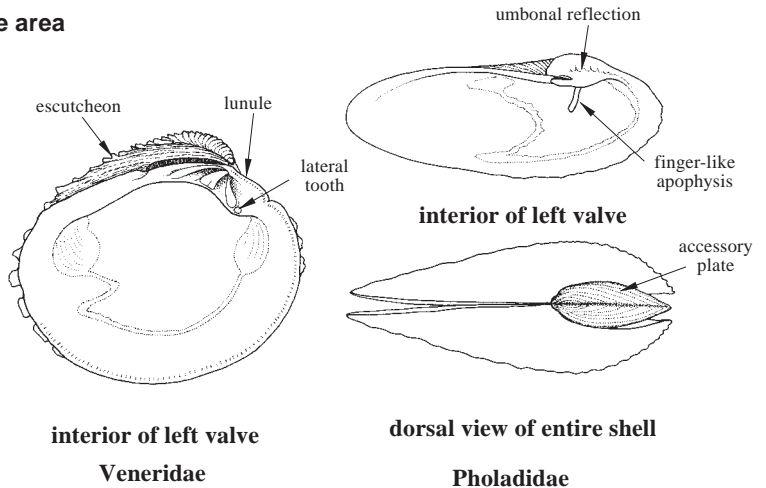


Habitat, biology, and fisheries: Suspension feeding animals, some living buried in soft bottoms, others nestling or boring into relatively hard substrates such as stiff clay or limestone. Their shells may be more or less strongly distorted, due to these peculiar modes of life. Members of this family have only limited economic interest in the area for they do not form numerous populations suitable for a sustained exploitation, though 1 species (*Petricolaria gracilis*) seems rather esteemed locally as a sea food.

Similar families occurring in the area

Veneridae: lunule and/or escutcheon distinct. Hinge always with 3 cardinal teeth in each valve; lateral teeth sometimes present.

Pholadidae: general aspect of the valves quite similar to that of *Petricolaria*, but easily distinguishable externally by the presence of umbonal reflection and accessory plates, and internally by the lack of hinge teeth and the occurrence of a well-developed finger-like apophysis arising from the umbonal cavity.



Key to species of interest to fisheries occurring in the area

- 1a. Shell subcircular in outline, almost equilateral; outer surface with irregular concentric lines and grooves, but devoid of radial ribs; animal not boring into hard substrates (Fig. 1). ***Mysia undata***
- 1b. Shell elongate ovate in outline, strongly inequilateral; outer surface with concentric ridges and radial ribs; animal boring into hard substrates (Fig. 2) ***Petricolaria gracilis***

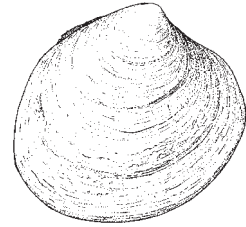


Fig. 1 *Mysia undata* (exterior)

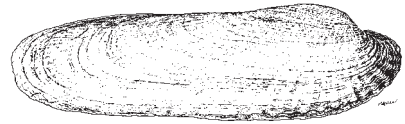


Fig. 2 *Petricolaria gracilis* (exterior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

🐚 *Mysia undata* (Pennant, 1777).

🐚 *Petricolaria gracilis* (Deshayes, 1853).

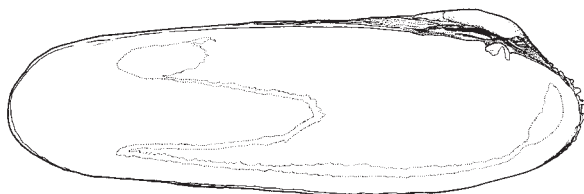
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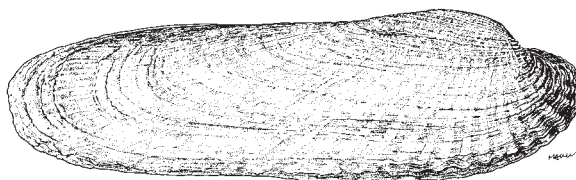
***Petricolaria gracilis* (Deshayes, 1853)**

Frequent synonyms / misidentifications: *Petricola gracilis* Deshayes, 1853; *P. serrata* Deshayes, 1853 / *Petricola pholadiformis* Lamarck, 1818 [= *Petricolaria pholadiformis*]; *P. stellae* Narchi, 1975.

FAO names: **En** – Graceful petricola; **Fr** – Pétricole gracile; **Sp** – Petricola delgada.



interior of left valve



exterior of right valve

Diagnostic characters: Shell very variable and often more or less distorted in outline, usually elongate to very elongate ovate, inflated, rather thin and always strongly inequilateral. Umbones markedly anterior to midline of valves, situated in the anterior fourth. Outer surface with numerous and somewhat irregular concentric ridges and radial ribs forming small scales where they cross, most prominent anteriorly and progressively lower and thinner posteriorly. Posterior cardinal tooth of left valve long and thin, parallel to valve margin and ligament. Pallial sinus deep, roughly wedge-shaped with a rounded end, extending to or slightly beyond midline of valves and not ascending forward. Interior smoothish, often with the outer sculpture showing through. **Colour:** outside of shell dirty white to cream coloured, often tinged with reddish brown posteriorly. Interior white, with the outer colours showing through.

Size: Maximum shell length 4.5 cm, commonly to 3.5 cm.

Habitat, biology, and fisheries: Boring into various hard substrates such as stiff mud, clay, or peat, in wood, as well as into moderately hard rocks such as certain types of limestones, volcanic tuffs or sandstones. Sometimes occurring also in the shell of large dead or live molluscs. Intertidal and sublittoral zones to about 30 m depth. Intertidal populations locally collected for human consumption. Often eaten in soups, or added to seafood dishes with rice. Rarely appears in local markets.

Distribution: Exact distribution not known, because of frequent confusion with other *Petricolaria* species; in the studied area, it has almost always been confused with the cold-temperate “false angel wing”, *Petricolaria pholadiformis*. Tropical East Atlantic, from Mauritania to Senegal, and from Côte d'Ivoire to southern Angola. Tropical West Atlantic, in the Caribbean and northern coast of South America. Perhaps also present in the Red Sea and Indian Ocean.

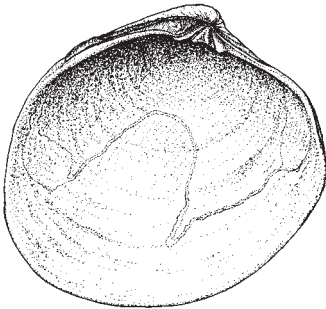


***Mysia undata* (Pennant, 1777)**

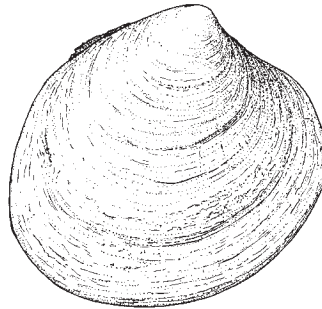
Frequent synonyms / misidentifications: *Lucinopsis undata* (Pennant, 1777) / None.

En – Undulated false lucine; **Fr** – Fausse lucine ondulée; **Sp** – Falsa lucina.

Maximum shell length 3.8 cm, commonly to 3 cm. Burrowing in muddy sand, shelly, muddy and sandy gravel bottoms. Sublittoral and continental shelf, from about 5 to 250 m depths. Occasionally collected for food where common, with other burrowing bivalves. Eastern Atlantic, from Norway to Morocco and the Canaries. Throughout the Mediterranean.



interior of left valve

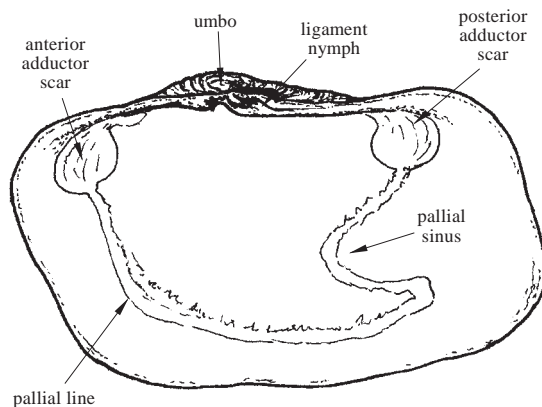


exterior of right valve

HIATELLIDAE

Panopes

Diagnostic characters: Shell rather thick and chalky, larger than high and roughly quadrangular in outline, slightly to widely gaping anteriorly and posteriorly, often irregular and rude or distorted; **equivalve to somewhat inequivalve** (genus *Hiatella*). **Umbo** **more or less anterior** to midline of valves. Outer sculpture mainly composed of irregular and coarse concentric growth marks. Periostracum generally thick. **Ligament external**, attached to strong nymphs. **Hinge reduced, with 1 or 2 cardinal teeth** in each valve, sometimes obsolete in the adult. **Two adductor muscle scars**, subequal in size. **Pallial sinus well-developed**, pallial line sometimes discontinuous. Internal margins smooth. Gills of eulamelibranchiate type, with smooth or folded branchial sheets, outer demibranch smaller than inner demibranch. Foot variable, finger-like, small and reduced, or stronger, sometimes with a byssus in the adult. Siphons more or less developed, usually with a thick periostracal covering and not wholly retractile. Mantle largely fused ventrally, with a small anteroventral opening.



interior of right valve

Habitat, biology, and fisheries: Filter-feeding animals, living deeply buried in soft bottoms (*Panopea*), mechanically boring or nestling (*Hiatella*) into rocks, depending on the hardness of the substrate. Large species of genus *Panopea*, like the North American geoduck, are highly esteemed for food and actively searched.

Similar families occurring in the area

The very large size of the shell with long, fused and poorly retractable siphons easily distinguishes the only *Panopea* species included in this contribution.

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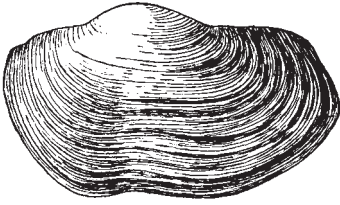
A single species of interest to fisheries occurring in the area

***Panopea glycymeris* (Born, 1778)**

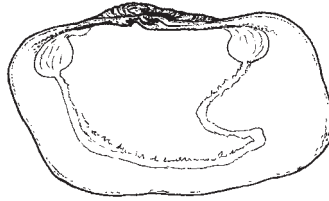
Frequent synonyms / misidentifications: *Panopea aldrovandi* Ménard de la Groye, 1807; *Panope glycymeris* [Spelling errors] / None.

En – Aldrovandi's panope; **Fr** – Panopée d'Aldrovandi; **Sp** – Panopea de Aldrovandi.

Maximum shell length 30 cm, commonly from 16 to 20 cm. Deeply burrowing in fine sandy or muddy bottoms, down to 1 m under the surface of the substrate. Sublittoral zone and upper continental shelf, from about 10 to 100 m depths. A gigantic species, the largest bivalve of the eastern Atlantic realm, with thick and fleshy siphons more than twice as long as the shell, when extended. However, this edible species is rarely collected and thus not marketed, for it lives only sublittorally and too deeply buried below the surface of the substrate to be easily dredged. Eastern Atlantic, from northern Spain to Senegal, and from Angola to Namibia. Western Mediterranean.



exterior of left valve

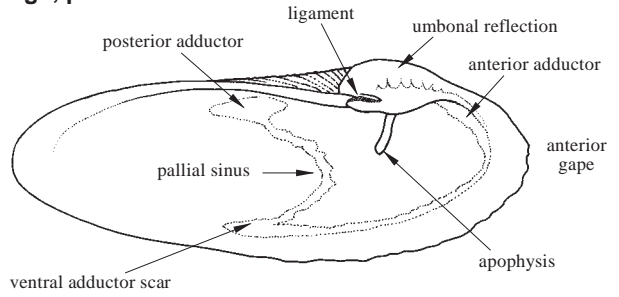


interior of right valve

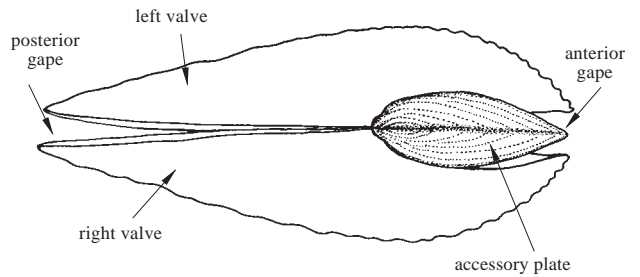
PHOLADIDAE

Angel wings, piddocks

Diagnostic characters: Shell sub-equivalve, globular to elongated, generally **gaping** anteriorly and posteriorly, though anterior gape is sometimes closed by a calcareous "callum" in the adult shell. **Dorsal margin** enrolled over the umbones, **forming an umbonal reflection**. Anterior part of the valves with concentric and radial ribs, more or less spinose where they cross. **A number of accessory calcareous plates about the main shell**, along the dorsal margin, sometimes over the anteroventral gape and along the posteroventral margin. Periostracum thin, often more or less developed beyond shell margins. **Ligament reduced**, always internal. **Hinge without teeth**. Umbonal cavity often with a **finger-like apophysis** to which the foot muscles are attached. **Three adductor muscle scars**. Anterior adductor scar extending over the umbonal reflection. **Pallial line deeply sinuated**, with the scar of the third adductor muscle ventrally. Gills elongate, of eulamellibranchiate type, with 1 or 2 branchial sheets. Siphons long and united, smooth or papillate, often enclosed within a chitinous sheath. Foot more or less circular, truncated and forming a sort of sucker, atrophying in adult of species that develop a callum. Mantle fused ventrally, except at the pedal, anterior gape.



interior of left valve



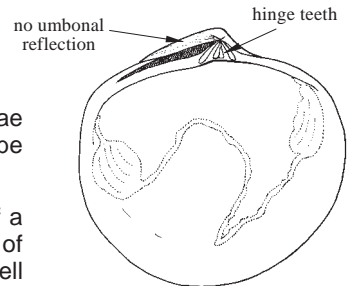
dorsal view of entire shell

Habitat, biology, and fisheries: The Pholadidae are highly specialized bivalves adapted for mechanical boring into relatively hard substrates such as limestone, sandstone, stiff clay or wood. Filter-feeding animals. Sexes separate, or alternating hermaphrodites (genus *Martesia*). Some Pholadidae are known for damage they cause to rocky or wooden structure in harbours and other coastal areas. A number of species are however collected for food and are often considered a delicacy.

Similar families occurring in the area

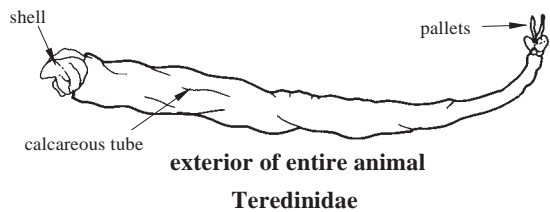
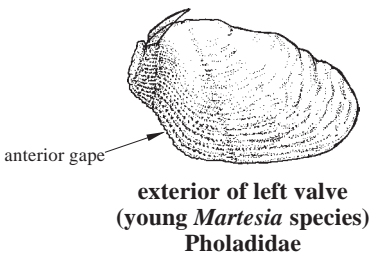
Teredinidae: shell of the young *Martesia* similar to that of a Teredinidae but, in the latter, burrow is lined by a calcareous deposit and can be closed by a pair of partly calcified "pallets".

Petricolidae: valves of *Petricolaria* quite similar externally to that of a Pholadidae, but easily distinguishable externally by the absence of umbonal reflection and accessory plates, and internally by the well developed hinge teeth and absence of finger-like apophysis in the umbonal cavity.



interior of left valve

Petricolidae



Key to species of interest to fisheries occurring in the area

1a. Shell not gaping anteriorly. Umbonal reflection of each valve erect, feebly recurved over the umbo. Accessory plates composed of 1 small, (median) plate dorsally, split in two; posterior end of valves with 2 pairs of extremely fragile calcareous-corneous inflated lobes (Fig. 1) *Talona explanata*

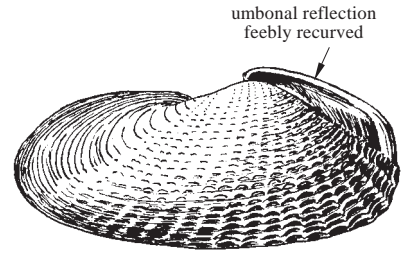
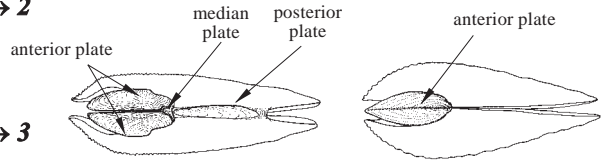


Fig. 1 *Talona explanata* (exterior)

1b. Shell gaping anteriorly. Umbonal reflection of each valve decidedly recurved over the umbo. Accessory plates composed of 1 or 3 plates dorsally (with anterior plate split in two, when 3 plates are present); posterior end of valves without calcareous-corneous lobes → 2

2a. Umbonal reflection with transverse partitions; 3 accessory dorsal plates (Fig. 2a) → 3



a) *Pholas* b) *Barnea*

Fig. 2 dorsal view of shell

2b. Umbonal reflection without transverse partitions; a single accessory dorsal plate (the anterior plate) (Fig. 2b) → 4

3a. Shell rostrate anteriorly. Early growth stages of divided anterior dorsal plate located on lateral margins (Fig. 3) *Pholas dactylus*

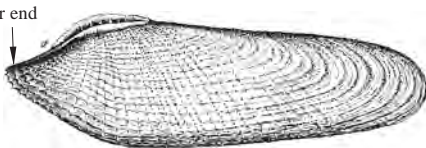


Fig. 3 *Pholas dactylus* (exterior)

3b. Shell rounded anteriorly. Early growth stages of divided anterior dorsal plate located more or less centrally (Fig. 4) *Pholas campechiensis*

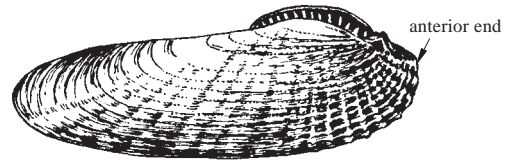


Fig. 4 *Pholas campechiensis* (exterior)

4a. Shell rounded anteriorly and posteriorly (scarcely angled anteriorly in left valve) (Fig. 5) *Barnea candida*

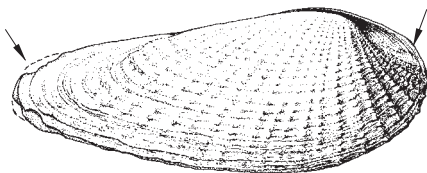


Fig. 5 *Barnea candida* (exterior)

4b. Shell squarely truncate posteriorly, obliquely truncate and beaked anteriorly (Fig. 6) *Barnea truncata*

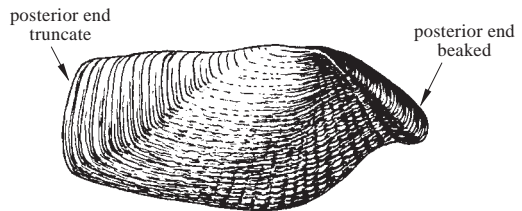


Fig. 6 *Barnea truncata* (exterior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

🐚 *Barnea candida* (Linnaeus, 1758).

🐚 *Barnea truncata* (Say, 1822).

🐚 *Pholas campechiensis* (Gmelin, 1791).

🐚 *Pholas dactylus* Linnaeus, 1758.

🐚 *Talona explanata* (Spengler, 1792).

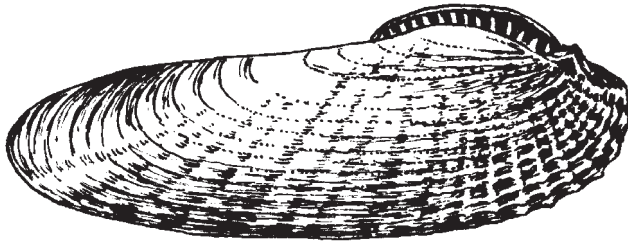
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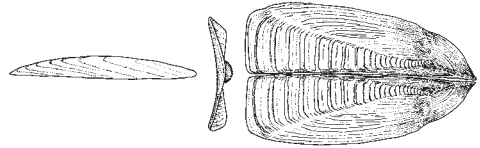
Pholas campechiensis (Gmelin, 1791)

Frequent synonyms / misidentifications: *Thovana campechiensis* (Gmelin, 1791) / None.

FAO names: En – Campeche piddock; Fr – Pholade de Campêche; Sp – Ala de angel campechano.



exterior of right valve



dorsal view of accessory plates

Diagnostic characters: Shell elongate to very elongate ovate in outline (from about 2.5 to 5 times longer than high), rounded and narrowly gaping anteriorly, narrowly rounded and more widely gaping posteriorly. Umbonal reflection separated from dorsal margin of shell by a narrow space that is provided with small, transverse calcareous partitions. Outer surface with many close-set lamellate concentric ridges and radial cords bearing small spines or scales where they cross, most prominent on anterior half of valves and becoming weaker on posterior half. **Three accessory calcareous plates along dorsal margins of the valves;** anterior plate nearly rectangular and longitudinally split in 2, median plate small and transverse, posterior plate long and narrow. **Early growth stages of divided anterior dorsal plate located more or less centrally.** Internal apophysis of the umbonal cavity large and spatulate, somewhat depressed medially and recurved along its anterior and posterior margins. Pallial sinus rounded, broad and relatively deep, extending to or slightly beyond midline of valves. Internal margins of anterior half with radial crenulations corresponding to the outer sculpture. **Colour:** outside of shell chalky to dirty white. Interior milky white and glazed.

Size: Maximum shell length 11 cm, commonly from 6 to 7 cm.

Habitat, biology, and fisheries: Boring in mud, clay, peat, wood and rather soft limestone, at shallow subtidal levels. Actively collected for food where common. Consumed in soups or in sea food dishes with rice.

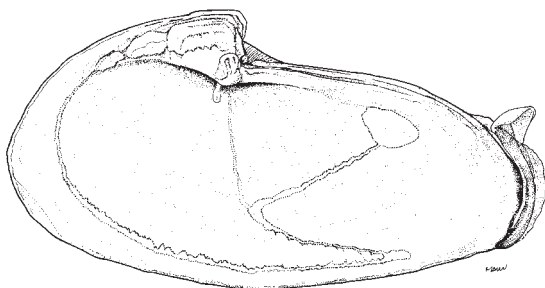
Distribution: Widely distributed in the tropical Atlantic. East Atlantic, from Senegal to northern Angola. West Atlantic, from North Carolina and Florida, throughout the Caribbean and the Gulf of Mexico, south to Uruguay.



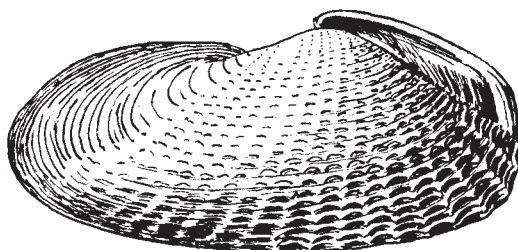
Talona explanata (Spengler, 1792)

Frequent synonyms / misidentifications: None / None.

FAO names: En – Talona pholad; Fr – Pholade talone; Sp – Ala de angel talón.



interior of right valve



exterior of right valve

Diagnostic characters: Shell moderately elongate ovate in outline (from about 2 to 2.5 times longer than high), strongly inflated, narrowly rounded and gaping posteriorly, rounded but not gaping anteriorly. Umbonal reflection narrow and erect, not folding back over the umbones and without transverse partitions. Outer surface with many close-set concentric ridges, crossed by imbricate radial ribs throughout but on the nearly smooth posterodorsal part of valves. A single, median, accessory calcareous plate along dorsal margins of the valves; median plate small, transverse and composed of 2 triangular pieces. Posterior end of shell with 2 pairs of extremely fragile calcareous-corneous inflated lobes (2 lobes on each valve). Internal apophysis of the umbral cavity rather thin, short and narrow. Pallial sinus trigonal and moderately deep, not reaching midline of valves. Internal margins smooth. **Colour:** outside of shell dirty white, with a pale greenish to yellowish brown periostracum. Interior milky white and porcelaneous.

Size: Maximum shell length 7 cm, commonly to 5.5 cm.

Habitat, biology, and fisheries: Boring in mud bottoms, together with *Macoma cancellata*. May occur abundantly in favourable environments. Mainly in shallow sublittoral waters, from about 1 to 15 m depths. Sometimes cast ashore in great numbers on beaches. Collected for food at low tide, or occasionally caught in bottom trawls.

Distribution: The tropical East Atlantic, from Senegal to northern Angola.

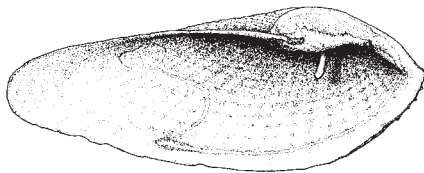


***Barnea candida* (Linnaeus, 1758)**

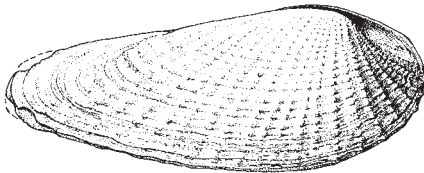
Frequent synonyms / misidentifications: None / *Petricola pholadiformis* Lamarck, 1818 [= *Petricolaria pholadiformis*].

En – White piddock; **Fr** – Pholade blanche; **Sp** – Barnea blanca.

Maximum shell length 7.5 cm, commonly from 5 to 6 cm. Boring into various bottoms, such as wood, firm sand or mud, peat, shales, limestone and chalk, in marine and brackish water environments. May locally form dense colonies. Intertidal and sublittoral zones, down to about 40 m depth. Occasionally dredged, or locally collected for food at low tide or at shallow subtidal level by coastal people. Rarely marketed. Used in soups. Eastern Atlantic, from northern Norway to Mauritania and the Canaries. Throughout the Mediterranean and the Black Sea.



interior of left valve



exterior of right valve



dorsal view of
accessory plate

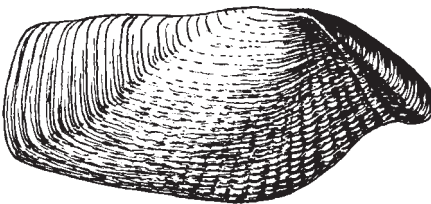


***Barnea truncata* (Say, 1822)**

Frequent synonyms / misidentifications: None / None.

En – Truncate barnea; **Fr** – Pholade tronquée; **Sp** – Barnea truncada.

Maximum shell length 7 cm, commonly to 5 cm. Boring in mud, clay and peat, in strictly marine conditions; small specimens sometimes living in waterlogged pieces of wood. Intertidal and shallow subtidal levels. Collected locally for subsistence purposes where common, and mainly consumed in soups. Widely distributed in the tropical Atlantic. East Atlantic, from Senegal to Congo. West Atlantic, from Massachusetts and Florida (USA), throughout the Caribbean and Gulf of Mexico, south to Brazil.



exterior of right valve

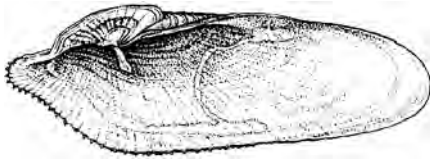


***Pholas dactylus* Linnaeus, 1758**

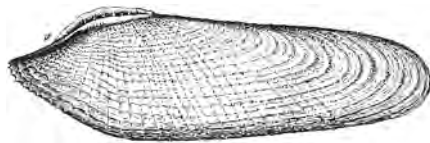
Frequent synonyms / misidentifications: *Pholas callosa* Cuvier, 1816 / None.

En – Common piddock; **Fr** – Pholade commune; **Sp** – Almeja brava.

Maximum shell length up to more than 15 cm, commonly from 8 to 10 cm. Boring into various bottoms such as wood, peat, firm sands or muds, sandstones, shales, limestones and even gneiss. Low intertidal and sublittoral zones to about 20 m depth. May form rather dense populations. Artisanal local exploitations at low tide or in shallow water. The meat is used for human consumption or for fish bait. In Great Britain, piddocks are studied for chemicals of potential value in the diagnosis of various diseases. Eastern Atlantic, from the British Isles to Morocco and Canary Islands. Throughout the Mediterranean and the Black Sea.



interior of right valve



exterior of left valve



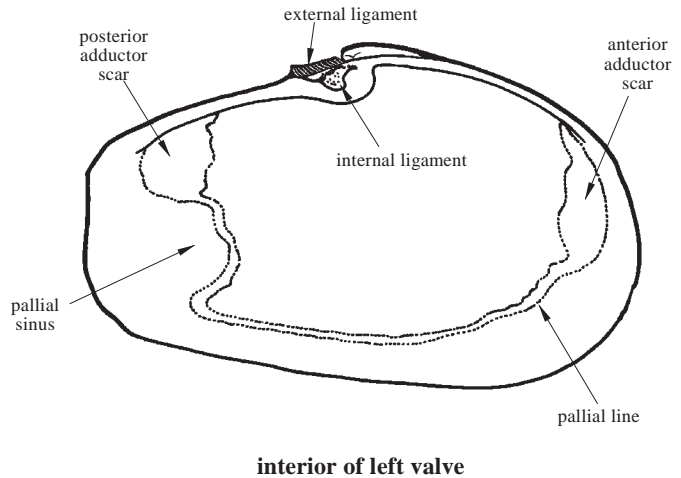
dorsal view of entire shell



THRACIIDAE

Thracia clams

Diagnostic characters: Shell rather **thin** and fragile, **elongate-ovate** to subtrigonal in shape, rounded anteriorly and truncate posteriorly, **usually closed**; often **somewhat inequivalve**, with slightly larger and more convex right valve. **Umbones** touching, 1 frequently puncturing the other, but **without an obvious median slit**. **Outer surface** of valves finely to very **finely granulated**. External ligament short and wide, just behind the umbones. **Internal ligament** reinforced by a small calcareous ossicle, **attached on trigonal pits not protruding ventrally nor supported by oblique buttresses**. **Hinge without teeth**. **Interior** of shell porcelaneous, **not nacreous**. **Two adductor muscle scars**, somewhat unequal in shape and size. **Pallial line with a broad, shallow** to rather deep **sinus**. Gills of eulamellibranchiate type, with well developed and plicate outer demibranchs, and reduced, dorsally reflected outer demibranchs. Foot of variable size, often rather small. Pallial openings reduced, comprising a pedal gape and a fourth pallial aperture (in addition to the siphonal openings). Siphons long, naked, separate and highly extensible, the inhalent siphon sometimes much longer. Simultaneous hermaphrodite animals, with paired male and female gonoducts fused together at the end.

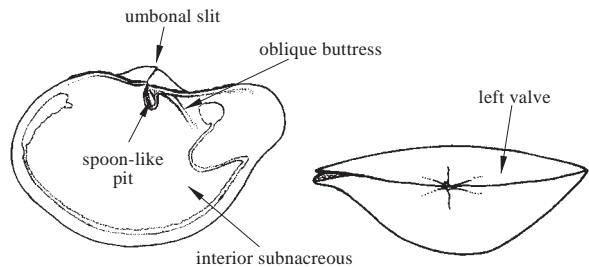


Habitat, biology, and fisheries: Mostly sedentary infaunal burrowers that lie positioned vertically in sandy bottoms, with their inflatable siphons extended to the surface through separate canals. Posterior end of these canals often lined with siphon produced mucus, allowing the animal to remain deep in its burrow and withdraw its siphons to just below the surface so as not to expose the delicate siphonal tips to potential predators. Some species have developed nestling habitat in rock crevices. Reproductive biology poorly known: at least some species are simultaneous hermaphrodites, leaving large yolky eggs with either a short planktonic stage or none at all. Locally collected by bottom trawls or dredges, mainly for fishermen's consumption. Sometimes marketed fresh, mixed with other bivalves.

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Similar families occurring in the area

Periplomatidae: shell gaping anteriorly and posteriorly, markedly inequivalve. Umbones with an obvious median slit. Internal ligament attached on protruding spoon-like pits, each supported by an oblique buttress. Interior subnacreous. Pallial line with a rather deep sinus.



interior of right valve

dorsal view of entire shell

Periplomatidae

Key to species of interest to fisheries occurring in the area

- 1a. Shell length not exceeding 4 cm long; outer surface very finely granulated (granulation only visible under a strong magnification); pallial sinus relatively deep, extending forward to level of the umbones (Fig. 1) ***Thracia phaseolina***
- 1b. Shell length often greatly exceeding 4 cm long; outer surface finely granulated (granulation visible to the naked eye or under a feeble magnification); pallial sinus relatively shallow, extending forward to about two-third the distance from the umbones to posterior end of shell (Fig. 2) ***Thracia pubescens***

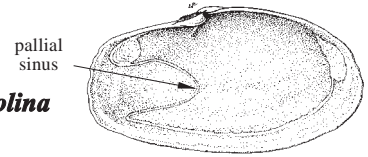


Fig. 1 *Thracia phaseolina* (interior)

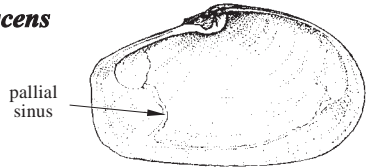


Fig. 2 *Thracia pubescens* (interior)

List of species of interest to fisheries occurring in the area

The symbol 🐚 is given when species accounts are included.

- 🐚 *Thracia phaseolina* (Lamarck, 1818).
- 🐚 *Thracia pubescens* (Pulteney, 1799).

References

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Prezant, R.S. 1998. Superfamily Thracioidea. In Beesley, P.L. et al., eds. *Mollusca: The Southern Synthesis. Part A. Fauna of Australia. Volume 5*. Melbourne, CSIRO: pp. 407–412.

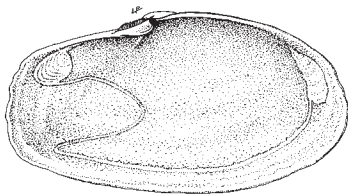
Yonge, C.M. 1937. The formation of siphonal openings by *Thracia pubescens*. *Proceedings of the Malacological Society of London*, 22(6): 337–338.

***Thracia phaseolina* (Lamarck, 1818)**

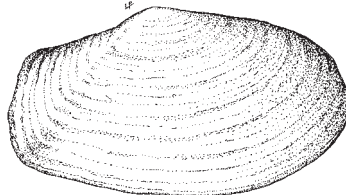
Frequent synonyms / misidentifications: *Odoncineta phaseolina* (Lamarck, 1818); *Tellina papyracea* Poli, 1795 (not of Gmelin, 1791); *Thracia papyracea* (Poli, 1795); *T. pubescens* (Montagu, 1803; not of Pulteney, 1799) / *Thracia pubescens* (Pulteney, 1799); *Thracia villosiuscula* (McGillivray, 1827).

En – Paper thracia; **Fr** – Thracie faséole; **Sp** – Tracia pergamina.

Maximum shell length 4 cm, commonly to 3 cm. In various soft bottoms of sand, muddy and gravely sand, from low in the intertidal zone to about 50 m depth. Collected for food where common. Outside the studied area, it is known to be regularly sold in some Italian and French Mediterranean markets, often mixed with other small-sized bivalves. Widely distributed in the Eastern Atlantic, from Norway, Iceland and the Faroes to Mauritania and Madeira and, with a large gap in distribution, from northern to southern Angola and the Canaries; perhaps also present in the Gulf of Guinea. Throughout the Mediterranean and the Black Sea.



interior of left valve



exterior of right valve

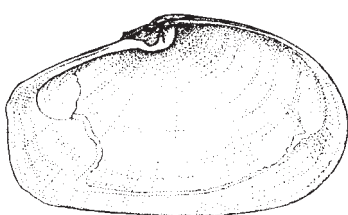


***Thracia pubescens* (Pulteney, 1799)**

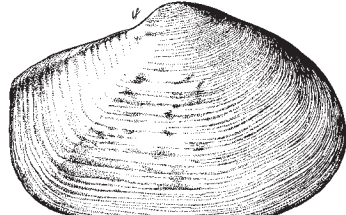
Frequent synonyms / misidentifications: None / None.

En – Pubescent thracia; **Fr** – Thracie veloutée; **Sp** – Tracia vellosa.

Maximum shell length 10 cm, commonly from 4 to 6 cm. In fine sandy and muddy bottoms, from just below low tide line to sublittoral and shelf zones, down to about 360 m; most frequent to 60 m depth. Rapidly burrowing into the sediment by means of its broad and very thin foot, then forming and enlarging distinct, mucus-lined tubes by means of the temporarily inflated ends of their separate siphons. Quite rare in the Mediterranean, more common in the Atlantic. Occasional bycatch of shrimp trawlers. Widely distributed in the eastern Atlantic, from Great Britain and Ireland to northern Angola; Canary Islands. Throughout the Mediterranean.



interior of left valve



exterior of right valve



GASTROPODS

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GENERAL REMARKS

Gastropods are molluscs in which the bilateral symmetry they possessed primitively is often greatly altered in recent species.

Their soft body shows 4 main regions: the **head**, which normally protrudes from the shell anteriorly; the **foot**, a muscular ventral organ with a flattened base used for locomotion (creeping or burrowing); the **visceral mass**, which fills dorsally the spire of the shell; and the **mantle**, a collar-like integument which lines and secretes the shell, and forms a mantle cavity normally provided with respiratory **gills** in aquatic species. A unique feature of the gastropods is a twisting of the visceral mass and mantle through 180° called the “torsion”, which occurs early during the larval development. Torsion is a phenomenon closely linked to coiling of the visceral mass and mantle; characteristically, the visceral mass is wound in a helicoid spiral. Part of the paired organs of the visceral mass cease developing, and the animal begins to become asymmetrical. This internal asymmetry persists in the adult, even when subsequent detorsion occurs.

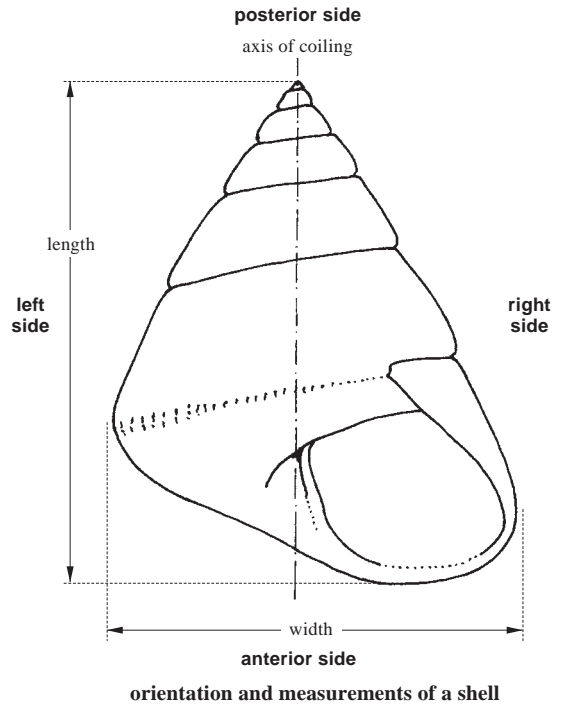
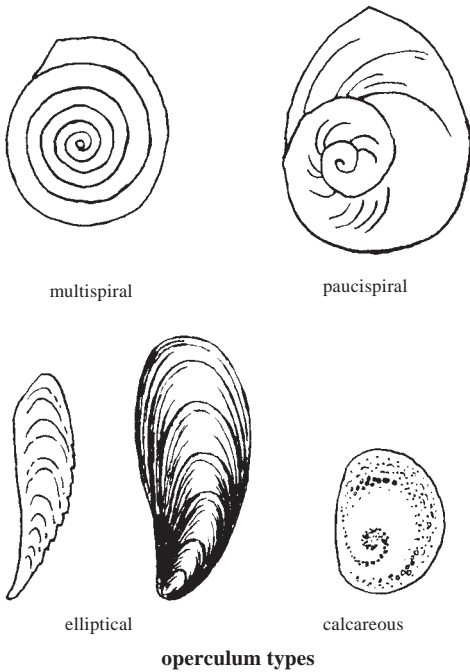
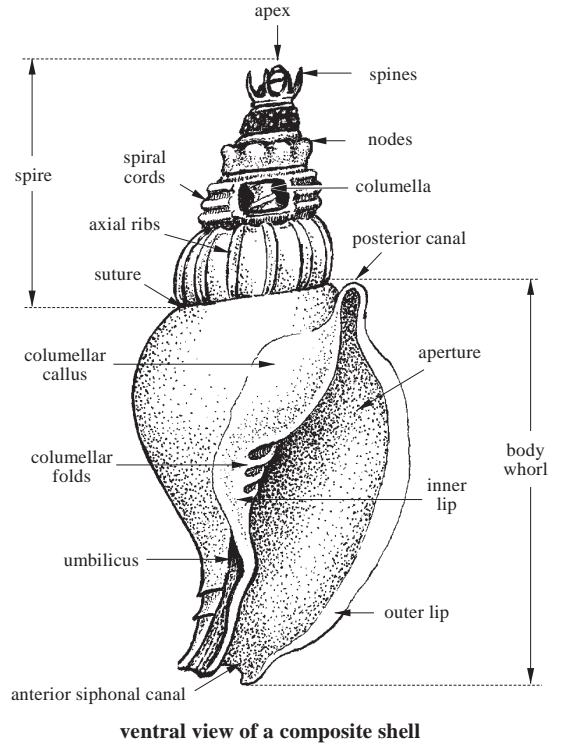
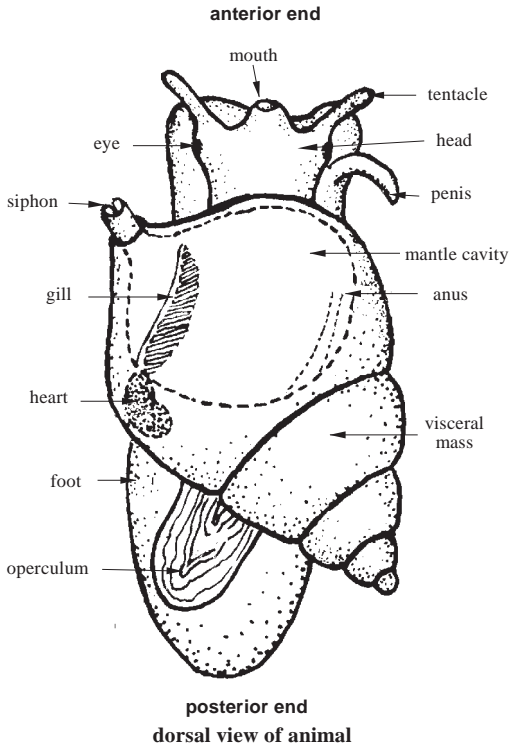
Most of the gastropods produce a **single coiled shell**, and many have a corneous or calcareous “trapdoor”, the **operculum**, that seals the opening of the shell. In some species, the shell may appear as a simple conical or cap-shaped plate, or may even be absent.

The shell of gastropods typically consists of a spirally coiled tube increasing in diameter with growth, and an opening only at the ventral growing end, called the **aperture**. The axis of the shell whorls or **columella** may be hollow, forming an opening, the **umbilicus** at the base of the shell. The **base** of shell is formed by the anterior part of the largest spiral turn or **body whorl**, while the other whorls, which are closer to the summit or **apex**, constitute the **spire**. The continuous line where 2 adjacent whorls join is known as the **suture**. The aperture may have a simple, ovate outline, or be deformed anteriorly by a **siphonal canal**. Its margin close to the columella forms the **inner lip**, whereas the opposite margin constitutes the **outer lip**; the latter sometimes shows a notch or **posterior canal**. Apart from **growth marks** left by the growing lip, the surface of the shell may be smooth, but usually it bears a distinct **sculpture**. Sculptural elements are either **spiral** in direction (following the curve of the whorls), or **axial** (transverse to the whorls and roughly parallel to the coiling axis).

The majority of marine gastropods are carnivores, herbivores or scavengers, using the **radula**, a cuticular ribbon carrying rows of teeth, to take in food. Sexes are generally separate, although a few species may be hermaphrodites. In primitive species, fertilization is external; in species with internal fertilization, eggs may be enclosed in protective layers of gelatinous mucus or corneous capsules before they are deposited. Depending on the species, embryos may hatch as free-swimming planktonic larvae (accounting for dispersal over large areas by marine currents), or as crawling young (after metamorphosis).

Until very recently, Gastropods were usually divided into 3 main subclasses: **Prosobranchia**, with an anterior mantle cavity and 1 or 2 gills in front of the heart; **Opisthobranchia**, with a right-sided or posterior mantle cavity and a single gill behind the heart, or without gills; and **Pulmonata**, the mantle cavity of which is modified into a primitive lung. Most of the marine shelled gastropods belong to the Prosobranchia, which was divided into the primitive **Archaeogastropoda**, the middle **Mesogastropoda**, and the advanced **Neogastropoda**, implying progressively improved levels of organization in gastropod evolution. It is now realized that this simplistic view cannot stand, as major advances in the understanding of gastropod phylogeny have been accomplished since the 1980s. The Opisthobranchia, Pulmonata and a few groups previously included in the Prosobranchia form a distinct lineage, the Heterobranchia, whereas the remaining Prosobranchia are paraphyletic; they consist of 5 different groups, each of which should be considered as distinct as the Heterobranchia. Features used to define this new phylogenetic classification of gastropods include shell structure, radular morphology, larval development, details of internal anatomy, and sperm ultrastructure (among others). Though their detailed definition is outside the scope of this contribution, the major groups of gastropods now recognized are briefly outlined below, with emphasis on the forms of interest to fisheries in the east central Atlantic.

Subclass Eogastropoda: the “true limpets”, or **Patellogastropoda** (previously included in the Archaeogastropoda); most primitive extant gastropods, characterized by unique radular morphology, secondarily flattened cone-shaped shell and peculiar shell structure.



general characteristics of gastropods

Subclass Orthogastropoda: all the remaining gastropods, distinguished by different radular morphology and other anatomical features. They are usually divided into 5 distinct groups (of which the first 3 listed below were included in the Archaeogastropoda).

Neritopsina: Nerites and their kin (with body form ranging from snail-like to limpet-like or slug-like), occurring in marine, freshwater or terrestrial environments.

Cocculiniformia: a still poorly understood group of uncertain affinities, mainly composed of small deep-sea limpets living on biogenic substrates. No representatives of this group are included in this contribution.

Vetigastropoda: all the remaining “archaeogastropods”, that were traditionally considered the most primitive gastropods. However, they also share a number of advanced features, and include abalones, keyhole limpets, top shells and turban shells.

Caenogastropoda: roughly corresponding to the Mesogastropoda and Neogastropoda, except for the “mesogastropod” groups now included in the Heterobranchia. This group encompasses most of the species of interest for fisheries included here.

Heterobranchia: group including the old “opisthobranchs” (sea slugs or sea hares) and “pulmonates” (false limpets and most of the terrestrial snails and slugs), together with some “mesogastropods” such as sundial shells (Architectonicidae).

The biodiversity of the malacological fauna in the tropical east Atlantic was thought to be much less important than that of the western Atlantic, but it is probably largely underestimated and no confident estimate of the gastropod diversity is presently available. However, a recent evaluation of the Angolan fauna (Rolán and Ryall, 1999) may give an idea of the biodiversity in the studied area. It was found that about 800 species of marine gastropods allocated to 137 families occurred in Angola alone (with 135 species recorded for the first time in this area), compared to a total number of 23 000 species in the world. For the present contribution, 146 species belonging to 33 families have been selected, mainly on the basis of size, abundance, distribution and commercial interest. To make this selection of species, primarily based on the first edition of the FAO east central Atlantic guide (Abbott, 1981), the author has largely used the “Provisional list of marine and brackish-water species of interest to fisheries” he prepared as a basis for the FAO Species Catalogue, *Gastropods of the World* (in preparation). However, in view of the paucity of detailed information on fisheries in many places, many other species are probably also collected locally in the area. Moroccan species not occurring south of Tangier along the Atlantic coast have not been included in this guide. Distributions given here must be considered as tentative only, as detailed and recent data on occurrence are not available for many gastropod species; it has often not been possible to show biogeographical patterns similar to those observed for the bivalves in the area, such as discontinuity of distribution for some tropical species.

GLOSSARY OF TECHNICAL TERMS

Anterior – Direction in which the head points when the animal is active; in a spiral shell, part of the aperture which is farthest from the apex.

Aperture – Opening of shell, situated at the last formed margin and providing an outlet for the head-foot mass.

Apex – The first formed part of the shell, generally pointed; in a spiral shell, apex is situated on top of the spire.

Apical – Pertaining to the apex.

Auricular – Ear-shaped.

Axial – Parallel to the coiling axis of the shell.

Base – Lower part of shell, anterior to the level of periphery of body whorl.

Body whorl – The largest, last whorl of the spiral in a coiled shell.

Callus – Thick secondary deposit of lime, generally shiny and porcelaneous.

Cancellate – With axial (or concentric) and spiral (or radial) components that intersect to form a latticed pattern.

Columella – Coiling axis of shell, forming the anterior part of inner lip.

Concentric – Parallel to lines of growth in a cone-shaped shell.

Corneous – Horny.

Crenulate – With the edge regularly notched or scalloped.

Denticulate – Finely toothed.

Foot – Mobile and extensible muscular organ, ventrally situated, with a flattened base used for locomotion.

Fusiform – Spindle-shaped, tapering at both ends.

Gill – Respiratory organ of aquatic gastropods, housed in the mantle cavity. The gill of Orthogastropoda is generally composed of 1 row of numerous, flexible leaflets disposed along a main axis; in Patellogastropoda, Neritopsina and Vetigastropoda, gills often have 2 rows of leaflets, and may be 1 (Lottiidae, Neritidae, Trochidae, Turbinidae) or 2 in number (Fissurellidae, Haliotidae).

Growth marks – Approximately axial (or concentric) lines left by the growing margin of aperture, superimposed on the outer sculpture of shell.

Hermaphrodite – With both male and female sex organs.

Inner lip – Margin of the aperture closer to the coiling axis of a spiral shell.

Keel – Prominent angular ridge.

Lira (pl. **lirae**) – Fine linear elevations of the shell surface or within the outer lip.

Lirate – With lirae.

Mantle – Fleshy integument which lines and secretes the shell.

Mantle cavity – Cavity enclosed by the mantle, housing the gills.

Multispiral – With numerous coils.

Nacreous – Pearly, often with multi-coloured hues, as in mother-of-pearl.

Nucleus – The first formed part of the operculum.

Operculum – Horny or calcareous part attached to the foot; it seals the aperture when the animal withdraws into the shell.

Outer lip – Margin of the aperture opposite to the inner lip of the spiral shell.

Paucispiral – With relatively few coils.

Periostracum – Layer of horny material covering outside of shell, at least during some part of the growth.

Periphery – Part of a whorl farthest from the coiling axis of the shell.

Posterior – Direction opposite to that into which the head points in the active animal; in a spiral shell, part of the aperture which is nearest to the apex.

Posterior canal (or **sinus**) – Notch or tube at or close to posterior end of aperture.

Protoconch – Larval or embryonic shell of a gastropod, developed before metamorphosis, and usually present in the adult as the apical whorls of the spire.

Radial – Diverging from the apex like the spokes of a wheel, in a cone-shaped shell.

Radula – The main feeding organ, generally consisting of a cuticular ribbon with transverse rows of horny teeth.

Sculpture – Relief pattern developed on the outer surface of the shell.

Shoulder – Distinct spiral angulation of a whorl.

Siphonal canal – Trough-like or tubular extension of aperture anteriorly, for enclosure of a fleshy siphon.

Siphonal fasciole – Distinctive spiral band of abruptly curved growth lines, near base of columella, marking successive positions of siphonal notch serving for protrusion of the fleshy siphon.

Spiral – Parallel to the curls of whorls, in a coiled shell.

Spire – All the whorls of a shell, excluding the last, or body whorl.

Suture – Spiral line or groove of shell surface, where adjacent whorls meet.

Turbinate – With a broad conical spire and a convex base.

Turreted – Sharply conical shape of a shell with numerous spire whorls.

Umbilicus – Opening at base of shell made around the coiling axis when columella is hollow.

Varix (pl. **varices**) – Axial rib-like thickening of the outer surface of shell, representing a previous growth halt during which outer lip of aperture thickened.

IDENTIFICATION NOTE

An illustrated key to families comprising the species treated in this guide can be found on the following pages. After a family is determined by using this key, the user should turn to the descriptive accounts of families and species. Each section on a family includes, beside a diagnosis of the family, a key to the species treated here. Furthermore, there are detailed accounts for the most important species given, and abbreviated accounts for species of secondary interest.

KEY TO FAMILIES OCCURRING IN THE AREA

Remarks on key characters: features used in this key only apply to species included in the present contribution; they do not consider a few exceptions within the families, the inclusion of which would make the key too complex for general use.

- 1a. Shell conical or ear-shaped, with a marginal indentation or slit anteriorly, or with 1 to several holes in addition to the aperture **Figure A**
- 1b. Shell not of these shapes, or without holes, anterior indentation or slit, apart from the aperture → **2**
- 2a. Shell conical, cap-shaped or slipper-shaped, without obvious coiling. Spire, if visible, not prominent **Figure B**
- 2b. Shell not of these shapes, conspicuously coiled → **3**
- 3a. Outer lip of the aperture with a distinct notch anteriorly **Figure C**
- 3b. Outer lip of the aperture without an anterior notch → **4**
- 4a. Aperture stretching along the whole shell length but narrow **Figure D**
- 4b. Aperture, if stretching along the whole shell length, widely open → **5**
- 5a. Shell without an anterior siphonal canal → **6**
- 5b. Shell with an anterior siphonal canal → **8**

- 6a. Interior of shell pearly **Figure E**
- 6b. Interior of shell not pearly. → 7

- 7a. Shell ovoid, spire concealed under body whorl or poorly protruding. Aperture stretching along the whole shell length **Figure F**
- 7b. Shell, if ovoid, with a more or less protruding spire. Aperture not stretching along the whole shell length **Figure G**

- 8a. Outer sculpture with axial varices **Figure H**
- 8b. Outer sculpture without axial varices. → 9

- 9a. Columella with strong spiral folds **Figure I**
- 9b. Columella without strong spiral folds (low threads or grooves may be present). → 10

- 10a. Siphonal canal relatively long **Figure J**
- 10b. Siphonal canal relatively short → 11

- 11a. Spire short → 12
- 11b. Spire well developed → 13

- 12a. Shell shape globular **Figure K**
- 12b. Shell shape elongate ovate to conical **Figure L**

- 13a. Spire much longer than the aperture **Figure M**
- 13b. Spire not much longer than the aperture **Figure N**

Note: The following figures contain all the families included in this contribution, plus those quoted as similar to the treated families. These similar families are marked with an asterisk (*).

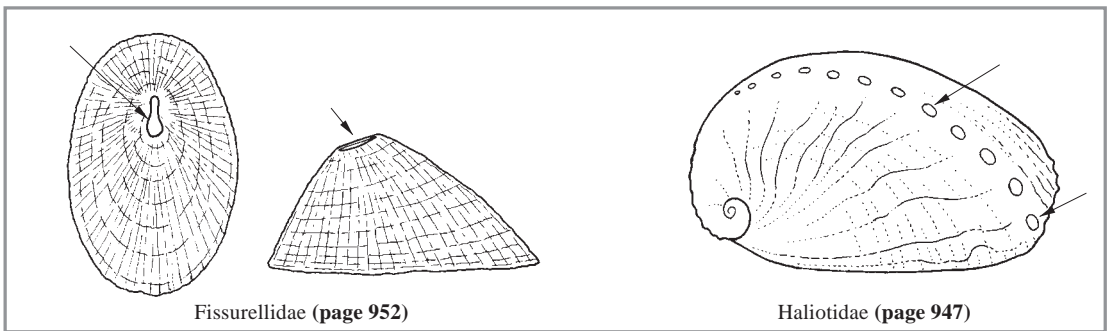


Figure A

Figure A:

Fissurellidae: shell conical, with a hole at the apex, or a marginal notch or groove. Interior with a horseshoe-shaped muscle scar. No operculum.

Haliotidae: shell ear-shaped, depressed and loosely coiled. Spire eccentric. A spiral row of holes on body whorl. Aperture occupying most of the underside. Interior nacreous. No operculum.

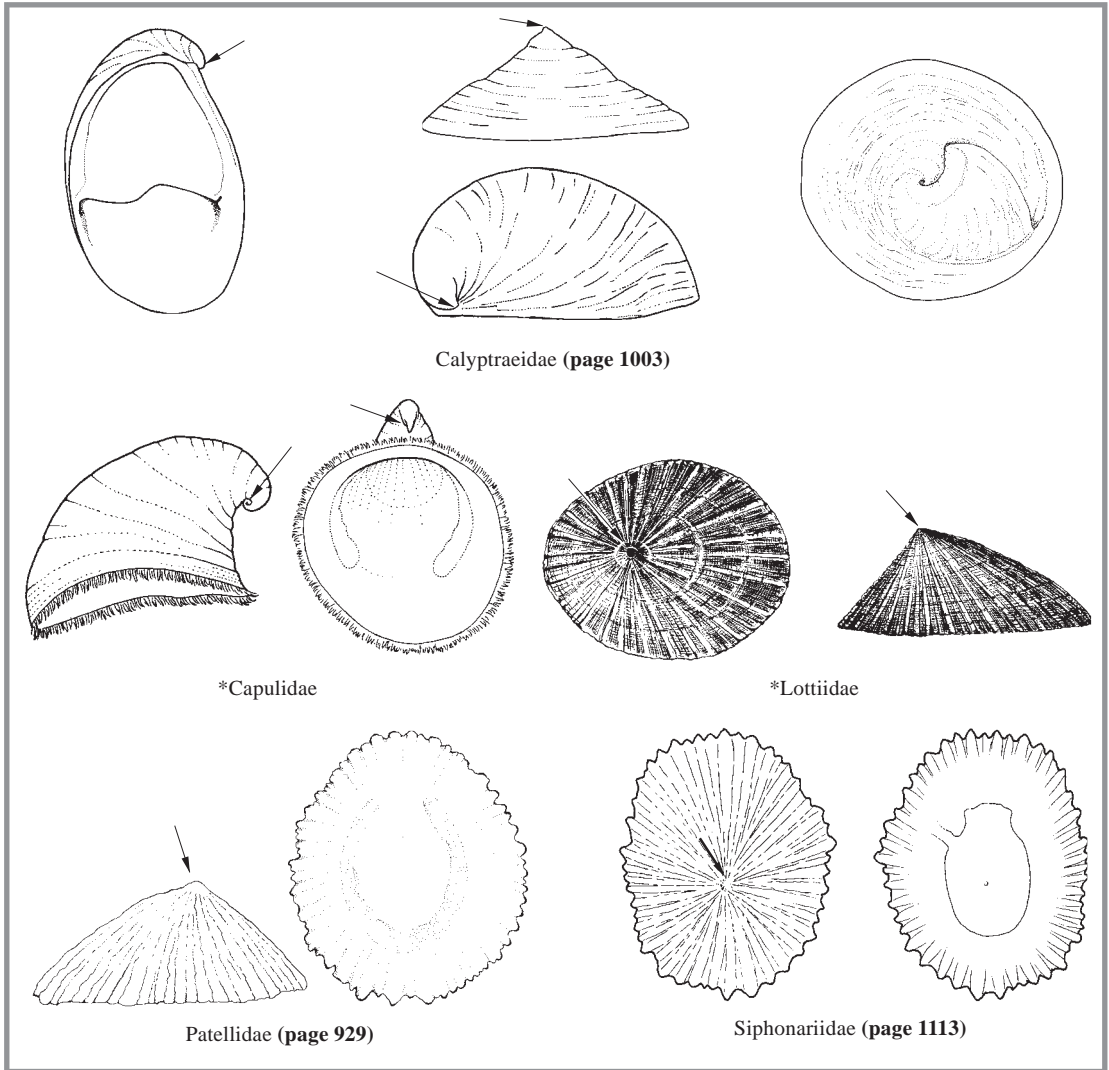


Figure B

Figure B:

Calyptraeidae: shell cap-shaped to conical, with a central to posterior apex. Interior with a calcareous septum projecting from the apical region. No operculum.

***Capulidae:** shell cap-shaped with a small spiral apex, but without any internal septum. No operculum.

***Lottiidae:** shell conical. Sculpture essentially radial. Interior with a horseshoe-shaped muscle scar. No operculum. A single true gill in the mantle cavity.

Patellidae: shell conical. Sculpture essentially radial. Interior with a horseshoe-shaped muscle scar. No operculum. True gills replaced by a fringe of respiratory tentacles.

Siphonariidae: shell conical, with a weak marginal lobe on the right side. Interior with a ring-like muscle scar, interrupted on the right side where there is a shallow radial groove. No operculum.

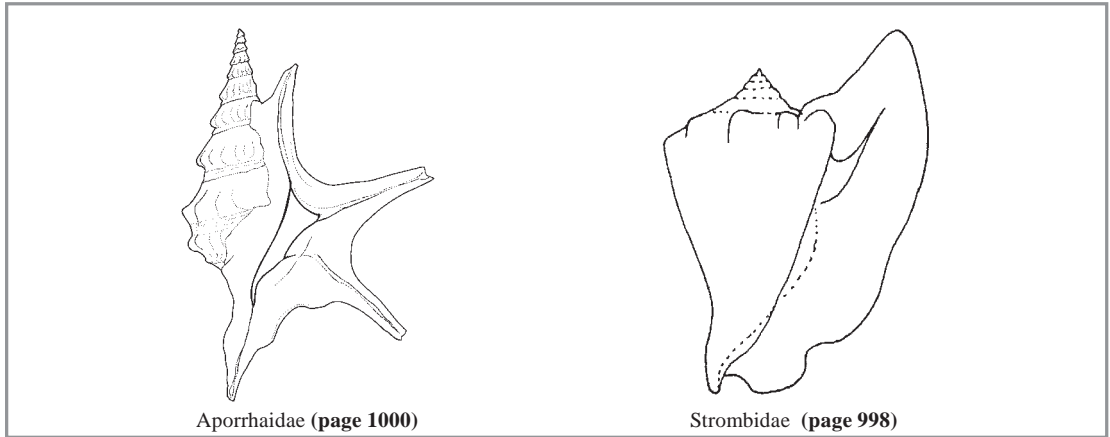


Figure C

Figure C:

Aporrhaidae: shell elongate, with a rather high spire and characteristic shape. Aperture with a well marked siphonal canal. Outer lip thickened and palmate, drawn out into channelled digitations. A shallow notch along the anterior margin of the outer lip. Operculum corneous, long and subovate to elliptical.

Strombidae: shell thick and solid, with a relatively large body whorl. Aperture with a well-marked siphonal canal. A distinct notch along the anterior margin of the outer lip. Operculum corneous, claw-like.

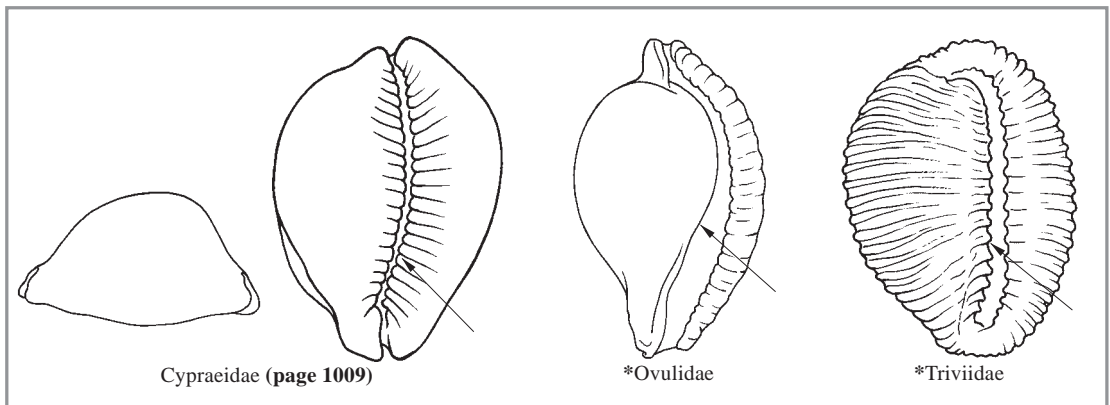


Figure D

Figure D:

Cypraeidae: shell ovate or oblong, spire concealed under body whorl. Surface highly polished, smooth. Aperture long and narrow, channelled at both ends. Both lips with teeth. No operculum.

***Ovulidae:** shell globular to spindle-shaped, with more or less expanded extremities. Spire concealed under body whorl. Surface often smooth, porcelaneous. Aperture very long, channelled at both ends. Inner lip smooth. No operculum.

***Triviidae:** shell ovate or oblong, usually small-sized. Spire concealed under body whorl. Surface strongly sculptured. Aperture long and narrow, channelled at both ends. Apertural teeth on both lips, continued over lateral and dorsal sides of shell. No operculum.

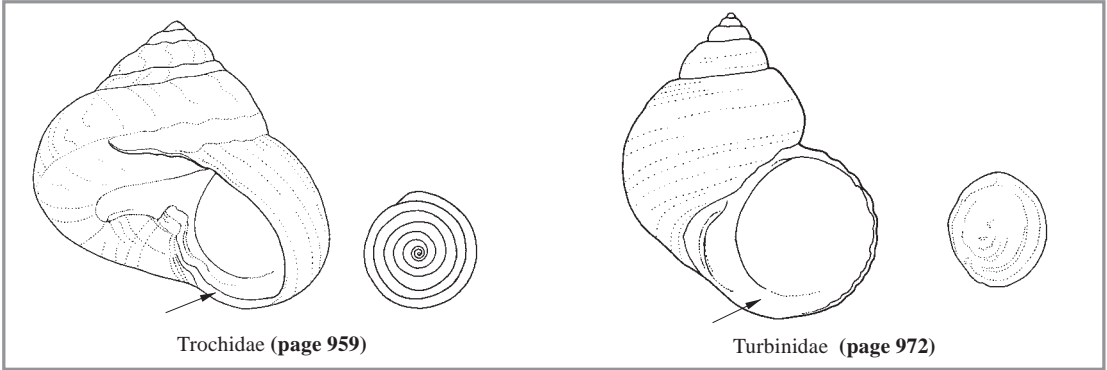


Figure E

Figure E:

Trochidae: shell conical to globose, often with a flattened base. Aperture without a siphonal canal, nacreous within. Operculum corneous, nearly circular, with many coils and a central nucleus.

Turbinidae: shell thick, turbinated to conical. Outer sculpture often spiral to nodular. Aperture rounded, without a siphonal canal, nacreous within. Operculum strongly calcified.

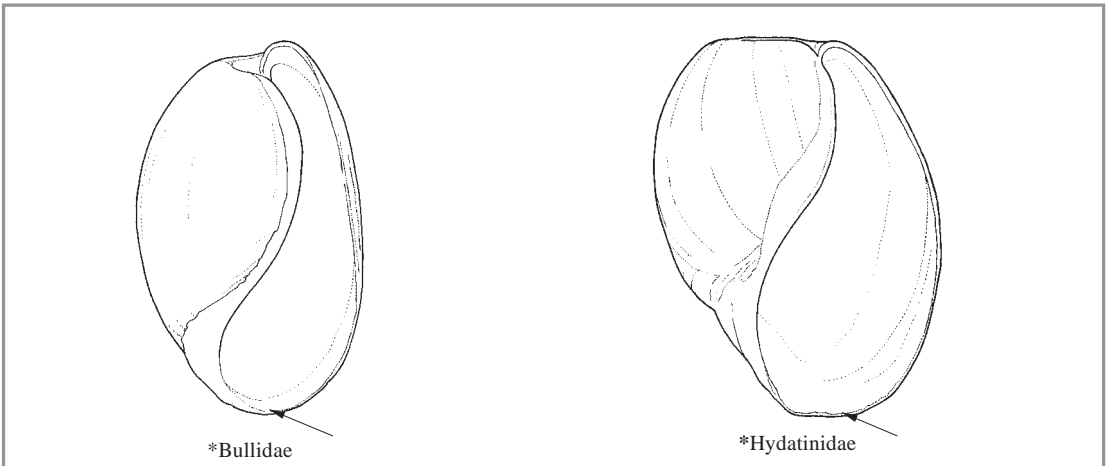


Figure F

Figure F:

***Bullidae:** shell ovoid and solid, with a deeply sunken, concealed spire and very large body whorl. Surface smooth or with faint spiral sculpture, with drab colour mottling or spotting. Aperture large, stretching along the whole shell length, broadly rounded anteriorly and narrowed posteriorly, raised above apex at posterior end. Inner lip smooth. No siphonal canal. Operculum absent.

***Hydatinidae:** shell ovoid and thin-walled, with a flat but not sunken spire and very large body whorl. Surface smooth or with faint spiral sculpture, with spiral colour banding. Aperture large, stretching along the whole shell length, broadly rounded anteriorly and somewhat narrowed posteriorly. Inner lip smooth. No siphonal canal. Operculum absent.

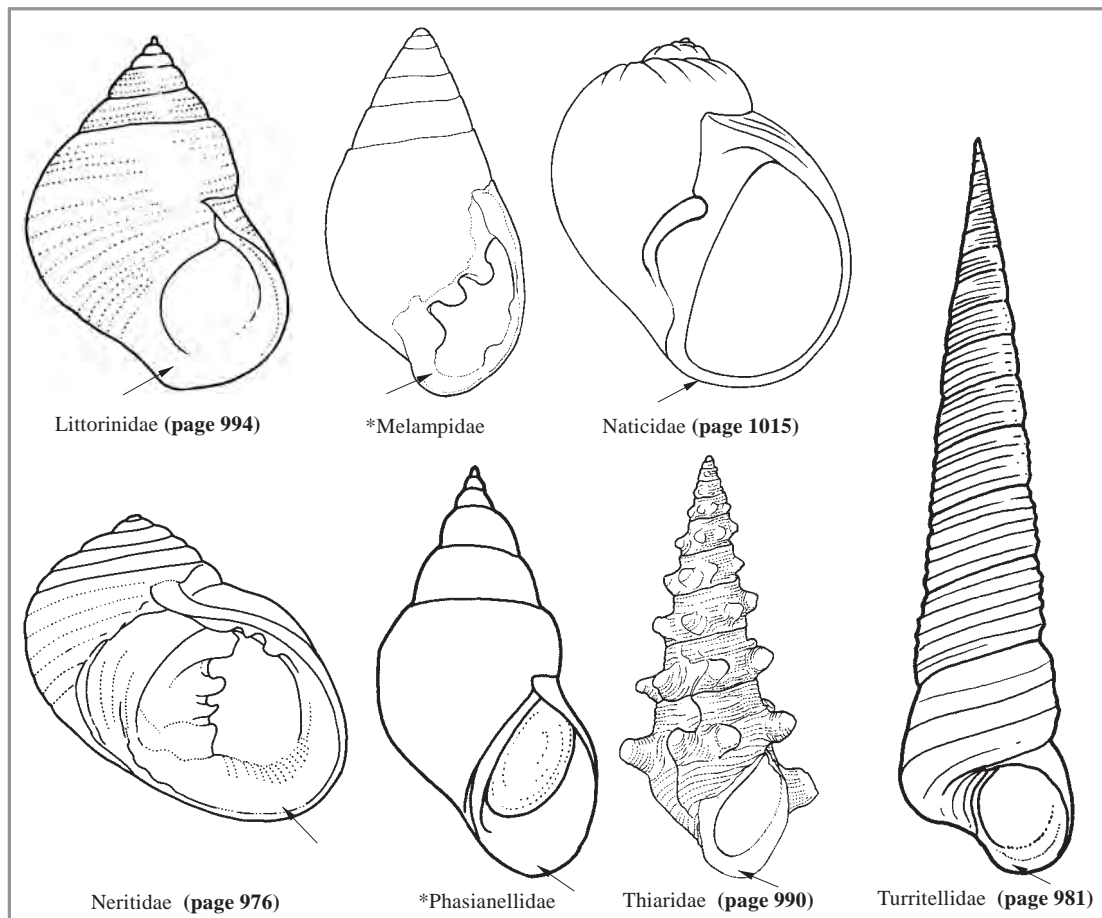


Figure G

Figure G:

Littorinidae: shell ovate-conical, without an umbilicus. Aperture rounded, without a siphonal canal. Operculum corneous, with relatively few spiral coils.

***Melampidae:** shell with a rather short, conical spire and large body whorl. Aperture often narrowed by folds and other constrictions. No siphonal canal. Operculum absent.

Naticidae: shell globular to ovate-conical or subauriculate. Outer surface smooth or with reduced sculpture. Aperture large, semicircular. Siphonal canal absent. Umbilicus open or closed, sometimes with an internal rib. Operculum corneous or calcified.

Neritidae: shell globose, with a relatively low spire and a very large, rounded body whorl. Aperture semicircular, without a siphonal canal. Inner lip protruding as a septum that narrows the aperture. No umbilicus. Inner walls of the spire resorbed. Operculum calcified, with a projecting peg.

***Phasianellidae:** shell ovate-conical, smooth. Aperture pear-shaped, without a siphonal canal. Operculum calcified, rounded.

Thiaridae: shell high-conical, with many whorls. Sculpture conspicuous, with strong spiral and usually axial elements. Aperture relatively small, ovate, produced and spout-like anteriorly, without a siphonal canal. Operculum narrowly ovate, corneous, with a few spiral coils and an anterior nucleus.

Turritellidae: shell elongate, sharply conical, with numerous whorls and a small aperture. Whorls sculptured with spiral ribs or keels. Siphonal canal absent. Operculum corneous, rounded.

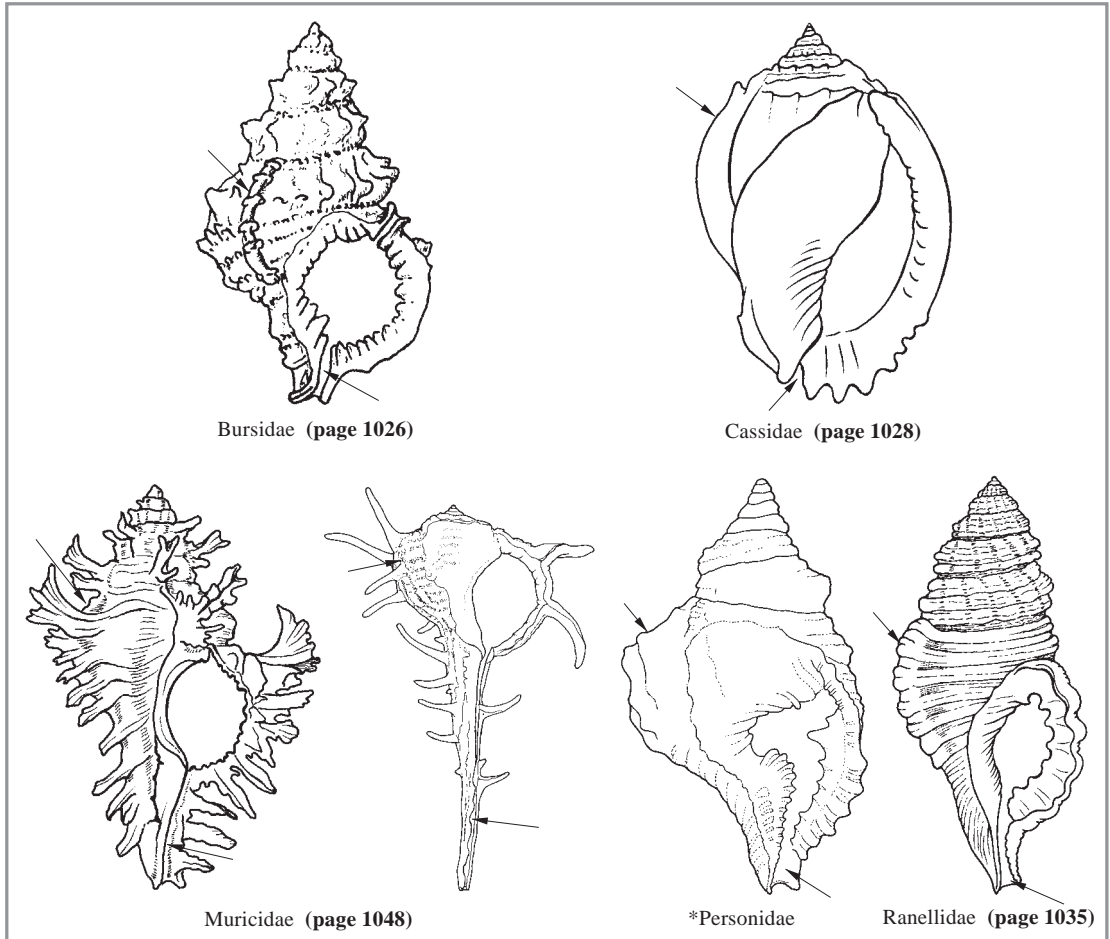


Figure H

Figure H:

Bursidae: shell ovate, often slightly dorsoventrally compressed, with 2 strong axial varices per whorl. Periostracum obsolete. Aperture with a short siphonal canal and a distinct posterior canal. Operculum corneous.

Cassidae: shell thick and solid, with a large body whorl and rather small, conical spire. Sculpture variable, axial varices sometimes present. Aperture elongate, with a short siphonal canal, recurved dorsally. Outer lip thickened. Inner lip with a shield-like callus. Operculum quite small, corneous.

Muricidae: shell variably shaped, generally with a raised spire and strong sculpture with axial varices, spines, tubercles or blade-like processes (axial varices absent in Rapaninae). Periostracum absent. Aperture with a well-marked siphonal canal. Operculum corneous.

***Personidae:** shell fusiform, inflated, roughly sculptured, bumped, with a wavering suture and with axial varices. Periostracum fibrous to hairy. Aperture distorted, narrowed by strong teeth. Inner lip with an extensive callus. Siphonal canal recurved. Operculum corneous.

Ranellidae: shell ovate-fusiform, with a strong sculpture and axial varices. Periostracum frequently well developed and hairy. Aperture with a siphonal canal. Operculum corneous.

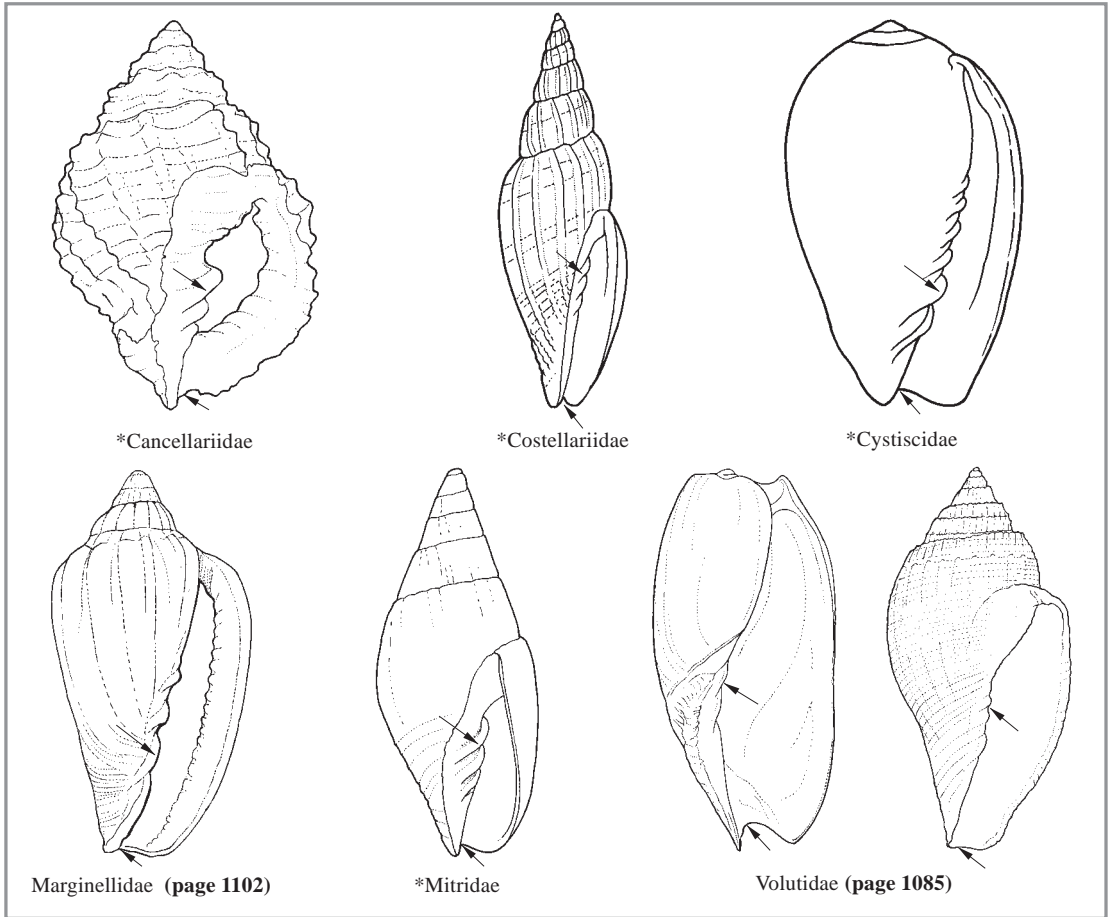


Figure I

Figure I:

*Cancellariidae: shell ovate to globose, with a large body whorl and moderately developed, conical spire. Sculpture of axial ribs, often cancellate by spiral ridges. Aperture with a shallow siphonal canal. Outer lip thickened, folded or denticulate within. Inner lip calloused, usually with 2 or 3 folds. Operculum absent.

*Costellariidae: shell fusiform-ovate, with a predominantly axial sculpture. Aperture notched by a short siphonal canal. Outer lip finely lirate inside. Columella with strong folds, larger posteriorly. No operculum.

*Cystiscidae: shell small, ovate, smooth and polished, often white. Internal whorls of spire partially resorbed. Aperture elongate, with a shallow siphonal canal. Outer lip not thickened externally. Columella with strong folds, most prominent anteriorly, posteriormost folds not extending much within the shell. No operculum.

Marginellidae: shell ovate, usually smooth and polished, often brightly patterned. Internal whorls of spire not resorbed. Aperture elongate, with a short siphonal canal. Outer lip thickened externally. Columella with strong folds, most prominent anteriorly and extending deep within the shell. No operculum.

*Mitridae: shell fusiform-ovate, with a predominantly spiral sculpture. Aperture notched by a short siphonal canal. Outer lip not lirate inside. Columella with strong folds, larger posteriorly. No operculum.

Volutidae: shell variable in shape, with a high pointed to low or sunken spire. Surface often smooth and glossy, sometimes with cancellate sculpture. Aperture long, with a short siphonal canal. Inner lip with strong oblique folds, weaker posteriorly. Operculum absent.

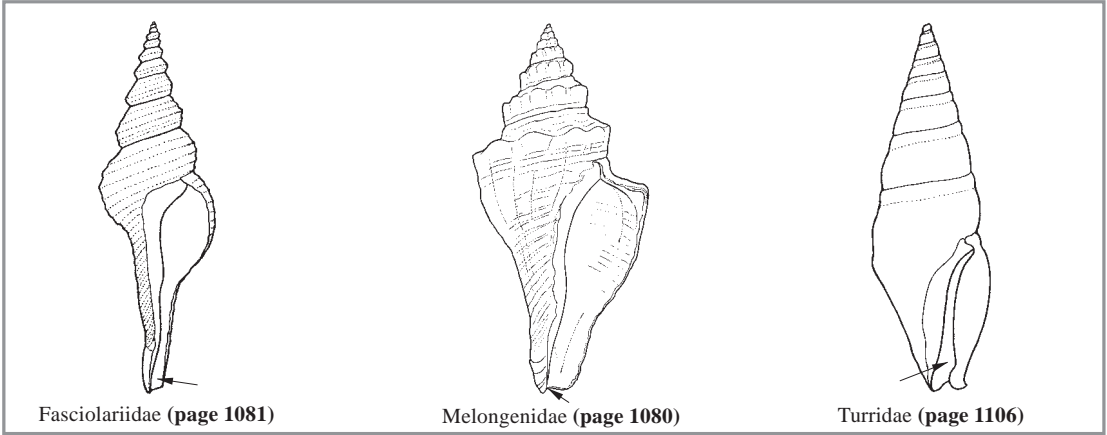


Figure J

Figure J:

Fascioliariidae: shell fusiform, with a well-developed siphonal canal. Columella often with a few low basal threads. Operculum corneous. Soft parts brilliant scarlet.

Melongenidae: shell fusiform, nodular to spiny on the shoulder. Aperture subquadrate, anteriorly narrowing into an open, well-developed siphonal canal. Columella smooth. Operculum corneous.

Turridae: shell generally fusiform, with a high spire. Siphonal canal well marked. A characteristic notch along the posterior part of the outer lip, reflected in the growth lines. Operculum corneous.

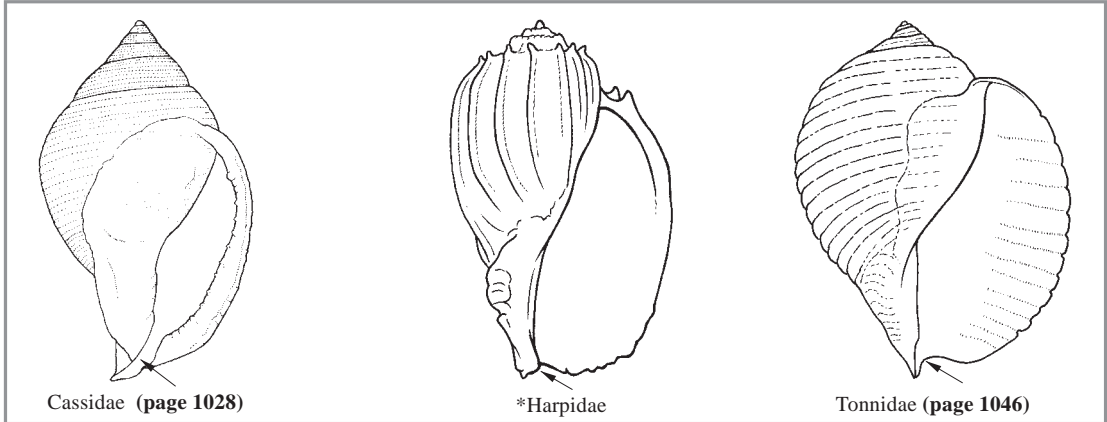


Figure K

Figure K:

Cassidae: shell thick and solid, with a large body whorl and rather small, conical spire. Sculpture variable, axial varices sometimes present. Aperture elongate, with a short siphonal canal, recurved dorsally. Outer lip thickened. Inner lip with a shield-like callus. Operculum quite small, corneous.

***Harpidae:** shell ovate, with an inflated body whorl and a small conical spire. Surface glossy, with strong axial ribs. Inner lip covered by a smooth, large callus. Columella without folds. Siphonal canal short and wide. Operculum absent.

Tonnidae: shell thin, globose, with a short spire and very inflated body whorl. Sculpture only spiral. Siphonal canal short. Operculum absent.

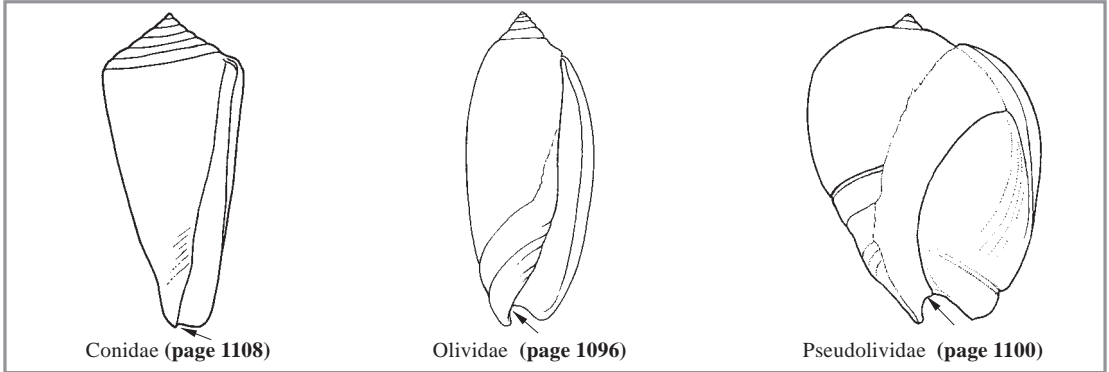


Figure L

Figure L:

Conidae: shell cone-shaped, with a low spire and a well-developed body whorl tapering towards the narrow anterior end. Aperture very long, with a short siphonal canal. Operculum corneous, quite small.

Olividae: shell elongate-ovate, with a short spire, a large body whorl and channelled sutures. Surface smooth, highly polished. Aperture elongate, with a short siphonal canal. Inner lip calloused, with oblique grooves anteriorly. Operculum absent.

Pseudolividae: shell fusiform to globose, with a medium-sized to short spire and large body whorl. Surface with a deep spiral groove on the anterior half of body whorl. Periostracum persistent. Aperture elongate, with a short siphonal canal. Outer lip thin, with a small spike corresponding to the outer spiral groove. Inner lip smooth, more or less calloused. Operculum corneous, large.

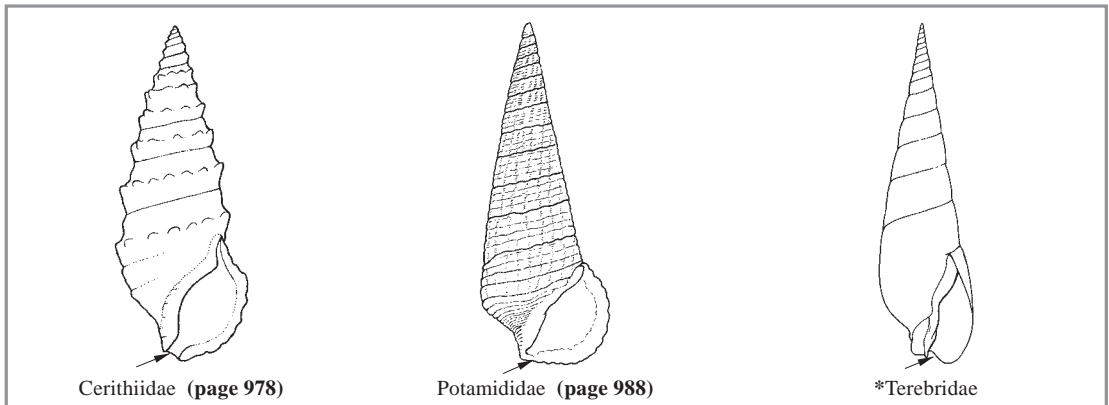


Figure M

Figure M:

Cerithiidae: shell sharply conical, with a high, many-whorled spire and rather small aperture. Sculpture variable. Aperture with a siphonal canal. Outer lip somewhat expanded. Operculum ovate, corneous, with a few spiral coils.

Potamididae: shell high-conical, with many spire whorls. Sculpture generally coarse. Aperture relatively small, with a short and deep siphonal canal. Outer lip often flaring. Operculum rounded, corneous, with many spiral coils.

***Terebridae:** shell elongate, with a high, many-whorled spire and relatively small aperture. Surface smooth or with a low sculpture. Siphonal canal short and wide. Inner lip with a twisted columella. Operculum corneous.

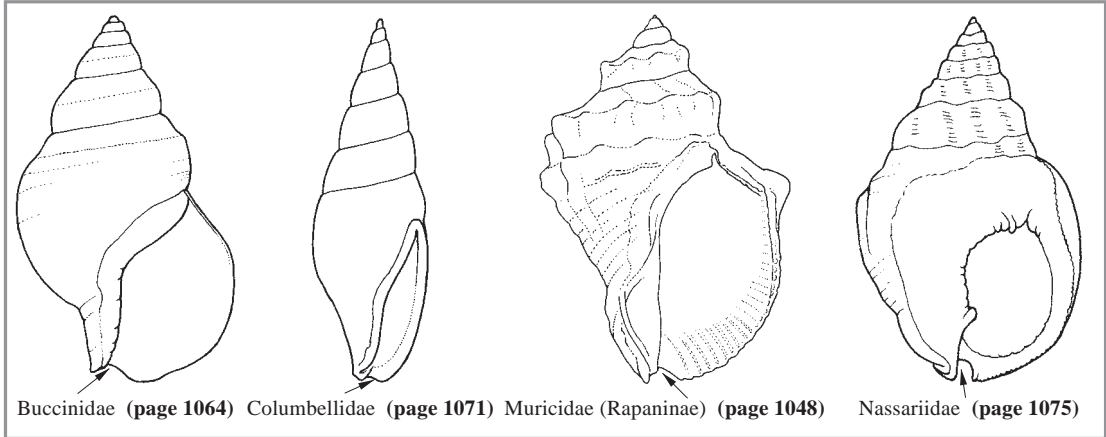


Figure N

Figure N:


Buccinidae: shell with a fairly high spire and large body whorl. Outer surface smooth or with sculpture, without axial varices. Siphonal canal usually rather short. Operculum corneous.

Columbellidae: shell small, fusiform, often boldly coloured. Aperture rather long and narrow, with a short siphonal canal. Inner lip not folded. Operculum corneous and small.














Muricidae (Rapaninae): shell with a raised spire and often strong sculpture, with spines, tubercles or spiral ribs, but without axial varices. Siphonal canal rather short. Operculum corneous, with a lateral nucleus.





Nassariidae: shell ovately rounded with a conical spire. Body whorl anteriorly bordered by a strong spiral groove. Aperture rather small and rounded, with a short, recurved siphonal canal. Inner lip not folded, calloused. Operculum corneous, smaller than the aperture.

**LIST OF FAMILIES AND SPECIES OF INTEREST TO FISHERIES
OCCURRING IN THE AREA**





The symbol  is given when species accounts are included.

PATELLIDAE







-  *Ansates pellucidus* (Linnaeus, 1758).
-  *Cymbula compressa* (Linnaeus, 1758).
-  *Cymbula granatina* (Linnaeus, 1758).
-  *Cymbula miniata* (Born, 1778).
-  *Cymbula nigra* (da Costa, 1771).
-  *Helcion pectunculus* (Gmelin, 1791).
-  *Patella candei* d'Orbigny, 1840.
-  *Patella depressa* Pennant, 1777.
-  *Patella lugubris* Gmelin, 1791.
-  *Patella piperata* Gould, 1846.
-  *Patella rustica* Linnaeus, 1758.
-  *Patella tenuis* Gmelin, 1791.
-  *Patella ulyssiponensis* Gmelin, 1791.

-  *Scutellastra argenvillei* (Krauss, 1848).
-  *Scutellastra barbara* (Linnaeus, 1758).
-  *Scutellastra cochlear* (Born, 1778).
-  *Scutellastra granularis* (Linnaeus, 1758).














HALIOTIDAE

-  *Haliotis marmorata* Linnaeus, 1758.
-  *Haliotis parva* Linnaeus, 1758.
-  *Haliotis tuberculata coccinea* Reeve, 1846.
-  *Haliotis tuberculata tuberculata* Linnaeus, 1758.



FISSURELLIDAE

-  *Dendrofissurella scutellum* (Gmelin, 1791).
-  *Fissurella alabastrites* Reeve, 1849.
-  *Fissurella coarctata* King, 1832.
-  *Fissurella mutabilis* G.B. Sowerby I, 1835.
-  *Fissurella nubecula* (Linnaeus, 1758).
-  *Pupillaea aperta* (G.B. Sowerby I, 1825).

TROCHIDAE

-  *Calliostoma granulatum* (Born, 1778).
-  *Calliostoma zizyphinum* (Linnaeus, 1758).
-  *Clanculus kraussi* (Philippi, 1846).
-  *Gibbula cineraria* (Linnaeus, 1758).
-  *Gibbula magus* (Linnaeus, 1758).
-  *Gibbula umbilicalis* (da Costa, 1778).
-  *Gibbula zonata* (Wood, 1828).
-  *Oxysteles fulgurata* (Philippi, 1848).
-  *Oxysteles variegata* (Anton, 1839).
-  *Phorcus atratus* (Wood, 1828).
-  *Phorcus lineatus* (da Costa, 1778).
-  *Phorcus punctulatus* (Lamarck, 1821).
-  *Phorcus sauciatus* (Koch, 1845).



TURBINIDAE

-  *Bolma rugosa* (Linnaeus, 1767).
-  *Turbo cidaris* Gmelin, 1791.








NERITIDAE

-  *Nerita senegalensis* (Gmelin, 1791).

CERITHIIDAE

-  *Cerithium atratum* (Born, 1778).
-  *Cerithium guinaicum* Philippi, 1849.




TURRITELLIDAE

-  *Archimediella gemmata* (Reeve, 1849).
-  *Archimediella torulosa* (Kiener, 1843).
-  *Mesalia mesal* (Deshayes, 1843).
-  *Mesalia opalina* (Adams, 1850).
-  *Turritella communis* Risso, 1826.
-  *Turritella ligar* Deshayes, 1843.
-  *Turritella unguina* (Linnaeus, 1758).



POTAMIDIDAE

-  *Tympanotonos fuscatus* (Linnaeus, 1758).

THIARIDAE

-  *Pachymelania aurita* (Müller, 1774).
-  *Pachymelania byronensis* (Wood, 1828).
-  *Pachymelania fusca* (Gmelin, 1791).


LITTORINIDAE

-  *Littoraria angulifera* (Lamarck, 1822).
-  *Littorina striata* King, 1832.





STROMBIDAE

-  *Strombus latus* Gmelin, 1791.






APORRHAIIDAE

-  *Aporrhais pesgallinae* Barnard, 1963.
-  *Aporrhais pespelecani* (Linnaeus, 1758).










CALYPTRAEIDAE

-  *Bostrycapulus* spp.
-  *Calyptraea chinensis* (Linnaeus, 1758).
-  *Calyptraea africana* Rolán, 2004.
-  *Crepidula porcellana* Lamarck, 1801).

CYPRAEIDAE

-  *Erosaria spurca* (Linnaeus, 1758).
-  *Luria lurida* (Linnaeus, 1758).
-  *Trona stercoraria* (Linnaeus, 1758).
-  *Zonaria pyrum* (Gmelin, 1791).
-  *Zonaria zonaria* (Gmelin, 1791).






NATICIDAE

-  *Natica adansoni* de Blainville, 1825.
-  *Natica collaris* Link, 1807.
-  *Natica fulminea* (Gmelin, 1791).
-  *Natica marochiensis* (Gmelin, 1791).
-  *Natica multipunctata* de Blainville, 1825.
-  *Natica turtoni* E.A. Smith, 1890.
-  *Natica vittata* (Gmelin, 1791).
-  *Sinum concavum* (Lamarck, 1822)
-  *Tectonatica tecta* (Anton, 1838).









BURSIDAE

-  *Bursa corrugata pustulosa* (Reeve, 1844).


CASSIDAE

-  *Cassis tessellata* (Gmelin, 1791).
-  *Cypraecassis testiculus* (Linnaeus, 1758).
-  *Galeodea rugosa* (Linnaeus, 1771).
-  *Semicassis saburon* (Bruguière, 1792).
-  *Semicassis undulata* (Gmelin, 1791).









RANELLIDAE






-  *Argobuccinum pustulosum* (Lightfoot, 1786)
-  *Cabestana cutacea* (Linnaeus, 1767).
-  *Charonia lampas* (Linnaeus, 1758).
-  *Charonia variegata* (Lamarck, 1816).
-  *Fusitriton magellanicus murrayi* (E.A. Smith, 1891).
-  *Monoplex corrugatus corrugatus* (Lamarck, 1816).
-  *Monoplex parthenopeus parthenopeus* (Salis, 1793).
-  *Ranella olearium* (Linnaeus, 1758).

TONNIDAE







-  *Tonna galea* (Linnaeus, 1758).

MURICIDAE



-  *Bolinus cornutus* (Linnaeus, 1758).
-  *Chicoreus varius* (G.B. Sowerby II, 1834).
-  *Hexaplex angularis* (Lamarck, 1822).
-  *Hexaplex bifasciatus* (A. Adams, 1853).
-  *Hexaplex duplex* (Röding, 1798).
-  *Hexaplex megacerus* (G.B. Sowerby II, 1834).
-  *Hexaplex rosarium* (Röding, 1798).
-  *Hexaplex saharicus* (Locard, 1897).

-  *Nucella squamosa* (Lamarck, 1816)
-  *Stramonita haemastoma* (Linnaeus, 1767).
-  *Thais nodosa* (Linnaeus, 1758).
-  *Thaisella coronata* (Lamarck, 1816).
-  *Trochia cingulata* (Linnaeus, 1758).






BUCCINIDAE

-  *Afer pseudofusinus* Fraussen and Hadorn, 2000.
-  *Afrocominella capensis* (Dunker, 1844).
-  *Burnupena catarrhacta* (Gmelin, 1791).
-  *Burnupena cincta* (Röding, 1798).
-  *Gemophos viverratus* (Kiener, 1834).
-  *Neptunea contraria* (Linnaeus, 1771).


COLUMBELLIDAE

-  *Columbella rustica* (Linnaeus, 1758).
-  *Columbella adansoni* Menke, 1853.




NASSARIIDAE

-  *Bullia callosa* (Wood, 1828).
-  *Dorsanum miran* (Bruguière, 1789).
-  *Nassarius mutabilis* (Linnaeus, 1758).
-  *Nassarius reticulatus* (Linnaeus, 1758).
-  *Nassarius tritoniformis* (Kiener, 1841).








MELONGENIDAE

-  *Pugilina morio* (Linnaeus, 1758).




FASCIOLARIIDAE

-  *Fusinus caparti* Adam and Knudsen, 1955.
-  *Fusinus meyeri* (Dunker, 1869).
-  *Latirus filorus* (Schubert and Wagner, 1829).

VOLUTIDAE

-  *Cymbium cucumis* Röding, 1798.
-  *Cymbium cymbium* (Linnaeus, 1758).
-  *Cymbium glans* (Gmelin, 1791).
-  *Cymbium marmoratum* Link, 1807.
-  *Cymbium olla* (Linnaeus, 1758).
-  *Cymbium pepo* (Lightfoot, 1786).
-  *Volutocorbis lutosus* Koch, 1948.





OLIVIDAE

-  *Agaronia acuminata* (Lamarck, 1811).
-  *Agaronia hiatula* (Gmelin, 1791).
-  *Olivella nana* (Lamarck, 1811).

PSEUDOLIVIDAE

-  *Pseudoliva crassa* (Gmelin, 1791).





MARGINELLIDAE

-  *Marginella desjardini* Marche-Marchad, 1957.
-  *Marginella glabella* (Linnaeus, 1758).
-  *Marginella sebastiani* Marche-Marchad and Rosso, 1979.
-  *Volvarina sowerbiana* (Petit de la Soussaye, 1851).



TURRIDAE

-  *Pusionella nifat* (Bruguère, 1789).

CONIDAE

-  *Conus ermineus* Born, 1778.
-  *Conus genuanus* Linnaeus, 1758.
-  *Conus pulcher* Lightfoot, 1786.
-  *Conus tabidus* Reeve, 1844.

SIPHONARIIDAE

-  *Siphonaria capensis* Quoy and Gaimard, 1833.
-  *Siphonaria pectinata* (Linnaeus, 1758).

References

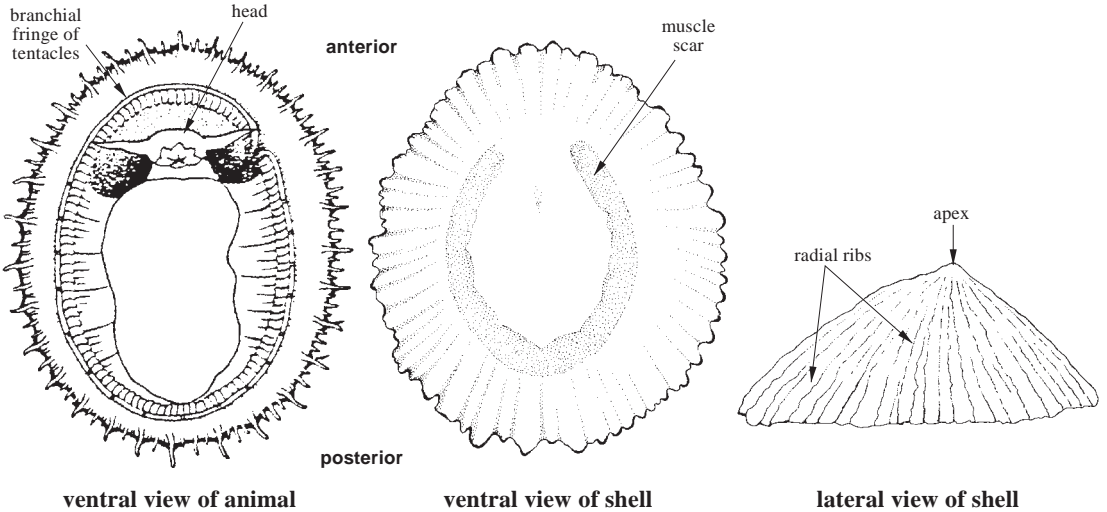
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PATELLIDAE

Limpets

Diagnostic characters: Shell usually **conical**, bilaterally symmetrical, without apical perforation or marginal slit or groove. Apex central to somewhat anterior. **Sculpture** more or less developed, **essentially radial**. Aperture ovate or irregularly polygonal, without a defined internal border. **Interior** of shell porcelaneous or iridescent, without a calcareous septum but **with** an anteriorly interrupted **horseshoe-shaped muscle scar**. **No operculum**. Head with a strong snout and a pair of tentacles, generally provided with eyes basally. Foot large, very strong. **True gills** absent, **replaced by a fringe of respiratory tentacles** (= the “pallial gills”) between the internal edge of mantle and the foot.

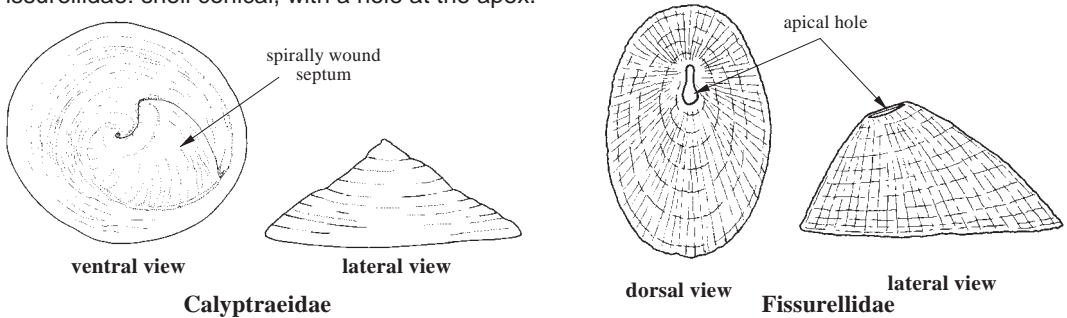


Habitat, biology, and fisheries: Sedentary animals, common on exposed hard substrates where they clamp tightly by means of their large foot. Mainly intertidal, often occurring in dense populations. Many species exhibit homing behaviour, excavating a shallow scar to which the shell margin conforms exactly, and returning to stick fast to the same spot after foraging for food. Graze on encrusting lichens and algae, or scrape tissue from kelp, with their powerful radula. Sexes separate or hermaphroditic, depending on species. Fertilization external. Eggs hatching as free-swimming planktonic larvae. Patellidae and other limpets are commonly collected for their edible foot by coastal populations in the eastern Atlantic, both for human consumption and as bait for angling. They are highly prized in the Macaronesian Islands, where the limpet populations tend to decline because of overcollecting.

Similar families occurring in the area

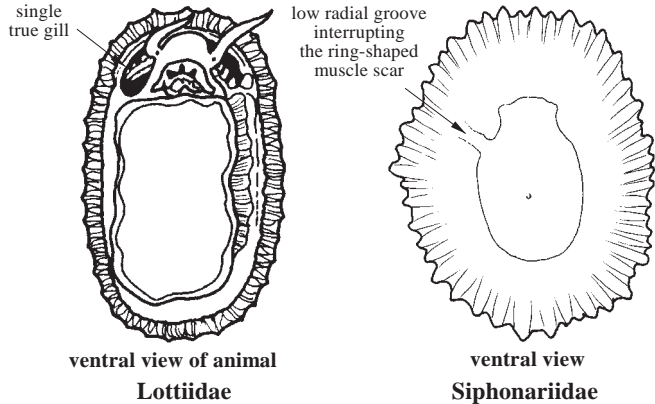
Calyptraeidae: inner side of shell with a calcareous septum more or less covering the apical region.

Fissurellidae: shell conical, with a hole at the apex.



Lottiidae: not easily distinguishable from Patellidae by macroscopic shell features. Differ anatomically by the presence of a single true gill in the mantle cavity. In the studied area, only represented by small forms hardly reaching 1 cm long, and restricted to the northern Macaronesian islands.

Siphonariidae: pulmonate snails with limpet-shaped shell, living on supratidal and intertidal rocks. Interior of shell with a muscle scar forming an incomplete ring, opening on the right side where there is a shallow radial groove and often a weak lobe on the shell margin.



Key to species of interest to fisheries occurring in the area

Remarks on key characters: The taxonomy of some East Atlantic Patellidae remains rather poorly understood, partly because some species are very variable in shell characters and there is little to distinguish one from another. To ensure identification of the selected species, the following key includes a number of shell characters as well as a few, simple, anatomical features.

- 1a. Size relatively small, not exceeding 3.5 cm long in the adult; shell cap-shaped; apex markedly anterior (usually at one-tenth of the shell length), often very close to front margin or nearly overlying it (Fig. 1a); fringe of respiratory tentacles of the animal interrupted by the head → 2
- 1b. Shell relatively large, often exceeding 5 cm long in the adult; apex subcentral to moderately anterior (usually at one-third to one-half of the shell length), not very close to front margin nor nearly overlying it (Fig. 1b); fringe of respiratory tentacles of the animal continuous in the head region → 3
- 2a. Outer surface nearly smooth; shell horn-coloured to brown, with a few radial iridescent blue lines (Fig. 2) *Ansates pellucidus*
- 2b. Outer surface sculptured with many fine radial ribs bearing small prickles; shell colour mottled yellowish brown, with black ribs (Fig. 3) *Helcion pectunculus*

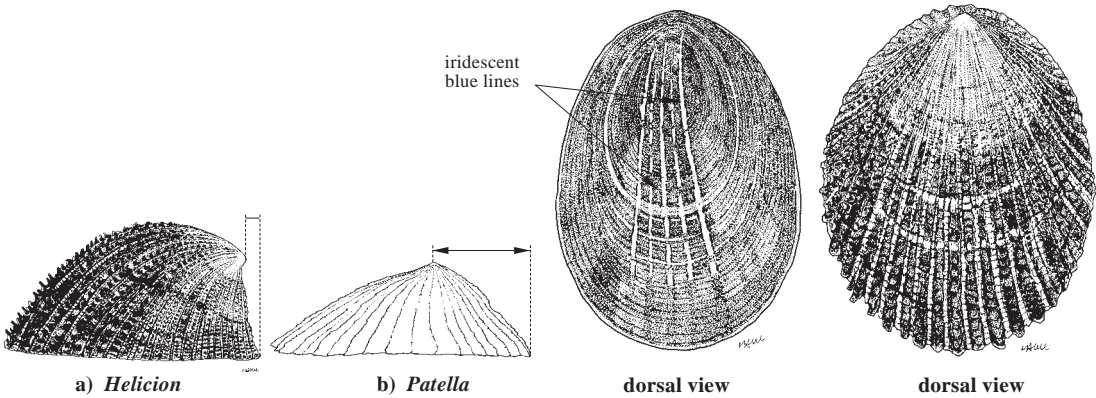


Fig. 1 lateral view of shell

Fig. 2 *Ansates pellucidus* Fig. 3 *Helcion pectunculus*

3a. Shell shape oblong and laterally compressed in the adult, sculptured with numerous unequal radial threads (Fig. 4) ***Cymbula compressa***

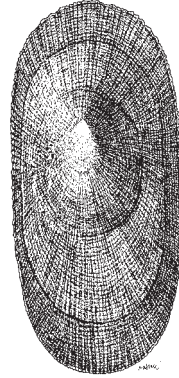
3b. Shell shape not oblong nor laterally compressed in the adult, differently sculptured → 4

4a. Shell pear-shaped, with spout-like anterior end (Fig. 5) ***Scutellastra cochlear***

4b. Shell differently shaped → 5

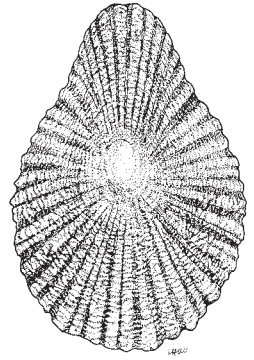
5a. Radial ribs relatively high and sharp, or with distinct tubercles or scales on top . . . → 6

5b. Radial ribs neither high and sharp nor distinctly tuberculated or scaled → 10



dorsal view

Fig. 4 *Cymbula compressa*



dorsal view

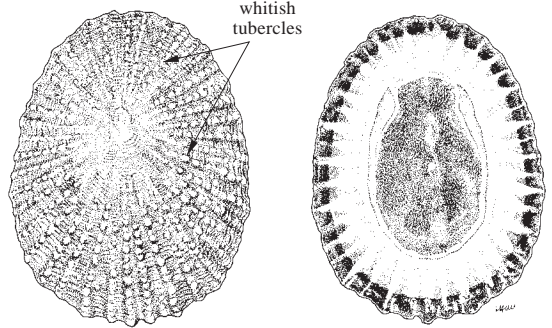
Fig. 5 *Scutellastra cochlear*

6a. Shell medium-sized, not exceeding 7 cm in length; outer sculpture with many rounded, fine and low radiating ribs, not or poorly affecting shell outline; tubercles or scales of radial ribbing markedly differing in colour → 7

6b. Shell large-sized, attaining 11 cm in length; outer sculpture with many sharp, relatively high radial ribs of unequal size, forming corrugations on shell margin; tubercles or scales of radial ribbing not differing in colour → 9

7a. Tubercles appearing blackish on a paler ground; internal coloration with about a dozen of brown rays, mostly visible towards periphery of shell → 8

7b. Tubercles appearing whitish on a darker ground; internal coloration with a wide brown to black border (Fig. 6) ***Scutellastra granularis***



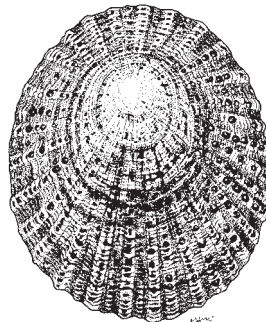
dorsal view

ventral view

Fig. 6 *Scutellastra granularis*

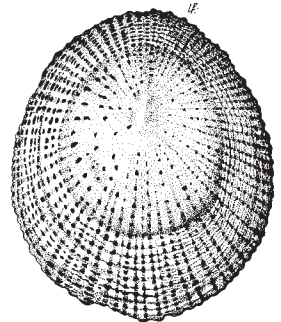
8a. Apex anterior (situated at one-third to one-fourth of shell length) and recurved anteriorward; foot all yellowish white to grey (Fig. 7) . . . ***Patella piperata***

8b. Apex subcentral to somewhat anterior (situated slightly beyond midlength to about one-third of shell length), poorly recurved anteriorward; foot pinkish orange with a grey border (Fig. 8) ***Patella rustica***



dorsal view

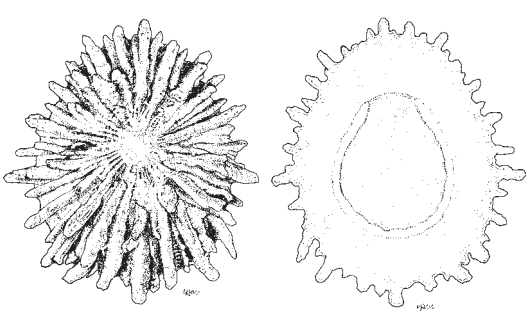
Fig. 7 *Patella piperata*



dorsal view

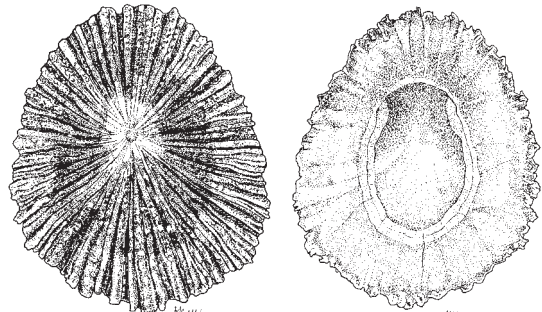
Fig. 8 *Patella rustica*

- 9a. Interior white, sometimes brownish on area inside to muscle scar (Fig. 9); foot black-spotted ***Scutellastra barbara***
- 9b. Interior whitish to greyish green, area inside to muscle scar yellow to orange or porcelaneous white (Fig. 10); foot orange or yellow, not spotted ***Patella ulysiponensis***



dorsal view ventral view

Fig. 9 *Scutellastra barbara*

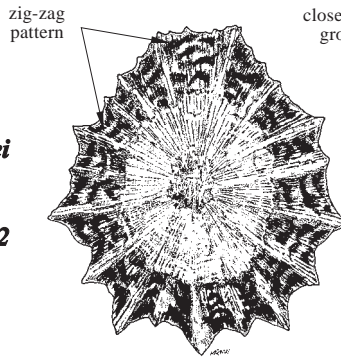


dorsal view ventral view

Fig. 10 *Patella ulysiponensis*

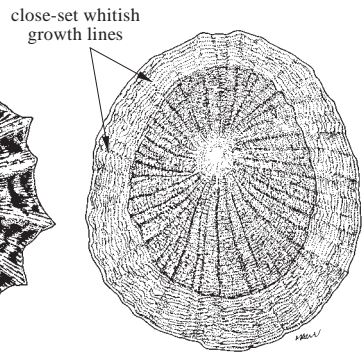
- 10a. Outer colour greyish, with zigzag brown markings; surface with about 7 strong radial angulations, forming star-like projections on periphery of shell (Fig. 11) ***Cymbula granatina***
- 10b. Outer colour without zigzag markings; surface with or without some strong radial angulations, forming star-like projections on periphery of shell → 11

- 11a. Lower (peripheral) half of outer surface with dirty white, irregular growth lines, giving the appearance of a lemon (Fig. 12) ***Patella candei***



dorsal view

Fig. 11 *Cymbula granatina*



dorsal view

Fig. 12 *Patella candei*

- 11b. Lower (peripheral) half of outer surface differently patterned → 12

- 12a. Sculpture of numerous small ribs of variable strength, regularly distributed; periphery of shell regularly ovate, not or poorly affected by the radial sculpture → 13

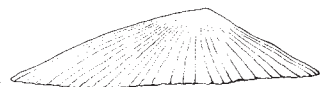
- 12b. Sculpture with broader radial ribs or angulations, more or less affecting the general ovate shape of shell . . . → 15

- 13a. Shell relatively high (height usually half its length) (Fig. 13a) . . ***Scutellastra argenvillei***



a) *Scutellastra argenvillei*

- 13b. Shell relatively low (height usually less than half its length) (Fig. 13b) → 14

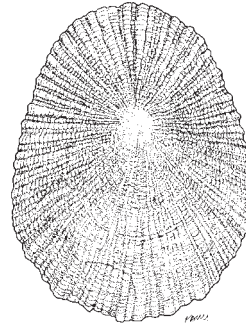


b) *Cymbula nigra*

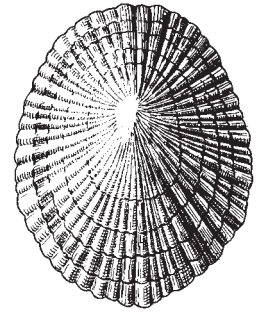
Fig. 13 lateral view of shell

14a. Outer colour with thin radial streaks or marks of pink, red or brownish on a white ground (Fig. 14) *Cymbula miniata*

14b. Outer colour grey to fawn, often more deeply coloured in the main rib interstices (Fig. 15). *Cymbula nigra*



dorsal view



dorsal view

15a. Outside of shell dull black, sometimes with white markings (Fig. 16) *Patella lugubris*

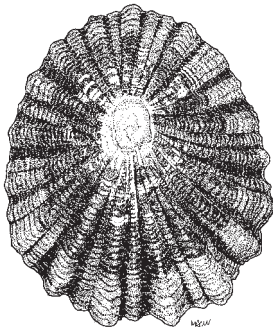
15b. Outside of shell differently coloured → 16

Fig. 14 *Cymbula miniata*

Fig. 15 *Cymbula nigra*

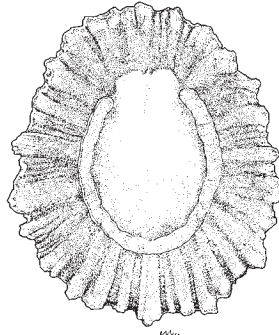
16a. Inner side of shell iridescent blue to bluish grey, area inside to muscle scar white and sometimes with a yellow spot (Fig. 17); foot grey to grey-brown; pallial tentacles black and triangular, embedded in the mantle *Patella tenuis*

16b. Inner side of shell variably patterned with white, blackish brown or blue, and with orange (Fig. 18); foot dark grey; pallial tentacles thin and numerous, chalk-coloured, projecting beyond mantle margin *Patella depressa*



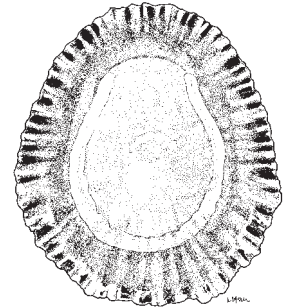
dorsal view

Fig. 16 *Patella lugubris*



ventral view


Fig. 17 *Patella tenuis*




ventral view

Fig. 18 *Patella depressa*

List of species of interest to fisheries occurring in the area


The symbol  is given when species accounts are included.

 *Ansates pellucidus* (Linnaeus, 1758).












 *Cymbula compressa* (Linnaeus, 1758).

 *Cymbula granatina* (Linnaeus, 1758).

 *Cymbula miniata* (Born, 1778).

 *Cymbula nigra* (da Costa, 1771).

 *Helcion pectunculus* (Gmelin, 1791).

-  *Patella candei* d'Orbigny, 1840.
-  *Patella depressa* Pennant, 1777.
-  *Patella lugubris* Gmelin, 1791.
-  *Patella piperata* Gould, 1846.
-  *Patella rustica* Linnaeus, 1758.
-  *Patella tenuis* Gmelin, 1791.
-  *Patella ulyssiponensis* Gmelin, 1791.
-  *Scutellastra argenvillei* (Krauss, 1848).
-  *Scutellastra barbara* (Linnaeus, 1758).
-  *Scutellastra cochlear* (Born, 1778).
-  *Scutellastra granularis* (Linnaeus, 1758).

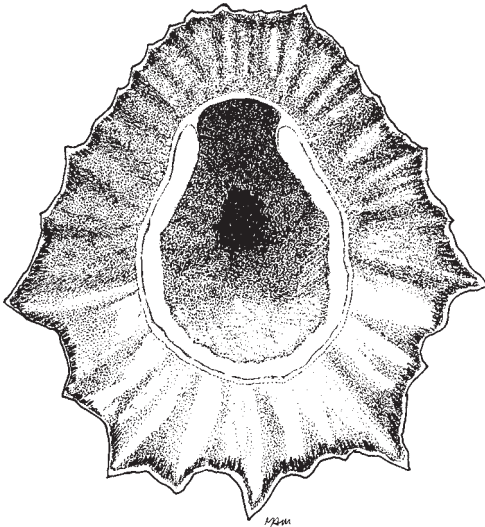
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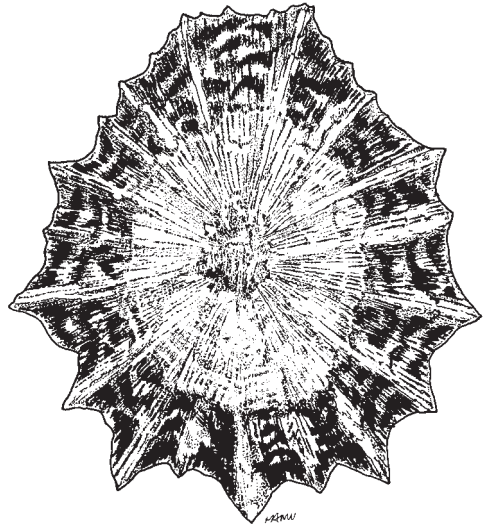
***Cymbula granatina* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Patella granatina* Linnaeus, 1758; *P. granatina* [Spelling error]; *Patellona granatina* (Linnaeus, 1758) / None.

FAO names: **En** – Sandpaper limpet; **Fr** – Patelle papier de verre; **Sp** – Lapa papel de lija.



ventral view



dorsal view

Diagnostic characters: Shell strong but relatively thin, reaching a **large** size, **rather flat** (juveniles) to **moderately elevated** (mature specimens). Outline roughly ovate and strongly scalloped, somewhat narrowing anteriorly. Apex almost central or slightly anterior to midlength of shell. External **sculpture of about 7 strong and angular main radial ribs, forming star-like projections on periphery of shell**, and unequal weaker ribs and riblets in the interstices; number of main ribs variable, mostly 5 (up to 9) in posterior half, and 2 (up to 12) in anterior half. Interior smoothish, with low radial undulations corresponding to the main outer sculpture. **Colour:** **outside** of shell **greyish** to dull white, **with zigzag concentric brown markings**, often chocolate brown on apical area of larger specimens due to erosion of shell. **Interior white or pale blue grey**, often lightly mottled with brownish markings, and sometimes with a pattern of numerous, short brown dashes on margin; **apical area deep chocolate brown**, with clearly defined edges. Foot of the animal brownish grey on base and grey on sides. Area between foot and mantle pale yellow when extended. Dorsal surface of head black, tentacles black, becoming light coloured at the base.

Size: Maximum shell length 10 cm, commonly to 7 cm.

Habitat, biology, and fisheries: Abundant on intertidal rocks, up to midtidal pools. Mainly feeding on deposits of diatoms in the north of its range, but also grazing on various seaweeds in the south. Species showing a homing behaviour, excavating a shallow scar to which the animal returns after wandering around to feed. Spawning mainly occurring in autumn and winter. Commonly collected by coastal people, both for food and for bait.

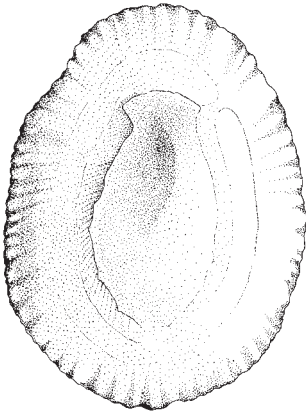
Distribution: Eastern Atlantic, from Namibia to western Cape Agulhas, South Africa.



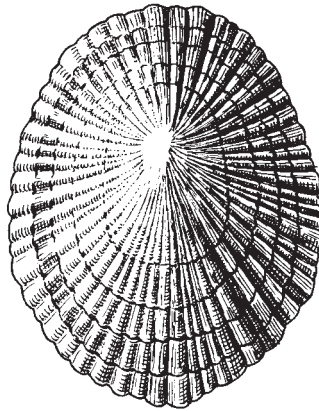
***Cymbula nigra* (da Costa, 1771)**

Frequent synonyms / misidentifications: *Patella kraussii* Dunker, 1853; *P. nigra* da Costa, 1771; *P. safiana* Lamarck, 1819; *Patellona safiana* (Lamarck, 1819); *Patella plumbea* Lamarck, 1819 / None.

FAO names: En – Safian limpet; Fr – Patelle safiane; Sp – Lepada safiana.



ventral view



dorsal view



lateral view

Diagnostic characters: Shell reaching a **large** size (up to 13 cm long), **moderately elevated**. Outline regularly elongate ovate, somewhat narrowing anteriorly, not or poorly affected by the radial sculpture. **Apex** decidedly anterior, **at about the anterior third**. External **sculpture of rather small and numerous ribs** (up to about 100 in number) of **variable strength**, regularly distributed and crossed by fine concentric growth lines. Interior smoothish, finely and shortly denticulate on margin. **Colour: outside of shell grey to fawn, often paler on some of the larger ribs and more deeply coloured in the rib interstices. Interior porcelaneous white to bluish grey**, with the outer colour pattern somewhat showing through; **apical area white opaque**, sometimes suffused with light buff or orange.

Size: Maximum shell length 13 cm, commonly to 10 cm in the north, but only 6 cm in tropical West Africa.

Habitat, biology, and fisheries: On rocky shores, in the intertidal and shallow sublittoral zones to about 10 m depth. Rather uncommon but attaining a large size on Mediterranean coasts of North Africa, it becomes progressively more common on the Atlantic shores of tropical Africa. This is the dominant limpet in Senegal. Commonly collected for food in various countries of the area, and generally consumed in stews and soups. In Senegal, it is traditionally consumed in great quantities. Very common in the Cape Verde Islands, it has become locally rare because of overcollecting.

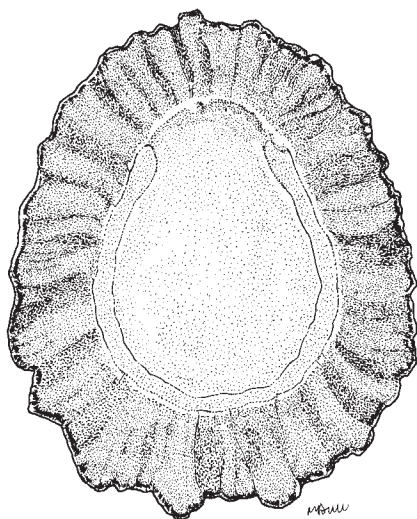
Distribution: Eastern Atlantic, from the Gibraltar Straits and northern Morocco to Namibia, and in the Cape Verde Islands. Southwestern Mediterranean, in Morocco, Algeria and northern Tunisia; rare and localised in eastern Spain.



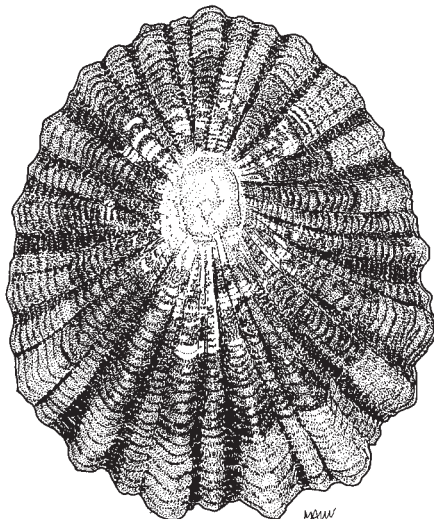
***Patella lugubris* Gmelin, 1791**

Frequent synonyms / misidentifications: *Patellona lugubris* (Gmelin, 1791) / *Patella safiana* Lamarck, 1819 [= *Cymbula nigra* (da Costa, 1771)].

FAO names: En – Mournful limpet; Fr – Patelle lugubre; Sp – Lepada lugubre.



ventral view



dorsal view

Diagnostic characters: Shell medium-sized, moderately elevated to rather low in profile. Outline broadly ovate to somewhat elongate ovate and narrowed anteriorly, prominently corrugated by radial ribbing. Apex at about the anterior two-fifth of the shell length. External sculpture of numerous, strong and rounded radial ribs, sometimes overlain by fine radial threads. Interior smoothish, with low radial undulations corresponding to the outer sculpture. **Colour:** outside of shell dull black, sometimes with white to cream markings, often eroded and chalky white on the apex. Interior porcelaneous bluish grey to pale grey, often with a narrow black margin; apical area often clouded with grey and white.

Size: Maximum shell length 7 cm, commonly from 4 to 5 cm.

Habitat, biology, and fisheries: Rather common on intertidal rocks. Locally collected for food by coastal people, and mainly used in soups.

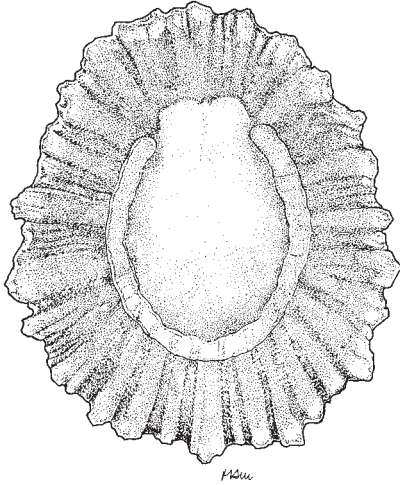
Distribution: Tropical East Atlantic, from Morocco to Senegal.



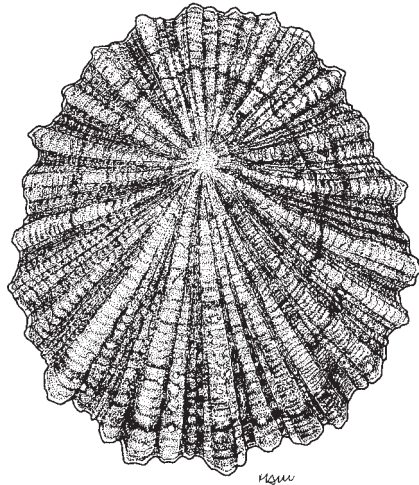
***Patella tenuis* Gmelin, 1791**

Frequent synonyms / misidentifications: *Patella crenata* d'Orbigny, 1840 [not of Gmelin, 1791]; *P. orbignyana* Nordsieck and Garcia-Talavera, 1979; *P. saxea* Nordsieck, 1975 / *Patella caerulea* Linnaeus, 1758; *P. candei ordinaria* Mabilie, 1888 [= *Patella ulyssiponensis*]; *P. chlorosticta* Gmelin, 1791 [= *Cymbula granatina*]; *P. lowei* d'Orbigny, 1840 [= *Patella ulyssiponensis*].

FAO names: **En** – Crenate limpet; **Fr** – Patelle crénelée; **Sp** – Lapa almenada.



ventral view



dorsal view

Diagnostic characters: Shell moderately large, rather thin, with a variable, poorly elevated shape. Outline roughly ovate to hexagonal and strongly scalloped, depending on the outer sculpture. Apex at about the anterior third of length. Outer sculpture with alternating broader and narrower, rounded radial ribs, giving the margin a strongly and regularly crenulated appearance (with broad pleated radial ribs giving a star-like appearance on shell with hexagonal outline), frequently overlain by a finer radial ribbing. Interior smoothish, thin and sharp on periphery, with radial undulations corresponding to the main outer sculpture. **Colour:** outside of shell dark grey to bluish grey, sometimes rusty brown. Inner side of shell iridescent dark blue to bluish grey, sometimes reddish brown on margin; area inside to muscle scar white, sometimes with a yellow spot. Foot of the animal grey to grey-brown on base, yellowish grey in sides. Pallial tentacles black, triangular and embedded in the mantle.

Size: Maximum shell length 8 cm, commonly to 6 cm.

Habitat, biology, and fisheries: On rocky shores from midtidal zone to shallow subtidal levels at 2 to 3 m depth. Animals living in the tidal zone without a special preference for tidal pools. Juveniles occurring mostly at relatively high levels. Subtidally living animals often on smooth rocks under the influence of strong currents. This species is probably composed of 2 geographically isolated subspecies, recognizable on genetic and morphological grounds. Shells from the Madeiran archipelago often have hexagonal shape with broad pleated radial ribs giving a star-like appearance, whereas in the Canaries, shells show a strongly scalloped margin related to their alternating broader and narrower radial ribs. Commercially fished for the highly appreciated taste of its meat. Stocks markedly declining at many places in Madeira Islands due to overcollecting, but Canarian populations of this limpet still have reasonable sizes.

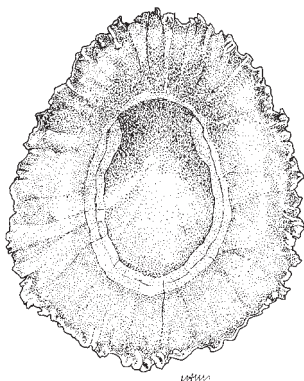
Distribution: Restricted to Macaronesian Islands, in Madeira Islands and the Canaries.



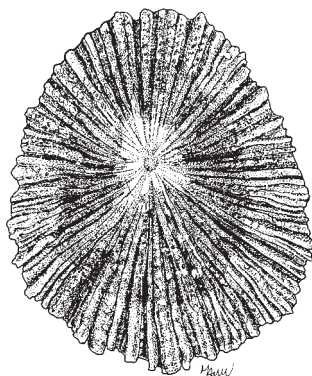
***Patella ulyssiponensis* Gmelin, 1791**

Frequent synonyms / misidentifications: *Patella aspera* Röding, 1798; *P. aspera* Lamarck, 1819; *P. athletica* Bean, 1844; *P. lowei* d'Orbigny, 1840; *P. nicklesi* Nordsieck, 1975; *P. ordinaria* Mabille, 1888; *P. pontica* Monterosato, 1888 [ex Valenciennes-MS]; *P. tarentina* Salis, 1793; *P. teneriffae* Mabille, 1888 / *Patella caerulea* Linnaeus, 1758; *P. vulgata* Linnaeus, 1758.

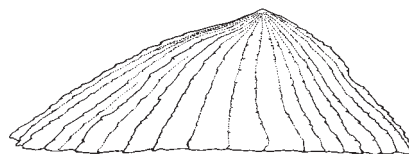
FAO names: **En** – Rough limpet; **Fr** – Patelle rude; **Sp** – Lapa áspera.



ventral view



dorsal view



lateral view

Diagnostic characters: Shell solid, reaching a large size (up to 11 cm in length), with a variable poorly elevated shape. Outline roughly elongate-ovate to subhexagonal, narrowing anteriorly and strongly affected by the prominent outer ribbing. Apex somewhat anterior to midlength of shell. Outer sculpture with many sharp, relatively high and closely spaced radial ribs of unequal size, extending beyond periphery of shell, and irregularly covered with small tubercles and scales. Interior of shell smoothish, irregularly corrugated on margin. **Colour:** outside coloration of shell variable, dirty white, greyish black or fawn to drab brown, often concentrically patterned with various shades of these colours or with radial bands of brown or dull black on whitish ground. Tubercles or scales of the outer surface not differing in colour from the underlying ribbing. Apical area frequently more or less eroded and chalky white. Inner side of shell porcelaneous, whitish to greyish green or grey blue; area inside to muscle scar yellow to orange or porcelaneous white. Foot of the animal yellow or cream to orange. Pallial tentacles translucent white.

Size: Maximum shell length 11 cm, commonly from 6 to 8 cm.

Habitat, biology, and fisheries: On rocky shores, from the lower part of intertidal zone to shallow subtidal waters at about 6 m depth. Intertidal specimens often heavily covered with tufts of seaweeds or encrusted with calcareous algae, and with an obvious preference for tidal pools. Commercially harvested in many places within its range. Heavily exploited in the Macaronesian islands, and locally known as "lapa brava" in the Azores. Overcollected at most accessible places in the Oceanic islands.

Distribution: Eastern Atlantic, from southern Norway and the British Isles to Mauritania and the Macaronesian islands, including the Azores. Throughout the Mediterranean and the Black Sea.

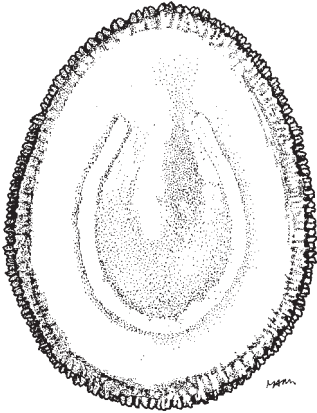
Remarks: Based on a recent molecular study, populations living in Macaronesian islands may represent a genetically distinct species from populations of continental European and Mediterranean shores.



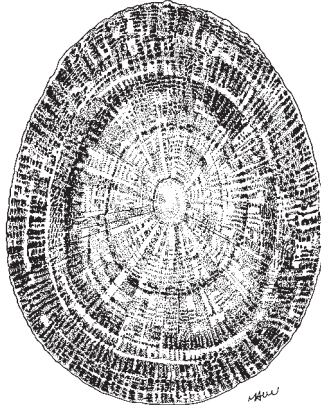
***Scutellastra argenvillei* (Krauss, 1848)**

Frequent synonyms / misidentifications: *Patella argenvillei* Krauss, 1848 / None.

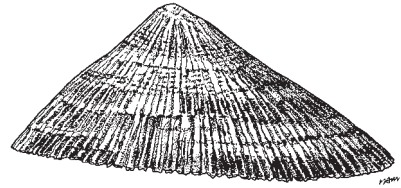
FAO names: En – D'Argenville's limpet; Fr – Patelle de d'Argenville; Sp – Lapa de Argenville.



ventral view



dorsal view



lateral view

Diagnostic characters: Shell massive, reaching a large size, with a regular and relatively elevated shape (height measuring usually half the length). Outline oblong-ovate, somewhat narrowed anteriorly, finely crenulated. Apex slightly anterior, usually eroded. External **sculpture of numerous, small, flat-topped ribs** (approximately 60 to 100 or more in number) of variable strength, **densely set**, regularly distributed and not or poorly affecting the periphery of shell. Interior smooth, only narrowly crenulated along margin. **Colour:** outside of shell dark brown to almost black with white linear rib interstices, and often with concentric markings. Interior porcelaneous white, rimmed with dark greyish on the margin; apical region suffused with yellowish brown. Foot of the animal dull grey on base, flecked with black or black on sides. Dorsal surface of head blue black, snout and tentacles bright yellow.

Size: Maximum shell length 11 cm, commonly to 8 cm.

Habitat, biology, and fisheries: Very common on exposed rocky shore where it forms concentrated communities at low intertidal levels, together with *Scutellastra cochlear*. Juveniles often clinging to the shells of the adult, leaving on them a conspicuous home-scar. Grazing on diatoms and encrusting *Lithothamnion* algae growing nearby the home-scar. When wetted by moving water, this limpet slightly raises its shell away from the surface, and is then easy to dislodge. Spawning period in winter. Commonly collected at low tide for human consumption and for bait.

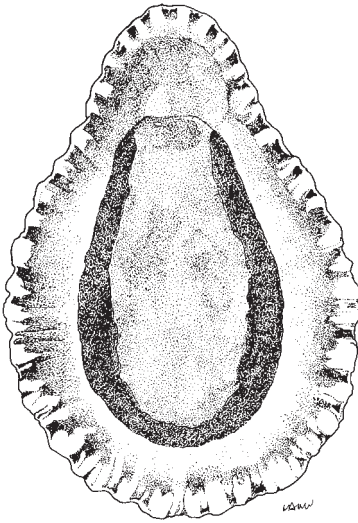
Distribution: Eastern Atlantic and southwest Indian Ocean; north to Namibia and east to western Transkei, South Africa.



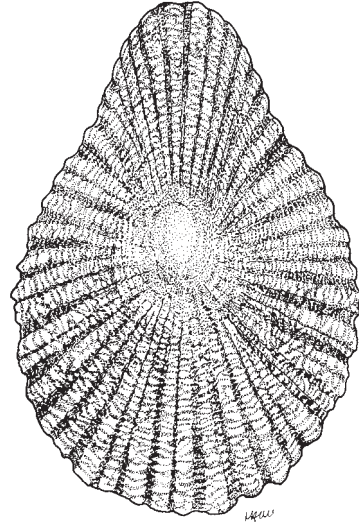
***Scutellastra cochlear* (Born, 1778)**

Frequent synonyms / misidentifications: *Olana cochlear* (Born, 1778); *Patella cochlear* Born, 1778 / None.

FAO names: En – Spoon limpet; Fr – Patelle cuillère; Sp – Lapa cuchara.



ventral view



dorsal view

Diagnostic characters: Shell solid, medium-sized, poorly elevated to almost flat. Outline pear-shaped, with the anterior end much narrowed and produced like a spout. External sculpture of rather broad, flat and unequal radial ridges. Surface of shell very often heavily encrusted by calcareous algae and more or less eroded to misshapen in older specimens, due to adherence of smaller specimens. Interior smoothish, sometimes with low radial undulations reflecting the main outer sculpture, margin distinctly corrugated. **Colour:** outside of shell whitish to light fawn, sometimes in concentric pattern. **Internal coloration** variable, mostly porcelaneous white to bluish white with a conspicuous black to purple brown muscle scar, apical region brownish often clouded with white. Animal with a very long neck fitting into the spout-like anterior end of shell; foot and mantle yellow, dorsal surface of head and tentacles green.

Size: Maximum shell length 8 cm, commonly to 5 cm.

Habitat, biology, and fisheries: Abundant on rocks covered with encrusting *Lithothamnion* algae, at low intertidal levels exposed to wave action. May form very dense communities, up to about 1 700 individuals per square metre, with juveniles living on the shells of the adults (up to 40 per shell), feeding on *Lithothamnion* and *Gelidium* algae that grow on them. A slow growing species, with longevity of 15 to 25 years, feeding when washed by the incoming tide on the surrounding *Lithothamnion* and other algae. Do not move away much from their deeply excavated home-scar, but mainly rotate on their foot so that the head can move in a circle for feeding. Spawning period in autumn and winter. Collected mainly for subsistence purposes by coastal population.

Distribution: Eastern Atlantic and southwest Indian Ocean; north to Namibia and east to Southern Natal, South Africa.

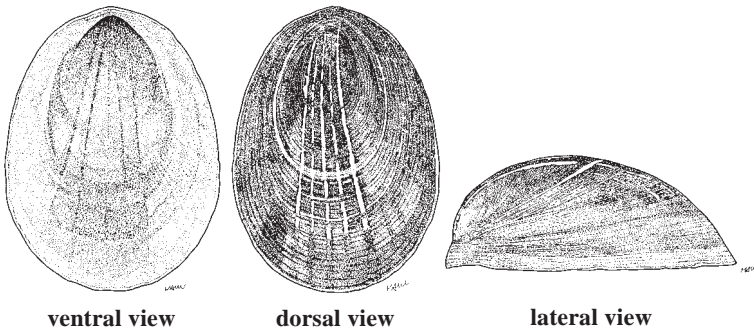


***Ansates pellucidus* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Helcion pellucidum* (Linnaeus, 1758); *Patella pellucida* Linnaeus, 1758; *Patina pellucida* (Linnaeus, 1758) / None.

En – Velvet helcion; **Fr** – Helcion velouté; **Sp** – Helción satinado.

Maximum shell length 3 cm; commonly to 1.5 cm. Low intertidal and sublittoral zones, down to about 25 m depth. Living on various seaweeds during the early stages of growth, then on plants of *Laminaria* where they migrate when adult. Individuals living on the fronds of the weeds have a thin, horn-coloured shell; those living at base of stipes or within cavities of the holdfasts develop a thicker, larger and brown-coloured shell (var. *laevis* Pennant, 1777). Lifespan usually about 1 year, but a few individuals of the *laevis*-form can survive a second year. Sexes separate. Breeding occurring mainly in winter and spring. Eggs and larvae planktonic. May form dense populations. The blue-rayed shell is mainly used for decorative purposes. Northeast Atlantic, from northern Norway and Iceland to Morocco. Western Mediterranean (eastward to Malta Islands).

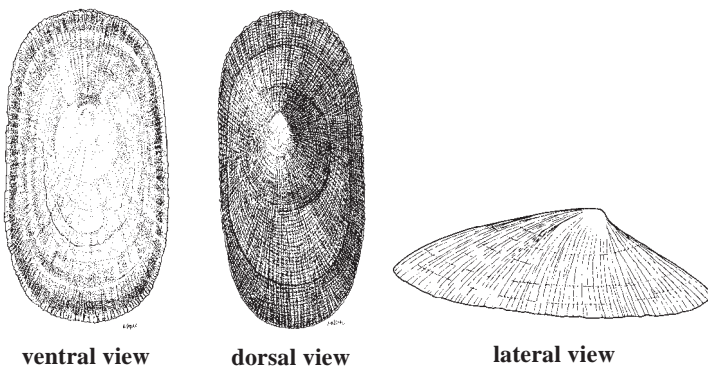


***Cymbula compressa* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Patella compressa* Linnaeus, 1758 / None.

En – Compressed limpet; **Fr** – Patelle comprimée; **Sp** – Lapa comprimida.

Maximum shell length 13.8 cm, commonly from 8 to 10 cm. Very common at low tide levels and shallow subtidal depths. Species adapted to clinging to giant kelp such as *Laminaria* and *Ecklonia*, scraping off the surface cells of kelp and the tiny seaweeds that grow upon it. Individuals show territorial behaviour, each plant generally being occupied by only 1 limpet. Juveniles generally live on fronds of kelp and have a rather depressed shell. They move downward on stipes and orientate themselves with the anterior end upwards when their shell becomes deeper and more compressed with age. Collected for food and for bait by coastal people, though in smaller quantities than the other large limpets of the area, due to the peculiar ecology of this less accessible limpet. Eastern Atlantic, from Namibia to False Bay, South Africa.

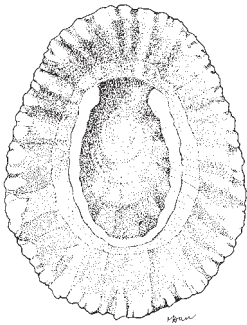


***Cymbula miniata* (Born, 1778)**

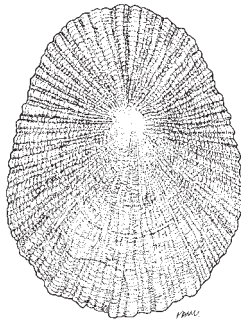
Frequent synonyms / misidentifications: *Patella miniata* Born, 1778 / *Patella compressa* Linnaeus, 1758 [= *Cymbula compressa*]; *P. sanguinans* Reeve, 1856 [= *Cymbula sanguinans* (Reeve, 1854)].

En – Cinnabar limpet; **Fr** – Patelle cinabre; **Sp** – Lapa cinabrio.

Maximum shell length 9.8 cm; commonly to 7.5 cm. Common on rocky shores, in pools at low tide levels (rarely on dry rocks), and sublittorally to 11 m depth. Feeding mainly on the calcareous red seaweed *Lithothamnion*. Often collected by coastal people for food and for its brightly coloured shell that is used in shellcraft to make decorative items. Eastern Atlantic and southwest Indian Ocean, in Namibia and South Africa, eastward to western Transkei. This species was usually thought to be composed of 2 geographical subspecies, 1 occurring mainly in the Atlantic (ssp. *miniata* Born, 1778) and the other one in the Indian Ocean (ssp. *sanguinans* Reeve, 1856); populations living in western Transkei (at the eastern limit of the range of ssp. *miniata*) were understood as the result of interbreeding of the 2 subspecies. However, recent studies combining morphological and biochemical techniques showed these limpets are distinct species, and that *C. miniata* (s. str.) is more closely related to *C. compressa* than to *C. sanguinans*. Then, the English FAO name "cinnabar limpet" must be restricted to the Atlantic species *Cymbula miniata*.



ventral view



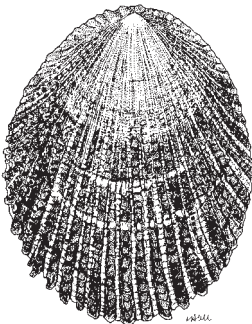
dorsal view



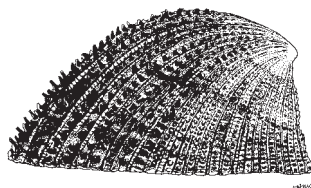
***Helcion pectunculus* (Gmelin, 1791)**

En – Comb limpet; **Fr** – Helcion peigne; **Sp** – Helción peine.

Maximum shell length 3.8 cm, commonly to 2.5 cm. Locally common on rocky shores, often in waters of varying salinity. Frequently occurring on damp rocks in pools and gulleys at upper midtidal levels or in environments under the influence of a fresh water supply. Attains its largest size in the mouth of estuaries. Collected locally at low tide for subsistence purposes by coastal people. East Atlantic and southwest Indian Ocean; north to Namibia and east to southern Natal, South Africa.



dorsal view



lateral view

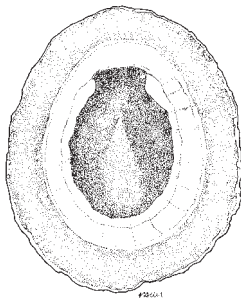


***Patella candei* d'Orbigny, 1840**

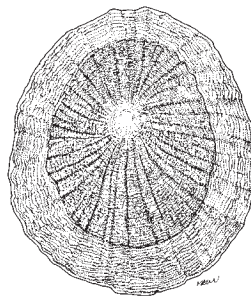
Frequent synonyms / misidentifications: *Patella citrullus* Gould, 1862 / *Patella caerulea* Linnaeus, 1758; *P. vulgata* Linnaeus, 1758.

En – De Cande's limpet; **Fr** – Patelle de de Cande; **Sp** – Lapa majorera.

Maximum shell length 8 cm, commonly from 5 to 6 cm. On rocky shores, relatively high in the intertidal zone, together with *Patella piperata* which also extends higher on the shore. Absent from infralittoral levels, where it is replaced by *Patella tenuis* or by *Patella ulyssiponensis*. Prefers relatively calm environments, protected from strong oceanic surf, where it can be found in quite large numbers. This is the dominant limpet in Selvagen Islands. Shells traditionally used as spoons or ladles. Mostly exploited for its highly appreciated meat, which is eaten raw or fried in olive oil with garlic and tomatoes. Because habitat of this limpet is easily accessible to humans, overcollecting may have strongly affected local stocks. *Patella candei* has become nearly extinct recently within an important part of its range, and it is now restricted to thinly populated or completely uninhabited islands; it no longer occurs on Madeira Islands, the Ilhas Desertas, nor on Tenerife and Lanzarote islands in the Canaries. Classified as a species in danger of extinction in the Canaries since 2001 onward. Macaronesian islands; nowadays restricted to Fuerteventura Island in the Canaries, and to the Selvagens; perhaps occurring also in the Azores.



ventral view



dorsal view

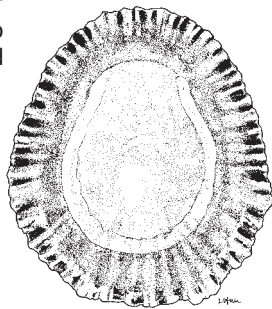


***Patella depressa* Pennant, 1777**

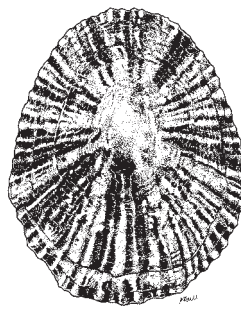
Frequent synonyms / misidentifications: *Patella intermedia* Murray, 1857 / *Patella athletica* Bean, 1844 [= *Patella ulyssiponensis*]; *P. caerulea* Linnaeus, 1758; *P. vulgata* Linnaeus, 1758.

En – Black-footed limpet; **Fr** – Patelle intermédiaire; **Sp** – Lapa intermedia.

Maximum shell length 6 cm, commonly from 3 to 4.5 cm. On littoral rocks, in exposed areas, from upper midtidal levels to shallow subtidal depths. Collected locally for food where common. Eastern Atlantic, from southern England and Wales to Senegal. In the Mediterranean, confined to Gibraltar Straits, eastward to Malaga (Spain) and to Melilla (Morocco).



ventral view



dorsal view

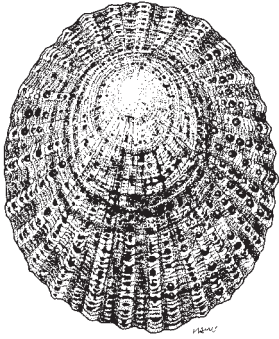


***Patella piperata* Gould, 1846**

Frequent synonyms / misidentifications: *Patella guttata* d'Orbigny, 1840 [non Gmelin, 1791]; *P. nigrosquamosa* Dunker, 1846 / *Patella lusitanica* Gmelin, 1791 [= *Patella rustica*].

En – Peppery limpet; **Fr** – Patelle poivrée; **Sp** – Lapa del sol.

Maximum shell length 5.5 cm, commonly to 4 cm. Littoral rocks, from high in the intertidal zone to shallow subtidal levels, and either on smooth or rough bottoms. Underside of rocks of the splash zone where strong surf occurs. Most common at high tidal levels, but larger mature specimens sparsely occurring in the infralittoral zone. Collected for food with other limpets in the Macaronesian islands, but less appreciated than the other species due to its slightly smaller size. Exact distribution not known, because of confusion with similar species. Macaronesian islands, Madeira Islands, Ilhas Desertas, the Selvagens, the Canaries and perhaps also in the Azores. Taxonomic status of this species still unclear. It may represent a separate species, or a subspecies of *Patella rustica*, endemic to Macaronesian Islands.



dorsal view



lateral view

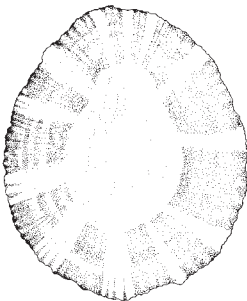


***Patella rustica* Linnaeus, 1758**

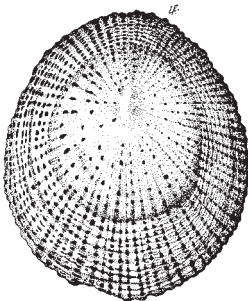
Frequent synonyms / misidentifications: *Patella lusitanica* Gmelin, 1791 / None.

En – Rustic limpet; **Fr** – Patelle ponctuée; **Sp** – Lapa punteada.

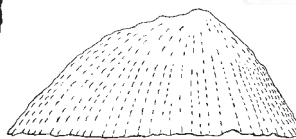
Maximum shell length 5 cm, commonly to 3 cm. Very common on hard substrates, at midtidal levels. Locally collected for food where common, in the Atlantic as well in the Mediterranean. Eastern Atlantic, from the Bay of Biscay (southwestern France) to Morocco. Throughout the Mediterranean. Southern limit of occurrence in West Africa uncertain, perhaps further south to Mauritania.



ventral view



dorsal view



lateral view

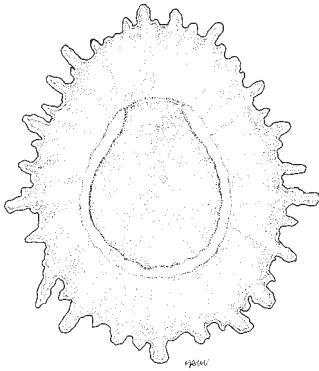


Scutellastra barbara (Linnaeus, 1758)

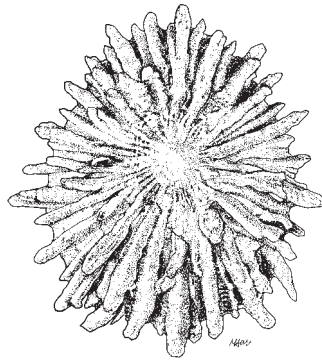
Frequent synonyms / misidentifications: *Patella barbara* Linnaeus, 1758; *P. plicata* Born, 1778; *P. spinifera* Lamarck, 1819 / None.

En – Barbara limpet; **Fr** – Patelle épineuse; **Sp** – Lapa bárbara.

Maximum shell length 13.3 cm, commonly to 8 cm. On rocks covered with encrusting *Lithothamnion* algae in intertidal pools, at low tide levels and in shallow subtidal waters to about 6 m depth. Juveniles often temporarily clinging to the shells of other gastropods. This limpet randomly moves from its weakly marked home-scar to feed on any minute encrusting organisms. Spawning period in early winter. Collected for food and for bait like other limpets of the area. Eastern Atlantic and southwest Indian Ocean; north to Namibia and east to Zululand, South Africa.



ventral view



dorsal view

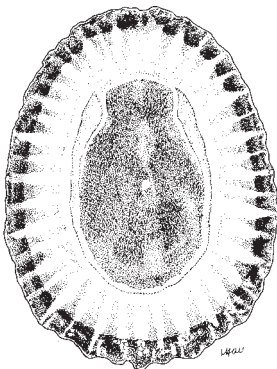


Scutellastra granularis (Linnaeus, 1758)

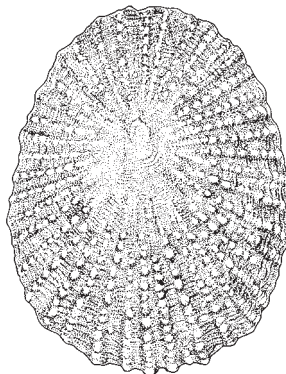
Frequent synonyms / misidentifications: *Patella granularis* Linnaeus, 1758; *Patellidea granularis* (Linnaeus, 1758) / *Patella natalensis* Krauss, 1848.

En – Granular limpet; **Fr** – Patelle granuleuse; **Sp** – Lapa granular.

Maximum shell length 7 cm, commonly to 5 cm. Very common on intertidal rocks and growing higher up on the shore than other limpets, from high tidal levels to mean low water marks. Feeding when rocks are moistened, mainly on black lichens of the upper shore, but also on small algae lower on the shore. Commonly collected for food and for bait. In South Africa, collecting is often limited to 15 specimens per day, to avoid overcollecting. Eastern Atlantic and southwest Indian Ocean; north to Angola, and east to Zululand, South Africa.



ventral view



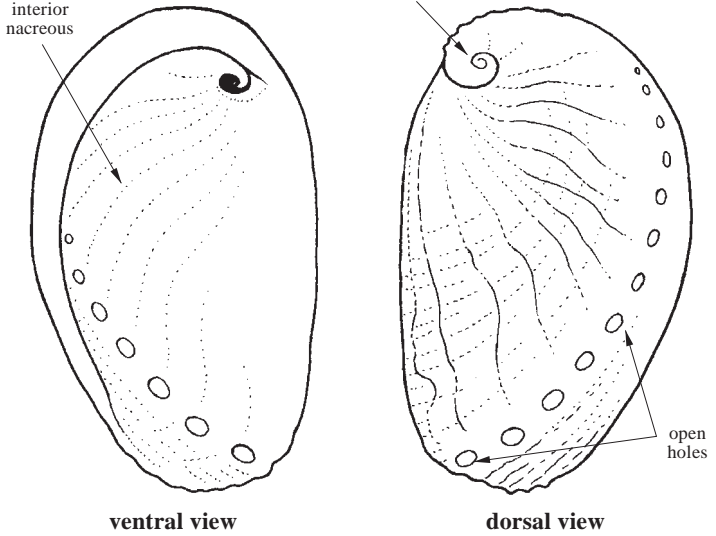
dorsal view



HALIOTIDAE

Abalones, ormers

Diagnostic characters: Shell ear-shaped, depressed and loosely coiled. Spire eccentric and protruding only a little or not at all. A spiral row of holes on the left side of body whorl, sometimes on tubular projections, and of which the last few remain open. Aperture broad, occupying most of the underside. Interior nacreous, with a big subcentral muscle scar. No operculum. Head with a short snout and long, rounded tentacles bearing eyes on short lateral stalks of their outer bases. Foot broad and ovate, very strong. A sensory ridge around the edge of the foot, bearing a series of tentacles. Two gills, the right one slightly reduced in size.



Habitat, biology, and fisheries: Firmly attached to hard substrates by their powerful muscular foot, from intertidal to about 50 m depths. Active during the night, crawling rapidly about and rasping algae. Sexes separate, fertilization external. Eggs released singly, each one enclosed in a gelatinous sheath and hatching as a planktonic larva. Abalones are commercially important species as food and for shell ornaments.

Similar families occurring in the area

None. Shell characters of the Haliotidae are highly distinctive.

Remarks: A reappraisal including anatomical and biochemical data (Geiger, 1998) throws new light on the taxonomy of east Atlantic species of the *Haliotis tuberculata* group. Though taxonomy of this group is still fluctuant, it would then be best to consider the scarlet abalone, *H. coccinea*, a geographic subspecies of *H. tuberculata*, confined to Macaronesian Islands, whereas the Mediterranean ormer *H. lamellosa* most probably represents only an ecomorph of *H. tuberculata* (s.s.).

Key to species of interest to fisheries occurring in the area

- 1a. A conspicuous, large spiral fold along midline of dorsal side of shell (Fig. 1) *Haliotis parva*
- 1b. Dorsal side of shell with a different sculpture → 2

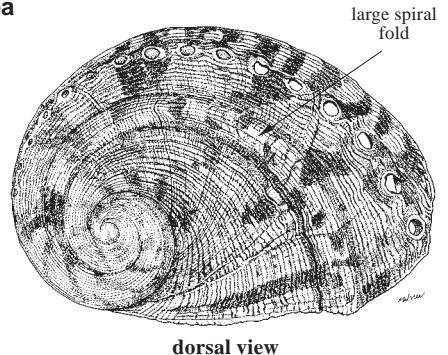
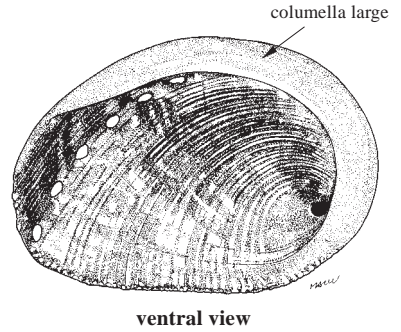
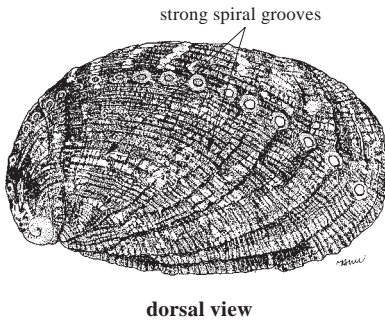


Fig. 1 *Haliotis parva*

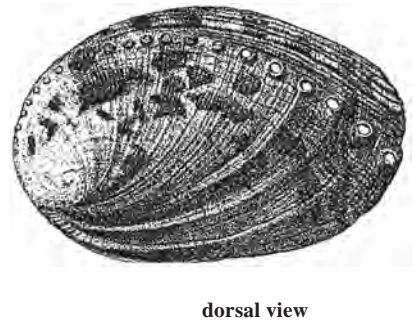
- 2a. Spire depressed, barely visible in ventral view; columella relatively wide, flowing smoothly into anterior margin; nacre with distinct magenta sheen (Fig. 2) ***Haliotis marmorata***
- 2b. Spire more or less elevated, visible in ventral view; columella relatively narrow, set off from anterior margin; nacre usually without magenta sheen → 3
- 3a. Shell small to medium-sized, rarely exceeding 7 cm long; outside of shell with highly distinct spiral grooves (Fig. 3) . . ***Haliotis tuberculata coccinea***
- 3b. Shell medium-sized to large, often exceeding 10 cm long; outside of shell without strong spiral grooves (Fig. 4) ***Haliotis tuberculata tuberculata***



ventral view
Fig. 2 *Haliotis marmorata*



dorsal view
Fig. 3 *Haliotis tuberculata coccinea*



dorsal view
Fig. 4 *Haliotis tuberculata tuberculata*

List of species of interest to fisheries occurring in the area

The symbol is given when species accounts are included.

- Haliotis marmorata* Linnaeus, 1758.
- Haliotis parva* Linnaeus, 1758.
- Haliotis tuberculata coccinea* Reeve, 1846.
- Haliotis tuberculata tuberculata* Linnaeus, 1758.

References

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Geiger, D.L. & Owen, B. 2012. Abalone: World-wide Haliotidae. Hackenheim, Conch Books: VIII + 359 p., 92 pls.

Geiger, D.L. & Poppe, G.T. 2000. The Family Haliotidae. In G.T. Poppe & K.Groh, eds. *A conchological Iconography*. Hackenheim, Conch Books, 135 p., 83 pls.

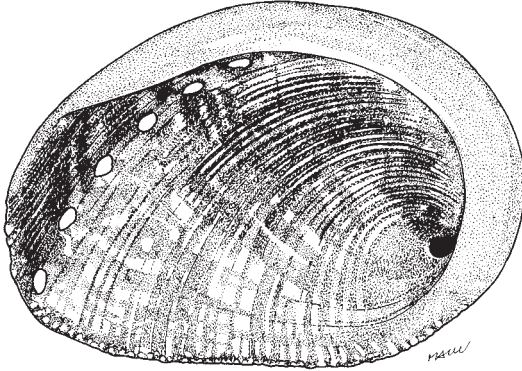
Mgaya, D.Y. 1995. Synopsis of biological data on the European abalone (ormer), *Haliotis tuberculata* Linnaeus, 1758 (Gastropoda: Haliotidae). *FAO Fisheries Synopsis*, 156: I–VII, 1–28.

Shepherd, S.A., Tegner, M.J. & Guzman del Proo, S.A. (eds), 1992. *Abalone of the world. Biology, Fisheries and Culture. Proceedings of the 1st international symposium on abalone*. Oxford, Fishing New Books: 608 p.

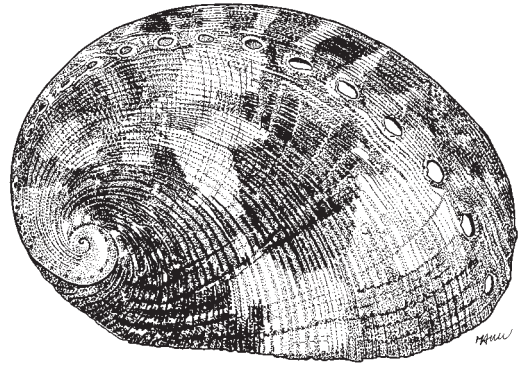
***Haliotis marmorata* Linnaeus, 1758**

Frequent synonyms / misidentifications: *Haliotis guineensis* Gmelin, 1791; *H. rosacea* Reeve, 1846; *H. speciosa* Reeve, 1846; *H. virginea* Reeve, 1846 [not of Gmelin, 1791] / *Haliotis alfredensis* Bartsch, 1915; *H. tuberculata tuberculata* Linnaeus, 1758; *H. marmorata* Reeve, 1846 [= *Haliotis virginea* Gmelin, 1791].

FAO names: En – Marbled abalone; Fr – Ormeau marbré; Sp – Abulón jaspeado.



ventral view



dorsal view

Diagnostic characters: Shell medium-sized (up to 9.4 cm long), **rounded ovate** in outline, with a low, depressed spire. **Outer surface with rounded spiral cords**, intersected by growth lines. **Holes** medium-sized to large, **hardly raised** above surface of shell, the last 6 to 7 open. Columellar ridge of the inner lip wide. **Outer lip markedly rounded near the spire**, flowing smoothly into inner lip. Inner side of shell with spiral grooves reflecting the outer sculpture, muscle scar obscure. Spire barely visible in ventral view. **Colour:** outside of shell **dark brown**, sepia or rust, usually **with large patches** or coarsely reticulated patterns of **white to cream**, sometimes plain coloured; a fine orange-red spiral band typically running through row of holes on specimens of southern populations. **Interior** nacreous **brilliant blue**, often **with distinct magenta sheen**.

Size: Maximum shell length 9.4 cm, commonly from 5 to 6 cm.

Habitat, biology, and fisheries: On subtidal rocks in shallow water, down to 5 m depth. Collected for its highly prized meat like *Haliotis tuberculata tuberculata*, with which it is often confused. Commercially exploited in Senegal for export to southeast Asia.

Distribution: Exact distribution not well known in the East Atlantic, because of confusion with similar species in the area. Supposedly occurring from Morocco to Equatorial Guinea, São Tomé, the Canaries and perhaps also in the Azores.

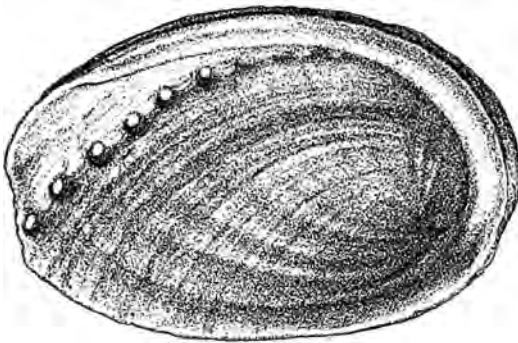
Remarks: A recent study shows that this species is composed of 2 forms which may represent a complex of 2 similar species or subspecies, *H. marmorata* (s.s.) in the south, and *H. speciosa* in the north; the latter being larger, with only 4 or 5 more elevated and larger open holes, but without the spiral orange-red band through row of holes and the magenta sheen of nacre.



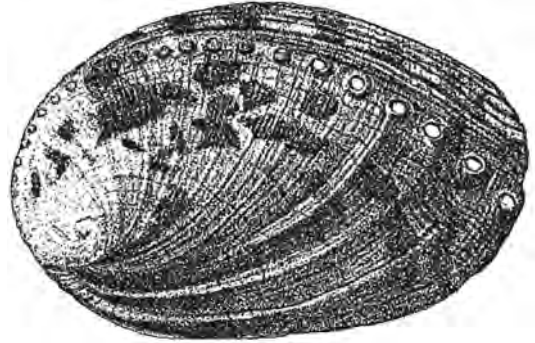
***Haliotis tuberculata tuberculata* Linnaeus, 1758**

Frequent synonyms / misidentifications: *Eurotis tuberculata* (Linnaeus, 1758); *Haliotis aquatilis* Reeve, 1846; *H. bistriata* Gmelin, 1791; *H. japonica* Reeve, 1846; *H. lamellosa* Lamarck, 1822 / *Haliotis aquatilis* of authors [= *Haliotis supertexta* Lischke, 1870]; *H. diversicolor* Reeve, 1846; *H. parva*; *H. rugosa* Lamarck, 1822.

FAO names: **En** – Tuberculate abalone; **Fr** – Ormeau tuberculeux; **Sp** – Oreja marina tuberculosa.



ventral view



dorsal view

Diagnostic characters: Shell large sized (up to 19 cm long in the Atlantic outer surface), **elongate ovate** in outline, with a variably depressed to elevated spire. **Outer surface with fine spiral threads and low, rounded radial folds. Holes** medium sized, **somewhat raised** above shell surface, with the last 3 to 9 open. Columellar ridge of the inner lip moderately large. **Outer lip** regularly and widely convex, somewhat **truncate at anterior end**. Inner side of shell smoothish, reflecting the outer sculpture, muscle scar obscure. Spire visible in ventral view. **Colour: outside of shell greenish brown with reddish to cream blotches. Interior usually nacreous silver.**

Size: Maximum shell length 19 cm, commonly from 8 to 10 cm.

Habitat, biology, and fisheries: On rocks and under stones, from low intertidal fringe to about 30 m depth. Feeding mostly at night, grazing mainly on green algae, but also on some kelp. Reproduction in summer. Dispersal of the planktonic larvae limited by the short time available before settlement. Actively collected for its highly prized foot in many areas, by hand at low tide or snorkelling. Generally sold fresh, but keeps well as a frozen product. In Essaouira area (Morocco), also used as a high quality source of mother-of-pearl, to make luxury inlaid furniture and music instruments. Outside the studied area, a sustained commercial fishery developed in the British Channel Islands and neighbouring French coasts of western Normandy and northern Brittany, where it occurs in sizeable densities. However, after depletion of the local populations, strict regulations are now imposed and aquaculture is emerging in France.

Distribution: Eastern Atlantic and the Mediterranean; north to southern Ireland and the English Channel, south to Morocco and Western Sahara. Southern limit imperfectly known, perhaps extending to Senegal.

Remarks: Because shell features of *H. tuberculata tuberculata* are highly variable along its wide geographical range (especially those of Mediterranean populations), the above diagnosis refers only to Atlantic specimens of this subspecies.

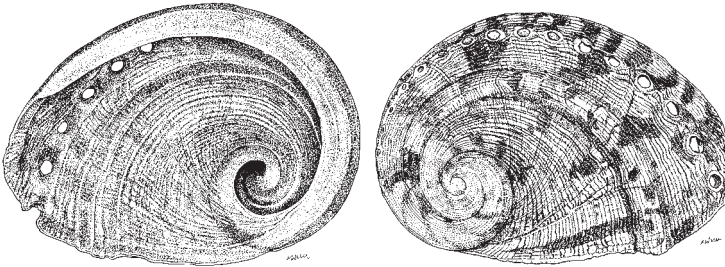


***Haliotis parva* Linnaeus, 1758**

Frequent synonyms / misidentifications: *Haliotis canaliculata* Lamarck, 1822; *H. rubicunda* Röding, 1798; *Padollus rubicundus* Montfort, 1810 / None.

En – Channelled abalone; **Fr** – Ormeau canaliculé; **Sp** – Abulón acanalado.

Maximum shell length 6 cm, commonly to 4.5 cm. On rocky shore at intertidal and sublittoral levels, mainly from 5 to 10 m depths. Habitat changing with growth, from under boulders in juveniles of 1 cm long to narrow rock crevices in medium-sized specimens, and to large crevices and under boulders in specimens larger than 3.5 cm. Main predators of this species are some reef fishes. Collected for food and for its often brightly coloured and attractive nacreous shell. Eastern Atlantic and southwest Indian Ocean; north to Angola and east to Eastern Cape, South Africa.



ventral view

dorsal view



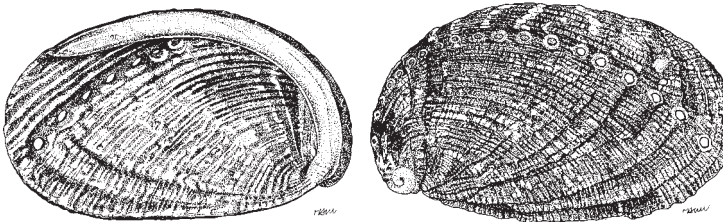
***Haliotis tuberculata coccinea* Reeve, 1846**

Frequent synonyms / misidentifications: *Haliotis coccinea* Reeve, 1846; *H. canariensis* Nordsieck, 1975 / *Haliotis tuberculata tuberculata* Linnaeus, 1758; *H. marmorata* Linnaeus, 1758.

En – Scarlet abalone; **Fr** – Ormeau écarlate; **Sp** – Abulón escarlata.

Maximum shell length 8 cm, commonly to 5 cm. Common on rocky shores. Sublittoral zone, from 2 to 25 m depths. Locally collected for food. Macaronesian islands in the Azores, Madeira and the Canaries; Cape Verde Islands. Absent from West African mainland coasts.

Remarks: Recent molecular and morphological studies tend to show that the scarlet abalone also occurs on European coasts, and that the populations from the Cape Verde Archipelago could represent an endemic subspecies *H. tuberculata fernandesi* Owen and Afonso, 2012.



ventral view

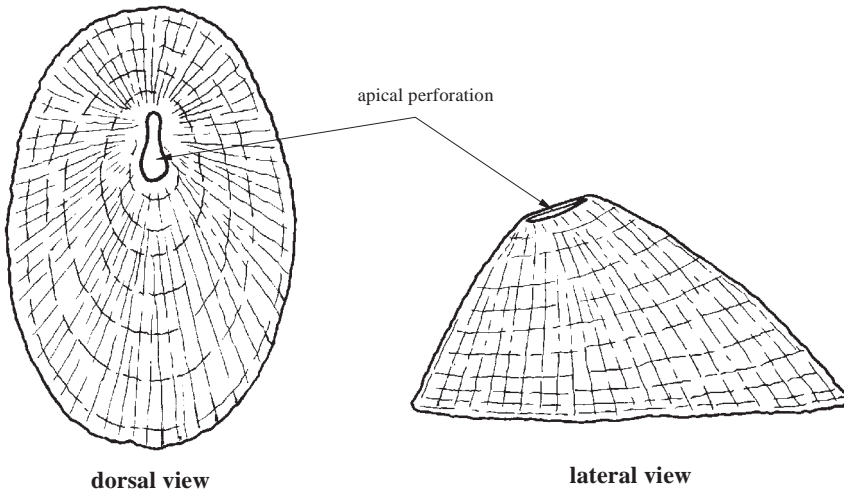
dorsal view



FISSURELLIDAE

Keyhole and slot limpets

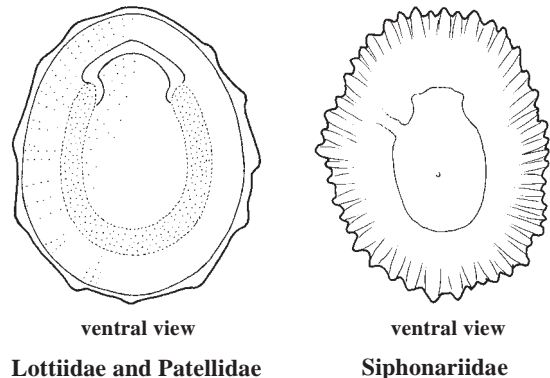
Diagnostic characters: Shell conical, with an apical perforation, or sometimes an anterior slit or notch located on the anterior margin or on the anterior slope. Early stages of growth with a coiled shell which is lost as the size of the aperture increases in species with an apical hole. Outer sculpture mostly of radial ribbing, often more or less cancellate. Interior porcelaneous, with an anteriorly interrupted horseshoe-shaped muscle scar. No operculum. Animal with an external, bilateral symmetry. Head with a strong and short snout, with 2 tentacles at its base. Mantle more or less expanded, sometimes covering the entire shell and leaving only the apical hole. A pair of bipectinate gills in the mantle cavity. Heart auricles, kidney and gonads are paired. Foot very strong, sometimes larger than the shell.



Habitat, biology, and fisheries: Species of this family generally occur under stones and ledges in the intertidal zone, on rocks, stones or shells sublittorally and deeper, to about 400 m. They generally avoid light, and some return from feeding excursions to the same resting place. Keyhole limpets graze on animal tissues and encrusting algae growing on firm substrates, using their multi-toothed, brush-like radula. Some species are specialized predators of sponges or ascidians. Sexes separate, or changing from male to female with age. Eggs deposited in a thin, gelatinous mass, or contained in spherical capsules, sometimes brooded between the front end of the foot and the mantle. Young hatching as late planktonic larvae or at the crawling stage. In the studied area, keyhole limpets are collected at low tide by coastal populations where abundant, both for human consumption and as bait for angling.

Similar families occurring in the area

The apical or anterior perforation easily distinguishes the keyhole limpets from other gastropods with conical shell, such as Patellidae, Lottiidae, or Siphonariidae.



Key to species of interest to fisheries occurring in the area

- 1a. Apical perforation large to very large, regularly oval (Fig. 1a and 1b) → 2
- 1b. Apical perforation rather small, not regularly oval and generally more or less keyhole-shaped (Fig. 1c). → 3

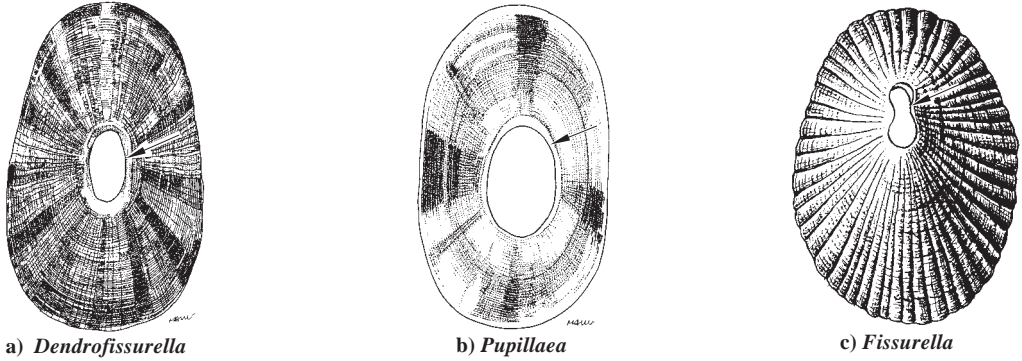
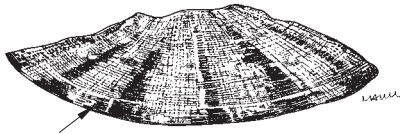


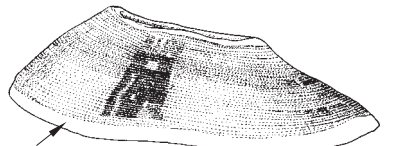
Fig. 1 dorsal view of shell

- 2a. Basal margin of shell simple; perforation large and narrowly oval; shell saddle-shaped (Fig. 2), well visible from the outside in life; foot very large, conspicuously projecting beyond posterior end of shell, and with a large, trunk-like and branched elongation at anterior end *Dendrofissurella scutellum*
- 2b. Basal margin of shell double (white inner layer projecting beyond the coloured outer one); perforation very large, oval; shell conical (Fig. 3), almost completely hidden by the wide mantle in life; foot large, but not conspicuously projecting beyond posterior end of shell, and without such an elongation at anterior end *Pupillaea aperta*



lateral view

Fig. 2 *Dendrofissurella scutellum*

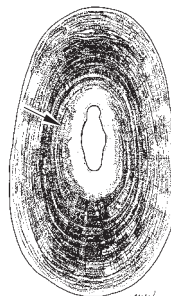


lateral view

Fig. 3 *Pupillaea aperta*

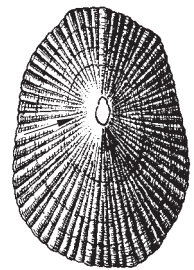
- 3a. Perforation widest in the middle → 4
- 3b. Perforation more or less contracted in the middle → 5

- 4a. Shell shape rather depressed, outer sculpture reduced to very fine to obsolete radial threads; perforation narrow and elongate, distinctly enlarged medially (Fig. 4) *Fissurella mutabilis*
- 4b. Shell shape not depressed, outer sculpture with fine but well marked radial riblets; perforation irregularly oval and slightly larger medially (Fig. 5) *Fissurella nubecula*



dorsal view

Fig. 4 *Fissurella mutabilis*



dorsal view

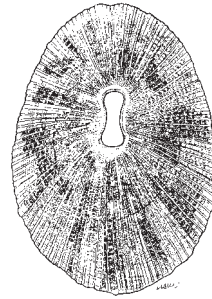
Fig. 5 *Fissurella nubecula*

- 5a. Outer sculpture of numerous fine radial ribs, sometimes grouped on low radial undulations and poorly affecting the basal margin of shell (Fig. 6)

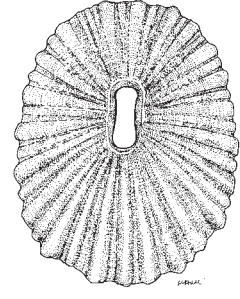
.....
Fissurella coarctata

- 5b. Outer sculpture of rather broad and unequal radial ribs that markedly scallop the basal margin of shell (Fig. 7)

.....
Fissurella alabastrites




dorsal view









dorsal view

Fig. 6 *Fissurella coarctata* Fig. 7 *Fissurella alabastrites*

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

-  *Dendrofissurella scutellum* (Gmelin, 1791).
-  *Fissurella alabastrites* Reeve, 1849.
-  *Fissurella coarctata* King, 1832.
-  *Fissurella mutabilis* G.B. Sowerby I, 1835.
-  *Fissurella nubecula* (Linnaeus, 1758).
-  *Pupillaea aperta* (G.B. Sowerby I, 1825).

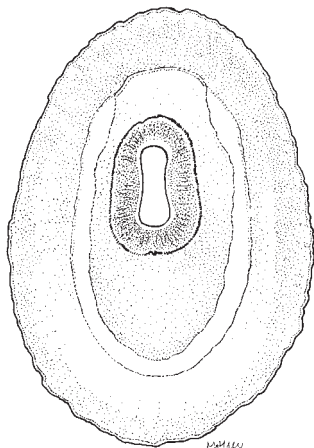
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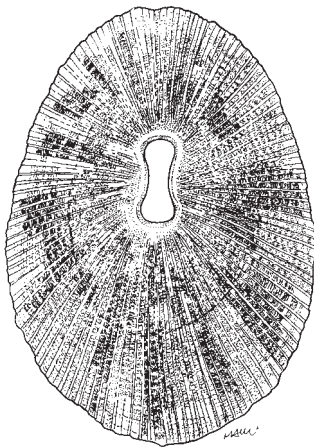
***Fissurella coarctata* King, 1832**

Frequent synonyms / misidentifications: *Fissurella taeniata* G.B. Sowerby II, 1867 / *Fissurella alabastrites*.

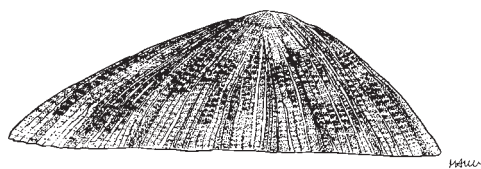
FAO names: **En** – Compressed keyhole limpet; **Fr** – Fissurelle compressée; **Sp** – Fisurela chata.



ventral view



dorsal view



lateral view

Diagnostic characters: Shell conical, moderately elevated in shape and elongate ovate in outline, with anterior end more narrowly rounded than posterior end. **Apical perforation** rather narrow and elongate, **somewhat contracted in the middle**, slightly higher in shape medially when viewed laterally, situated at **about the anterior one-third of the shell length**. Outer sculpture of about **a hundred fine** but well marked **radial ribs**, **sometimes grouped on low radial undulations** in larger specimens **and poorly** or not **affecting the basal margin of shell**. Internal callus of apical perforation large and thick, rounded at both ends, radially striated. **Colour:** **outside** of shell **greenish grey with 11 to 20 darker brown radial bands**, sometimes all reddish black. **Interior** often with a greenish hue in juveniles, **almost white** in large specimens; **callus of the apical perforation** light to dark **grey**.

Size: Maximum shell length 4 cm, commonly to 3 cm.

Habitat, biology, and fisheries: Common in rocky areas, at low intertidal and shallow subtidal levels. Collected by coastal people in Dakar area (Senegal) for human consumption. Used in soups.

Distribution: Eastern Atlantic, at least in Senegal and Cape Verde Islands. Southern limit of occurrence in West Africa uncertain, perhaps further south to Angola.

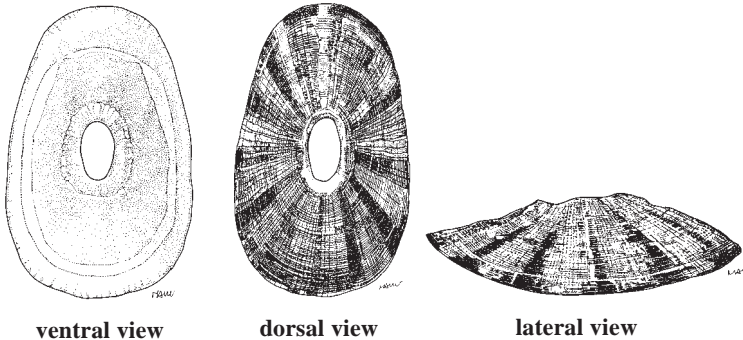


***Dendrofissurella scutellum* (Gmelin, 1791)**

Frequent synonyms / misidentifications: *Amblychilepas hiantula* (Lamarck, 1822); *A. scutellum* (Gmelin, 1791); *Fissurella hiantula* Lamarck, 1822 / "*Fissurella hiantula*" of authors, not of Lamarck, 1822 [= *Fissurellidea megatrema* d'Orbigny, 1841].

En – Shield slot limpet; **Fr** – Fissurelle bouclier; **Sp** – Fisurela escudo.

Maximum shell length 5 cm, commonly to 3 cm. A common species, living under and among rocks, mostly in sheltered sandy pools, from low intertidal levels to lower continental shelf, down to about 130 m depths. Locally collected at low tide for subsistence purpose or as bait for angling. Eastern Atlantic, in Namibia and South Africa; eastward to False Bay (southwestern Cape), where it intergrades with the subspecies *D. scutellum hiantula* (Lamarck, 1822); the latter subspecies is distributed along the coasts of southwestern Indian Ocean, east to northern Natal. It probably does not occur in Angola, where it is replaced by the similar intertidal species *Medusafissurella chemnitzii* (G.B. Sowerby I, 1835).

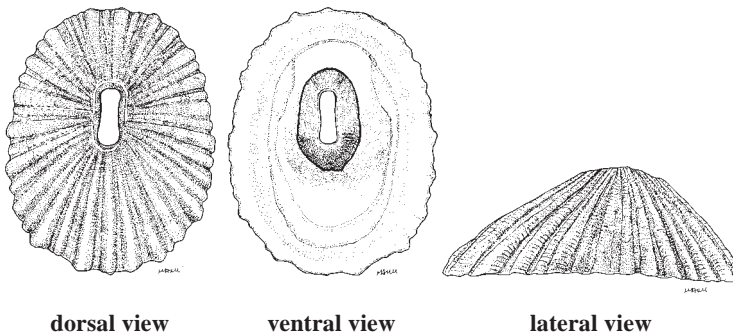


***Fissurella alabastrites* Reeve, 1849**

Frequent synonyms / misidentifications: *Fissurella calypso* Salvat, 1967; *F. keppeliana* G.B. Sowerby III, 1911; *F. nimbose* Thiele, 1891 [not of Gmelin, 1791] / "*Fissurella alabastrites*" Dunker, 1853 [= *F. coarctata*]; *F. glaucopsis* Reeve, 1849.

En – Alabaster keyhole limpet; **Fr** – Fissurelle albâtre; **Sp** – Fisurela alabastro.

Maximum shell length 4.4 cm, commonly to 3.5 cm. In rocky areas, at low intertidal and shallow subtidal levels. A common species, abundantly occurring in some places. Collected at low tide and shallow water for human consumption. Restricted to the Cape Verde Archipelago.

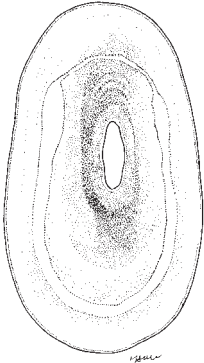


Fissurella mutabilis G.B. Sowerby I, 1835

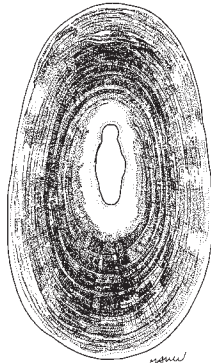
Frequent synonyms / misidentifications: None / None.

En – Mutable keyhole limpet; **Fr** – Fissurelle muable; **Sp** – Fisurela variable.

Maximum shell length 2.5 cm, commonly to 2 cm. In rocky areas, from intertidal zone to about 180 m depths. Commonly found in groups under rocks in intertidal pools at midtidal levels, but also living among clumps of *Perna* mussels in the eastern part of its range. Occasionally collected locally at low tide with other species for subsistence purposes. Eastern Atlantic, from Namibia to South Africa. Also occurring along the coasts of southwestern Indian Ocean, east to Delagoa Bay, Mozambique.



ventral view



dorsal view

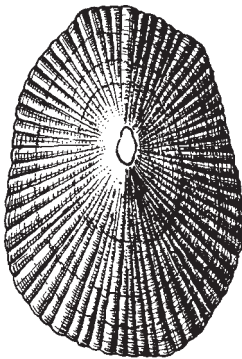


Fissurella nubecula (Linnaeus, 1758)

Frequent synonyms / misidentifications: *Cremides nubecula* (Linnaeus, 1758) / *Diodora graeca* (Linnaeus, 1758).

En – Cloudy keyhole limpet; **Fr** – Fissurelle nuageuse; **Sp** – Fisurela nebulosa.

Maximum shell length 3.4 cm, commonly to 2.5 cm. In rocky shores, intertidally and at shallow subtidal depths. More common in sheltered rather than exposed areas. Collected for food by coastal people, at least in Dakar area (Senegal) where it appears very common. Used in soups. Distribution imperfectly known, because of confusion with similar species. Eastern Atlantic, probably from the southern part of the Bay of Biscay to Angola, in Fuerteventura (Canaries) and Cape Verde Islands. Throughout the Mediterranean.



dorsal view

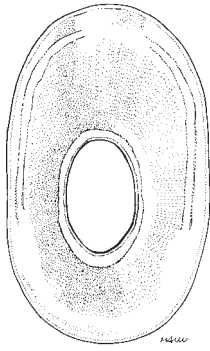


Pupillaea aperta (G.B. Sowerby I, 1825)

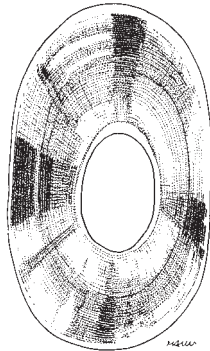
Frequent synonyms / misidentifications: *Fissurella aperta* Sowerby I, 1825; *Fissurellidea aperta* (Sowerby I, 1825) / None.

En – Double-edge keyhole limpet; **Fr** – Fissurelle rebordée; **Sp** – Fisurela rebordeada.

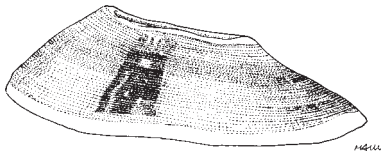
Maximum shell length 5 cm, commonly to 4 cm. In crevices and underside of rocks with sandy material, intertidally and sublittorally, down to about 30 m depths. Animal voluminous, displaying a huge, dark coloured mantle which almost completely covers the shell in life, and may reach about 11 cm in length. Collected locally for food and for bait. Eastern Atlantic and southwest Indian Ocean; north to Namibia, and east to Western Transkei, South Africa.



ventral view



dorsal view



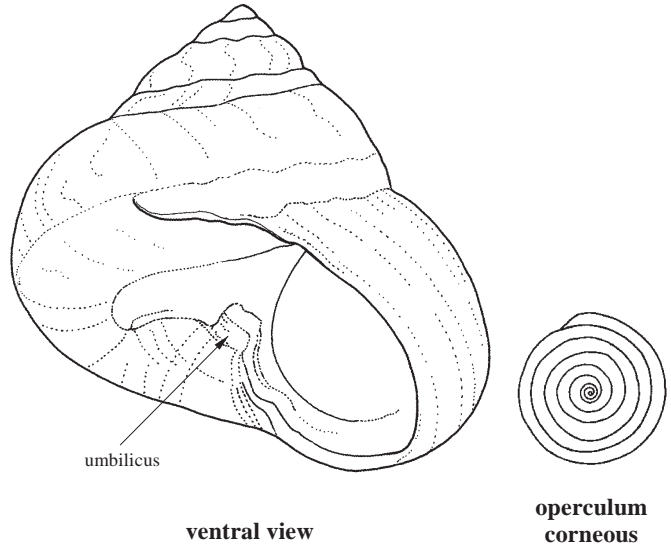
lateral view



TROCHIDAE

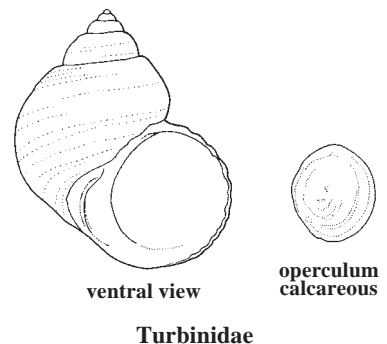
Top shells

D **Diagnostic characters:** Shell pyramidal, conical to globose in shape, with a moderately large, rounded to angular body whorl and **often with a flattened base**. Umbilicus more or less narrow to closed, sometimes with a calloused plug. Outer surface smooth or sculptured axially and spirally, with beads, nodules, or tubercles. Periostracum sometimes conspicuous. **Aperture** rounded to squarish, **without a siphonal canal, nacreous within**. Columella and margin of the outer lip generally not in the same plane. **Operculum corneous, nearly circular, with many coils and a central nucleus**. Head with a short snout, a pair of conical, often papillate tentacles and cup-shaped, open eyes on distinct stalks. Foot moderately small, often medially grooved, with a large fleshy ridge on either side bearing sensitive tentaculate processes.



Habitat, biology, and fisheries: Mostly littoral and shallow sublittoral, occurring in large numbers on hard substrates like rocky shores or coral reefs. However, there are also species living among eelgrass or on deep-water bottoms of sand or mud. Slow moving animals, mostly browsing on detritus and algae. Calliostomatinae (genus *Calliostoma* and related genera) have been shown being obligate carnivores, feeding on small coelenterates or on sponges. Sexes separate, fertilization external. Eggs laid singly in sea water and hatching as free-swimming planktonic larvae, or bound in gelatinous masses and then frequently hatching as crawling juveniles. Larger or most common species of Trochidae are traditionally used as food by coastal populations in the area. Shells are utilized by the shellcraft industries, sometimes serving as lime material.

Remarks: Some authors split the top shells into 2 families, considering on biological, radular and molecular ground that *Calliostoma* species and their kin belong to a distinct family, the Calliostomatidae. A conservative course is adopted here, and the Trochidae are considered in a wide sense.



Similar families occurring in the area

Turbinidae: appearance of shell sometimes strongly convergent with Trochidae; easily distinguished from the latter by their operculum strongly calcified externally.

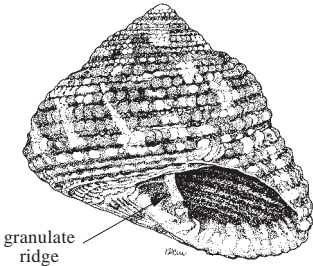
Key to species of interest to fisheries occurring in the area

- 1a. Columella with a strong basal tooth → 2
- 1b. Columella smooth, without a strong basal tooth → 6

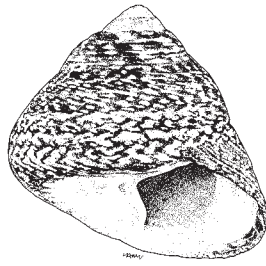
- 2a. Umbilicus widely open, bordered by a granulate ridge (Fig. 1) ***Clanculus kraussi***
- 2b. Umbilicus closed or nearly so, not encircled by a granulate ridge → 3

- 3a. Colour pattern of numerous and very fine oblique dark purplish brown to green lines, intersected by other zigzag or spiral fine streaks, on a pale buff ground (Fig. 2) . . . ***Phorcus lineatus***
- 3b. Colour pattern with different features → 4

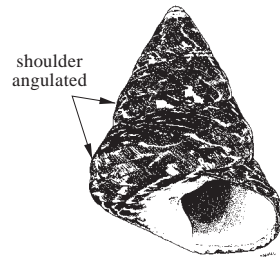
- 4a. Spire whorls angulated on shoulder, with a well marked suture (Fig. 3) ***Phorcus atratus***
- 4b. Spire whorls more or less convex, but not angulated on shoulder and with a rather shallow suture → 5



granulate ridge
ventral view
Fig. 1 *Clanculus kraussi*

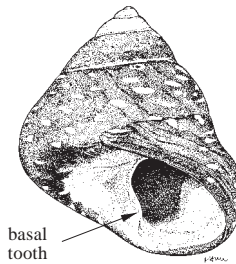


ventral view
Fig. 2 *Phorcus lineatus*



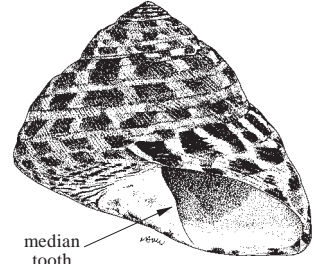
shoulder angulated
ventral view
Fig. 3 *Phorcus atratus*

- 5a. Colour pattern of small white dots on a dark purplish brown to black background; columella thick edged, tooth basal (Fig. 4) . . . ***Phorcus punctulatus***



basal tooth
ventral view
Fig. 4 *Phorcus punctulatus*

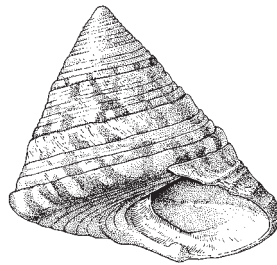
- 5b. Colour pattern with spiral rows of variably shaped, often triangular to quadrangular dark purple to brownish spots on a greenish to ashy grey background; columella rather thin edged, tooth somewhat above the base (Fig. 5) ***Phorcus sauciatus***



median tooth
ventral view
Fig. 5 *Phorcus sauciatus*

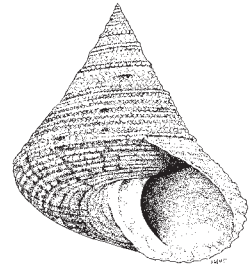
- 6a. Shell conical, with sharp apex and flat-sided whorls; aperture subquadrangular → 7
- 6b. Shell approximately conical, but without both sharp apex and flat-sided whorls; aperture differently shaped → 8

- 7a. Spiral ridges of last whorl smooth (those on topmost whorls somewhat beaded); columella with a slight bulge (Fig. 6) . . . ***Calliostoma zizyphinum***



ventral view
Fig. 6 *Calliostoma zizyphinum*

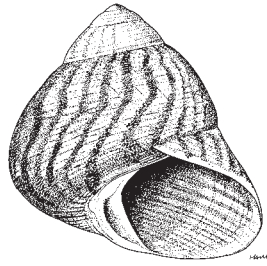
- 7b. Spiral ridges all finely beaded; columella without bulge (Fig. 7) . . . ***Calliostoma granulatum***



ventral view
Fig. 7 *Calliostoma granulatum*

- 8a. Inner lip of aperture wide, with a shallow central furrow → 9
- 8b. Inner lip of aperture without central furrow → 10

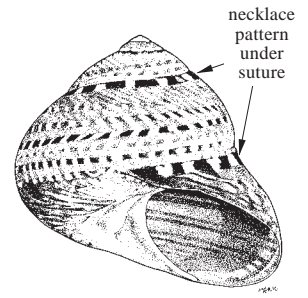
9a. Colour pattern of oblique and somewhat undulate brownish purple rays on a dark olive green background (Fig. 8)
 ***Oxystele fulgurata***



ventral view

Fig. 8 *Oxystele fulgurata*

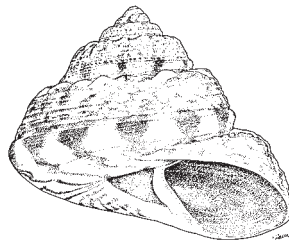
9b. Colour pattern very variable, always with a necklace of dark and light squares just below the suture but without oblique purple rays (Fig. 9)
 ***Oxystele variegata***



ventral view

Fig. 9 *Oxystele variegata*

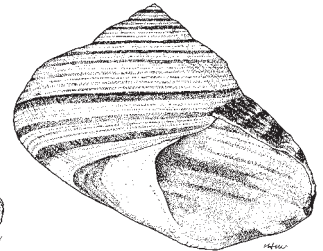
10a. Whorls distinctly shouldered, bearing strong tubercles under the suture (Fig. 10) . . ***Gibbula magus***



ventral view

Fig. 10 *Gibbula magus*

10b. Whorls smoothly convex in profile, devoid of strong tubercles under the suture → 11



ventral view

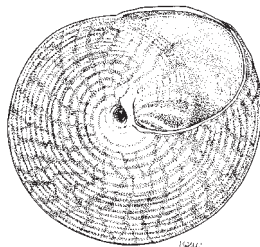
Fig. 11 *Gibbula zonata*

11a. Spiral sculpture conspicuous, with 3 or 4 prominent ridges on spire whorls (Fig. 11). . ***Gibbula zonata***

11b. Spiral sculpture slight, without prominent ridges on spire whorls → 12

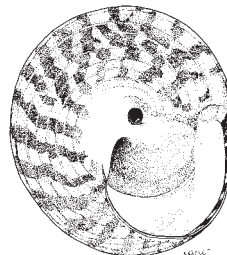
12a. Base of shell with 13 or 14 low spiral threads; umbilicus small (occasionally closed in older shells); colour pattern of many fine, grey to purplish brown lines on a yellowish white to light grey background (Fig. 12a) ***Gibbula cineraria***

12b. Base of shell with 8 to 11 low spiral threads; umbilicus large; colour pattern of a few, broad reddish purple stripes on a paler background (cream-coloured in adults, often greenish in small shells) (Fig. 12b) ***Gibbula umbilicalis***



ventral view

a) *Gibbula cineraria*
















ventral view

b) *Gibbula umbilicalis*

Fig. 12 basal view of shell

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

-  *Calliostoma granulatum* (Born, 1778).
-  *Calliostoma zizyphinum* (Linnaeus, 1758).
-  *Clanculus kraussi* (Philippi, 1855).
-  *Gibbula cineraria* (Linnaeus, 1758).
-  *Gibbula magus* (Linnaeus, 1758).
-  *Gibbula umbilicalis* (da Costa, 1778).
-  *Gibbula zonata* (Wood, 1828).
-  *Oxysteles fulgurata* (Philippi, 1848).
-  *Oxysteles variegata* (Anton, 1839).
-  *Phorcus atratus* (Wood, 1828).
-  *Phorcus lineatus* (da Costa, 1778).
-  *Phorcus punctulatus* (Lamarck, 1821).
-  *Phorcus sauciatus* (Koch, 1845).

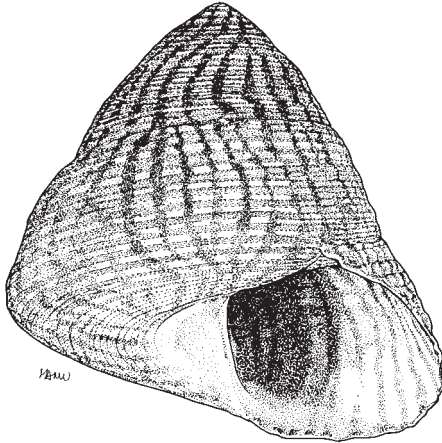
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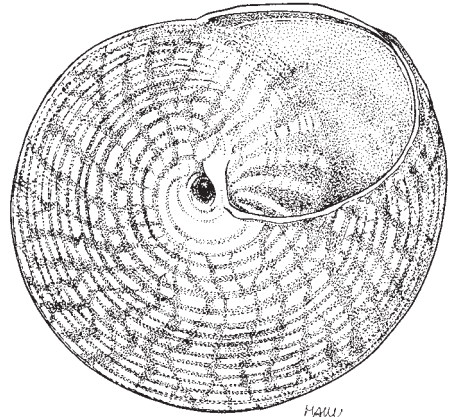
Gibbula cineraria (Linnaeus, 1758)

Frequent synonyms / misidentifications: *Gibbula cinerea* [Spelling error]; *Jujubinus strigosus* (Gmelin, 1791) / None.

FAO names: En – Grey top; Fr – Gibbule cendrée; Sp – Carraquela.



ventral view



basal view

Diagnostic characters: Shell solid, rather small (up to 1.8 cm in length), **about as long as wide**, approximately conical in shape, with blunt apex, slightly dome-shaped profile of spire and flattened base. Whorls **smoothly convex** in profile, slightly dipping to sutures. **Body whorl distinctly angulated at periphery**. Outer **sculpture slight**, with many **low spiral ridges and grooves**, and fine oblique growth lines. **Base of shell with about 13 or 14 low spiral threads**. **Umbilicus small** but usually deep, ovate in shape (occasionally closed in older shells). Aperture oblique, with straight and narrow inner lip. **Columella smooth**, with a slight median bulge but without a strong basal tooth. **Colour:** outside of shell yellowish white to light grey, with a dense pattern of many fine, somewhat irregular, grey to purplish brown lines which cross growth lines more or less at right angle and may be interrupted to give streaks or spots. Interior nacreous, with blue to green hue. Aperture usually with a narrow row of spots on and within the outer lip margin, corresponding to the outer colour pattern.

Size: Maximum shell length 1.8 cm, commonly to 1.5 cm.

Habitat, biology, and fisheries: Common in rocky areas, from low water level of neap tides in the intertidal zone to sublittoral and upper continental shelf, down to about 130 m depths. May form numerous intertidal populations, occurring on and amongst seaweeds, in pools, and under stones and ledges. Seem to prefer flatter than steeper shores and occur in areas under the influence of surf, as well as in rather protected ones; can also live in waters of reduced salinity (down to about 25‰). Eat weeds and their epiphytes, and are also detritivores. This species is collected at low tide where abundant, for food and for its nacreous shell that is used by the craft industries. Sold in Morocco as “bigorneaux” (periwinkles), often mixed with other species. Trials of exportation from Morocco to the European Union failed in 1999.

Distribution: Eastern Atlantic, from Norway and Iceland to Morocco and the Canaries.

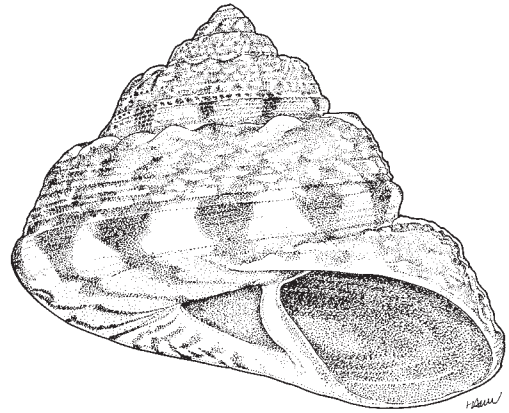


***Gibbula magus* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Magus gibbula; Fr – Troque mage; Sp – Peonza maga.

Diagnostic characters: Shell solid, medium-sized (up to 3.8 cm in length), **approximately conical**, without a sharp apex and **rather low in shape**, distinctly wider than high. **Whorls markedly shouldered**, with deep suture. Outer surface of shell with a **spiral row of strong, elongated tubercles on shoulder slope** of each whorl, and with **numerous spiral ridges** and grooves, often alternately large and small on apical half of whorls, more equal in size on the base; **body whorl with a larger spiral ridge at the periphery**, forming a rounded keel above the rather flat base. **Umbilicus large, round and deep**, with a rounded peripheral ridge, and somewhat narrowed on its columellar side by thickened edge of inner lip. Aperture quadrilateral ovate in shape, with a thin oblique outer lip. Columella smooth, with a slight bulge but without a strong basal tooth. **Colour: outside of shell whitish**, grey or pale tan, marked with **conspicuous, irregular pink to reddish brown or brownish grey streaks and blotches**. **Interior iridescent white**, generally without a conspicuously coloured band within the outer lip margin.



ventral view

Size: Maximum shell width 3.8 cm, commonly to 3 cm.

Habitat, biology, and fisheries: Living on various hard or soft bottoms, from lower intertidal zone to upper continental shelf, down to 90 m deep or more. Most common on sublittoral sandy to muddy bottoms with shells, gravels or calcareous coralline algae like *Phymatolithon calcareum*. Eggs laid singly in a jelly coat from spring to early summer, hatching as planktonic larvae which settle after a brief free life. Quite frequently collected in many places with bottom trawls and nets, both for its edible flesh and its attractive shell.

Distribution: Eastern Atlantic and throughout the Mediterranean; north to Shetland Islands, Ireland, western Channel and Britain, and south to Senegal. Also occurring in the Azores and Canary Islands.



***Phorcus atratus* (Wood, 1828)**

Frequent synonyms / misidentifications: *Monodonta atrata* (Wood, 1828); *Osilinus atratus* (Wood, 1828) / *Monodonta articulata* Lamarck, 1822 [= *Phorcus articulatus* (Lamarck, 1822)]; *M. colubrina* (Gould, 1849) [= *P. sauciatus* (Koch, 1845)]; *Osilinus punctulatus* (Lamarck, 1822) [= *Phorcus punctulatus* (Lamarck, 1822)].

FAO names: En – Blackened monodont; Fr – Monodonte noirecie; Sp – Peonza ennegrecida.

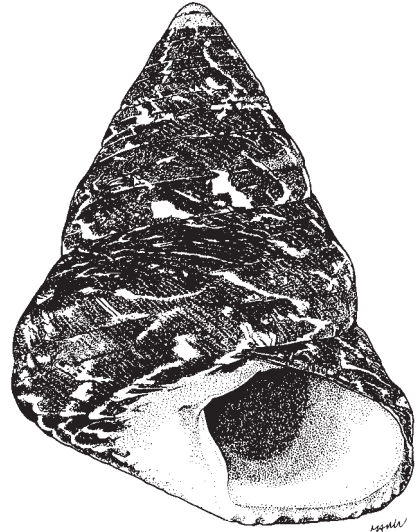
Diagnostic characters: Shell moderately thick but solid, medium-sized (up to 3.2 cm long), usually longer than wide to about as long as wide, variable but roughly ovoid-conical in shape, with more or less strongly elevated spire, somewhat acute, often eroded apex and slightly convex base. Spire whorls mostly angulated on shoulder, with well marked suture; body whorl with 2 spiral angulations, 1 on shoulder and another one, often less well marked, at periphery. Outer sculpture with unequal spiral threads and grooves on spire whorls and on the base, in addition to oblique growth lines. Umbilicus closed. Aperture oblique oval subquadrate in outline, with straight and short inner lip. Columella with a rather prominent basal tooth. Columellar callus covering the umbilicus and adjacent area. **Colour:** outside of shell with a rather variable coloration, usually purplish black to dull brownish purple, or ashy grey to pale tan or greenish, marked with several spiral rows of white to yellowish spots or irregular, oblique to roughly axial zigzag stripes; pale spot or stripe sometimes poorly developed to nearly absent on the spire, but usually present on the base. Eroded apical area of the spire whitish to orange in colour. Inner lip, columellar callus and part of base adjacent to aperture whitish. Colour pattern of the base not extending into the aperture. Interior pearly and iridescent. Inner margin of the outer lip usually with a conspicuously coloured narrow band corresponding to the outer colour pattern.

Size: Maximum shell length 3.2 cm, commonly to 2 cm,

Habitat, biology, and fisheries: On rocky shores, rather high in the intertidal zone. Collected for food where common; this species is considered a species of interest in the Canaries, where it is actively sought for human consumption.

Distribution: Exact distribution not known because of confusion with other *Phorcus* species of the East Atlantic; occurring at least in the Macaronesian islands of Madeira, the Selvagens and the Canaries, in Cape Verde Islands, and possibly also in Portugal and along the coasts of the African mainland of Senegal.

Remarks: Based on a molecular study, the form living in the Cape Verde archipelago has been considered as an endemic species, *Phorcus mariae* Templado and Rolán, 2012.



ventral view



***Phorcus punctulatus* (Lamarck, 1822)**

Frequent synonyms / misidentifications: *Monodonta punctulata* (Lamarck, 1822); *Osilinus punctulatus* (Lamarck, 1822) / *Osilinus atratus* (Wood, 1828) [= *Phorcus atratus* (Wood, 1828)].

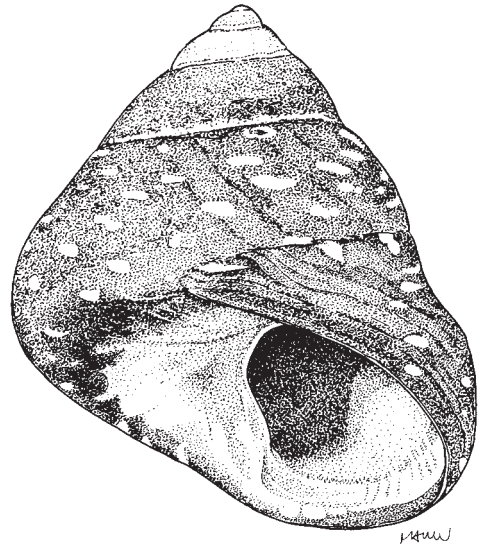
FAO names: En – Dotted monodont; Fr – Monodonte ponctuée; Sp – Peonza punteada.

Diagnostic characters: Shell thick and solid, rather small (up to 2 cm long), usually **about as long as wide** (but ranging from a slightly flattened to rather high form), **approximately conical** in shape, **with blunt**, generally eroded apex and widely **convex base**. Spire **whorls convex** in profile and with rather shallow suture, **body whorl** somewhat depressed under suture and **with rounded periphery**. **Outer sculpture feeble**, reduced to a few spiral grooves on early spire whorls only and **nearly smooth on later spire whorls**, sometimes with traces of shallow spiral elements on body whorl. **Umbilicus closed**. **Aperture oblique, semi-circular** in outline, with straight and short inner lip. **Columella with a rather prominent basal tooth**. Columellar callus covering the umbilicus and somewhat expanding posteriorly upon base of body whorl. **Colour: outside of shell with a pattern of small white dots on a dark purplish brown to black background**; dots often forming spiral and/or oblique series, sometimes more or less fused together to form short streaks and always elongated in a roughly spiral direction. Eroded apical area of the spire rusty to orange in colour. Inner lip, **part of the base adjacent to the aperture and calloused umbilical area white**. Colour pattern of the base not extending into the aperture. **Interior beautifully iridescent**, with reddish and green tints. Outer lip of aperture usually edged with black.

Size: Maximum shell length 2 cm, commonly to 1.5 cm.

Habitat, biology, and fisheries: Common on intertidal rocks, mostly in small pools, but also present subtidally at shallow depths. Commonly collected at low tide for food, and consumed boiled in salted water.

Distribution: East Atlantic, probably restricted to Senegal and Cape Verde Islands.



ventral view

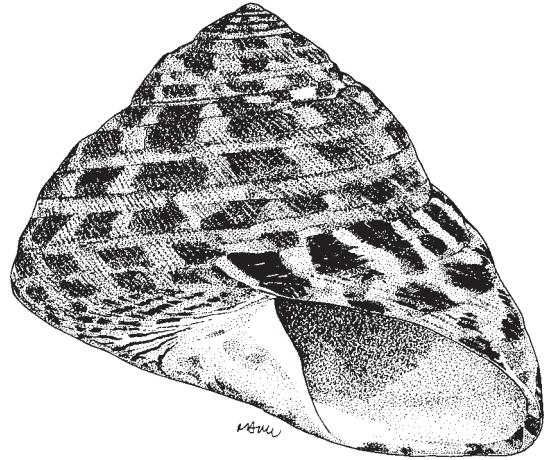


***Phorcus sauciatus* (Koch, 1845)**

Frequent synonyms / misidentifications: *Diloma sauciata* (Koch, 1845); *Monodonta colubrina* (Gould, 1849); *M. sauciata* (Koch, 1845); *Osilinus edulis* (Lowe, 1843) [Invalid name]; *O. sauciatus* (Koch, 1845); *Oxysteles sauciata* (Koch, 1845) / *Osilinus atratus* (Wood, 1828) [= *Phorcus atratus* (Wood, 1828)]; *O. turbinatus* (Born, 1778) [= *Phorcus turbinatus* (Born, 1778)].

FAO names: **En** – Edible monodont; **Fr** – Monodonte couleuvrée; **Sp** – Peonza culebra.

Diagnostic characters: **Shell** solid but **rather thin**, medium-sized (up to 3 cm long), usually **slightly wider than long to about as long as wide**, variable but **approximately conical** in shape, **with more or less elevated spire**, acute apex (when not eroded) and **rather flattened base**. Spire **whorls more or less convex** in profile **but not angulated** and with distinct but shallow suture, **body whorl** often somewhat depressed under suture and **with rounded to somewhat angulated periphery**. Outer sculpture with **variably developed spiral grooves and threads on spire whorls and base** of shell, in addition to oblique growth lines. **Umbilicus closed**. Aperture strongly oblique, with thin outer lip. **Columella** oblique and thin edged, **with a rather prominent tooth** situated **somewhat above the base**. Columellar callus covering the umbilicus and adjacent area. **Colour: outside** of shell with a variable coloration, **usually with a pattern of spiral rows of variably shaped, often triangular to quadrangular dark purple to brownish spots on a greenish to ashy grey background**; a spiral row of white spots sometimes present just under the suture; on body whorl, dark spots may also be connected into fine oblique or zigzag lines, or form irregular streaks on the base, aligned with growth lines or crossing them more or less at right angle. Outer coloration sometimes so obscurely mottled that it appears nearly uniform olivaceous green, especially on the body whorl. Colour pattern of the base generally forming a spiral band into the aperture, sometimes more or less obscured by a translucent glaze. **Inner lip and umbilical callus whitish**, often with an orange to reddish hue along the coloured base. **Interior pearly and iridescent**. Inner margin of the outer lip usually with a conspicuously coloured narrow band corresponding to the outer colour pattern.



ventral view

Size: Maximum shell length 3 cm, commonly to 2 cm.

Habitat, biology, and fisheries: Common in rocky environments, in upper half of the intertidal zone. Collected locally where common, this species is actively sought for food in the Canaries.

Distribution: East Atlantic, probably from southern Spain and Portugal to Mauritania, and in Madeira and Canary Islands.



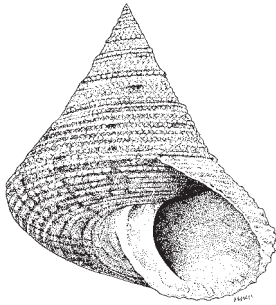
***Calliostoma granulatum* (Born, 1778)**

Frequent synonyms / misidentifications: *Ampullotrochus granulatus* (Born, 1778); *Calliostoma papillosum* (da Costa, 1778) / *Calliostoma gubbiolii* Nofroni, 1984.

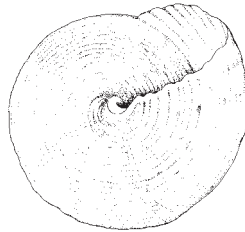
En – Granular top-shell; **Fr** – Troque granulé; **Sp** – Peonza granulosa.

Maximum shell length 4.1 cm, commonly to 3 cm. A common species, living offshore on muddy or gravelly bottoms, from shallow sublittoral levels to lower continental shelf, down to about 300 m depths. Carnivore, feeding on hydroids. Regularly collected with bottom trawls and nets. Used locally for food and for its shell, but rarely marketed. Widely distributed in the East Atlantic, including the Madeira and Canary islands, and throughout the Mediterranean; north to the British Isles and south to Angola.

Remarks: Young of *Calliostoma granulatum* are often confused with the recently recognised *C. gubbiolii* Nofroni, 1984, a similar but smaller species (up to 1.5 cm long) living off Portugal, the Alboran Sea and Canary Islands, and recently found south to Angola.



ventral view



basal view

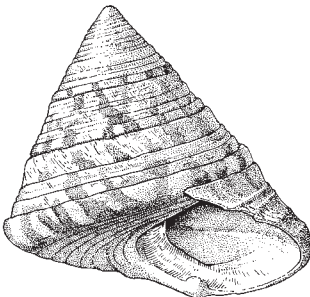


***Calliostoma zizyphinum* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Calliostoma conuloides* (Lamarck, 1822) / None.

En – Painted top-shell; **Fr** – Troque marginé; **Sp** – Peonza pintada.

Maximum shell length 4.5 cm, commonly to 3 cm. Common on rocky to muddy bottoms, amongst seaweeds or under rocks and stones, from low intertidal levels to lower continental shelf, down to about 300 m depths. A carnivorous species, probably feeding on small coelenterates. Eggs laid in a rope of jelly which is fastened at intervals to stones or weeds by the foot of the female. Occasionally collected for food and for its brightly coloured, nacreous shell to make decorative items. Eastern Atlantic, north to Lofoten Islands and Norway, and south to Morocco and Macaronesian islands (the Azores, Madeira and the Canaries). Throughout the Mediterranean.



ventral view

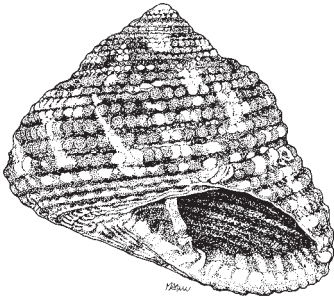


***Clanculus kraussi* (Philippi, 1846)**

Frequent synonyms / misidentifications: *Monodonta kraussi* Philippi, 1846 / *Clanculus atricatena* Tomlin, 1921; *C. cruciatus* (Linnaeus, 1758); *C. villanus* (Philippi, 1846).

En – Krauss clanculus; **Fr** – Troque de Krauss; **Sp** – Peonza de Krauss.

Maximum shell length 2 cm, commonly to 1.2 cm. On rocky shores, in areas covered by photophillic algae. Low intertidal and sublittoral zones, down to about 20 m depth. Common in Mauritania and Senegal, where it is locally collected for food and the nice shell. Exact distribution in the eastern Atlantic not known, because of frequent confusion with other species of the genus *Clanculus*. Presently known from southern Morocco to Senegal, but probably not occurring in the Gulf of Guinea nor in Angola and Namibia; absent from South Africa.



ventral view

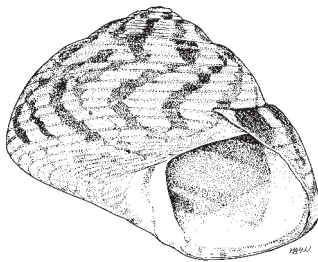


***Gibbula umbilicalis* (da Costa, 1778)**

Frequent synonyms / misidentifications: *Gibbula obliquata* (Gmelin, 1791); *G. umbilicatus* [Spelling error] / *Gibbula pennanti* (Philippi, 1846); *G. umbilicaris* (Linnaeus, 1767).

En – Flat top; **Fr** – Gibbule oblique; **Sp** – Peonza oblicua.

Maximum shell length 2.2 cm, commonly to 1.5 cm. Common to very common in rocky areas, from rather high on the shore to sublittoral and upper shelf zones, down to about 130 m depths. Rather resistant to emersion, it may occur abundantly in the intertidal zone, up to high water level of neap tides amongst seaweeds, under stones and ledges, and still higher in pools. Collected at low tide where common, for human consumption and for its attractive shell, locally used to make necklaces and decorative items. Outside of the area, it is also collected for food on the Atlantic and Channel coasts of France and in Galicia, mainly for recreational purposes. Consumed boiled. Eastern Atlantic, north to western Channel, Ireland and western Scotland, and south to Mauritania.



ventral view



basal view

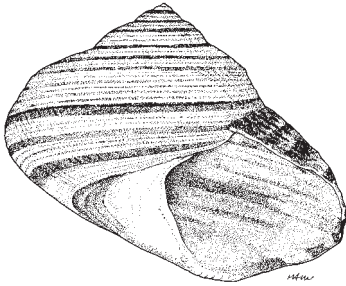


***Gibbula zonata* (Wood, 1828)**

Frequent synonyms / misidentifications: None / *Gibbula rosea* (Gmelin, 1791) [a dubious, old name, probably corresponding to the South African *Gibbula cicer* (Menke, 1844) or *G. multicolor* (Krauss, 1848)].

En – Zoned top; **Fr** – Gibbule zonée; **Sp** – Peonza cintura.

Maximum shell length 1.3 cm, commonly to 1 cm. Commonly occurring at low tide and shallow subtidal levels, under stones in pools or in gulleys of rocky shores. Locally collected for subsistence purpose by coastal people where common. Eastern Atlantic, from Namibia to False Bay, South Africa.



ventral view



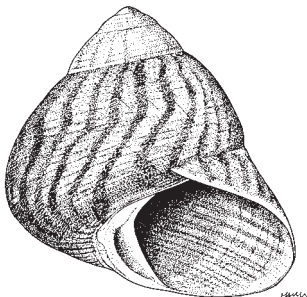
***Oxystele fulgurata* (Philippi, 1848)**

Frequent synonyms / misidentifications: *Diloma fulgurata* (Philippi, 1848); *Monodonta fulgurata* Philippi, 1848 / *Oxystele variegata*.

En – Gleaming top; **Fr** – Troque élatant; **Sp** – Peonza brillante.

Maximum shell length 2.2 cm, commonly to 1.8 cm. Common to very common in rocky areas of the intertidal zone, between high and low water levels of neap tides. Can form dense populations. Collected at low tide where common, for food and for its shell. Consumed boiled in salted water. The tropical East Atlantic, from Gabon to Angola.

Remark: Relationships between this species and both *Monodonta sagittifera* and *Oxystele variegata* not clear.



ventral view

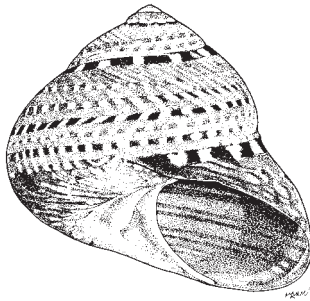


***Oxystele variegata* (Anton, 1838)**

Frequent synonyms / misidentifications: *Diloma variegata* (Anton, 1838); *Monodonta variegata* (Anton, 1838) / None.

En – Variegated top; **Fr** – Troque bigarré; **Sp** – Peonza abigarrada.

Maximum shell length 3.5 cm, commonly to 2.5 cm. Very common in various rocky environments where it can form dense populations, either in rather sheltered areas, such as the mouth of estuaries, and between boulders exposed to wave action. Intertidal zone, from high to low water levels of neap tides. Locally collected for food and for its shell. Eastern Atlantic and southwest Indian Ocean; north to northern Namibia, and east to southern Natal, South Africa; records from southern Angola need confirmation.



ventral view

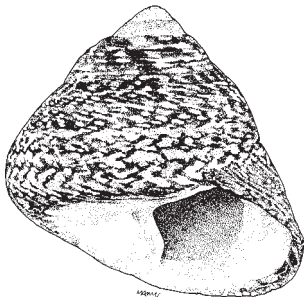


***Phorcus lineatus* (da Costa, 1778)**

Frequent synonyms / misidentifications: ? *Monodonta sagittifera* (Lamarck, 1822); *M. lineata* (da Costa, 1778); *Osilinus lineatus* (da Costa, 1778); *Trochocochlea crassa* (Pulteney, 1799) / *Monodonta colubrina* (Gould, 1856) [= *Phorcus sauciatus* (Koch, 1845)].

En – Thick monodont; **Fr** – Monodonte épaisse; **Sp** – Peonza gruesa.

Maximum shell length 5.6 cm, commonly from 2.5 to 3 cm. Common on rocky environments of the upper intertidal zone, where it can form dense populations. Avoid excessive exposure and deposits of sand. Browse mainly on microscopic algae and detritus, rarely on large weeds. Eggs green, laid singly from late spring to summer in a jelly coat, and hatching as planktonic larvae which settle after a short free life of about 4 to 5 days. Young growing rather rapidly, reaching a length of more than 2 cm after 2 years, at which time they begin to reproduce. Locally marketed in Morocco. Also collected for food in western Europe, mainly for recreational purposes. Consumed boiled. Eastern Atlantic, north to western Channel and southwestern British Isles, and south to West Africa. Southern limit of distribution uncertain because of confusion with other *Phorcus* species, perhaps further south to Mauritania.



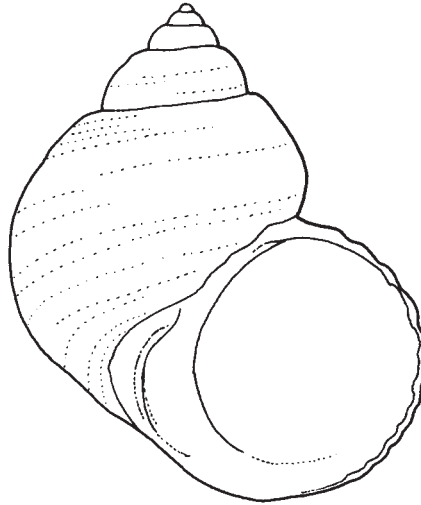
ventral view



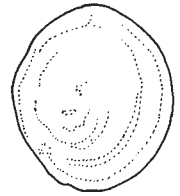
TURBINIDAE

Turban shells

D diagnostic characters: **Shell** thick, often heavy, **turbinata** to **conical** (occasionally flattened) in shape. **Outer sculpture** very variable, **often spiral to nodular**. Periostracum well developed to absent. **Aperture** variously **rounded**, **without a siphonal canal, nacreous** within. Inner lip smooth, sometimes with a broad callus extending on shell base. Umbilicus present, at least at juvenile stages. **Operculum strongly calcified** externally, its inner layer corneous, usually showing spiral coiling with a subterminal or central nucleus. Head with a short, midventrally split snout, and a pair of long tentacles, the eyes on stalks at their outer bases. Foot large and ovate, sometimes anteriorly truncate, with a fleshy ridge on either side bearing tentaculate processes.



ventral view



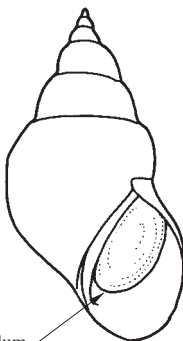
operculum calcareous

Habitat, biology, and fisheries: Mainly living in shallow waters of warm temperate and tropical seas, especially on rocky and coral reef habitats. Mainly herbivorous animals, feeding on small epibenthic algae and vegetable detritus, and also probably on animal tissues growing on firm substrates for species living in deeper environments. Sexes separate, fertilization external. Eggs generally released in gelatinous masses, hatching as free-swimming planktonic larvae. Turbans are commonly collected both for their edible flesh and nacreous shell. They are locally valued for food and some are sought for their calcareous operculum.

Similar families occurring in the area

Phasianellidae: shell rather thin, mostly small and smooth, without periostracum; aperture pear-shaped, not nacreous inside.

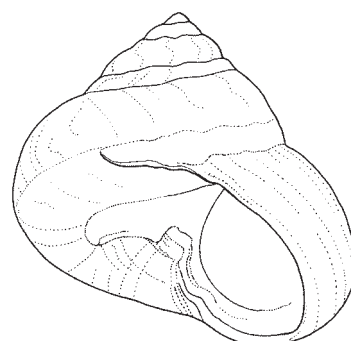
Trochidae: appearance of the shell sometimes strongly convergent with Turbinidae, but easily distinguishable by the entirely corneous operculum.



operculum calcareous

ventral view

Phasianellidae



ventral view

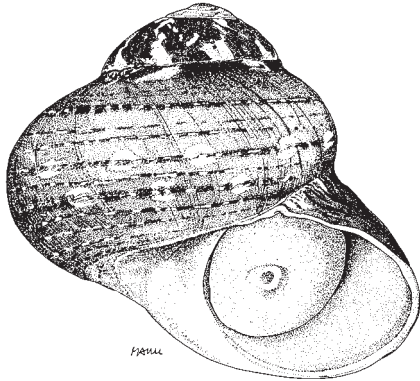
Trochidae



operculum corneous

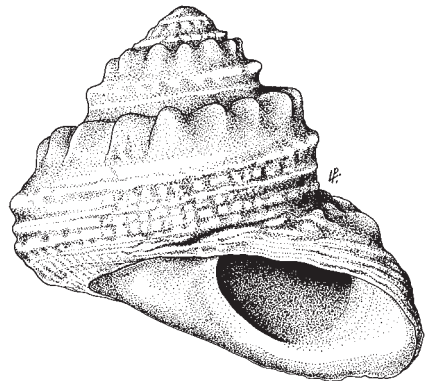
Key to species of interest to fisheries occurring in the area

- 1a. Shell smooth, or with 2 or 3 weak spiral ridges at whorl periphery. Operculum subcircular, whitish in colour (Fig.1) ***Turbo cidaris***
- 1b. Shell conspicuously sculptured, with numerous granular spiral ridges and slightly oblique axial folds on upper half of whorls. Operculum rounded ovate, bright orange-red in colour (Fig. 2) ***Bolma rugosa***



ventral view


Fig. 1 *Turbo cidaris*




ventral view

Fig. 2 *Bolma rugosa*

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

 *Bolma rugosa* (Linnaeus, 1767).

 *Turbo cidaris* Gmelin, 1791.

References

Beu, A.G. & Ponder, W.F. 1979. A revision of the species of *Bolma* Risso, 1826 (Gastropoda: Turbinidae). *Records of the Australian Museum*, 32(1): 1–68.

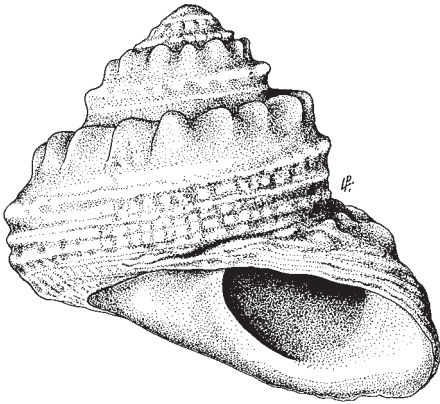
Hickman, C.S. & McLean, J.H. 1990. Systematic revision and suprageneric classification of trochacean gastropods. *Science Series Natural History Museum of Los Angeles County*, 35: I–VI & 1–169.

Pilsbry, H.A. 1888. Monograph of the Turbinidae and Trochidae: family Turbinidae. In G.W. Tryon Jr., ed. *Manual of Conchology; Structural and Systematic. With illustrations of the species. Volume 10, Part Second*. Philadelphia, Academy of Natural Sciences: pp. 161–323, pl.37–69.

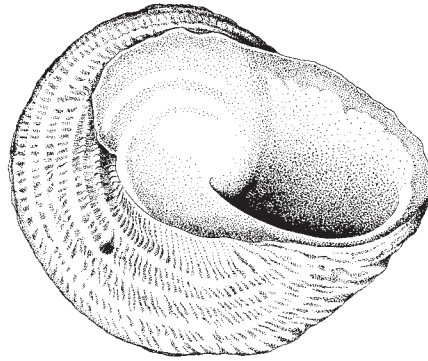
***Bolma rugosa* (Linnaeus, 1767)**

Frequent synonyms / misidentifications: *Astraea rugosa* (Linnaeus, 1767); *Astralium rugosum* (Linnaeus, 1767); *Turbo rugosus* Linnaeus, 1767 / *Astralium calcar* (Linnaeus, 1758).

FAO names: En – Rough turbo; Fr – Turbo scabre; Sp – Peonza rugosa.



ventral view



basal view



operculum
(external view)



operculum
(internal view)

Diagnostic characters: Shell moderately large, thick and conical. Spire well developed, with **strongly convex whorls**, carinated on periphery and **with a deep** to canalculated **suture**. Last whorl with 2 peripheral angles. **Sculpture** variable but **conspicuous**, usually **with numerous granular spiral ridges**, **slightly oblique axial folds on upper half of whorls**, and rounded to **spiny tubercles at periphery of early whorls at least**. Incremental lines numerous and lamellose, crossing at about right angle the slanty axial folds of the spire and raised into small hollow scales where they cross the spiral ridges. Aperture rounded, inner lip arched, more or less strongly thickened by a broad callus extending on shell base. **Operculum rounded ovate**, with a somewhat eccentric nucleus; outer surface of operculum smooth and calloused, **with somewhat protruding nucleus and** shallow spiral depression on central area, and with thick, **rounded peripheral ridge**; inner surface flat, usually with well developed spiral coiling and growth marks. **Colour:** **shell colour dull greenish brown** to cinereous grey, sometimes with whitish or light orange patches; inner lip pearly white, **columnellar callus tinged with glossy orange brown**; interior nacreous. **Outside of operculum bright orange-red**, often flecked with **white on inner lip edge** and toward nucleus.

Size: Maximum shell diameter to 6.5 cm; commonly to 4.5 cm.

Habitat, biology, and fisheries: Rather common on rocky and muddy bottoms of shallow sublittoral to upper continental shelf, from about 5 to 60 m depths. An edible, locally marketed species, regularly collected in trawl nets, but in moderate quantity. The bright red calcareous operculum has been cherished for use in jewellery since ancient times, and the shell is frequently used to make decorative items. Outside the area, it is also commercially fished in the nearby northwestern Mediterranean, for its operculum which is used as a pendant to bring luck and is known as “Saint Lucy’s eye”.

Distribution: Eastern Atlantic, from southern part of the Bay of Biscay to Morocco, Madeira, the Azores and the Canaries. Throughout the Mediterranean.

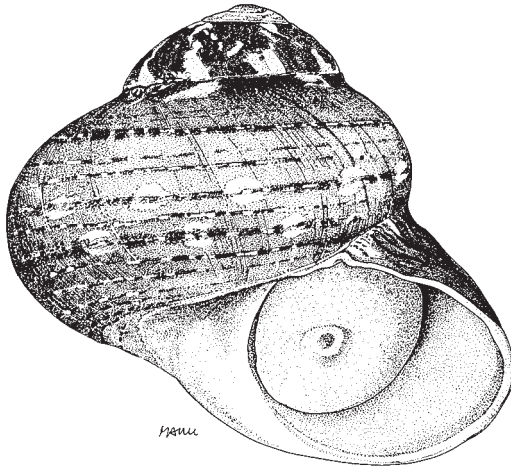


Turbo cidaris Gmelin, 1791

Frequent synonyms / misidentifications: *Turbo natalensis* Krauss, 1848 / None.

En – Crown turban; **Fr** – Turbo diadème; **Sp** – Turbante diadema.

Maximum shell length 6 cm, commonly to 5 cm. Common under rocks, among algae and in crevices, from midtidal pools to about 10 m depths. Locally collected for food by coastal people. Shell used by the shellcraft industries. Eastern Atlantic, from southern Angola to South Africa; eastward to Port Alfred, Eastern Cape, where it intergrades with the subspecies *T. cidaris natalensis*; the latter subspecies is distributed along the coasts of southwestern Indian Ocean, east to Natal.



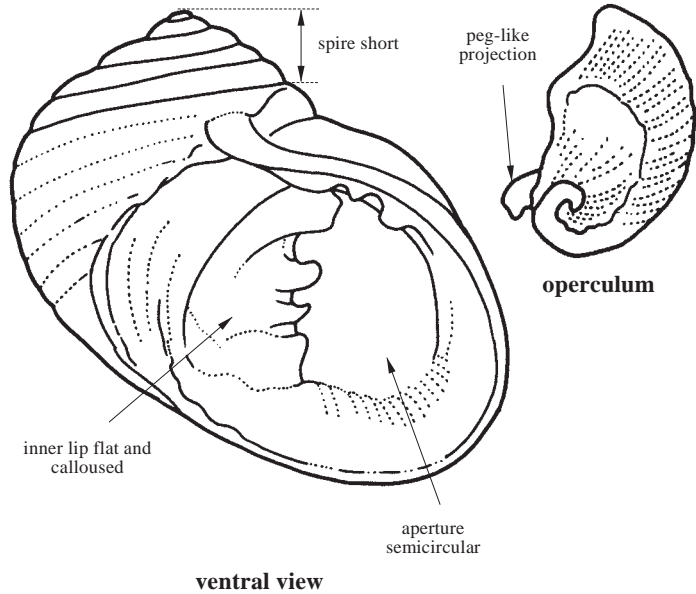
ventral view



NERITIDAE

Nerites

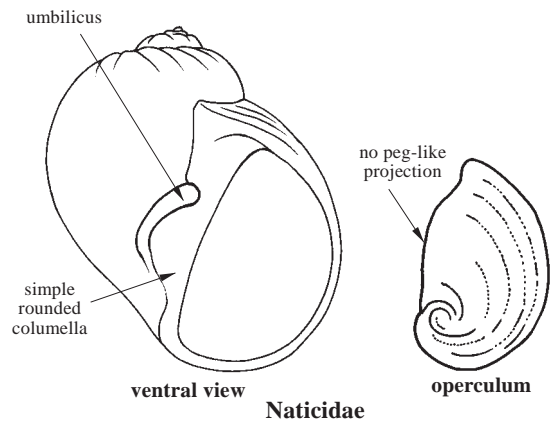
Diagnostic characters: Shell globose, thick and solid to rather thin, with a relatively low spire and a very large, rounded body whorl. No umbilicus. Outer surface smooth or costulate. Aperture semicircular, without a siphonal canal, inner and outer lip often toothed. Columella forming a flat, calloused inner lip, protruding as a septum that narrows the aperture. Columellar shield smooth, ridged or pustulose. Interior of shell porcelaneous, with the inner walls of the spire whorls resorbed in adult stages. Operculum semicircular, calcified, with a few spiral turns and a projecting peg on its inner edge. Head large, with a broad, short and commonly indented snout. Cephalic tentacles slender, with eyes on prominent stalks at their outer bases. Foot oblong, wide in front and attenuated behind. Mantle cavity deep, with long, triangular, bipectinate gill.



Habitat, biology, and fisheries: Along shorelines in warm temperate to tropical, marine, brackish or even freshwater habitats. Marine species live often quite high in the intertidal zone, and are exposed to the air and sun for long periods. The tightly fitting operculum prevents desiccation and, in some species, surface of the mantle cavity acts as a primitive lung. Herbivorous animals, grazing by night at low tide on fine algae and detritus covering the bottoms where they live. Sometimes forming very large colonies. Sexes separate, fertilization internal. Eggs laid in capsules, attached to the rocks or to the shells of nerites. In the studied area, nerites are commonly collected locally by coastal people, for human consumption and for the shellcraft industry.

Similar families occurring in the area

Naticidae: aperture large and roughly semicircular, but not narrowed by a flat protrusion of the inner lip. Umbilicus sometimes open, and with an internal rib. Inner walls of spire whorls not resorbed. Operculum, when calcified, without a projecting peg on its inner side.



Reference

Tryon, G.W. Jr. 1888. Family Neritidae. In G.W. Tryon Jr., ed. *Manual of Conchology; Structural and Systematic. With illustrations of the species. Volume 10, Part One*, Philadelphia, Academy of Natural Sciences: pp. 3–82, pl.1–29.

A single species of interest to fisheries occurring in the area.

Nerita senegalensis (Gmelin, 1791)

Frequent synonyms / misidentifications: None / None.

FAO names: **En** – Senegal nerite; **Fr** – Néríte du Sénégal; **Sp** – Nerita senegalesa.

Diagnostic characters: **Shell thick** and sturdy, **globose, with a rounded, rather low spire**, width about equal to length. **Outer surface dull, with many unequal flattened spiral ridges** separated by incised lines. **Outer lip of aperture with about 12 small, equal-sized denticles** at inner margin, and a pair of **larger, more distantly spaced teeth at both anterior and posterior ends**. Periostracum thick and fibrous, enhancing the numerous growth lines. **Columellar shield flattened, narrowly elevated and pleated on outer margin, with a number of irregular tubercles, and 2 or 3 centrally placed small teeth on its inner margin**. **Operculum finely granulate**. **Colour: outside of shell dark grey with small paler markings** and sometimes an overall yellow colour due to periostracum. **Aperture and columellar shield white, sometimes with a yellowish hue on inner margin**. Operculum whitish to dark grey.

Size: Maximum shell length 5 cm, commonly from 2 to 3 cm.

Habitat, biology, and fisheries: One of the most common gastropod species of rocky shores in tropical West Africa. Sometimes extending to rocky estuaries. Intertidal zone, from upper shore to low tide levels, on and under rocks or stones. Usually resting in crevices or in tidal pools when tide is low, but may also be found on the open rock, especially if it is shady. Collected for food at low tide by coastal people. Used boiled or in soups. Shell used by the local shellcraft industries to make traditional decorative items.

Distribution: The tropical east Atlantic, from Senegal to Angola, and in the Cape Verde Islands.



ventral view

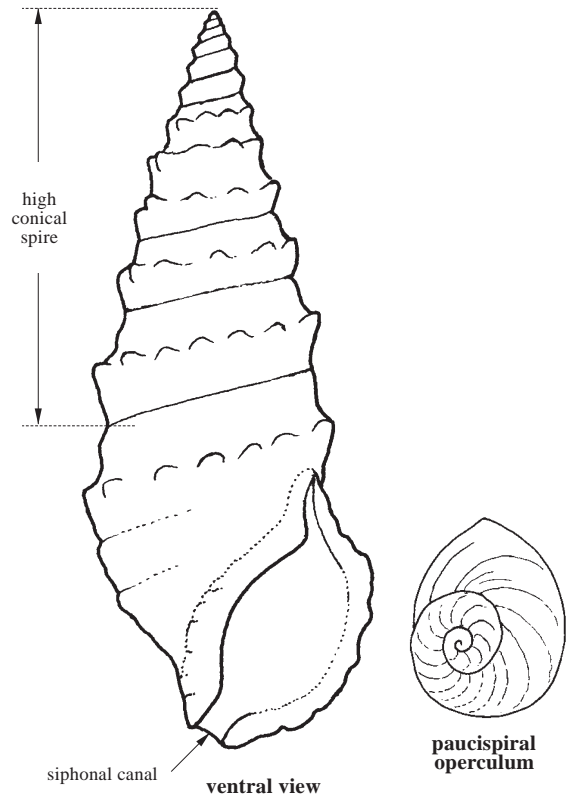


CERITHIIDAE

Ceriths

DDiagnostic characters: Shell elongate, thick and solid, **sharply conical with a high, many-whorled spire and rather small aperture**. Sculpture variable, usually spiral or nodulose, and with axial ribs or varices. Umbilicus generally absent. Periostracum obsolete. **Aperture with a distinct, anterior siphonal canal** which may be drawn out, up-turned and often laterally twisted. **Outer lip somewhat expanded**, usually notched posteriorly. Inner lip smooth or twisted. **Operculum ovate, corneous, with a few spiral coils** and an eccentric nucleus. Head with a large snout and long, cylindrical tentacles bearing eyes on swellings of their outer bases. Foot broad and short, angular anteriorly. Fleshy siphon weakly developed.

Habitat, biology, and fisheries: Mainly tropical to warm temperate, shallow water animals living on sandy to muddy bottoms of marine and estuarine environments, though small species may abound under rocks or on marine vegetation. Gregarious herbivores, grazing on small algae, bacteria and organic debris. Species are often specialized to different sizes of food particles, and may be locally extremely abundant, where the habitat is favourable. Sexes separate, fertilization internal; sperm transferred during mating in spermatophores which disintegrate at the entrance to the mantle cavity of the female. Eggs released on substrate in gelatinous masses, hatching as planktonic larvae or directly as crawling juveniles, depending on the species. As ceriths are often abundant and easily accessible in coastal areas, they are collected locally, both for food and for shellcraft.



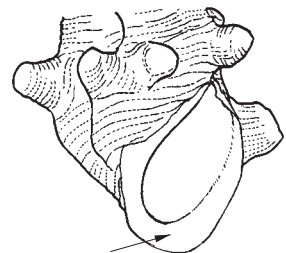
Similar families occurring in the area

Potamididae: shell very similar to Cerithiidae, but recognizable by the rounded operculum with many spiral coils.

Pachymelania species (Thiaridae): shape of shell somewhat recalling that of Cerithiidae, but easily distinguished by the absence of a deep siphonal canal (reduced to a shallow embayment at anterior end of aperture).



multispiral operculum
Potamididae




ventral view
Thiaridae


Key to species of interest to fisheries occurring in the area

- 1a. Spire with several beaded spiral threads and 2 or 3 axial varices on each whorl . ***Cerithium atratum***
- 1b. Spire with 9 or 10 large and rounded, axial ribs on each whorl, without varices and beaded spiral threads ***Cerithium guinaicum***

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

 *Cerithium atratum* (Born, 1778).

 *Cerithium guinaicum* Philippi, 1849.

References

Houbrick, R.S. 1974. The genus *Cerithium* in the western Atlantic. *Johnsonia*, 5(50): 33–84.

Houbrick, R.S. 1988. Cerithioidean phylogeny. *Malacological Review, Supplement*, 4: 88–128.

Tryon, G.W. Jr. 1887. Family Cerithiidae. In G.W. Tryon Jr, ed. *Manual of Conchology; Structural and Systematic. With illustrations of the species. Volume 10, Part Second*. Philadelphia, Academy of Natural Sciences: pp. 112–228, pl. 19–39.

***Cerithium atratum* (Born, 1778)**

Frequent synonyms / misidentifications: *Cerithium antillarum* Mörch, 1876; *C. caudatum* Sowerby, 1855; *C. floridanum* Mörch, 1876; *Theridium atratum* (Born, 1778) / *Cerithium algicola* C.B. Adams, 1845 [= *Cerithium eburneum* Bruguière, 1792]; *C. guinaicum*; *C. vulgatum* Bruguière, 1792.

En – Dark cerith; **Fr** – Cérithte sombre; **Sp** – Pada oscura.

Maximum shell length 5 cm, commonly from 3 to 4 cm. On different kinds of sandy to muddy bottoms, frequently in protected bays and coastal lagoons. Intertidal and sublittoral zones to about 50 m depth. May form dense populations in favourable environmental conditions. Collected locally for subsistence purpose where common in the studied area, this species is also used as food in Brazil. In the United States, it is generally known as the “Florida cerith”. Widely distributed in the tropical Atlantic; in the east Atlantic, from Sierra Leone to Angola, and in the Cape Verde and Gulf of Guinea islands; in the west Atlantic, from North Carolina (USA) throughout the Gulf of Mexico and the Caribbean to Brazil.



ventral view

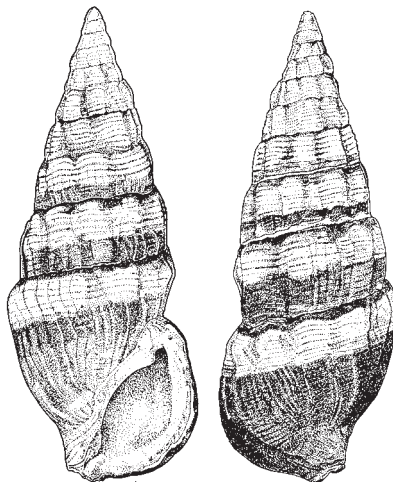


***Cerithium guinaicum* Philippi, 1849**

Frequent synonyms / misidentifications: *Cerithium auricomma* Schwengel, 1940; *Pseudovertagus guinaicus* (Philippi, 1849); *Cerithium moenensis* Gabb, 1881 / None.

En – Guinea cerith; **Fr** – Cérithte de Guinée; **Sp** – Pada guineana.

Maximum shell length 4.5 cm, commonly to 3.5 cm. Clinging on rocks among seaweeds, in low tide pools and at shallow sublittoral levels down to about 20 m depth. Collected locally for food and for shellcraft. Widely distributed in the tropical Atlantic; from Guinea to Angola and São Tomé Island in the east Atlantic, and from Florida throughout the Caribbean to Venezuela in the west Atlantic.



ventral view

dorsal view



TURRITELLIDAE

Screw shells, tower shells, turret shells

Diagnostic characters: Shell elongate, sharply conical, with numerous whorls and a small, square to rounded aperture. Umbilicus usually absent. Whorls strongly sculptured with spiral ribs or keels. Growth lines arched to sinuous. Outer lip of the aperture thin, often concave. Inner lip smooth. Anterior siphonal canal absent. Operculum corneous, rounded, usually with many spiral coils (with a few coils in genus *Mesalia*) and a central nucleus; border of the operculum thin, often with flexible bristles. Head large and prominent, with a short snout and long, tapering tentacles bearing eyes on slight swellings at their outer bases. Visceral mass of the animal occupying only the last few whorls of the spire. Foot rather short and small, truncate anteriorly, obtusely attenuated posteriorly and grooved beneath.

Habitat, biology, and fisheries: Filter-feeding animals, mostly living in soft, subtidal bottoms of sand or mud where they can form dense populations. Organic particles are drawn through the mantle cavity by means of ciliary water currents, sorted by small tentacles and the tiny bristles of the operculum, trapped in mucous sheets on the gills and transferred to the mouth. Sexes separate, fertilization internal. Eggs generally laid in a cluster of spherical, stalked capsules, attached to stones or empty shells. A short, planktonic larval stage is usually present, but some species brood their eggs and embryos to the crawling stage. In the area, Turritellidae are collected occasionally for food, but mainly for their shells that are used in the shellcraft industries to make decorative items. They may be trawled locally in great quantities.

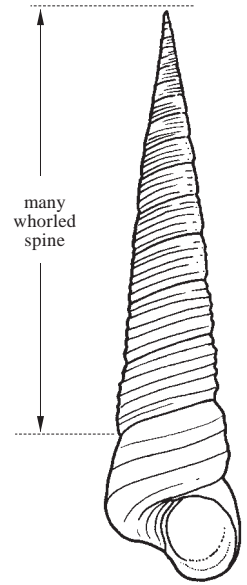
Remarks: A revision of the East Atlantic Turritellidae is strongly needed. Identification of the species in this family may be difficult, for the range of shell shape is rather small, whorl sculpture and shape are often exceedingly variable in adult stages and, after a serious damage of the rather thin aperture, new sculpture may differ greatly from previous one. Furthermore, useful characters such as the embryonic shell features and progressive development of spiral ornamentation are often obscured by subsequent erosion or shell break of the apical area.

Similar families occurring in the area

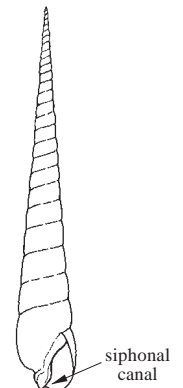
Terebridae: general shape of shell similar to Turritellidae, but with a well-marked, notched siphonal canal at the anterior end; operculum ovate, with a terminal nucleus.

Key to species of interest to fisheries occurring in the area

- 1a. Shell strongly elongate (width about 22 to 26% of length); inner lip neither recurved outward nor sinuated at base of columella; operculum with many spiral coils (Fig. 1a) → 3
- 1b. Shell moderately elongate (width about 28 to 36% of length). Inner lip recurved outward and slightly sinuated at base of columella; operculum with a few spiral coils (Fig. 1b). → 2



ventral view



ventral view
Terebridae

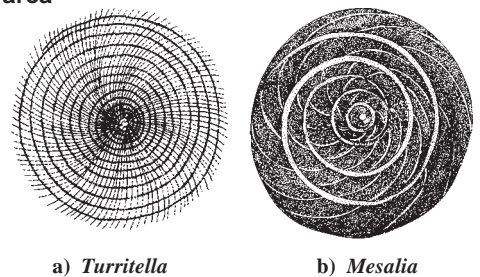


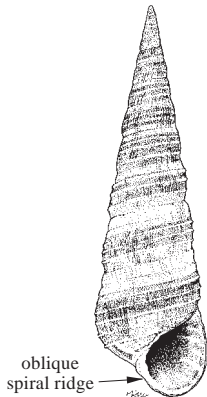
Fig. 1 operculum
(exterior)

- 2a. Shell with well developed chestnut to fawn axial streaks on a pale ground; spiral sculpture of whorls reduced to a strong groove under suture; base of columella without spiral ridge above the recurved inner lip (Fig. 2) ***Mesalia opalina***
- 2b. Shell colour whitish to brownish, without distinct axial streaks; spiral sculpture with a few distant ridges on apical part of whorls; base of columella with a small oblique spiral ridge, just above the recurved inner lip (Fig. 3) ***Mesalia mesal***
- 3a. Spire whorls nearly flat; base of the outer lip broadly sinuate (Fig. 4) . . ***Archimediella gemmata***
- 3b. Spire whorls more or less strongly convex; base of the outer lip not sinuate → 4



ventral view

Fig. 2 *Mesalia opalina*



oblique spiral ridge

ventral view

Fig. 3 *Mesalia mesal*



ventral view

Fig. 4 *Archimediella gemmata*

- 4a. Spiral sculpture of 2 keels on earlier whorls, of 3 to 5 prominent granulated ridges on later whorls, and with a fine striation all over the shell. Shape of growth lines on spire whorls rather symmetrically concave (Fig. 5) ***Archimediella torulosa***
- 4b. Spiral sculpture of rather numerous, regularly spaced threads on spire whorls, devoid of keels on earlier whorls and without a fine striation all over the shell; shape of growth lines on spire whorls asymmetrically concave (strongly oblique posteriorly and nearly parallel to the coiling axis anteriorly) → 5

- 5a. Shell relatively large (up to 14 cm in length), with strong and close-set spiral threads; colour off-white or cream, marbled with lilac brown axial blotches (Fig. 6) ***Turritella ligar***



ventral view

Fig. 5 *Archimediella torulosa*



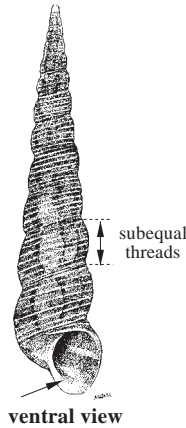
ventral view

Fig. 6 *Turritella ligar*

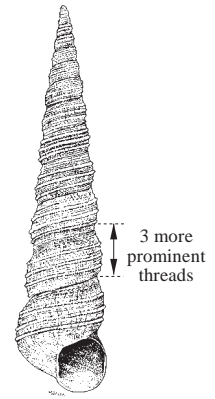
- 5b. Shell relatively small (not exceeding 8 cm in length), with rather fine and well spaced spiral threads (3 threads sometimes a little stronger); colour uniform, white to blackish brown, devoid of axial darker blotches (spiral ridges may be lighter coloured) → 6

6a. Shell relatively large (up to 8 cm long); aperture ovate, somewhat elongate and well rounded anteriorly; about 8 subequal fine spiral threads per whorl (Fig. 7). . . . *Turritella unguina*

6b. Shell relatively small (up to 6 cm long); aperture squarely rounded, somewhat flattened anteriorly; numerous fine spiral threads of unequal size, 3 usually more prominent than the others (Fig. 8). *Turritella communis*




ventral view










ventral view

Fig. 7 *Turritella unguina* Fig. 8 *Turritella communis*

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

-  *Archimediella gemmata* (Reeve, 1849).
-  *Archimediella torulosa* (Kiener, 1843).
-  *Mesalia mesal* (Deshayes, 1843).
-  *Mesalia opalina* (Adams and Reeve, 1849).
-  *Turritella communis* Risso, 1826.
-  *Turritella ligar* Deshayes, 1853.
-  *Turritella unguina* (Linnaeus, 1758).

References

- Marche-Marchad, I.** 1960. Les Turrillidae de l'Afrique occidentale (Gastropodes Prosobranches marins). *Bulletin d'Institut Fondamental d'Afrique Noire*, 22 (A3): 853–885, pl. 1–3.
- Marche-Marchad, I.** 1981. Note sur des représentants du genre *Mesalia* Gray, 1847 (Gastropoda, Turrillidae), trouvés dans la Méditerranée. *Bolletino Malacologico*, 17(3–4): 41–48.
- Marwick, J.** 1957. Generic revision of the Turrillidae. *Proceedings of the Malacological Society of London*, 32(4): 144–166.
- Tryon, G.W. Jr** 1886. Family Turrillidae. In G.W. Tryon Jr, ed. *Manual of Conchology; Structural and Systematic. With illustrations of the species. Volume 8*. Philadelphia, Academy of Natural Sciences: pp. 192–211, pl. 59–65.

***Turritella unguina* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Turritella fuscata* Lamarck, 1822; *T. nivea* Reeve, 1849 / *Turritella britannica* Monterosato, 1890 [= *Turritella communis*].

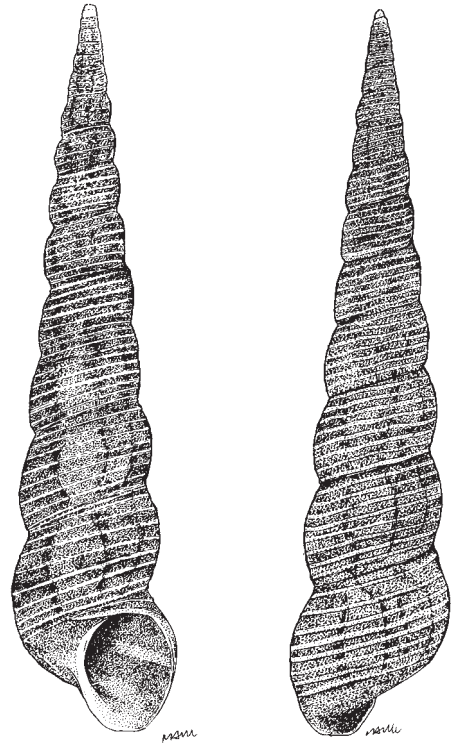
FAO names: **En** – Rounded screw shell; **Fr** – Turritelle brunie; **Sp** – Torrecilla marrón.

Diagnostic characters: Shell medium sized (up to 8 cm long) and **strongly elongate** (width about 22 to 26% of length). **Whorls strongly convex** in outline, **with** impressed suture and **about 8 subequal fine spiral threads** per whorl. Apical spire whorls devoid of spiral keels. Shape of growth lines on spire whorls asymmetrically concave, strongly oblique posteriorly and nearly parallel to the coiling axis anteriorly. **Aperture ovate, somewhat elongate and well rounded anteriorly.** Margin of the outer lip rather thin, forming a broad very shallow sinus leaning backward with respect to direction of growth, continued as a rather straight line across the base (on specimens with a broken aperture, shape of the outer lip retained in the axial growth marks of body whorl). Inner lip neither recurved outward nor sinuated at base of columella. **Operculum with many spiral coils.** **Colour:** shell colour **uniform white to fawn or blackish brown externally and internally**, sometimes changing progressively in shade from apex to aperture but always devoid of axial blotches.

Size: Maximum shell length 8 cm, commonly to 6 cm.

Habitat, biology, and fisheries: On various soft bottoms. Most of the time half buried in the sandy bottom, with the foot enrolled like a kind of siphon, to separate incoming and outgoing respiratory currents of water. Mainly at low tide and sublittoral levels to a depth of about 30 m, but also occurring deeper on continental shelf. A rather sedentary species, sometimes washed up by hundreds on beaches after storms. Shell often used in traditional local jewellery.

Distribution: Exact distribution not known, because of confusion with similar species. The tropical East Atlantic, probably from Senegal to Angola.



ventral view

dorsal view

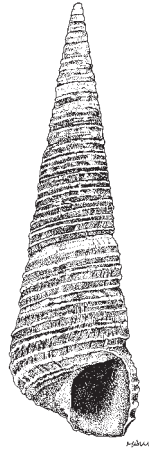


***Archimediella gemmata* (Reeve, 1849)**

Frequent synonyms / misidentifications: *Turritella candida* Reeve, 1849; *T. gemmata* Reeve, 1849 / *Turritella meta* Reeve, 1849 [= *T. variegata* (Linnaeus, 1758)].

En – Beaded turret; **Fr** – Turritelle perlée; **Sp** – Torrecilla perlada.

Maximum shell length 7 cm, commonly to 5 or 6 cm. On muddy sand bottoms, often with stones or near rocks, at low tide level and in shallow water. Locally collected where common. Tropical east Atlantic, from Mauritania to Angola.



ventral view

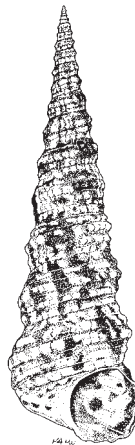


***Archimediella torulosa* (Kiener, 1843)**

Frequent synonyms / misidentifications: *Haustator torulosus* (Kiener, 1843); *Turritella torulosa* Kiener, 1843 / None.

En – Projecting turret; **Fr** – Turritelle toruleuse; **Sp** – Torrecilla trenzada.

Maximum shell length 10 cm, commonly to 7.5 cm. On sublittoral shelly sand bottoms, down to about 30 m depth. Locally used for food. Tropical east Atlantic, from Mauritania to Ghana and in Cape Verde Islands.



ventral view

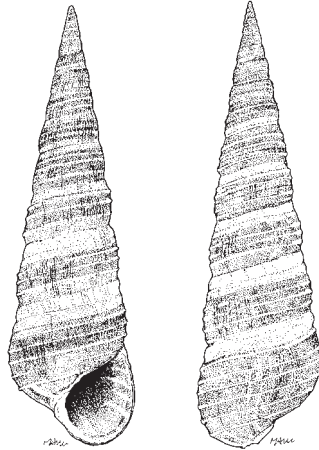


Mesalia mesal (Deshayes, 1843)

Frequent synonyms / misidentifications: *Turritella mesal* Deshayes, 1843; *T. varia* Kiener, 1843; *Mesalia freytagi* Maltzan, 1884 / *Mesalia brevialis* (Lamarck, 1822).

En – Mesal turret; **Fr** – Turritelle mésal; **Sp** – Torrecilla mesal.

Maximum shell length 7.5 cm, commonly to 5 or 6 cm. On sand and mud bottoms, at shallow sublittoral depths. Abundant in Dakar area (Senegal) on fine sand between 2 and about 15 m depths, when young individuals are not too heavily preyed by moon snails (Naticidae). Locally collected where common. Eastern Atlantic, probably from southern Portugal to Senegal, in the Canaries and Cape Verde Islands. Western Mediterranean.



ventral view

dorsal view

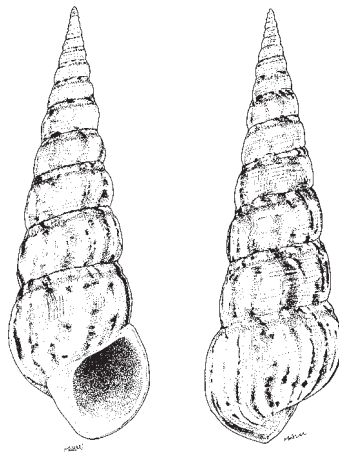


Mesalia opalina (Adams and Reeve, 1849)

Frequent synonyms / misidentifications: *Mesalia flammifera* Locard, 1897; *Turritella opalina* Adams and Reeve, 1849 / *Mesalia brevialis* of authors [not of Lamarck, 1822] [= *Mesalia mesal* (Deshayes, 1843)].

En – Opal turret; **Fr** – Turritelle opaline; **Sp** – Torrecilla opalina.

Maximum shell length 8 cm, commonly to 6 or 7 cm. On muddy sandy bottoms with empty shells, in sublittoral and shelf zones, from about 10 to 170 m depth. Collected in bottom trawls and nets where common. Eastern Atlantic, from Mauritania to Senegal and Cape Verde Islands.



ventral view

dorsal view



***Turritella communis* Risso, 1826**

Frequent synonyms / misidentifications: *Turritella britannica* Monterosato, 1890 / *Turritella terebra* (Linnaeus, 1758); *T. unguina*.

En – Tower shell (formerly reported as “horny auger”); **Fr** – Turritelle commune; **Sp** – Torrecilla común.

Maximum shell length 9.3 cm, commonly to 4.5 cm. Frequently more or less buried just below the surface in various bottoms of soft to hard mud, or muddy sand and gravel. Very common, patchily distributed inactive animals, occurring from extreme low tide and shallow sublittoral levels to continental shelf zone, down to a depth of about 200 m. Breeding in late spring and early summer. Sperm discharged by males in the sea, and entering a female in the feeding current. Planktonic larval stage short. Frequently found in great numbers in bottom trawls and nets. Shell used to make decorative items. Eastern Atlantic, from northern Norway to Morocco, and in the Canary Islands. Throughout the Mediterranean.



ventral view



dorsal view



***Turritella ligar* Deshayes, 1843**

Frequent synonyms / misidentifications: None. / None.

En – Ligar screw shell; **Fr** – Turritelle ligar; **Sp** – Torrecilla ligar.

Maximum shell length 14 cm, commonly from 10 to 12 cm. On sandy bottoms, often with mud and empty shells, from shallow subtidal levels to about 50 m depths. Locally common. Sometimes collected for food. Eastern Atlantic, from Mauritania to Senegal.



ventral view



dorsal view



POTAMIDIDAE

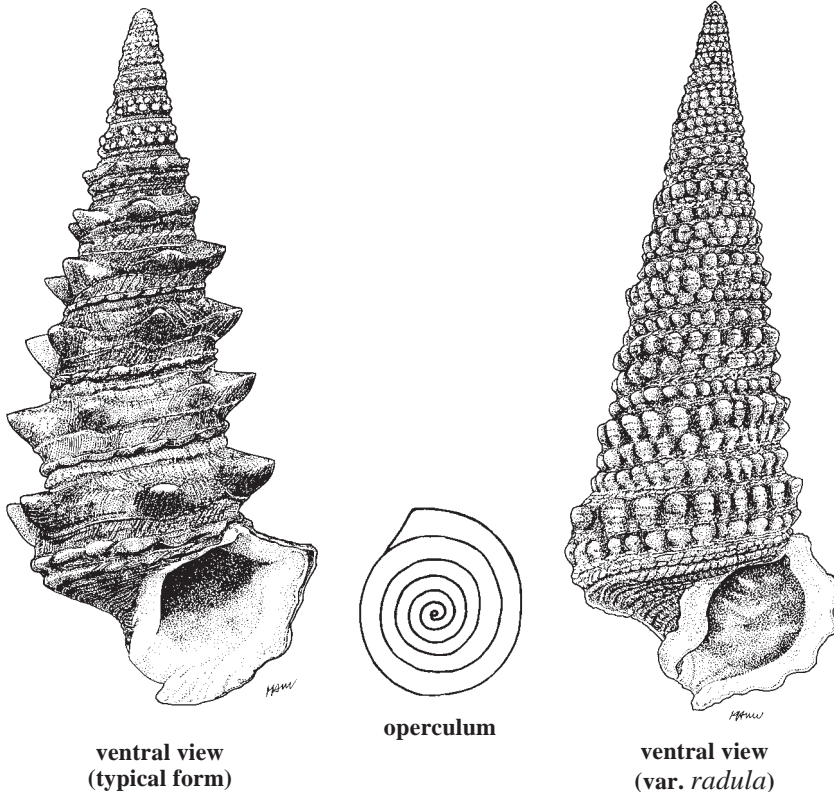
Swamp-ceriths, mud creepers

A single species occurring in the area.

Tympanotonos fuscatus (Linnaeus, 1758)

Frequent synonyms / misidentifications: *Potamides fuscatus* (Linnaeus, 1758); *P. muricatum* (Bruguière, 1792); *Tympanotonos radula* (Linnaeus, 1758); *Tympanotonos fuscatus* (Linnaeus, 1758) [Spelling error] / None.

FAO names: **En** – West African mud creeper; **Fr** – Potamide sombre; **Sp** – Torreón oscuro.



Diagnostic characters: Shell medium- to large-sized (up to 10 cm in length), thick and solid, **turreted, with many flattened to slightly convex whorls**, often with the apical region eroded, dissolved away or broken off. **Sculpture conspicuous, with spiral rows of tubercles on early spire whorls and varied patterns on later whorls, with 1 central row of tubercles becoming larger, pointed and projecting like spines, or with 4 or more spiral rows of rather small and rounded tubercles** [var. *radula* (Linnaeus, 1758)]; 1 row of tubercles may be a little larger than the others in var. *radula*. Axial varices sometimes present. Base of body whorl somewhat flattened, with many fine spiral cords. Periostracum well developed and strongly coloured. **Aperture relatively small, squared, with a short and deep anterior siphonal canal and a strongly flaring outer lip. Operculum rounded, corneous, with many spiral coils and central nucleus.** **Colour:** outer colour mainly due to periostracum, light tan or fawn to dark brown. **Aperture pale coloured, glazed** whitish grey, sometimes flushed with darker grey or brown inside the outer lip or with orange brown to dark red on columella and siphonal canal.

Similar species occurring in the area

Cerithiidae: shell somewhat similar, but recognizable by the ovate operculum with only a few spiral coils.

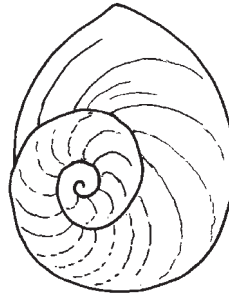
***Pachymelania* species (Thiaridae):** shape of shell recalling that of *Tympanotonos*, but easily distinguished by the absence of a deep siphonal canal (reduced to a shallow embayment at anterior end of aperture).

Size: Maximum shell length 10 cm, commonly from 5 to 6 cm.

Habitat, biology, and fisheries: Abundant in low energy brackish water environments, where it can form huge populations on mud flats of estuaries and in mangrove swamps, in the intertidal zone and down to a maximum depth of about 2 m. Often occurring in the same areas than the melanian *Pachymelania fusca*, moving about on the exposed moist surfaces, but usually resting when covered by the water. Common in big pools near the sea created by occasional freshwater currents. Limit of penetration into fresh water corresponding to a maximum annual salinity of about 2 ‰. The West African mud creeper is adapted to amphibious life and can survive out of the water for months during the dry season without eating, the fast period causing the development of an axial varix on the shell. Can live on all types of soft substrates (even on black anoxic muddy areas), provided that they are rich in organic remains on which the snail feeds. Sexes separate. Males devoid of penis, sperm transferred during mating in spermatophores. Eggs small and numerous, released in rounded capsules embedded into a jelly substance to form a narrow meandering ribbon, commonly mud incrustated and attached to various hard substrates. Eggs hatching as free swimming larvae, living in the plankton for an extended time before metamorphosis.

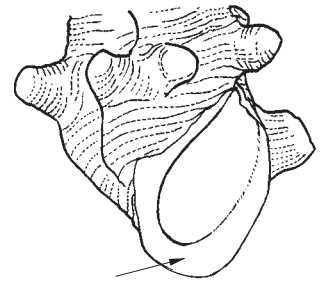
An edible species, heavily exploited in some areas of tropical West Africa, for human consumption as well as for various other purposes. Often consumed steamed or boiled in salt water. In Guinea, shells are first crushed to extract easily the flesh of animals, which is used as a seasoning in rice dishes. Intensively exploited and regularly marketed in Niger estuary, where size of the living snails has markedly decreased. Probably no longer living in the greater part of the Cape Verde Archipelago, because of long overcollecting. Collected and marketed in Benin mainly for baiting. In southwestern Senegal, shells also used as an additive in clay for earthenware, to give required plasticity to the material and to prevent deformation or cracking during drying and cooking. Attention must be brought to the fact that this species may be a temporary host for a parasitic fluke causing pulmonary or neurological troubles in various mammals, man included. It is suspected that man contamination is linked to consumption of the currently marketed swimming crab *Callinectes marginatus*, a common predator of gastropods.

Distribution: The tropical east Atlantic, from Senegal to southern Angola; Cape Verde Islands.



paucispiral operculum

Cerithiidae



ventral view

Thiaridae



Reference

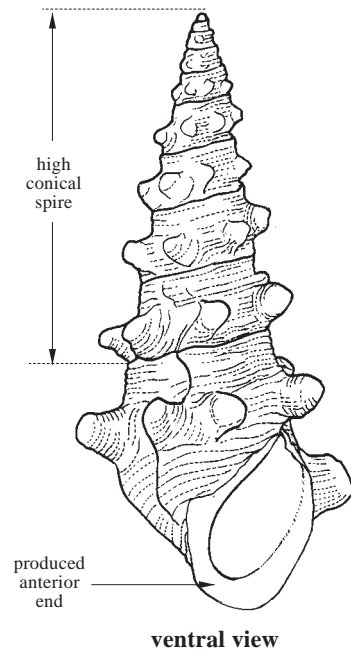
Pilsbry, H.A. & Bequaert, J. 1927. The aquatic molluscs of the Belgian Congo. With a geographical and ecological account of Congo malacology. *Bulletin of the American Museum of Natural History*, 53(2): 69–602, pl. 10–77.

THIARIDAE

Melanians

Diagnostic characters: Shell thick and solid, tapering, **high-conical** to turreted, **with many** flattened or slightly convex **whorls**. **Sculpture conspicuous, with strong spiral and usually axial elements**, giving then a reticulated to nodular aspect. Periostracum usually well developed and strongly coloured. **Aperture relatively small, ovate to subangular, produced and spout-like anteriorly, without a true siphonal canal** which is replaced to a shallow embayment near anterior end of aperture. Inner lip covered by a callus. **Operculum narrowly ovate, corneous, with a few spiral coils and an anterior nucleus**. Head rather small, with a flat snout and a pair of tentacles abruptly narrowing distally and bearing eyes above their thickened bases. Mantle margin fringed all around the body. Gill well developed, or narrowed and leaving room to a pallial cavity. Foot short and rounded.

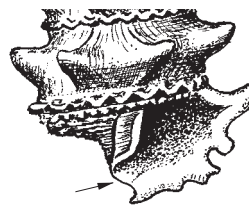
Remarks: Systematic status of the West African genus *Pachymelania* has been long disputed. First included in the old "Melaniidae" family, it was later transferred to the Potamididae, the Pleuroceridae, and then to the Thiariidae. However, the latter family comprises a large heterogeneous and probably polyphyletic group of mainly freshwater species that needs much systematic attention. Then, it is well possible that genus *Pachymelania* will be set apart in a distinct family, the Pachymelaniidae. To avoid confusion with other unrelated species, features used here are restricted to those of the genus.



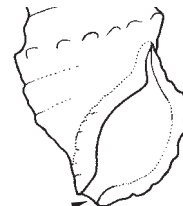
Habitat, biology, and fisheries: Abundant in brackish- to fresh-water environments, depending on species, on sand to mud flats near and within coastal swamps of estuaries and mangroves, in the tidal zone or at rather shallow depths. Microphagous, ciliary feeding animals. Sexes separate. Eggs laid on the sediment within long gelatinous strings or masses often coated with mud and faecal matter. Planktonic larval stage probably short (7 or 8 days). In tropical West Africa, some *Pachymelania* species may be temporary hosts for a parasitic fluke causing pulmonary or neurological troubles in various mammals, man included. It is suspected that human contamination is linked to the consumption of the swimming crab *Callinectes marginatus*, a predator of gastropods currently marketed in Togo and Benin.

Similar families occurring in the area

Potamididae and Cerithiidae: shape of shell somewhat recalling that of *Pachymelania*, but easily distinguished by the deep siphonal canal (reduced to a shallow anterior embayment of aperture in *Pachymelania*).



ventral view
Potamididae

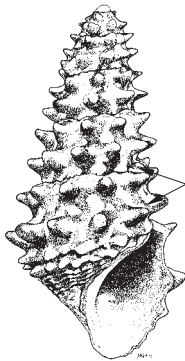


ventral view
Cerithiidae

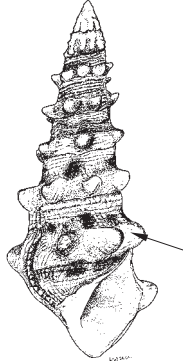
Key to species of interest to fisheries occurring in the area

- 1a. Shell relatively large (up to 6.3 cm long), with 2 spiral rows of strong conical tubercles per whorl (Fig. 1) ***Pachymelania byronensis***
- 1b. Shell medium-sized to small (up to 5.5 cm long), with at most 1 spiral row of strong tubercles per whorl. → 2

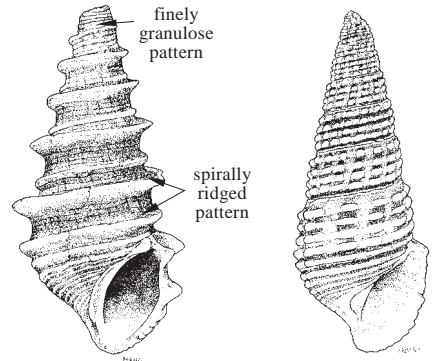
- 2a. Lower spire whorls with 1 spiral row of strong tubercles (Fig. 2) ***Pachymelania aurita***
- 2b. Lower spire whorls variably sculptured, but never with 1 spiral row of strong tubercles (with a dense and fine granulate sculpture, or with 2 greatly elevated spiral ridges, or with a combination of these 2 patterns) (Fig. 3) ***Pachymelania fusca***



ventral view



ventral view



ventral view




Fig. 1 *Pachymelania byronensis*

Fig. 2 *Pachymelania aurita*

Fig. 3 *Pachymelania fusca*

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

-  *Pachymelania aurita* (Müller, 1774).
-  *Pachymelania byronensis* (Wood, 1828).
-  *Pachymelania fusca* (Gmelin, 1791).

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***Pachymelania aurita* (Müller, 1774)**

Frequent synonyms / misidentifications: *Claviger auritus* (Müller, 1774); *C. balteatus* (Philippi, 1851); *Melania aurita* (Müller, 1774); *M. balteata* Philippi, 1851; *M. subaurita* Brot, 1858 / None.

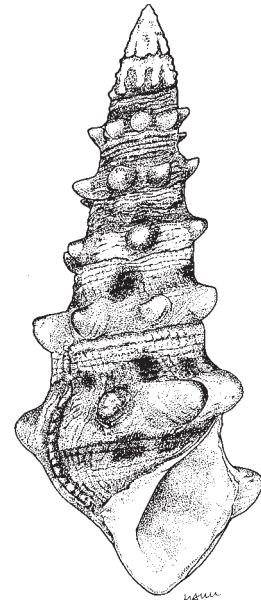
FAO names: **En** – Eared melania; **Fr** – Mélanie auriculée; **Sp** – Melania auricula.

Diagnostic characters: Shell medium-sized (up to 5.5 cm long), thick and solid, high-conical, width about one-third of the length. **Spire tall, with many flattened whorls**, often truncated at the apex due to erosion or crab predation. Sculpture of the spire with fine spiral grooves crossing low, arched axial ridges, which are progressively replaced by **a spiral row of strong tubercles just above the suture on later whorls**; tubercles sometimes poorly developed (form *balteata* Philippi, 1851). Body whorl with shallow, slightly undulating spiral grooves or cords on the base, or with fine axial growth lines only. Periostracum conspicuous, strongly adherent and covering the entire shell but for the eroded apical region. **Outer lip of the aperture sinuous in shape**, concave posteriorly and convexly produced in front of the spiral row of tubercles. **Colour: outer colour mainly due to periostracum and variable, light to dark brown, uniform or with yellow to whitish spiral bands**, 1 on tubercle area and 2 of variable extent on basal part of body whorl.

Size: Maximum shell length 5.5 cm, commonly to 4 cm.

Habitat, biology, and fisheries: Most common on fine to medium-sized sand and muddy sand flats of the mangroves and open lagoons, avoiding anoxic black mud and areas deeper than 5 m or under the influence of strong currents. Active when covered by water during high tide as well as when water has run off during low tide. Prefers brackish water areas with salt concentrations closer to those of the open sea, but can live in habitats with strong annual variations of salinity (from nearly 0 to 27‰). Plows through the sediment when covered by water, while it moves about on the surface of the bottom when exposed at low tide. Can form very dense populations (up to 2 000 individuals, or even 60 000 juveniles per square metre), being dominant on sandy bottoms, but less so on soft muddy bottoms. Very common in Nigeria, where it is currently consumed and marketed by coastal populations. In Benin, it is collected and sold for baiting. Juveniles of this species represent also an important part of the diet for a number of commercial fish.

Distribution: The tropical east Atlantic, from Senegal to Angola.



ventral view

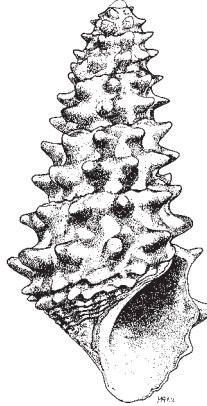


***Pachymelania byronensis* (Wood, 1828)**

Frequent synonyms / misidentifications: *Melania byronensis* (Wood, 1828); *M. owenii* Gray, 1831; *M. tuberculosa* Rang, 1832; *Pachymelania byroni* E.A. Smith, 1893 / None.

En – Byron's melania; **Fr** – Mélanie de Byron; **Sp** – Melania de Byron.

Maximum shell length 6.3 cm, commonly to 5 cm. On various soft bottoms of coastal lagoons or mangroves near the mouth of rivers, where salinity is lower than 1.5‰ all year long. Cannot survive more than 7 days out of the water, or in water salinity higher than 2‰. Locally collected where abundant. Sometimes used in fresh-water aquaria to clean up the bottom, at least in Germany where it is rather regularly imported. The tropical east Atlantic, from Guinea to Cameroon.



ventral view

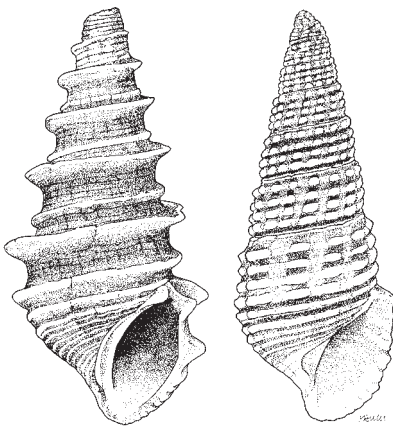


***Pachymelania fusca* (Gmelin, 1791)**

Frequent synonyms / misidentifications: *Claviger matoni* (Gray, 1831); *Melania fusca* (Gmelin, 1791); *M. matoni* Gray, 1831; *M. mutans* Gould, 1843; *M. quadriseriata* Gray, 1831; *Pirena granulosa* Lamarck, 1822; *Vibex fuscus* (Gmelin, 1791) / None.

En – Dark melania; **Fr** – Mélanie granuleuse; **Sp** – Melania granulosa.

Maximum shell length 4.5 cm, commonly to 3 cm. Common to abundant on muddy bottoms of mangroves and lagoon areas rich in vegetal remains, within or very near the intertidal zone. Often occurring in the same areas as the potamidid *Tympanotonos fuscatus*. Moving about on exposed mud flats even when the ground is almost dry, but usually resting when covered by the flood. Can survive out of the water for months during the dry season, and often resting in shadowy areas or buried in the sediment. Locally collected where abundant, for food or for baiting. Eastern Atlantic, from Senegal to central Angola.



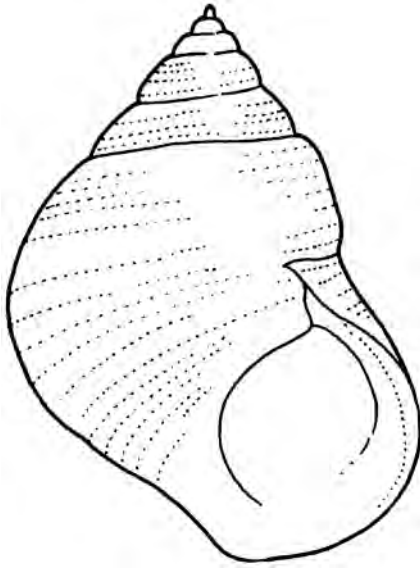
ventral view



LITTORINIDAE

Periwinkles

Diagnostic characters: Shell ovate-conical, usually strong and **without an umbilicus**. Outer surface smoothish or with spiral or nodular sculpture. Periostracum absent. **Aperture rounded** to oval or quadrate, **porcelaneous, without a siphonal canal**. Columella smooth or with a tooth-like swelling. No umbilicus. **Operculum corneous, with relatively few spiral coils** and either ovate with a lateral nucleus or rounded with a subcentral nucleus. Head with a short snout and conical tentacles bearing eyes on small swellings at their outer bases. Foot rather strong, the 2 sides of which can move independently.



ventral view



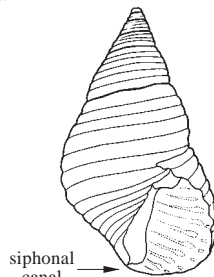
paucispiral
operculum

Habitat, biology, and fisheries: Widely distributed littoral animals, occurring in tropical, temperate to cold climates, in the intertidal zone and the splash area well above high tide levels. Species living high up the shore can survive desiccation, and have reduced gills and a vascularized mantle cavity acting as a primitive lung. Very common on rocky shores, or in tidal marshes and mangroves. Herbivores, mostly feeding on algae which are grazed with a powerful radula. Sexes separate, fertilization internal. Eggs generally laid each one in a small corneous, pelagic capsule and hatching as free-swimming planktonic larvae, or brooded in the mantle cavity of the female and with reduced planktonic larval stage. Littorinidae are easily collected on the shore by coastal inhabitants, mainly for subsistence purposes.

Similar families occurring in the area

Planaxidae: shape of shell very similar to Littorinidae, but readily distinguished by the short, but distinct, anterior siphonal canal of the aperture.

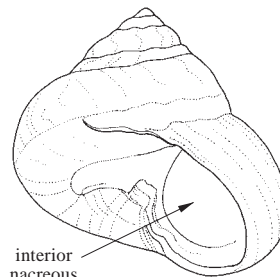
Trochidae: shell nacreous inside; operculum rounded, with many coils and a subcentral nucleus.



siphonal
canal

ventral view

Planaxidae



interior
nacreous

ventral view

Trochidae



multispiral
operculum

Key to species of interest to fisheries occurring in the area

- 1a.** Shell relatively small (hardly attaining 2 cm in length), thick and globose (width larger than two-thirds of the length); when not eroded, outer sculpture with well developed, often granular to nodulose spiral ribs; colour greyish with faint brown flecks, aperture blackish brown with a prominent cream band anteriorly (Fig. 1) ***Littorina striata***
- 1b.** Shell relatively large (often exceeding 2.5 cm in length), light-built and slender (width about three-fifths of the length); outer sculpture reduced, with many low, flat spiral cords; colour mostly with a brown-spotted mosaic pattern on a light yellow to orange background, aperture pale coloured, glazed with white or with the outer colour showing through (Fig. 2) ***Littoraria angulifera***

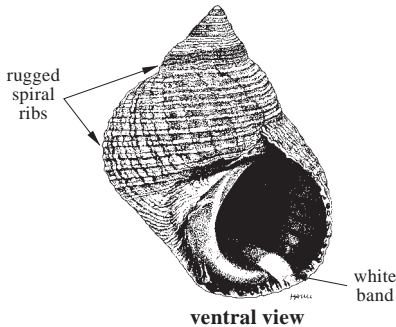


Fig. 1 *Littorina striata*

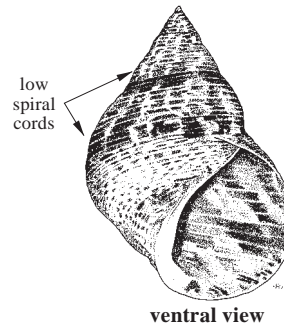


Fig. 2 *Littoraria angulifera*

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

 *Littoraria angulifera* (Lamarck, 1822).

 *Littorina striata* King, 1832.

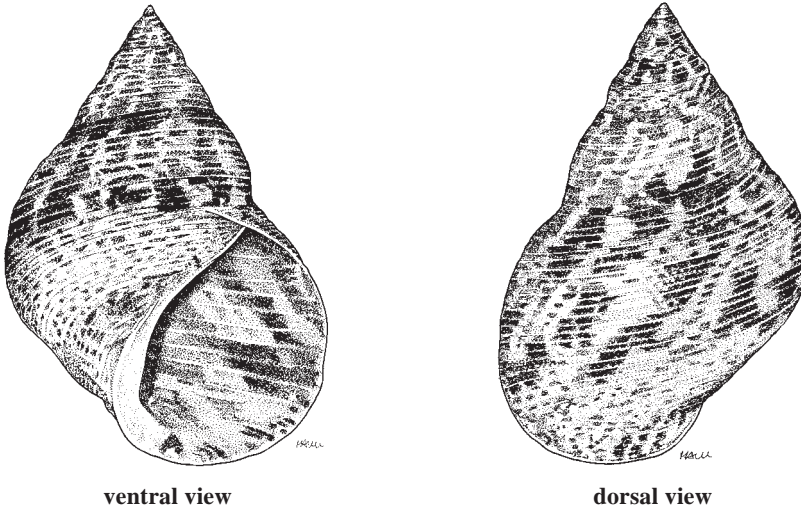
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***Littoraria angulifera* (Lamarck, 1822)**

Frequent synonyms / misidentifications: *Littorina ahenea* Reeve, 1844; *L. angulifera* (Lamarck, 1822); *L. scabra angulifera* (Lamarck, 1822); *Littorinopsis angulifera* (Lamarck, 1822) / *Littoraria scabra* (Linnaeus, 1758).

FAO names: **En** – Angulate periwinkle; **Fr** – Littorine anguleuse; **Sp** – Bígaro anguloso.



ventral view

dorsal view

Diagnostic characters: Shell relatively large (up to about 4 cm long), light-built but solid and slender (width about three-fifths of the length), with a tall, conical spire and shallow sculpture. Spire whorls convex, with a narrowly channelled, incise suture and numerous, fine, low and flattened spiral cords. Outer lip of the aperture thin and smooth, rounded ovate to somewhat flattened anteriorly. Columella smooth, shallowly excavated, straightish anteriorly and meeting basal end of shell at an obtuse angle. Operculum thin and ovate, with a few spiral whorls and lateral nucleus. Colour: outside of shell mostly with a brown-spotted mosaic pattern of dark oblique axial stripes and close-set dashed spiral lines, on a light yellow to orange background. Aperture pale coloured, glazed with white or with the outer dark pattern showing through, frequently spotted with brown on the inner edge of outer lip. Columella whitish with a lilac hue in the centre.

Size: Maximum shell length 4.1 cm, commonly to 2.5 cm.

Habitat, biology, and fisheries: In mangrove areas, often clinging on trunks, aerial roots and low branches of mangrove trees near estuaries, or on dock pilings and other natural and artificial surfaces emerging from the water. An often abundant species, mainly feeding on leaves of the mangrove trees, and secreting abundant mucus which helps seal the aperture to prevent desiccation in a semi-arboreal habitat. Upper littoral and supralittoral zones, near the water surface or above it, from about -1 m up to 2 m high. Eggs brooded in the female mantle cavity, planktonic larval stage very short. Eaten in various places in tropical West Africa, cooked in salt water after a fast of a few days to avoid excessive mucus release during cooking.

Distribution: Widely distributed in the tropical Atlantic; from Senegal and Cape Verde Islands to Angola (but not in South Africa) in the east Atlantic, and from Florida through the Gulf of Mexico, the Caribbean and Bermuda islands to southern Brazil in the west Atlantic.



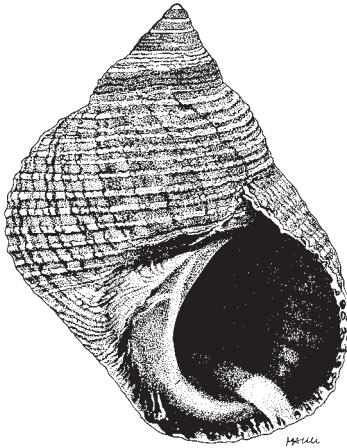
***Littorina striata* King, 1832**

Frequent synonyms / misidentifications: *Littorina affinis* d'Orbigny, 1839; *L. arenica* Dunker, 1845; *L. canariensis* d'Orbigny, 1839; *Melaraphe striata* (King, 1832); *Nodilittorina striata* (King, 1832) / *Littorina miliaris* Quoy and Gaimard, 1833 [= *Echinolittorina miliaris*]; *Nodilittorina granosa* (Philippi, 1845); [= *E. granosa*].

En – Striate periwinkle; **Fr** – Littorine striée; **Sp** – Bígaro estriado.

Maximum shell length 1.95 cm, commonly from 1.2 to 1.5 cm. On bare rocks of the shore, often in crevices and high level pools. Upper intertidal zone and supralittoral fringe. Most abundant in exposed areas. Often forms dense populations, with mean densities of about 470 individuals per square metre. Probably grazes on microalgae on rock surface, and on encrusting lichens. Variations in growth rate and shell sculpture related to temperature control and conservation of water; smaller-sized and more strongly sculptured individuals dissipate heat more efficiently, and thus predominate at higher levels on the shore, in sheltered areas with little wave-splash or on dark rocks heated by the sun. Females generally larger than males, releasing pelagic egg capsules that hatch in free-swimming planktonic larvae. Despite its small size, *Littorina striata* is considered a species of interest in the Canaries, where it is actively sought for human consumption. Probably restricted to Macaronesian Islands (the Azores, Madeira, Selvagen and Canary islands) and Cape Verde Archipelago. Perhaps occurring also occasionally on the West African mainland coasts nearer to the Cape Verde and Canary islands, and in central Liberia.

Remarks: Based on a molecular study, this species probably belongs to genus *Tectarius*.



ventral view



STROMBIDAE

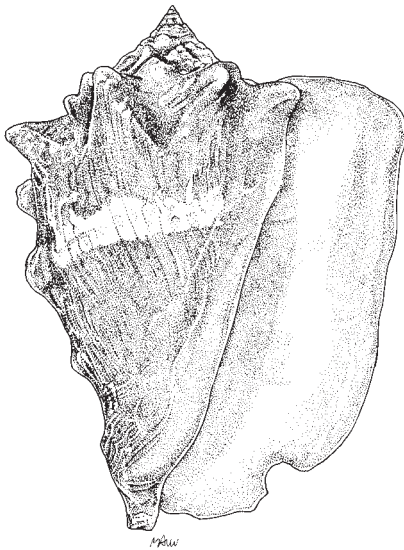
Conchs

A single species occurring in the area.

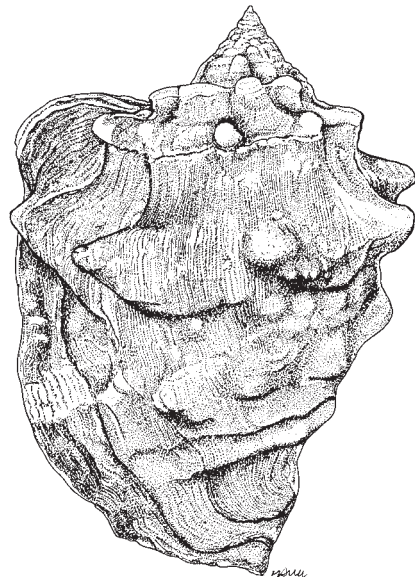
Strombus latus Gmelin, 1791

Frequent synonyms / misidentifications: *Lentigo latus* (Gmelin, 1791); *Persististrombus latus* (Gmelin, 1791); *Strombus bubonius* Lamarck, 1822; *S. (Afristrombus) latus* (Gmelin 1791) / None.

FAO names: **En** – West African conch; **Fr** – Strombe d’Afrique occidentale; **Sp** – Cobo del Africa occidental.



ventral view



dorsal view

Diagnostic characters: Shell thick and solid, biconical, with a relatively large body whorl, and a short and wide spire armed with blunt spines just above the suture. Body whorl often glossy, with 2 to 4, often poorly distinct, spiral rows of knobby ridges, and a row of triangular spines on the shoulder which are longer than those of the penult whorl; shoulder sculpture variably developed at adult stages, sometimes forming very heavy spines or reduced to rather low tubercles, depending on specimens. Periostracum thin. Aperture long and narrow, with a well-marked siphonal canal anteriorly and a distinct notch along the anterior margin of the outer lip. Inner lip covered by a smooth and glossy callus, with a quite straight columella. No umbilicus. Outer lip thickened, wavy, rather flared, with short and weak lirae in adult specimens. Operculum thick and corneous, claw-like, narrowly elliptical with a sharp terminal nucleus. **Colour:** basic outer colour cream to brown, with scattered white spots or blotches and often with pinkish spiral bands at shoulder and midbody whorl. Aperture cream to pinkish, inner lip callus whitish to orange. Head bearing complex eyes with highly coloured iris, on top of long stalks which protrude, the one along the anterior canal, the other under the notch of outer lip. Foot narrow, with a short creeping sole anteriorly and a long, finger-like posterior part that terminates in the claw-like operculum.

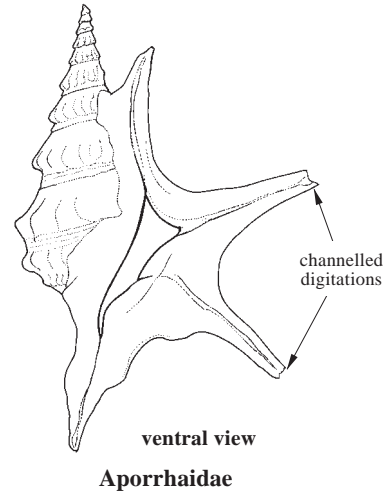
Similar species occurring in the area

Aporrhaidae: outer lip of the aperture palmate, drawn out into a number of channelled digitations. Notch on the anterior margin of the outer lip relatively wide and shallow.

Size: Maximum shell length 17.7 cm, commonly from 8 to 12 cm.

Habitat, biology, and fisheries: On various sandy bottoms, pure sand, or mixed with rocks, mud or rubble, or on marine grassflats. Littoral and sublittoral zones, from low tide levels to a depth of about 50 m. Very active animal, using its narrow foot and strong operculum in a leaping locomotion and as a defensive weapon. Browses on delicate algae, or swallows sand and detritus to digest the decomposing plant matter. Sexes separate, fertilization internal. Eggs numerous, laid in gelatinous, tubular, tangled masses, and hatching as planktonic larvae. A moderately common species, commercially harvested with dredges for its edible flesh, which is mainly used in seafood dishes with rice.

Distribution: Eastern Atlantic, from Rio de Oro, Western Sahara to Angola, the Cape Verde and Gulf of Guinea islands.



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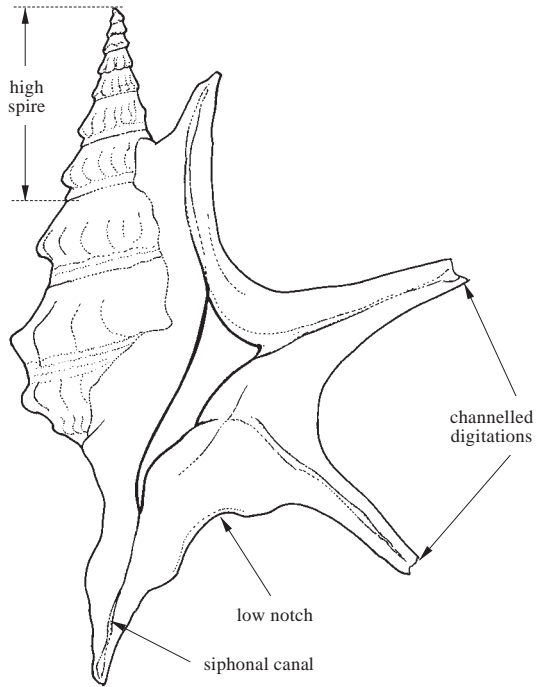
Walls, J.G. 1980. *Conchs, tibias and harps*. Neptune, T. F. H., 191 p.

APORRHAIIDAE

Pelican-foot shells

D **Diagnostic characters:** Shell elongate, with a rather high, pointed spire with rounded whorls and characteristic shape of the aperture. Outer sculpture with many fine spiral threads, usually with a row of somewhat axially elongated peripheral knobs on the spire whorls, and 2 additional spiral rows of knobs on last whorl, merging into continuous ridges on apertural digitations. **Aperture** long and narrow, with a well marked siphonal canal. Inner lip covered by a glossy callus. **Outer lip** thickened and **palmate** in adult specimens, drawn out into as many as 5 **channelled digitations**; anteriormost digitation bearing the siphonal canal. A rather wide and **shallow notch** present along the anterior margin of the outer lip. No umbilicus. **Operculum** corneous, long and subovate to elliptical, with a terminal nucleus and smooth edges. Head with a long, tapering snout and slender, narrow tentacles with small eyes on the outer pedunculate base. Foot rather small, oblong, narrow and tapering posteriorly.

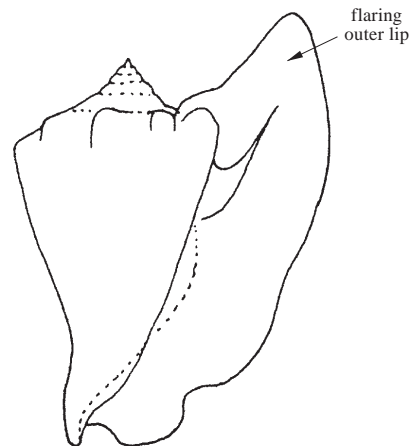
Habitat, biology, and fisheries: Specialized detritus feeding animals, living partly buried in muddy sandy bottoms where they can form dense populations. Foot used for a stepwise locomotion and for a turning-back reflex (when aperture of shell is positioned upwards), in which the animal bends its extended body round the columella or the outer lip, to anchor the foot in the substrate before pulling back the shell downwards. Sexes separate. Eggs laid, each one in spherical capsule, singly or in group, hatching as free-swimming planktonic larvae. Collected in bottom trawls and dredges, for food and for their bizarrely shaped shells that are used in the local shellcraft industries. In some localities where they are abundant, Pelican-feet are actively collected and constitute a popular food.



ventral view

Similar families occurring in the area

Strombidae: outer lip of the aperture thickened and flaring, but not palmate nor drawn out into channelled digitations.




Strombidae

Key to species of interest to fisheries occurring in the area

- 1a.** Shell usually thick, with relatively long spire and strong peripheral knobs; digitations of the outer lip rather broad, short to moderately long; posteriormost digitation largely lying alongside the spire and not extending posteriorward beyond the spire apex; anteriormost digitation somewhat bent ventralward ***Aporrhais pespelecani***
- 1b.** Shell thinner, with relatively short spire and small to obsolete peripheral knobs; digitations of the outer lip long and slender; posteriormost digitation largely detached from the spire and markedly extending posteriorward beyond the spire apex; anteriormost digitation straight, not bent ventralward ***Aporrhais pesgallinae***

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

 *Aporrhais pesgallinae* Barnard, 1963.

 *Aporrhais pespelecani* (Linnaeus, 1758).

References

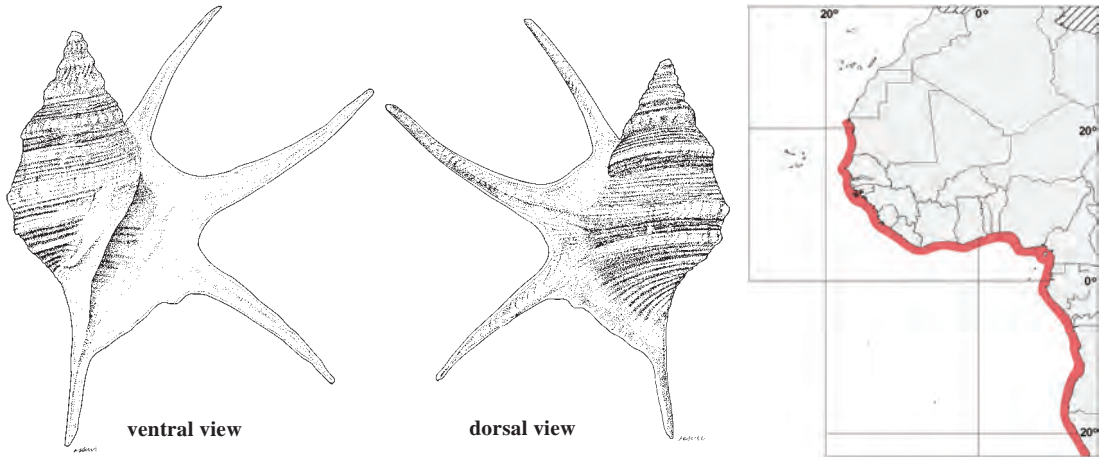
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- Mari, A.** 1972. Notes on the Genus *Aporrhais*. *La Conchiglia*, 4(9–10): 6–7.
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***Aporrhais pesgallinae* Barnard, 1963**

Frequent synonyms / misidentifications: *Aporrhais elegantissimus* Parenzan, 1970 / *Aporrhais uttingeriana* Risso, 1826.

En – Posh pelican-foot; **Fr** – Chénope pied-de-poule; **Sp** – Pie de gallina.

Maximum shell length 6.2 cm, commonly to 4 cm. Patchily common on muddy to muddy-sandy bottoms, offshore on continental shelf and upper slope, from about 150 m to 400 m depths. Occasionally caught in bottom trawls or dredges, for food and for its nice shell. Eastern Atlantic, from Mauritania to Namibia.

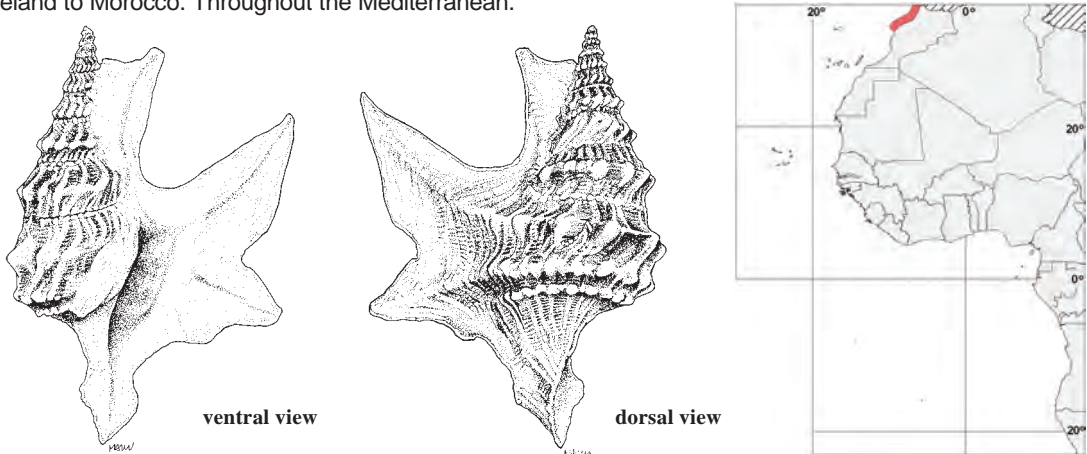


***Aporrhais pespelecani* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Aporrhais pespelicani* [spelling error]; *Chenopus pespelecani* (Linnaeus, 1758) / None.

En – Common pelican-foot; **Fr** – Pied de pélican; **Sp** – Pie de pelicano.

Maximum shell length 7 cm, commonly to 4.5 cm. Width to 4.2 cm (outer lip digitations included). A detritus feeder and browser, living partly buried in various detritic bottoms, mostly in muddy sand and fine sand. Infralittoral and continental shelf zones, from just below the tidal zone to about 180 m or more. At shallow subtidal levels, only present in calm waters of protected bays, to avoid rough water environments. Species occurring abundantly in almost all appropriate habitats and forming locally dense populations, but in the northernmost part of its range where it is quite rare. Breeding period extending from March to July or August in the Atlantic. Collected by bottom trawls or dredges, for human consumption and for its bizarrely shaped shell that is used to make decorative items. Heavily exploited in some areas of the nearby Mediterranean, especially in the Adriatic; commonly marketed in Cyprus. Northeast Atlantic, from northern Norway and Iceland to Morocco. Throughout the Mediterranean.

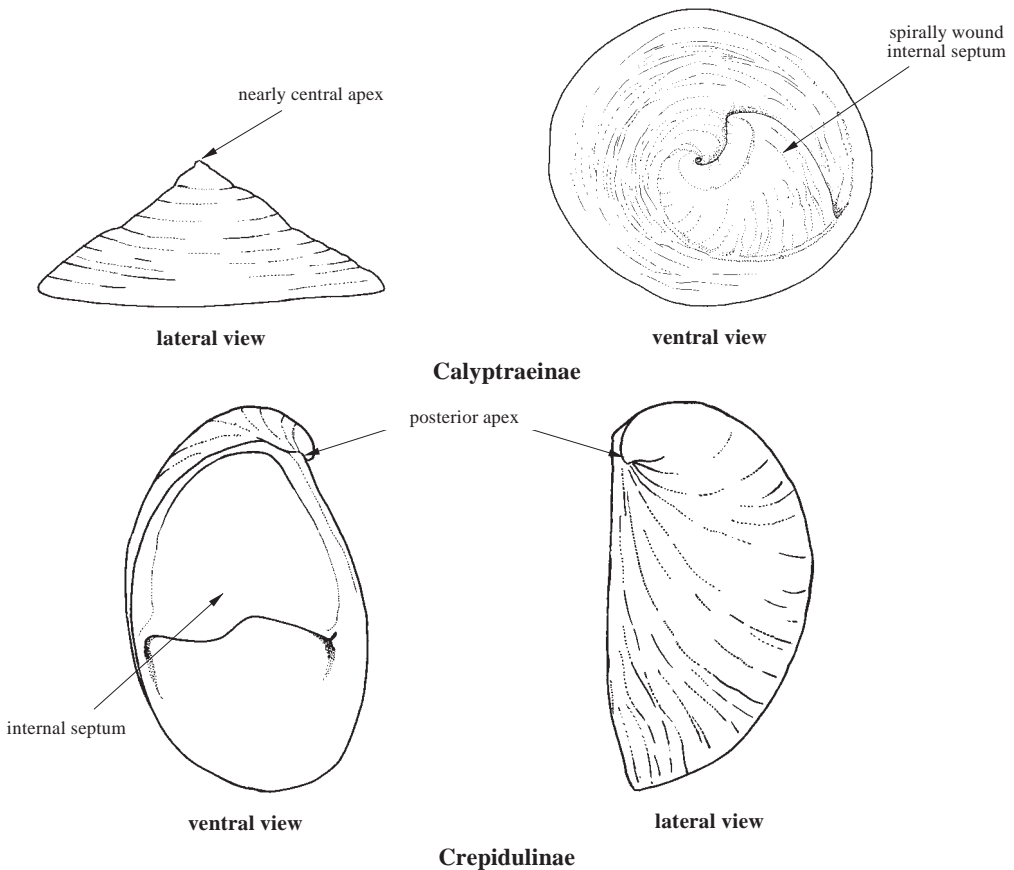


CALYPTRAEIDAE

(= CREPIDULIDAE)

Cup-and-saucer, slipper shells

D **Diagnostic characters:** Shell cap-shaped or conical (Calyptraeinae) to slipper-shaped (Crepidulinae), with apex more or less spirally coiled, central to posterior in position. Shell tending to be variable in form because of sedentary mode of life, adapting to the irregularities of the substrate. Exterior smooth, ribbed or scaly, sometimes spinose. Interior with a calcareous septum supporting the soft parts and more or less covering the apical region. Muscle scar oval to horseshoe-shaped. **No operculum.** Head more or less distinct, with an elongate neck region and short, subulate tentacles with eyes at their outer base; snout short, slit distally. Foot short, rounded or angulated, not posteriorly elongate. Mantle cavity elongate, gill well developed, with long, thread-like filaments.

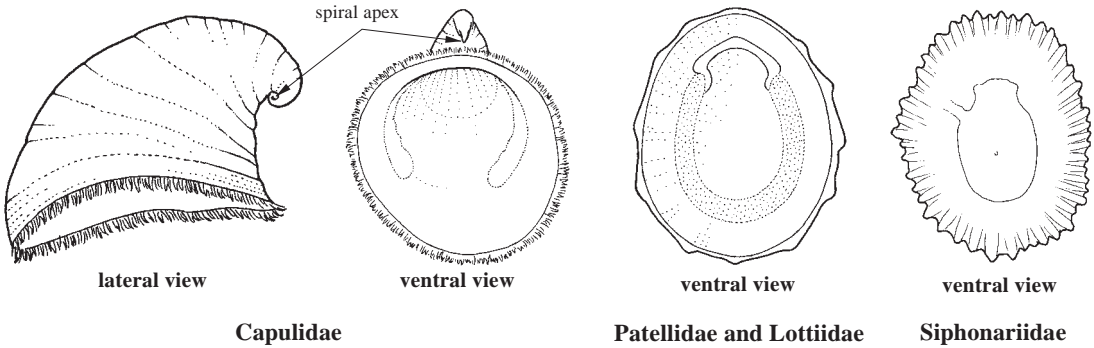


Habitat, biology, and fisheries: Sedentary, often attached, filter-feeding animals, using the large gill to trap minute planktonic organisms. Hermaphrodites, changing sex from male to female with age. Crepidulinae may form pairs or chains, each individual clinging to the one beneath, with males above and females underneath. Eggs produced in capsules, commonly brooded beneath the shell for several weeks, hatched as planktonic larvae or as crawling young. Calyptraeidae represents only a family of limited interest to fisheries; larger and most common Crepidulinae are accessorially collected for human consumption or for baiting, whereas shells of the smaller Calyptraeinae are used in local shellcraft.

Similar families occurring in the area

Capulidae: shell cap-shaped with a small spiral apex, but without any internal septum.

Lottiidae, Patellidae and Siphonariidae: shell conical, but without any internal septum.







Key to species of interest to fisheries occurring in the area

- 1a. Shell low conical in shape, with subcentral apex → 2
- 1b. Shell slipper-shaped, with posterior apex → 3
- 2a. Shell relatively small (up to 2.5 cm long), not transparent, mostly rounded in outline; outer surface not glossy, scales when present, numerous and not very prominent *Calyptraea chinensis*
- 2b. Shell relatively large (up to 3.5 cm long), more or less transparent, mostly ovoid in outline; outer surface glossy, scales when present, distant and elevated *Calyptraea africana*
- 3a. Outer surface with spinose radial ridges, very variable in strength *Bostrycapulus* spp.
- 3b. Outer surface without radial ridges or spines *Crepidula porcellana*

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

-  *Bostrycapulus* spp.
-  *Calyptraea africana* Rolán, 2004.
-  *Calyptraea chinensis* (Linnaeus, 1758).
-  *Crepidula porcellana* Lamarck, 1801.

References

Collin, R. 2005. Development, phylogeny, and taxonomy of *Bostrycapulus* (Caenogastropoda: Calyptraeidae), an ancient cryptic radiation. *Zoological Journal of the Linnean Society*, 144: 75–101.

Fischer, P.-H. 1950. Remarques sur la systématique et la phylogénie du genre *Calyptraea*. *Journal de Conchyliologie*, 90: 231–324.

Hoagland, K.E. 1977. Systematic review of fossil and recent *Crepidula* and discussion of evolution of the Calyptraeidae. *Malacologia*, 16(2): 353–420.

Rolán, E. 2004. The genus *Calyptraea* (Gastropoda, Caenogastropoda, Calyptraeidae) in the East Atlantic. *Iberus*, 22(2): 51–79.

***Bostrycapulus* spp.**

Frequent synonyms / misidentifications: *Crepidula porcellana* var. *aculeata* (Gmelin, 1791) / *Crepidula aculeata* (Gmelin, 1791) [= *Bostrycapulus aculeatus* (Gmelin, 1791)]; *C. calyptraeiformis* Deshayes, 1830 [= *B. calyptraeiformis* (Deshayes, 1830)].

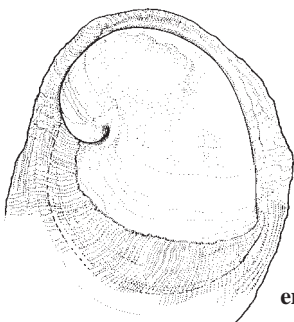
En – Spiny slipper shells; **Fr** – Crépîdules épîneuses; **Sp** – Pique espinosos.

Maximum shell length 4 cm; commonly from 2 to 3 cm. In sandy or muddy habitat, attached to rocks, stones, other shells or mangrove trunks. Intertidal and sublittoral zones to about 40 m depth. Produces encapsulated eggs which hatch as planktonic larvae or crawling young, depending upon species. Accessorily collected for subsistence purposes and for their attractively sculptured shells. In the studied area, spiny slipper shells are known from Senegal to Liberia, and in Canary and Cape Verde islands.

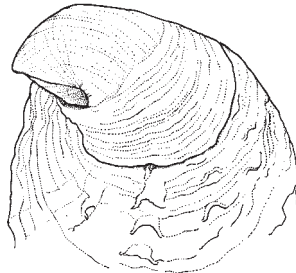
Remarks: Until recently, spiny slipper shells were referred to as *Crepidula aculeata* worldwide. However, it has been shown that *C. aculeata* is so different from true *Crepidula* that it should be assigned to a different genus, and that it forms a complex of species with very similar adult morphology and anatomy. West African *Bostrycapulus* are rather poorly known, their exact number and relative distribution still need to be re-evaluated; 2 tropical species are already recognised on the basis of development and DNA sequence data: *B. tegulicius* (Rochebrune, 1883) in Cape Verde Islands (probably endemic) and *B. heteropoma* Collin and Rolán, 2010 in Dakar (Senegal). As *Bostrycapulus aculeatus* is probably restricted to the West Atlantic and the identity of the species occurring in the studied area is still under study, they are here collectively referred to as *Bostrycapulus* spp. Spiny slipper shells living in South Africa and introduced in western Mediterranean at Alicante (Spain) belong to other species.



dorsal view
Bostrycapulus sp.



Bostrycapulus tegulicius
(Rochebrune, 1883)



Bostrycapulus heteropoma
Collin & Rolan, 2010

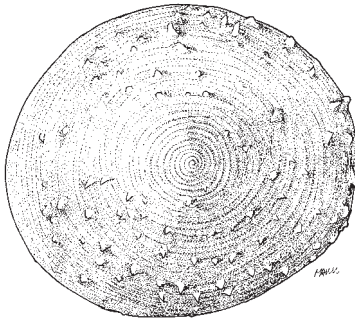
embryonic shells

***Calyptraea africana* Rolán, 2004**

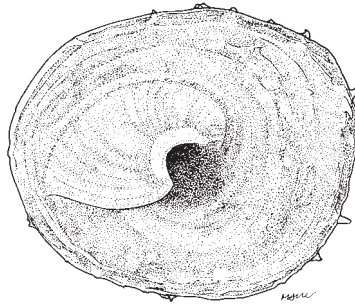
Frequent synonyms / misidentifications: ? *Calyptraea solida* Martens, 1874 [not of Reeve, 1844] / *Calyptraea chinensis*.

En – African cup-and-saucer; **Fr** – Calyptrée africaine; **Sp** – Sombrero africano.

Maximum shell length 3.5 cm, commonly to 2.5 cm. Common on rocks, empty shells or under stones. Shallow waters of sheltered areas, from about 3 to 30 m depths. Spawn formed by numerous ovoid elongate soft capsules, which are fixed to substrate and brooded by the animal; each capsule with 10 to 35 small eggs, hatching directly as crawling young. Collected where common for its shell, which is used in decorative items. Eastern Atlantic, from Western Sahara to Ghana, and from Cameroon to southern Angola; Gulf of Guinea islands (São Tomé and Príncipe).



dorsal view



ventral view



lateral view



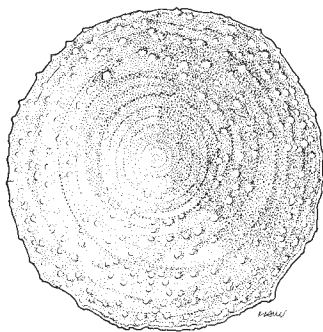
***Calyptraea chinensis* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Calyptrea sinensis* [Spelling errors] / None.

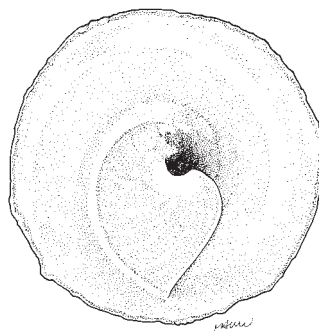
En – Chinese cup-and-saucer; **Fr** – Calyptrée-chapeau chinois; **Sp** – Sombrero chino.

Maximum shell length 2.5 cm, commonly to 1.5 cm. Common on empty shells or under stones among sand and mud, in sheltered areas of the intertidal zone, sublittorally and offshore to about 190 m depth. Alimentary particles trapped on gill in a mucous sheet, which is rolled up and passed to the mouth. Eggs released in roughly spherical soft capsules (often with about 15 to 25 eggs per capsule) attached to substrate, brooded under the foot of the female and finally hatched directly as crawling young. Too small to be eaten, but shells often used in decorative items. Eastern Atlantic, from Belgium and the British Isles to Morocco and Western Sahara, Madeira and Canary Islands. Throughout the Mediterranean and the Black Sea.

Remarks: *Calyptraea chinensis* was long thought to be the only species present in the eastern Atlantic. However, it was confused with 2 other species in tropical West Africa, and another one in southeast Africa.



dorsal view



ventral view



lateral view

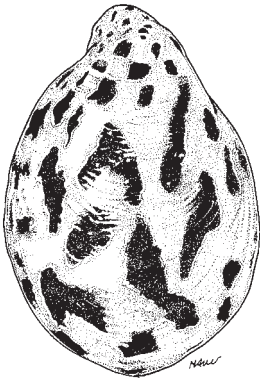


***Crepidula porcellana* Lamarck, 1801**

Frequent synonyms / misidentifications: *Crepidula fornicata* var. *garnot* Dautzenberg, 1891; *C. goreensis* (Gmelin, 1791); *C. porcellana* (Lamarck, 1799); *C. sulin* Dautzenberg, 1912 / *Crepidula fornicata* (Linnaeus, 1758); *C. onyx* Sowerby, 1824.

En – Goriee slipper shell; **Fr** – Crépidule sandale; **Sp** – Concha sandalia.

Maximum shell length 3.5 cm, commonly to 2.5 cm. Attached to rocks and empty shells, or clinging to shells of living mussels or of gastropods such as *Turbo*, *Burnupena* or *Conus*. Very common in tidal pools and in shallow sublittoral waters of protected areas, but also occurring on continental shelf to about 100 m depth. Can form simple stalks, with a maximum of 4 or 5 individuals clinging together. Egg-capsules containing 2 to 20 large eggs, hatching directly as crawling young. Collected for food or for bait where abundant; used mainly in soups. East Atlantic, from Essaouira (Morocco) to South Africa and in Canary Islands; also occurring along the southwestern coasts of Indian Ocean, eastward to northern Natal.



dorsal view



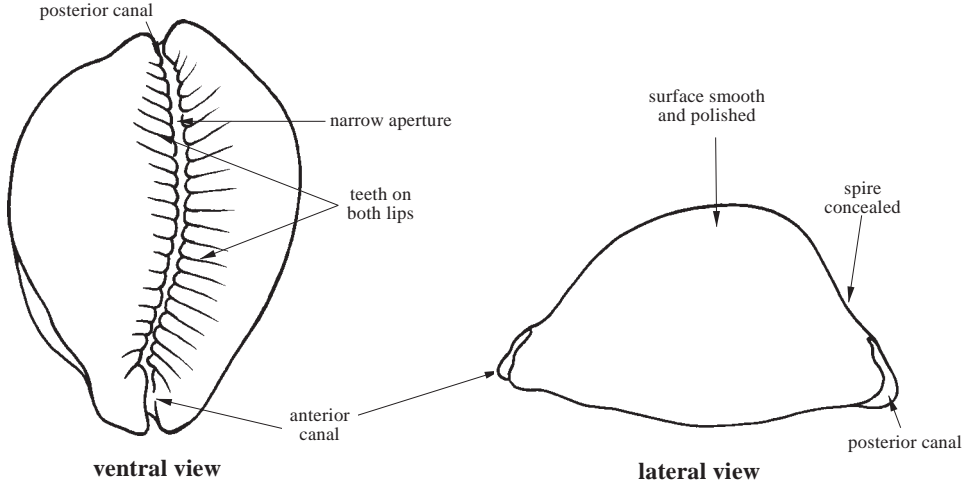
ventral view



CYPRAEIDAE

Cowries

Diagnostic characters: Shell fairly sturdy, **ovate or oblong**, **spire** short and **concealed under body whorl** in the adult. **Surface highly polished, smooth** and usually vividly patterned, with a low groove on midline of the dorsal side. Periostracum absent. Ventral side more or less flattened to calloused. **Aperture long and narrow**, extending almost the full length of shell, shortly **channelled at both ends**. **Both lips with** raised transverse ridges or **teeth**, the outer one thickened and incurved; inner lip with a shallow longitudinal furrow situated towards front end. **No operculum**. Mantle very large, with 2 lobes expanding in life over the shell and meeting along the dorsal sulcus. Mantle lobes often brightly coloured and with numerous small, finger-like or branched sensory outgrowths.

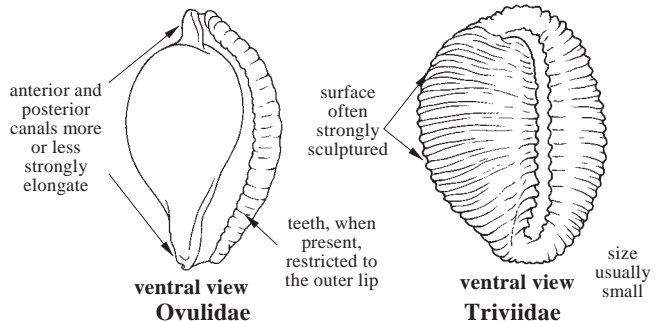


Habitat, biology, and fisheries: Generally associated with coral reefs. Feed most actively at night, browsing on encrusting algae and sponges or tiny animals that grow on rock and coral. Sexes separate, fertilization internal. Eggs laid in horny capsules attached to the substrate by a short stalk and grouped together in a cluster. After laying, the female covers the eggs with her foot until they hatch as free-swimming larvae or as crawling young. Juvenile shell strikingly different from the adults: thin, oliviform, with a pointed spire, a wide aperture and a sharp, untoothed outer lip. When animal nears maturity, features of the adult appear. Then, shell cannot increase in size but is thickened by deposition of material over the whole surface, producing the glossy aspect and the distinctive adult colour pattern. Though cowries have been locally used as food by the native fishermen, they are nowadays mainly collected for their highly prized shell, for collection purposes or for the shellcraft industry. Since ancient times, they have been used (and are still used) to make jewels, decorative items, and for magic or religious purposes; in western Africa, they symbolized wealth. For many centuries, cowries have also circulated in Africa as currencies. The most widely used species in tropical West Africa (*Monetaria annulus*, *M. moneta* and *Erronea caurica*) were imported from the Indian Ocean, but locally fished species were also traded. They were used as cash to buy goods, to pay for services rendered, and as units of account for fixing prices without necessarily using them to pay. Cowries still circulate today, on a very small scale, between the peoples of the Burkina Faso and northern Ghana.

Similar families occurring in the area

Ovulidae: teeth, when present, restricted to the outer lip. Anterior and posterior canals sometimes strongly elongate.

Triviidae: size usually small. Surface often strongly sculptured, with the apertural teeth continued over the lateral and dorsal sides of shell.



Key to species of interest to fisheries occurring in the area

- 1a. Lateral shell margins pitted (Fig. 1a) ***Erosaria spurca***
- 1b. Lateral shell margins not pitted (Fig. 1b) → 2

- 2a. Shell colour with well marked, paired dark brown to black blotches at both ends; dorsal side uniform greyish brown, with 2 lighter transverse bands (Fig. 2) ***Luria lurida***
- 2b. Shell colour with a different combination of characters; if present, paired blotches less distinct, and then dorsal side pattern variegated with irregular, mottled banding → 3

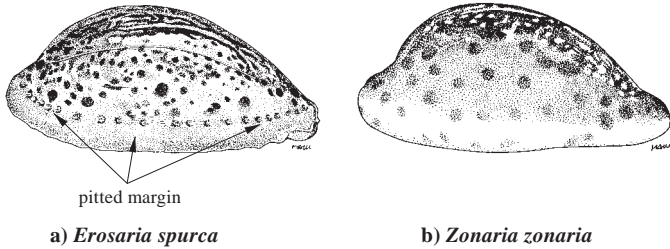


Fig. 1 lateral view



Fig. 2 *Luria lurida*

- 3a. Teeth of the aperture relatively fine and closely spaced, more developed toward the concave anterior end; anterior part of columella produced interiorly into a depressed, spoon-like area (Fig. 3) ***Trona stercoraria***
- 3b. Teeth of the aperture relatively coarse and widely spaced, not more developed toward the shallowly convex anterior end; anterior part of columella not produced into a spoon-like area → 4

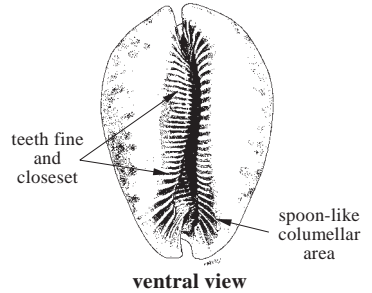


Fig. 3 *Trona stercoraria*

- 4a. Lateral shell margins with dark spots; ventral side cream to pale greyish blue (never bright red or orange) (Fig. 4) ***Zonaria zonaria***
- 4b. Lateral shell margins not spotted; ventral side usually bright orange brown to red (occasionally pinkish cream to pale grey) (Fig. 5) ***Zonaria pyrum***

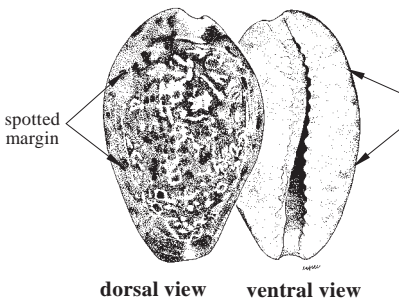


Fig. 4 *Zonaria zonaria*

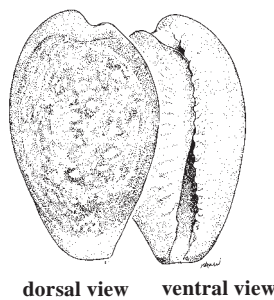





Fig. 5 *Zonaria pyrum*

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

 *Erosaria spurca* (Linnaeus, 1758).

 *Luris lurida* (Linnaeus, 1758).

 *Trona stercoraria* (Linnaeus, 1758).

 *Zonaria pyrum* (Gmelin, 1791).

 *Zonaria zonaria* (Gmelin, 1791).

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Lorenz, F. Jr & Hubert, A. 1993. *A Guide to Worldwide Cowries*. Wiesbaden, Hemmen: 571 p.

Meyer, C.P. 2003. Molecular systematics of cowries (Gastropoda: Cypraeidae) and diversification patterns in the tropics. *Biological Journal of the Linnean Society*, 79(3): 401–459.

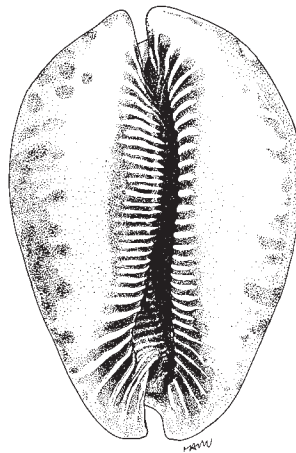
Meyer, C.P. 2004. Toward comprehensiveness: increased molecular sampling within Cypraeidae and its phylogenetic implications. *Malacologia*, 46(1): 127–156.

***Trona stercoraria* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Cypraea conspurcata* Gmelin, 1791; *C. gibba* Gmelin, 1791; *C. rattus* Lamarck, 1810; *C. stercoraria* Linnaeus, 1758; *Zoila stercoraria* (Linnaeus, 1758) / None.

FAO names: En – Rat cowry; Fr – Porcelaine rat; Sp – Porcellana rata.

Diagnostic characters: **Shell relatively large**, solid to very thick, variably **ovate to rhomboidal** in outline. **Dorsal side moderately inflated** and rounded to **strongly humped**, then with markedly produced lateral calluses and extremities. Mantle groove often poorly distinct. Ventral side broad and slightly concave, more or less enlarged by peripheral thickening. Aperture narrow, larger anteriorly, **teeth relatively fine, closely spaced, more developed toward the concave anterior end**. Teeth of the inner lip finer and longer on the main part of aperture, extending deep in the **anterior part of columella** which is **produced interiorly into a depressed, spoon-like area**. **Colour:** **shell coloration very variable**, ranging from almost white to dark chocolate brown or nearly black, **usually mottled brown to dark brown on a pale olive grey background** for dorsal side, and **with a big blackish brown spot on the spire**. Lateral sides frequently somewhat suffused with lighter or darker tinge, depending on the specimens. Ventral side variable in colour, olive grey to light purple or creamy white, aperture usually of a slightly darker tinge with whitish teeth.



ventral view



dorsal view

Size: Maximum shell length 9.7 cm, commonly from 4.5 to 8 cm.

Habitat, biology, and fisheries: On all kinds of rocky shores, even in areas under the influence of strong surf or currents. Barnacles can attach to shell (some cowries carry up to 6 specimens on their surface), and are often covered with enamel by the mantle, forming tubercles on dorsal and lateral sides. Intertidal and shallow subtidal levels, down to about 20 m. The most common cowry in tropical West Africa, locally forming fairly large populations. Regularly collected at low tide and in shallow water by coastal people, for food and for its shell.

Distribution: The tropical east Atlantic, from Mauritania to southern Angola, including the Cape Verde Islands and the Gulf of Guinea islands of São Tomé, Príncipe and Bioko.

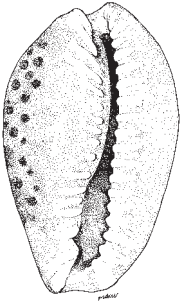


***Erosaria spurca* (Linnaeus, 1758)**

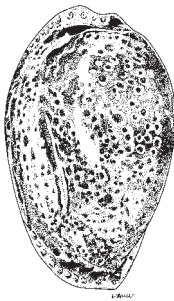
Frequent synonyms / misidentifications: *Cypraea atlantica* Monterosato, 1897; *C. spurca* Linnaeus, 1758; *C. verdensia* Melvill, 1888 / *Cypraea acicularis* Gmelin, 1791; *C. spurca sanctaehelenae* Schilder, 1930 [= *Erosaria acicularis* Gmelin, 1791].

En – Dirty cowry; **Fr** – Porcelaine impure; **Sp** – Porcellana impura.

Maximum shell length 4 cm, commonly from 2 to 3 cm. On rocky shores, often hiding under rock slabs or amongst seaweeds, and deeper on sandy to muddy bottoms. From low tide levels to shelf zone, to a depth of about 100 m. Most common at 10 to 40 m depths, where it is collected with bottom trawls or dredges. Seems relatively rare in Senegal and Gabon. East Atlantic, from southern Iberian Peninsula to Angola. Macaronesian islands (in the Azores, Madeira, the Selvagens and Canary Islands), the Cape Verde Archipelago and Gulf of Guinea islands, but not in St Helena and Ascension Island nor in the western Atlantic where it is replaced by the very similar *Erosaria acicularis*. Throughout the Mediterranean.



ventral view



dorsal view



lateral view

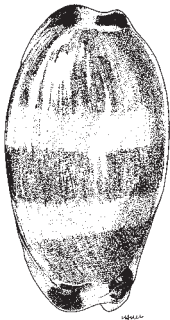


***Luria lurida* (Linnaeus, 1758)**

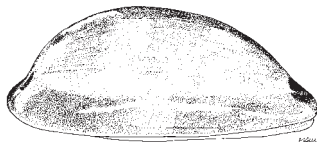
Frequent synonyms / misidentifications: *Cypraea lurida* Linnaeus, 1758; *C. minima* Dunker, 1853; *Talparia lurida* (Linnaeus, 1758) / None.

En – Lurid cowry; **Fr** – Porcelaine livide; **Sp** – Porcellana livida.

Maximum shell length 6.7 cm, commonly to 4.5 cm. On rocky areas, under stones and amongst seaweeds. Intertidal and sublittoral zones, to about 45 m depth. Actively collected for its elegant shell. East Atlantic, from Gibraltar area to northern Namibia. Macaronesian islands of the Azores, Madeira, the Canaries and Cape Verde Islands, islands of the Gulf of Guinea, and Ascension and St Helena islands. Throughout the Mediterranean.



dorsal view



lateral view



Zonaria pyrum (Gmelin, 1791)

Frequent synonyms / misidentifications: *Cypraea angelicae* Clover, 1974; *C. angolensis* Odhner, 1923; *C. maculata* Gmelin, 1791; *C. pyrum* Gmelin, 1791; *C. rufa* Lamarck, 1811 / *Zonaria picta* (Gray, 1824).

En – Pear cowry; **Fr** – Porcelaine poire; **Sp** – Porcellana pera.

Maximum shell length 5.2 cm, commonly from 3 to 4 cm. On sublittoral sandy to muddy bottoms, mainly at depths of 15 to 50 m but also occurring deeper, down to about 150 m. Collected for its shell that is frequently used in jewelry. East Atlantic, from Gibraltar area to Ghana, and from Gabon to northern Namibia. Macaronesian islands of Madeira and the Canaries.



ventral view

dorsal view

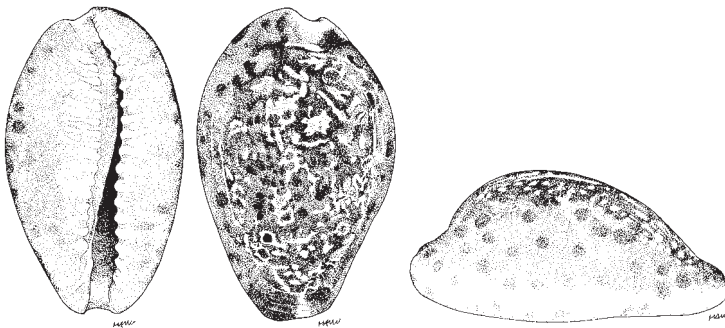


Zonaria zonaria (Gmelin, 1791)

Frequent synonyms / misidentifications: *Cypraea gambiensis* Shaw, 1909; *C. zonata* Lamarck, 1810; *Luponia zonaria* (Gmelin, 1791); *Cyprea zonaria* Gmelin, 1791 / *Cypraea nebulosa* Kiener, 1843 (not of Solander, 1786); *Zonaria picta* (Gray, 1824).

En – Zoned cowry; **Fr** – Porcelaine ceinture; **Sp** – Porcellana cintura.

Maximum shell length 4.3 cm, commonly from 2.5 to 3.5 cm. Under stones and in crevices of rocky areas and near mangroves. Littoral and sublittoral zones, mainly in low tide and shallow subtidal levels to 5 m depth, but also deeper on sand to about 50 m. Collected at low tide and in trawl nets. The tropical east Atlantic, from Western Sahara to southern Angola, and in São Tomé and Príncipe islands.



ventral view

dorsal view

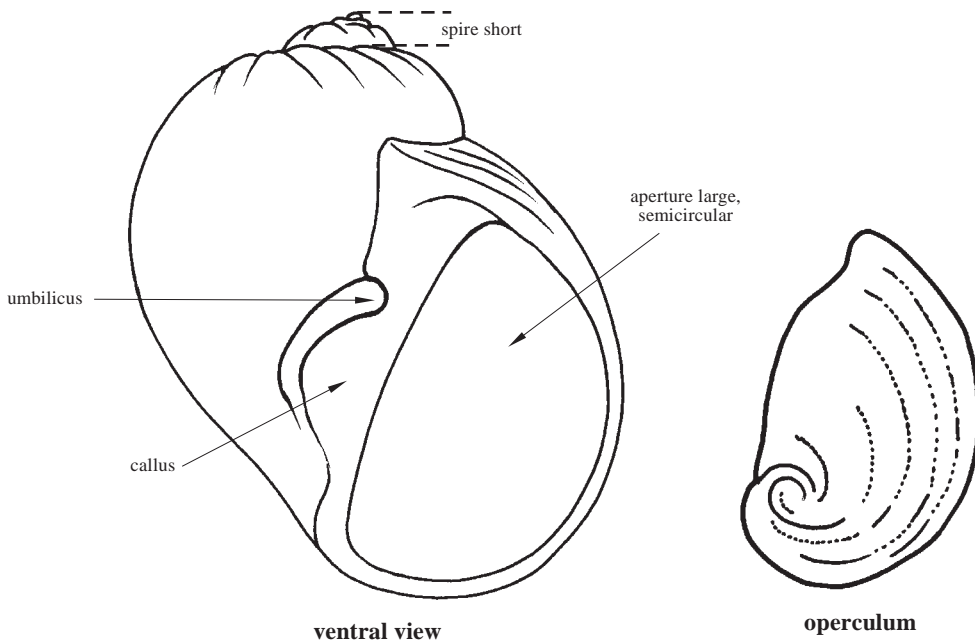
lateral view



NATICIDAE

Moon snails

D **Diagnostic characters:** Shell globular to ovate-conical, or subauricular in shape (genus *Sinum*). **O** **uter surface** generally **smooth** and glossy or with **reduced sculpture**. Spire low, obtuse to conical and few whorled, body whorl large and often inflated. **A** **perture large, semicircular**, with a thin outer lip and a more or less developed callus on the inner lip. Anterior **siphonal canal absent**. **U** **mbilicus open or closed, sometimes with an internal rib** (= funicle). **O** **perculum** entirely **corneous** or externally **calcified** and variously sculptured, with an eccentric nucleus and a few spiral turns. Head with rather small, widely spaced tentacles. Eyes reduced to absent, behind the tentacles. Foot highly developed, reflecting over the head and much of the shell when expanded.



Habitat, biology, and fisheries: Sand or mud dwelling animals, ploughing through the substrate with the expanded foot. Active predators, feeding mainly on burrowing bivalves or gastropods. Drill a circular hole with bevelled edges in the shell of their prey by means of an enzymatic secretion and the scraping action of the radula, before rasping the soft parts. Sexes separate, fertilization internal. Egg capsules generally embedded in a large collar-like ribbon that is hardened by grains of sand or mud. Eggs hatching as free-swimming, planktonic larvae or as crawling young. In the studied area, moon snails are commonly collected by hand or with nets, for food, for baiting and for decorative purposes.

Similar families occurring in the area

None. Shell characters and behaviour are highly distinctive.

Key to species of interest to fisheries occurring in the area

- 1a. Shell subauricular in shape, with numerous, fine but well visible spiral riblets; operculum corneous and reduced (Fig. 1) ***Sinum concavum***
- 1b. Shell globular in shape, devoid of fine spiral riblets; operculum calcareous → 2
- 2a. Inner lip callus broadly expanded, entirely covering the umbilicus (Fig. 2) ***Tectonatica tecta***
- 2b. Inner lip callus variably expanded, but not covering entirely the umbilicus → 3

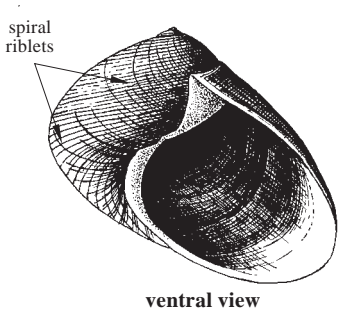


Fig. 1 *Sinum concavum*

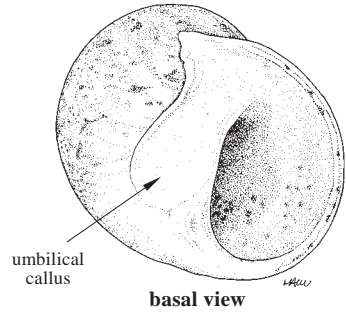


Fig. 2 *Tectonatica tecta*

- 3a. Spiral ridges of the operculum numerous and well developed, more or less covered along the outer margin by an elaborate sculpture of irregular transverse rods and beads; body whorl with a distinctive colour pattern of 2 pairs of alternatively white and dark brown narrow spiral bands on light background, each pair encircling a wider brownish area (Fig. 3) ***Natica turtoni***
- 3b. Spiral ridges of the operculum, when developed, without an elaborate roofing sculpture along the outer margin; body whorl colour differently patterned. → 4

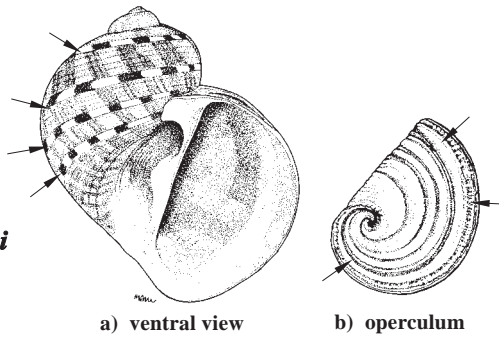


Fig. 3 *Natica turtoni*

- 4a. Umbilicus widely open, without a funicle (Fig. 4) ***Natica fulminea***
- 4b. Umbilicus widely to narrowly open, but always with a funicle → 5
- 5a. Funicle reduced to narrow spiral thread (Fig. 5) ***Natica vittata***
- 5b. Funicle well developed → 6

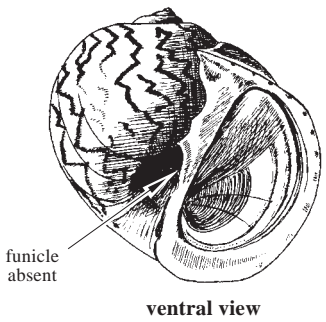


Fig. 4 *Natica fulminea*

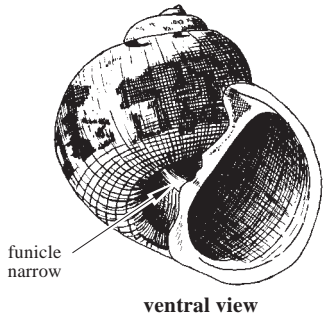


Fig. 5 *Natica vittata*

- 6a. Body whorl surface overlaid by many, fine, slightly undulating orange to brown axial lines, but for a broad whitish area encircling the umbilicus, and posteriorly connected to a series of thick and short brown streaks around the suture (Fig. 6) *Natica collaris*
- 6b. Body with a different colour pattern → 7

- 7a. Base of body whorl with a broad dark brown spiral band encircling the umbilicus (Fig. 7) *Natica adansoni*
- 7b. Base of body whorl whitish, plain or with reddish brown to black spots → 8

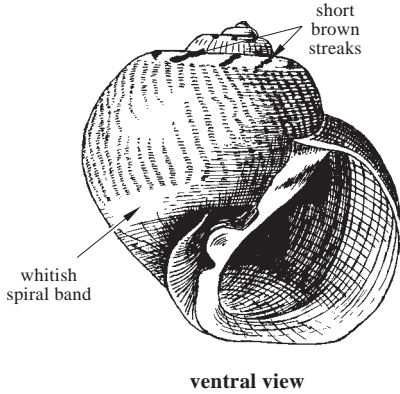


Fig. 6 *Natica collaris*

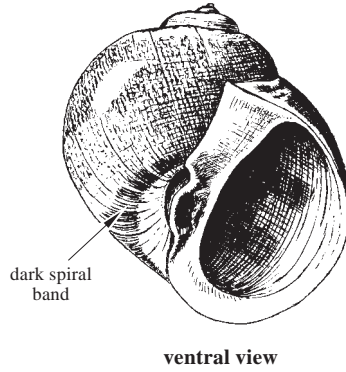


Fig. 7 *Natica adansoni*

- 8a. Operculum with 2 broad grooves separated by a narrow sharp ridge along the outer margin, and a median spiral thickening; umbilicus widely open, with a moderately developed funicle; body whorl colour variable, whitish with many reddish brown or black spots, some of which may coalesce into irregular, sometimes axially expanded blotches (Fig. 8) *Natica multipunctata*
- 8b. Operculum only with a shallow groove along the outer margin; umbilicus comma-shaped, largely occupied by a strongly developed funicle; body whorl colour variable, basically grey brown with a narrow light spiral band along the suture, a broad whitish zone on the base, and often with 3 or 4 spiral rows of darker spots (Fig. 9) *Natica marochiensis*

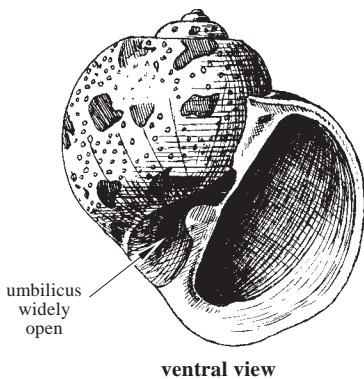


Fig. 8 *Natica multipunctata*

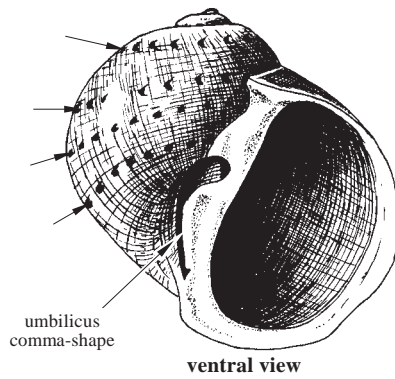












Fig. 9 *Natica marochiensis*

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

-  *Natica adansoni* de Blainville, 1825.
-  *Natica collaris* Link, 1807.
-  *Natica fulminea* (Gmelin, 1791).
-  *Natica marochiensis* (Gmelin, 1791).
-  *Natica multipunctata* de Blainville, 1825.
-  *Natica turtoni* E.A. Smith, 1890.
-  *Natica vittata* (Gmelin, 1791).
-  *Sinum concavum* (Lamarck, 1822).
-  *Tectonatica tecta* (Anton, 1838).

References

- Dixon, R.M. & Ryall, P.S.** 1985. Naticidae of West Africa. *La Conchiglia*, 17(200–201): 3–14.
- Dixon, R.M. & Ryall, P.S.** 1986. Naticidae of West Africa. Part II - End. *La Conchiglia*, 18 (202–203): 4–5, 8–10.
- Kabat, A.R.** 1991. The classification of the Naticidae (Mollusca: Gastropoda): Review and analysis of the supraspecific taxa. *Bulletin of the Museum of Comparative Zoology*, 152(7): 417–449.

Natica adansoni de Blainville, 1825

Frequent synonyms / misidentifications: *Natica variabilis* Reeve, 1855 / *Natica adansoni* Philippi, 1846 [= *N. michaelis* Fischer-Piette, 1942] *N. adansoni* Reeve, 1855 and *N. fanel* Récluz, 1844 [= *N. multipunctata*]; *N. prietoi* Hidalgo, 1873.

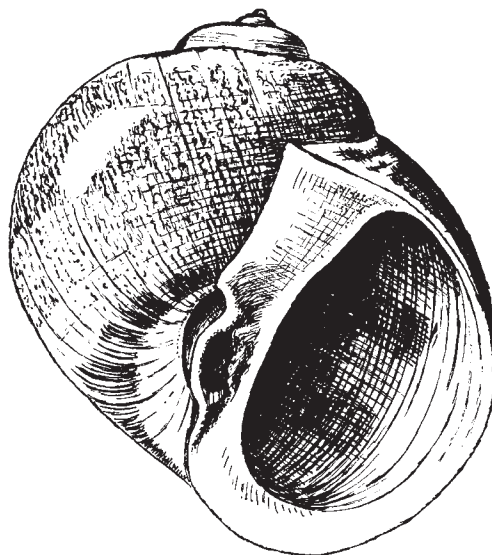
FAO names: **En** – Adanson's moon snail; **Fr** – Natice d'Adanson; **Sp** – Nática de Adanson.

Diagnostic characters: Shell solid, **ovate-conic** in shape and about as long as wide, **with** a moderately elevated spire, **convex whorls and well impressed suture**. Surface glossy, with many fine, oblique growth lines. **Umbilicus long and narrow, comma-shaped, largely filled by a thick funicle and well developed callus**. **Operculum calcareous, glossy, with about 3 marginal ridges** (1 to 4 in number) along outer edge, and with a slightly prominent and granular, crescent-shaped area toward nucleus; inner edge of operculum slightly serrated. **Colour: outside of shell creamy white, with a distinctive collar of brown marks just below the suture, and with an unclear, dense network of undulating light brown lines, grouped together in a wide spiral band covering most of the surface running around the central part of body whorl** (sometimes overlain by lilac hue). Base of body whorl with a **broad dark brown spiral band encircling the umbilicus**. **Funicle and inner lip callus stained dark brown** at funicle level and posterior to it. Interior whitish, often largely stained violet within. Outside of operculum glossy white, with a yellowish brown area toward nucleus.

Size: Maximum shell length 4.25 cm, commonly from 2.5 to 3.5 cm.

Habitat, biology, and fisheries: On clean and muddy sand bottoms. Intertidal to circalittoral zones, from low tide level to about 80 m depth. Fairly common to locally very common in shallow water. Collected at low tide, or with bottom trawls and nets. Used in stews and soups.

Distribution: Eastern Atlantic, from Morocco to southern Angola. Macaronesian Islands, in Madeira and the Canaries, and in the Cape Verde Archipelago.



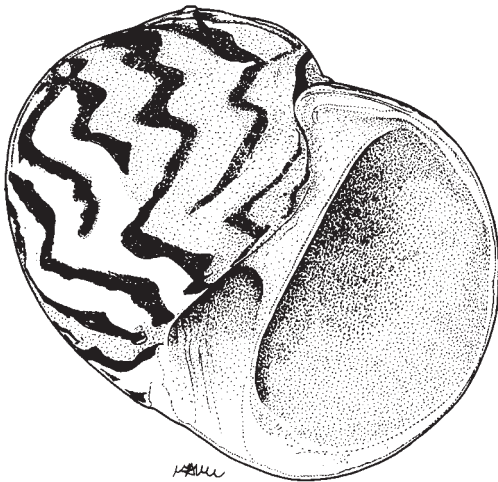
ventral view



Natica fulminea (Gmelin, 1791)

Frequent synonyms / misidentifications: *Natica arachnoidea* Lamarck, 1822 (not of Gmelin, 1791); *N. cruentata* Gmelin, 1791; *N. fulminans* [Incorrect spelling]; *N. punctata* (Chemnitz, 1781) [Invalid name]; ? *N. ziczac* (Röding, 1798) / *Naticarius cruentatus sensu* Poppe and Goto, 1991 [not of Gmelin, 1791] [= *Naticarius hebraeus* (Martyn, 1786)].

FAO names: **En** – Flamed moon snail; **Fr** – Natices flammée; **Sp** – Nática flamante.



ventral view



dorsal view

Diagnostic characters: Shell globose, about as long as wide, with a short spire, moderately convex whorls and very large body whorl which is slightly flattened around suture. Surface smoothish, covered by fine, easily peeled off, periostracum with tiny and closely set lines parallel to shell growth marks. Umbilicus widely open, without a funicle, sometimes slightly narrowed by callus. Inner lip callus prominent posteriorly, strongly narrowing from umbilicus level to base of columella. Operculum calcareous, with a single shallow groove defining a minutely granular area along outer edge, and with a slightly raised and rough, crescent-shaped area toward nucleus. **Colour:** outside of shell creamy white, with variable reddish brown colour pattern, typically composed of angular, zigzag axial lines throughout the outer surface (and occasionally overlapping to form a tented pattern); zigzag lines sometimes replaced by numerous tiny dots, locally fused into irregular blotches or wavy axial flames to form 2 or 3 interrupted spiral bands. Margin of aperture and inner lip callus white. Interior of shell whitish. Outside of operculum whitish, dirty yellowish brown on raised nucleus area.

Size: Maximum shell length 4.7 cm, commonly to 2.5 cm.

Habitat, biology, and fisheries: On fine sandy bottoms, often close to rocks. Low intertidal to sublittoral and upper shelf zones, to about 80 m depth. Mainly collected with bottom trawls and nets. Used in stews and soups.

Distribution: East Atlantic, from Mauritania to Angola in the Canary and Cape Verde islands.



***Natica marochiensis* (Gmelin, 1791)**

Frequent synonyms / misidentifications: *Natica maroccana* (Chemnitz, 1781) [Invalid name]; *N. maroccana* (Dillwyn, 1817) / *Natica marochiensis* Paes da Franca, 1960 [= *Notocochlis gualteriana* Récluz, 1844]; *Natica prietoi* Hidalgo, 1873.

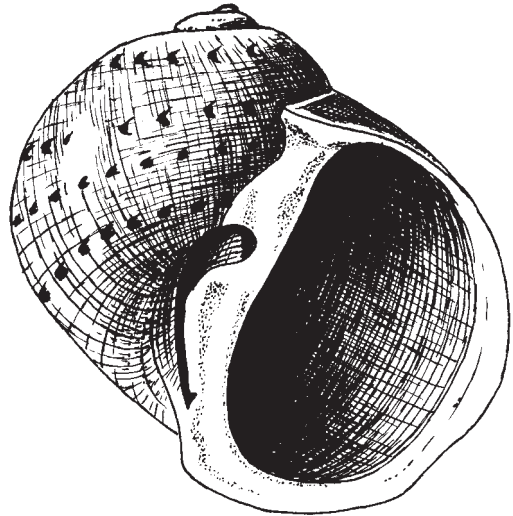
FAO names: **En** – Morocco moon snail; **Fr** – Natices du Maroc; **Sp** – Nática marroquí.

Diagnostic characters: Shell fairly solid, **ovate-conic** in shape and about as long as wide, **with a moderately elevated conical spire, convex whorls and well impressed suture.** Surface glossy, with many fine, somewhat oblique growth lines. **Umbilicus** long and rather narrow, **comma-shaped, largely occupied by a strongly developed funicle.** **Inner lip callus rather thin posteriorly,** connected by a short narrow bridge to the long, semicircular thicker portion covering the funicle. **Operculum** calcareous, slightly depressed, glossy and **smoothish** but for sand grains adhering on the nucleus area, and **with a single shallow groove along the outer margin;** inner edge of operculum not serrated. **Colour:** **outer colour** of shell **variable, basically grey brown with a narrow light spiral band along the suture, a broad whitish zone on the base, encircling the umbilicus, and often with 3 or 4 spiral rows of darker arched spots on body whorl.** Spiral spotted pattern sometimes indistinct. **Inner lip callus milky white.** **Aperture** more or less deeply **stained brown within,** but for a white spiral band ending at anterior end of shell. Outside of operculum whitish, often with pale grey radial marks of growth.

Size: Maximum shell length 4 cm, commonly to 2.5 cm.

Habitat, biology, and fisheries: On sandy-muddy bottoms, preying mainly on bivalves. Intertidal to shelf zones, down to about 100 m depth. Collected at low tide, or sublittorally with bottom trawls and dredges. Eaten in stews and soups.

Distribution: East Atlantic, from Morocco to Angola. Western Mediterranean. Also widely distributed in the western central Atlantic, from Florida to Texas and Campeche State (Mexico), through the Gulf of Mexico and the Caribbean, to southern Brazil.



ventral view

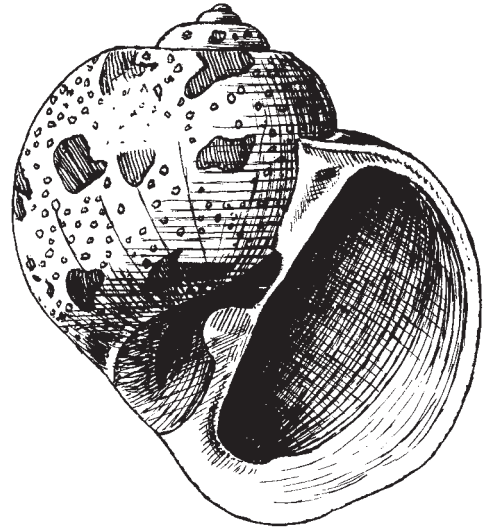


Natica multipunctata de Blainville, 1825

Frequent synonyms / misidentifications: *Natica adansoni* Reeve, 1855 [not of de Blainville, 1825]; *N. fanel* Récluz, 1844 [not of Röding, 1798]; *N. rocquignyi* Fischer-Piette, 1942; *N. variolaria* Récluz, 1844; *Naticarius multipunctatus* (de Blainville, 1825) / *Natica fanel* (Röding, 1798) [= *Naticarius hebraeus* (Martyn, 1784)]; *Notocochlis tigrina* (Röding, 1798).

FAO names: **En** – Fanel moon snail; **Fr** – Natice fanel; **Sp** – Nática fanel.

Diagnostic characters: Shell thick, **globose**, about as long as wide, **with a moderately short spire**, rounded whorls and well marked suture. **Body whorl very large**, quite smooth apart from the numerous, slightly oblique growth lines, **distinctly flattened around suture**. **Umbilicus very large, widely open and deep, with a well developed central funicle**. Inner lip **callus thick, well developed posteriorly, linked by a long, narrow bridge** to the anteriorly sloping **funicle callus**. **Operculum calcareous, with 2 broad grooves separated by a narrow sharp ridge** along the outer margin, **and a median, rough spiral thickening**; outer margin groove wider, forming a minutely granular depressed area along outer edge of operculum; inner margin of operculum serrated to nearly smooth. **Colour:** **outside of shell creamy white to pale blue grey, covered with many reddish brown or blackish spots** of variable shape and size, **some of which often fused into irregular** or axially expanded **blotches**, which may be roughly placed in 1, 2 or 3 spiral bands. **Umbilicus and funicle stained orange brown**. Margin of the aperture and **inner lip callus glossy white**. Interior of shell white with a mauve hue. Outside of operculum whitish, dull yellow on median spiral ridge.



ventral view

Size: Maximum shell length 4.5 cm, commonly from 2 to 3 cm.

Habitat, biology, and fisheries: On sand and mud or sand and gravel bottoms. Low tide levels and sublittorally, to about 50 m depth. Used in stews and soups.

Distribution: East Atlantic, from Morocco to Angola and in Canary Islands.

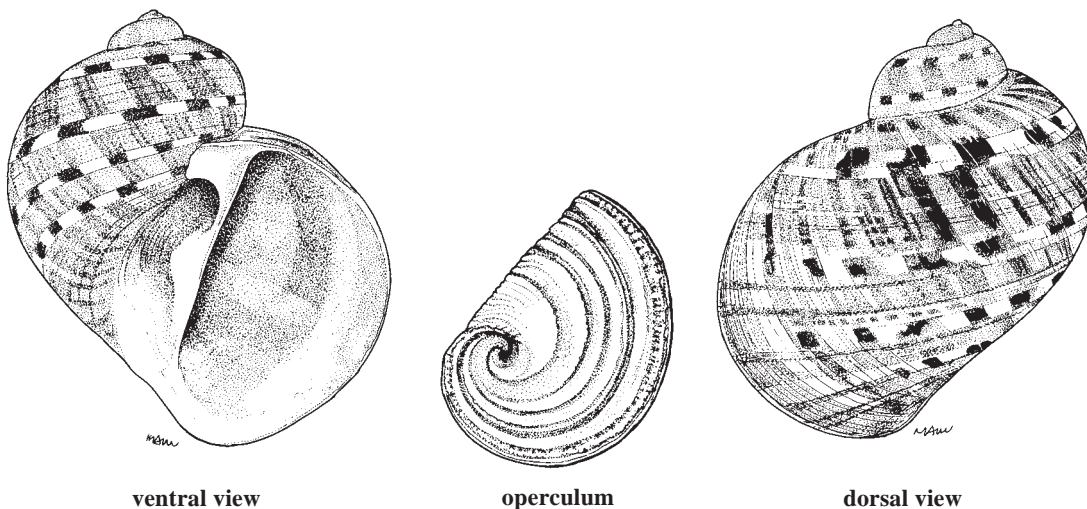
Remarks: In the 1981 edition of this Guide, Abbott erroneously used the name *Natica tigrina* (Röding, 1798) for the West African species, but *N. tigrina* is a different species, living in the Indo-West Pacific. The taxonomy of the West African species has been long confused, and it generally appears under incorrect names, even in the recent literature.



Natica turtoni E.A. Smith, 1890

Frequent synonyms / misidentifications: *Glypheapithema turtoni* (E.A. Smith, 1890); *Naticarius turtoni* (E.A. Smith, 1890). / None.

FAO names: **En** – Turton's moon snail; **Fr** – Natices de Turton; **Sp** – Nática de Turton.



ventral view

operculum

dorsal view

Diagnostic characters: Shell rather thin and light, **roughly globular** in shape and **distinctly longer than wide**, with a relatively tall spire, **strongly convex whorls and deeply impressed suture**. Outer surface glossy and smooth, apart from fine growth marks which tend to be stronger at the sutures of early whorls. **Umbilicus very large**, deep and widely open, **with a thick and elongate funicle** in its anterior two-thirds which forms a callus at columellar margin. Callus of the inner lip protruding at posterior end of the aperture, not confluent with the central callus of umbilicus. Periostracum thin, easily peeled off, strongly wrinkled axially below the suture and with many tenuous raised lines enhancing the axial growth marks. **Operculum calcareous, with numerous** and well developed **spiral ridges**, which are **more or less covered**, at least **along the outer margin** by an elaborate sculpture of **irregular transverse rods and beads**; inner margin of operculum strongly serrated. **Colour:** **outside of shell creamy white**, often flushed with greyish on early spire whorls, with a distinctive pattern of **2 pairs of alternatively white and dark brown narrow spiral bands on body whorl**, each pair encircling a wider brownish area; anterior brownish spiral area narrower than the posterior one. A third brown band encircling the umbilicus on base of body whorl. **Inner lip callus and umbilicus white**. Periostracum yellowish brown, translucent. Aperture brownish mauve within, often with the spiral series of brown spots of the outer surface showing through. Outside of operculum white.

Size: Maximum shell length 6 cm, commonly from 3 to 4 cm.

Habitat, biology, and fisheries: In sand. Sublittoral and circalittoral zones, from low tide levels to about 60 m depth. Collected at low tide, and with bottom trawls and nets. Used in stews and soups.

Distribution: Eastern Atlantic, from Mauritania to Angola, in the Canaries, Cape Verde and St Helena islands.

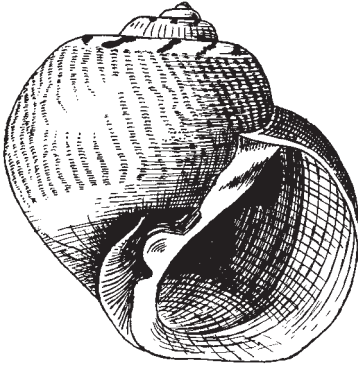


***Natica collaris* Link, 1807**

Frequent synonyms / misidentifications: *Natica collaria* Lamarck, 1822 / None.

En – Collar moon snail; **Fr** – Natices à collet; **Sp** – Nática engolada.

Maximum shell length 3.3 cm, commonly to 2 cm. On sandy bottoms. Sublittoral and circalittoral zones, from about 5 to 80 m depths. Collected with bottom trawls and nets. Used in stews and soups. East Atlantic, from Mauritania to Congo and northern Angola.



lateral view

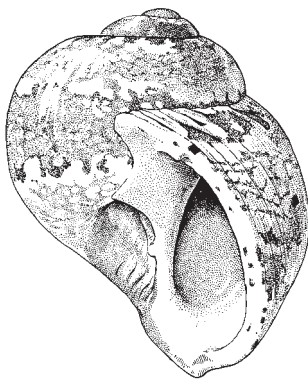


***Natica vittata* (Gmelin, 1791)**

Frequent synonyms / misidentifications: *Natica flammea* (Röding, 1798); *N. intricatoides* Hidalgo, 1873; *N. textilis* Reeve, 1855; *Naticarius vittatus* (Gmelin, 1791) / *Natica vittata*, Morán et al., 1989 [not of Gmelin, 1791] [= *Natica oteroi* (Fernandes and Rolán, 1991)].

En – Ribbioned moon snail; **Fr** – Natices laciniée; **Sp** – Nática listada.

Maximum shell length 2.5 cm, commonly to 1.5 cm. On muddy-sandy bottoms, often around rocks. Intertidal and sublittoral zones to about 20 m depth. Common at low tide and shallow sublittoral levels. Locally collected as food with bottom trawls and dredges, at least in Morocco. Used in stews and soups. Western Mediterranean and East Atlantic, from the Alboran Sea to Namibia, Macaronesian islands (in Madeira and the Canaries), but not in the Cape Verde Archipelago. Also present more in the south, in South Africa (ssp. *textilis* Reeve, 1855).



lateral view

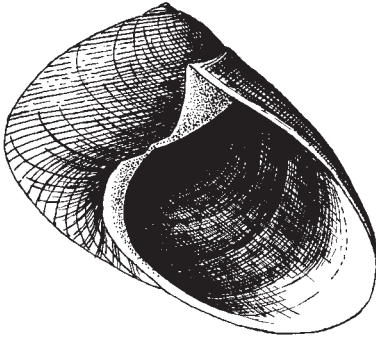


Sinum concavum (Lamarck, 1822)

Frequent synonyms / misidentifications: *Sigaretus concavus* Lamarck, 1822 / None.

En – Concave baby's ear; **Fr** – Natice concave; **Sp** – Sigarita concava.

Maximum shell length 5.8 cm, commonly to 3.5 cm. In sandy bottoms. Mainly occurring offshore, from 15 to 50 m depths. Collected with trawls for its large fleshy body. Consumed in stews and soups. Eastern Atlantic, from Senegal to Angola.



ventral view

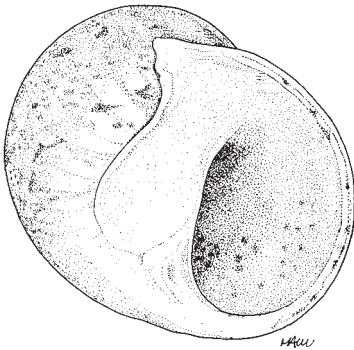


Tectonica tecta (Anton, 1838)

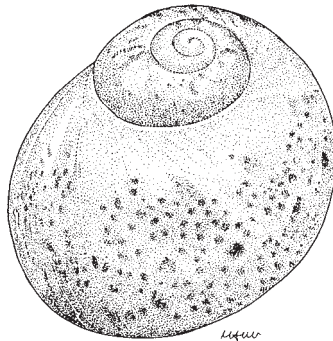
Frequent synonyms / misidentifications: *Natica genuana* Reeve, 1855; *N. imperforata* Gray, 1839 [not of Jay, 1836]; *N. tecta* Anton, 1838 / None.

En – Occluded moon snail; **Fr** – Natice occluse; **Sp** – Nática imperforada.

Maximum shell length 4.1 cm, commonly to 2.5 cm. In various environments of sand or mud bottoms, such as sandy-mud estuarine areas, or marine clean sand substrates of the open coast. Intertidal to shelf zones, down to a depth of about 100 m; most common from intertidal levels in areas protected from direct wave action to 20 m depth. Spawn consisting in a series of flattened leaflets of mucus embedding the eggs, consolidated with sand and attached basally to hard surfaces. Collected for food and for baiting where common. East Atlantic, from Namibia to South Africa; also occurring along the southwestern African coasts of the Indian Ocean, to Eastern Cape.



basal view



apical view



BURSIDAE

Frog shells

Diagnostic characters: Shell ovate to somewhat elongate, often slightly dorsoventrally compressed. Sculpture coarsely nodose to finely gemmate, with 2 strong axial varices per whorl. Varices frequently aligned up sides of spire. Periostracum obsolete to absent, not hirsute. Aperture with a short anterior siphonal canal and a distinct, slot-like posterior canal. Outer lip usually thick and denticulate within, inner lip more or less calloused, with transverse ridges or granules (rarely smooth). Operculum corneous, its nucleus at the midinner margin or at the anterior end. Head with an extensible, distally flattened snout, and slender filiform tentacles bearing eyes at their outer bases. Foot rather short and thick. Mantle with a short respiratory siphon anteriorly and a very short, permanent anal siphon posteriorly.

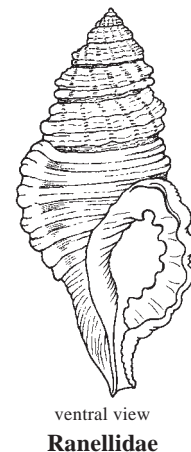
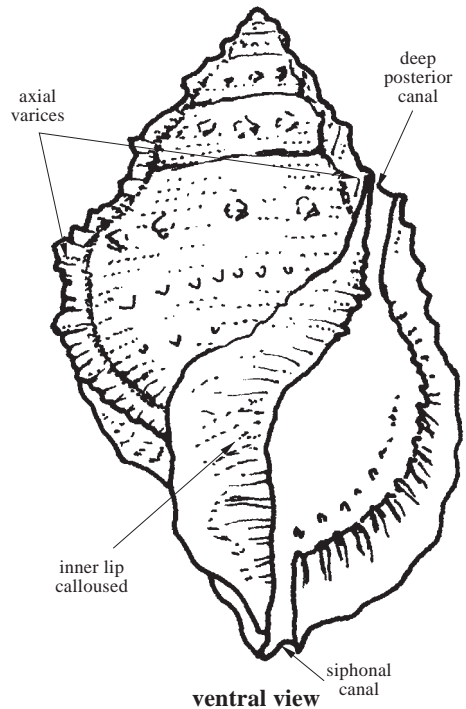
Habitat, biology, and fisheries: Active predators, living on tropical, shallow water coral reefs and rocks, to deeper on the continental shelf, on sand and mud bottoms. Mainly feeding on polychaete worms, which are anaesthetized with acidic saliva, removed from their tubes and swallowed whole. Sexes separate, fertilization internal. Eggs laid in a gelatinous matrix, sometimes brooded by the female with its foot, often hatching as long-lived (more than 1 year in some *Bursa* species), free-swimming planktonic larvae, enabling a very wide geographic range. Locally collected for food and shell trade, either at low tide or with trawl nets, depending on species.

Similar families occurring in the area

Ranellidae (= Cymatiidae): periostracum often conspicuous, fibrous to hairy. Aperture without a posterior canal.

References

- Beu, A.G. 1985. A classification and catalogue of living world Ranellidae (= Cymatiidae) and Bursidae. *Conchologists of America Bulletin*, 13(4): 55–66.
- Beu, A.G. 1987. Taxonomy of gastropods of the families Ranellidae (= Cymatiidae) and Bursidae. Part 2. Descriptions of 14 new modern Indo-West Pacific species and subspecies, with revisions of related taxa. *New Zealand Journal of Zoology*, 13(2): 273–355.
- Cossignani, F. 1994. *Bursidae of the world*. Ancona, l'Informatore Piceno, 119 p.



Ranellidae

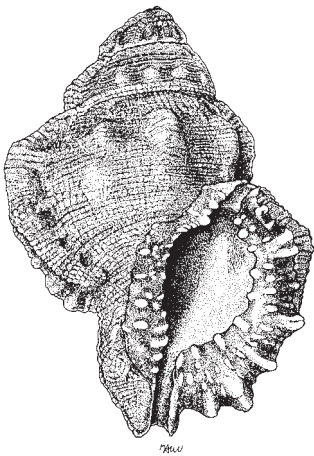
A single species of interest to fisheries occurring in the area.

***Bursa corrugata pustulosa* (Reeve, 1844)**

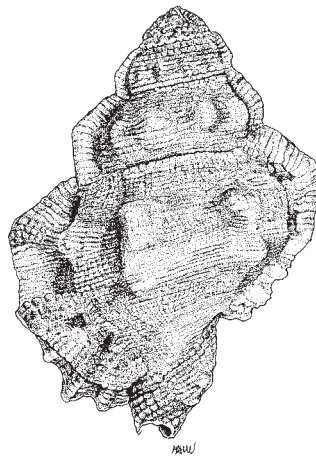
Frequent synonyms / misidentifications: *Bursa caelata* (Broderip, 1833); *B. corrugata* (Perry, 1811); *B. ponderosa* (Reeve, 1844); *B. pustulosa* (Reeve, 1844); *B. semigranosa* (Lamarck, 1822); *Colubrellina corrugata* (Perry, 1811) / None.

En – Pustular frog shell; **Fr** – Ranelle jabik; **Sp** – Bursa jabik.

Maximum shell length 7.6 cm, commonly to 5 cm. Under stones, in rocky areas and in coarse sand. Mainly in shallow subtidal water, from about 1 to 10 m deep. Common in Dakar area (Senegal), where it is occasionally collected by coastal people with other molluscs. Very wide and discontinuous occurrence in tropical areas. East Atlantic [ssp. *pustulosa* (Reeve, 1844)], from Senegal to Angola, and in the Canaries, Cape Verde Archipelago, and Principe, St Helena and Ascension islands. West Atlantic [ssp. *ponderosa* (Reeve, 1844)], from southern Florida and Bermuda through the Caribbean to Brazil. East Pacific [ssp. *corrugata* (Perry, 1811)], from Baja California to Peru.



ventral view



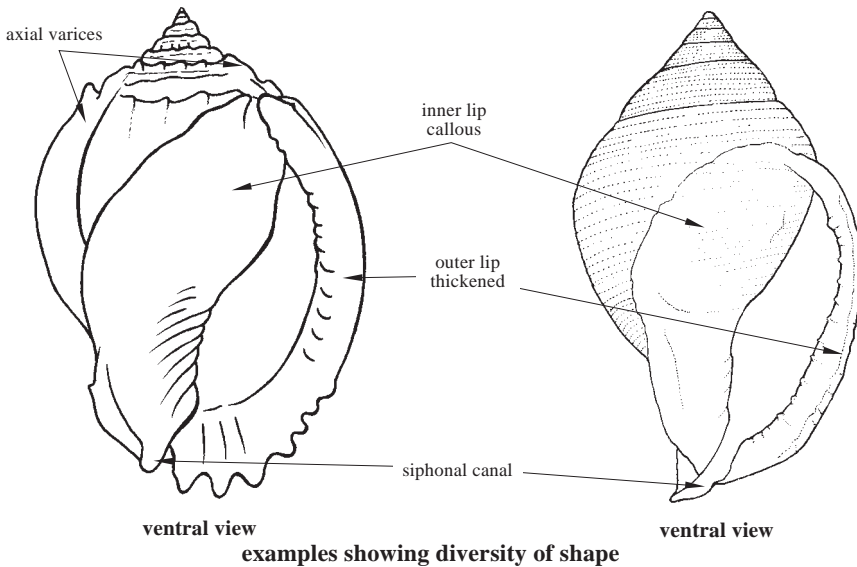
dorsal view



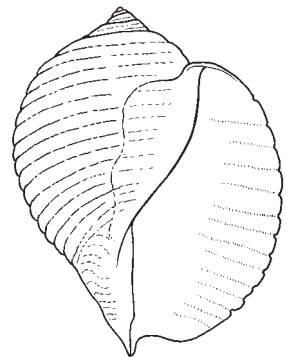
CASSIDAE

Helmet and bonnet shells

Diagnostic characters: Shell medium-sized to very large, **often thick and solid**, elongate-ovate to cylindrical or globose in shape, **with large body whorl and rather small, conical spire**. **Sculpture variable**, ranging from nearly smooth to ridged or nodulose, often with both axial and spiral elements; **axial varices sometimes present**. Periostracum very weak to absent. **Aperture elongate, with a short siphonal canal** more or less strongly **recurved dorsally**. **Outer lip thickened**, often denticulate within; previous outer lips sometimes retained on earlier whorls as axial ridges. **Inner lip with a well developed, usually shield-like callus** which may be confined to the columellar area or form a flange along left side of body whorl. **Operculum quite small and thin, corneous** (sometimes absent in the adult), narrowly oval with nucleus near the anterior end, or fan-shaped with nucleus half way down the inner margin. Head large, with a rather narrow and short extensible snout and filiform tentacles with the eyes at their outer bases. Foot large, more or less rounded anteriorly and posteriorly, with a thick epidermis.



Habitat, biology, and fisheries: Sand dwelling, slow moving carnivorous animals, ranging from intertidal levels to considerable depths. Feed almost exclusively on echinoderms, sea urchins or starfish, mainly at night and often while both predator and prey are buried in the sand. Cassids first squirt neurotoxic saliva over their prey to paralyse the spines, protected by the thick skin of their foot. Then, the snout of predator is pushed through the unprotected anus, or through a hole rasped by radula in the test of the victim which may also be crushed under the weight of its predator. Sexes separate, fertilization internal; shell of the female frequently larger than that of the male. Eggs laid in large masses of numerous, small horny capsules, forming irregular or cylindrical and tower-like structures. Each capsule contains several hundred eggs, most of which often serve to feed the developing embryos. Hatch as planktonic larvae, or crawling young, depending upon species. Cassids are collected for food and their large decorative shells are popular in the shell trade.



ventral view
Tonnidae

Similar families occurring in the area

Tonnidae: shell relatively thin, devoid of axial varices and operculum. Columellar callus not developed in a thick extensive shield.

Key to species of interest to fisheries occurring in the area

- 1a. Maximum width markedly posterior to midlength of shell (Fig. 1a) → 2
- 1b. Maximum width at about midlength of shell (Fig. 1b) → 3

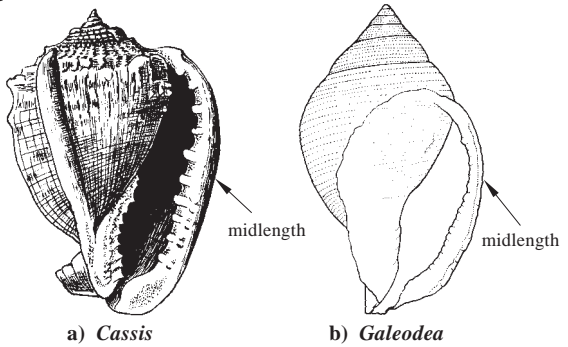


Fig. 1 ventral view

- 2a. Axial varices prominent, every 240° of spire; outer lip sharply recurved dorsally, with a few indistinct, pale fawn and widely spaced blotches on the outer edge; inner lip teeth rather strong, short, distantly spaced and few (about 10 to 15 in number) (Fig. 2) ***Cassis tessellata***

- 2b. Axial varices absent; outer lip roundly recurved dorsally, with a dozen or more distinct, dark brown spots arranged in pairs on the outer edge; inner lip teeth rather fine, elongated, close set and numerous (at least 25 in number) (Fig. 3) ***Cypraeacassis testiculus***

- 3a. Spiral ribs rather prominent and rounded on top, a little narrower than intervening grooves; siphonal canal slightly recurved, somewhat produced anteriorward (Fig. 4a); operculum irregularly elongate oval, with nucleus near anterior end of the outer margin (Fig. 4b) . ***Galeodea rugosa***

- 3b. Spiral ribs rather low (sometimes obsolete) and flattened on top, distinctly larger than intervening grooves; siphonal canal strongly twisted, not produced anteriorward but recurved onto dorsal side of shell; operculum fan-shaped, with nucleus half way down the inner margin (Fig. 5a) → 4

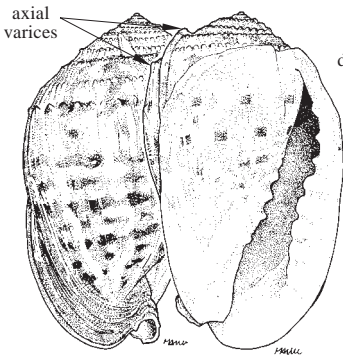


Fig. 2 *Cassis tessellata*

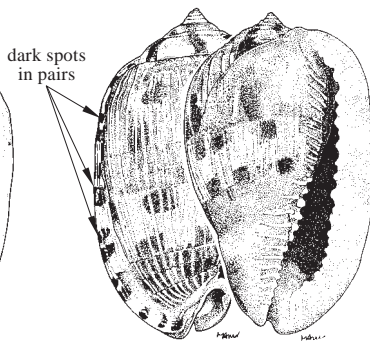
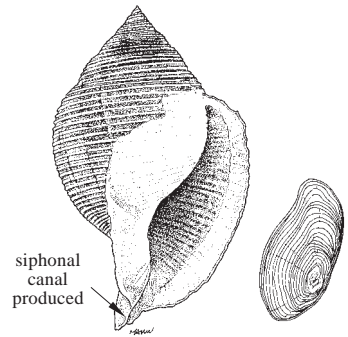


Fig. 3 *Cypraeacassis testiculus*



**a) ventral view b) operculum
Fig. 4 *Galeodea rugosa***

- 4a. Less than 20 spiral ribs on last whorl (Fig. 5b) ***Semicassis undulata***

- 4b. More than 30 spiral ribs on last whorl (Fig. 6) . . ***Semicassis saburon***

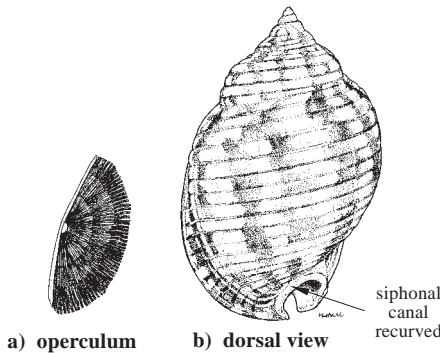


Fig. 5 *Semicassis undulata*

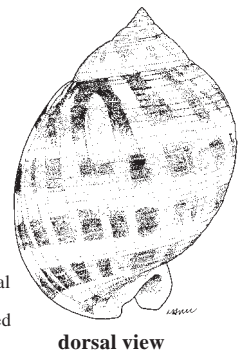



Fig. 6 *Semicassis saburon*

List of species of interest to fisheries occurring in the area


The symbol  is given when species accounts are included.

 *Cassis tessellata* (Gmelin, 1791).

 *Cypraecassis testiculus* (Linnaeus, 1758).

 *Galeodea rugosa* (Linnaeus, 1771).

 *Semicassis saburon* (Bruguière, 1792).

 *Semicassis undulata* (Gmelin, 1791).

References

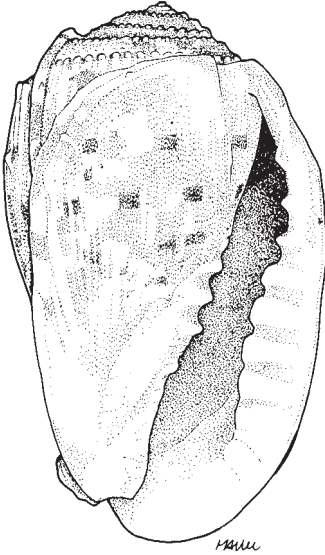
Abbott, R.T. 1968. The Helmet Shells of the World (Cassidae). Part 1. *Indo-Pacific Mollusca*, 2(9): 1–201.

Kreipl, K. 1997. *Recent Cassidae*. Wiesbaden, Hemmen, 151 p., 24 pls.

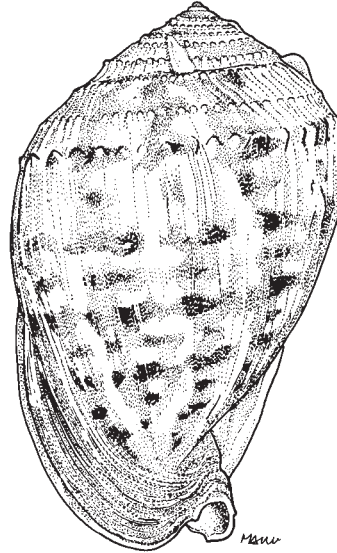
Cassis tessellata (Gmelin, 1791)

Frequent synonyms / misidentifications: *Cassis rumpfii* (Gmelin, 1791); *C. spinosa* (Gronovius, 1781) [Invalid name] / None.

FAO names: **En** – Tessellate helmet; **Fr** – Casque à damier; **Sp** – Casco teselado.



ventral view



dorsal view

Diagnostic characters: Shell reaching a **very large size** (up to about 32 cm long), solid but relatively thin, **globose and somewhat elongate** in shape, with a short pointed spire. **Maximum width markedly posterior to midlength of shell. Spire whorls** with about 3 fine, coarsely beaded spiral threads crossed by numerous small axial ridges, and with **prominent axial varices every 240° of spire. Two or 3 spiral rows of fine knobs on posterior half of body whorl** in addition to the beaded threads (1 row on the slightly angulated shoulder, and the others more anteriorly). Aperture long and rather narrow, slightly wider anteriorly. **Outer lip** broad, sharply recurved dorsally, **with a series of strong teeth** along the inner edge **and often with a second row of sharp nodules. Inner lip with a rather thin callous shield, forming anteriorly an expanded blade over umbilicus** and siphonal canal, **and bounded by a large former axial varix** along left side of body whorl. **Inner lip teeth rather strong, short, distantly spaced and relatively few** (about 10 to 15 in number). **Colour:** **outside of shell creamy tan, with narrow spiral bands of small, squared to crescent-shaped, light brown spots** on a paler ground. Calloused ventral side glossy, with the spotted colour pattern of body whorl showing through. **Outer lip whitish and glossy, with a few indistinct, pale fawn and widely spaced blotches on the outer edge. Interior of aperture flushed with darker brown.**

Size: Maximum shell length 31.2 cm, commonly from 9 to 16 cm.

Habitat, biology, and fisheries: On sandy bottoms, just below low tide levels and offshore to about 50 m deep. Collected for decorative and food purposes. Used in meat dishes.

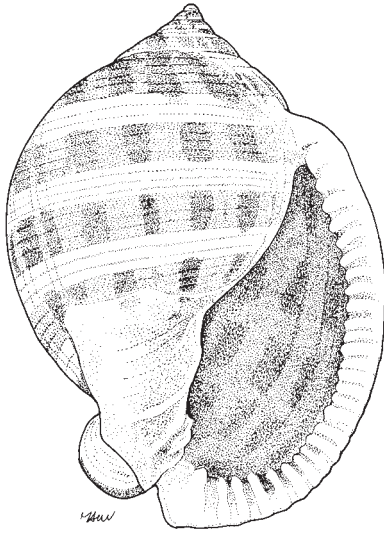
Distribution: The tropical East Atlantic, from Senegal to Angola and in the Gulf of Guinea islands.



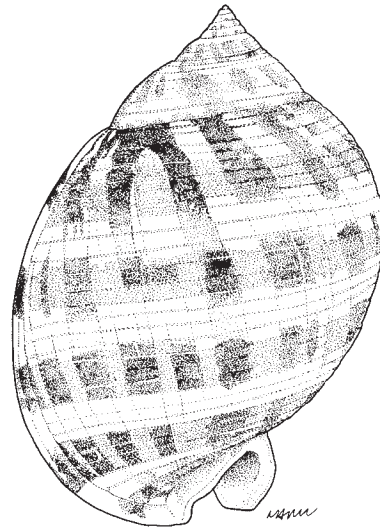
Semicassis saburon (Bruguière, 1792)

Frequent synonyms / misidentifications: *Cassis saburon* (Bruguière, 1792); *C. saburoni* [Incorrect spelling]; *Phalium saburon* (Bruguière, 1792) / None.

FAO names: **En** – Saburon bonnet; **Fr** – Casque saburon; **Sp** – Casco redondo.



ventral view



dorsal view

Diagnostic characters: Shell medium-sized (nearly reaching 10 cm long), rather solid but not heavy, **globular** in shape, with a **relatively low**, pointed **spire** and a large, strongly inflated body whorl. **Maximum width at about midlength** of shell. **Axial varices absent**. Spire whorls slightly convex, with distinct but low, small spiral ribs. **Body whorl with more than 30 spiral ribs**, which are **low, flattened and distinctly larger than intervening grooves, sometimes obsolete** on most of the whorl surface. Aperture rather wide and elongated, narrowing posteriorly; **siphonal canal strongly twisted**, not produced anteriorward but **recurved onto dorsal side of shell**. **Outer lip thickened** exteriorly and interiorly, **toothed** along its inner edge. **Inner lip with a moderately developed** and thin **callous shield**, closely adhering to body whorl posteriorly, thicker and somewhat expanded anteriorly over umbilicus. Columellar callus **mostly smooth, except for a few short, irregular spiral ridges** which are sometimes split into granulations **on the anterior area**. **Operculum** rather thin, **fan-shaped, with** nucleus half way down the inner margin, and with **feeble wide radial rays**. **Colour:** **outside** of shell **cream** to light greyish brown, with **spiral rows of squared darker yellowish brown spots** (about 1 on spire whorls and 4 or 5 on body whorl), which are also more or less arranged in an axial pattern. **Outer lip and callus shield glossy white**, with body whorl colour pattern showing through. Interior of aperture flushed with orange brown.

Size: Maximum shell length 9.8 cm, commonly to 5 cm.

Habitat, biology, and fisheries: On various offshore sandy-muddy bottoms. Continental shelf and upper slope, from about 20 to 380 m depths. An edible species, sometimes collected in numbers with bottom trawls or nets. Sold in Moroccan local markets.

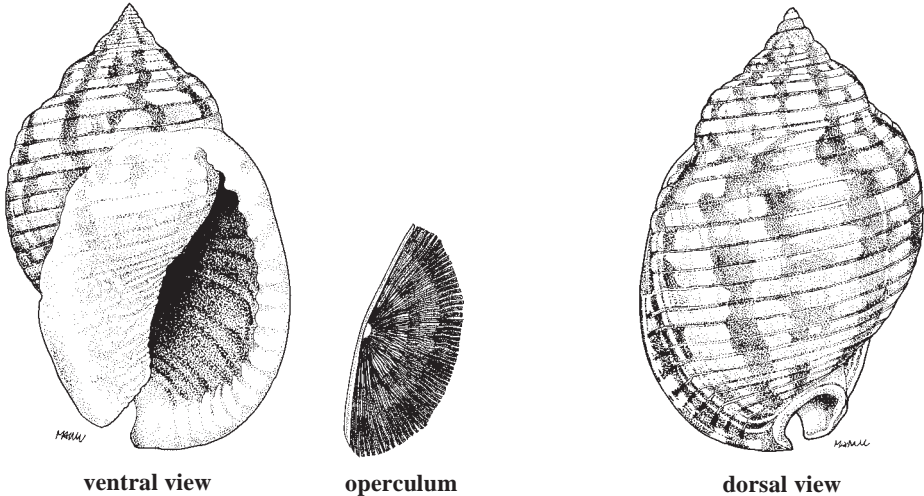
Distribution: Eastern Atlantic, from the Bay of Biscay (France) to Angola, in the Azores, Madeira and Canary islands. Throughout the Mediterranean.



***Semicassis undulata* (Gmelin, 1791)**

Frequent synonyms / misidentifications: *Cassis undulata* (Gmelin, 1791); *Phalium undulatum* (Gmelin, 1791) / *Semicassis granulata* (Born, 1778).

FAO names: **En** – Grooved bonnet; **Fr** – Casque cannelé; **Sp** – Casco acanalado.



Diagnostic characters: Shell medium-sized to rather large (nearly reaching 13.5 cm long), **globose ovate** in shape, sturdy, **with a relatively tall**, pointed **spire** and a large, inflated body whorl. **Maximum width at about midlength** of shell. **Axial varices absent**. Spire whorls slightly convex, with 4 to 7 distinct small spiral ribs crossed by many fine and raised axial lines. **Body whorl with less than 20 spiral ribs**, which are rather low but **well marked, flattened on top and distinctly larger than intervening grooves**; 1 or 2 spiral ribs sometimes provided with small rounded knobs on shoulder area. Aperture rather wide and elongated, narrowing posteriorly; **siphonal canal strongly twisted**, not produced anteriorward but **recurved onto dorsal side of shell**. **Outer lip thick, toothed** along its inner edge and exteriorly thickened in a protruding ridge. **Inner lip with a well developed callous shield**, closely adhering to body whorl posteriorly and forming an expanded blade over umbilicus anteriorly. Inner side of callus **with a series of spiral ridges**, broken up into **more or less contiguous, tortuous granules on columellar area**; granules not developed up to the outer margin of callus where a smooth area occurs all around the callus. **Operculum** rather thick, **fan-shaped**, with nucleus half way down the inner margin, and **with many** closely set and **strong radial ridges**. **Colour:** **outside** of shell **cream** to light buff, **with** a pattern of more or less axially arranged **darker brown spots**, often somewhat fused into irregular axial blotches, **and with fine brown lines in spiral grooves** of body whorl. **Outer lip and callus shield glossy white**. Interior of aperture generally tinged light to deep fawn.

Size: Maximum shell length 13.4 cm, commonly from 6 to 8 cm.

Habitat, biology, and fisheries: Common on sandy to muddy bottoms of sublittoral to shelf zones, from about 8 to 110 m depths. Collected with dredges, trawls and bottom nets. Appears in local Moroccan markets. Used fresh. Also commercially fished in the Mediterranean.

Distribution: East Atlantic, from Spain and Portugal to Senegal, in Macaronesian islands (the Azores, Madeira and Canary islands) and the Cape Verde Archipelago. Throughout the Mediterranean.

Remarks: *Semicassis undulata* is very similar to the Atlantic Scotch bonnet, *Semicassis granulata* of which it was long considered a subspecies. However, their partly overlapping distributions without intermediate forms warrant their species status.

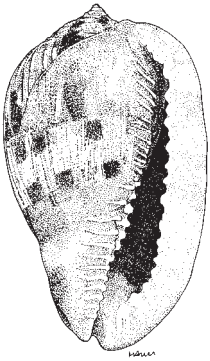


***Cypræacassis testiculus* (Linnaeus, 1758)**

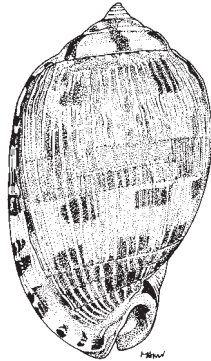
Frequent synonyms / misidentifications: *Cassis crumena* (Bruguière, 1792); *C. senegalica* (Gmelin, 1791); *C. testiculus* (Linnaeus, 1758); *Cypræacassis senegalica* (Gmelin, 1791) / None.

En – Senegalese cowry-helmet; **Fr** – Casque fasin; **Sp** – Casco fasin.

Maximum shell length 10 cm, commonly to 6.5 cm. Partially buried in sand, often near rocky areas. Low intertidal levels and sublittoral zone to about 50 m depth. Locally collected for food and shell trade. Tropical East Atlantic, from Senegal to Angola, in Macaronesian islands (the Azores and Canary Islands), the Cape Verde Archipelago and Gulf of Guinea islands. Also occurring in the tropical West Atlantic, from North Carolina, Florida and Texas (USA), through the Gulf of Mexico and the Caribbean to Brazil.



ventral view



dorsal view

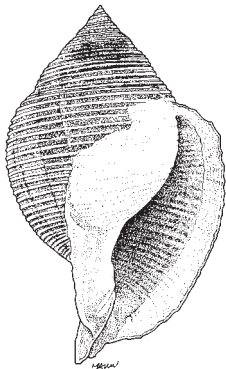


***Galeodea rugosa* (Linnaeus, 1771)**

Frequent synonyms / misidentifications: *Cassidaria rugosa* (Linnaeus, 1771); *C. tyrrhena* (Chemnitz, 1786) [Invalid name]; *C. tyrrhena* (Gmelin, 1791); *Morio rugosa* (Linnaeus, 1771) / None.

En – Rugose bonnet; **Fr** – Casque tyrrhénien; **Sp** – Casco tirreno.

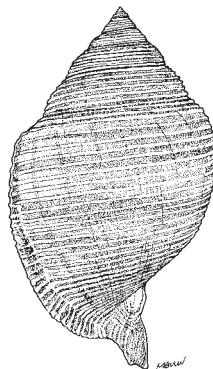
Maximum shell length 15 cm, commonly to 10 cm. On muddy sand and detritic bottoms, probably preying on echinoderms and other molluscs. Sublittoral to continental shelf and slope, down to over 700 m depths. Occasionally collected by shrimp trawlers. Also locally exploited in the northwestern Mediterranean (Spain, France). East Atlantic, from the southern British Isles to Morocco. Western Mediterranean.



ventral view



operculum



dorsal view



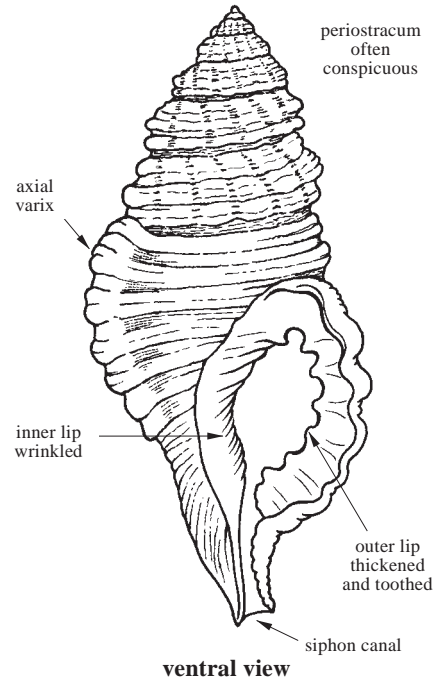
RANELLIDAE

(= CYMATIIDAE)

Triton shells

Diagnostic characters: Shell ovate to fusiform, thick and solid, with a raised spire and strong sculpture composed of nodules, spiral ribs and axial varices. Periostracum frequently well developed and fibrous to hairy. Aperture with a short to long siphonal canal anteriorly. Outer lip prominently thickened, often denticulate within. Inner lip commonly wrinkled and with a columellar callus. Operculum thick and corneous, rounded to trigonal. Head with a moderately stout, extensible snout and filiform tentacles bearing eyes on protuberances of their outer bases. Foot rather short, somewhat truncated posteriorly.

Habitat, biology, and fisheries: Active predators, living on sandy or rocky bottoms from the intertidal zone to depths of a few hundred metres. Ranellidae have a variety of diets including molluscs (bivalves and gastropods), echinoderms (starfishes, sea urchins and holothurians), worms or even ascidians, depending upon species. Prey are often first paralysed with an acidic salivary secretion, and then devoured. Sexes separate, fertilization internal. Eggs laid on the substrate in large capsules clustered in masses. Planktonic larval stages sometimes very long, hence the very wide geographical distribution of some species. Since ancient times, certain species of Ranellidae have been fished, in the area as well as in other parts of the world, for their beautiful shell or their edible flesh, the large shells of genus *Charonia* being traditionally used as a kind of horn.

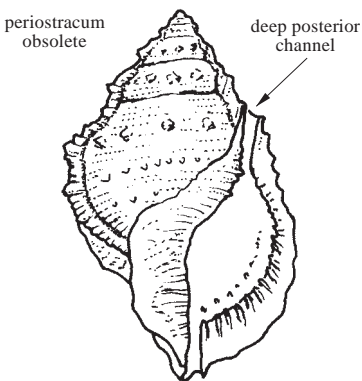


Similar families occurring in the area

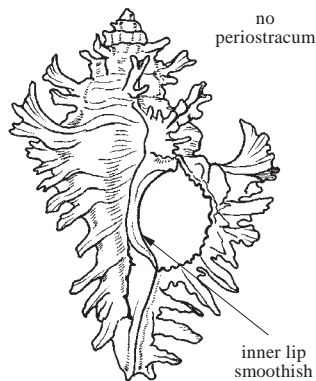
Bursidae: periostracum obsolete to absent. Aperture with a deep posterior canal.

Muricidae: axial varices, when developed, 3 or more in number on each whorl (only 2 per whorl in Ranellidae). No periostracum.

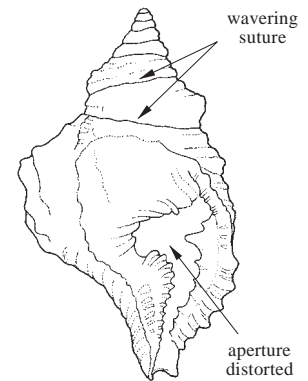
Personidae: spire whorls irregular, with a wavering suture. Aperture distorted. Inner lip strongly sinuous, with an extensive, shield-like callus.



ventral view
Bursidae



ventral view
Muricidae



ventral view
Personidae

Key to species of interest to fisheries occurring in the area

- 1a. Axial varices prominent, at about 1/2 whorl intervals, but not aligned from whorl to whorl → **2**
- 1b. Axial varices, when present, at about 2/3 whorl intervals and not aligned from whorl to whorl → **3**

- 2a. Anterior siphonal canal short; shell colour light reddish brown, with dark brown spiral band on ridges and nodules (Fig. 1) ***Argobuccinum pustulosum***
- 2b. Anterior siphonal canal long; shell colour off-white, suffused in places with reddish brown (Fig. 2) ***Ranella olearium***

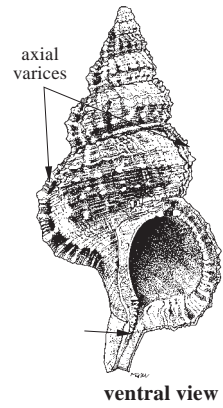
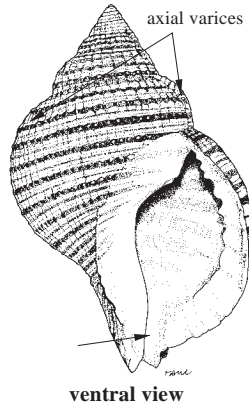


Fig. 1 *Argobuccinum pustulosum* Fig. 2 *Ranella olearium*

- 3a. Shell large to very large, often largely exceeding 25 cm long; periostracum very thin and smooth to indistinct → **4**
- 3b. Shell relatively small to medium-sized, hardly reaching 20 cm long; periostracum conspicuous, hairy to prickly . . . → **5**

- 4a. Spire very long, about 40% of total length; inner lip strongly ridged, with whitish transverse teeth and dark brown interstices; operculum with a central nucleus and complete concentric growth lines (Fig. 3) ***Charonia variegata***
- 4b. Spire moderately long, about 30% of total length; inner lip with poorly distinct ridges, without dark brown tinge of teeth interstices; operculum with an anterior subterminal nucleus and incomplete concentric growth lines (Fig. 4) ***Charonia lampas***

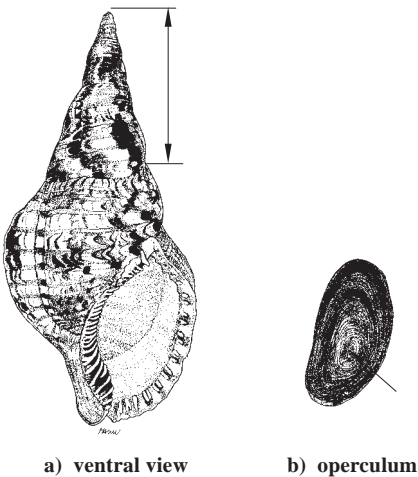


Fig. 3 *Charonia variegata*

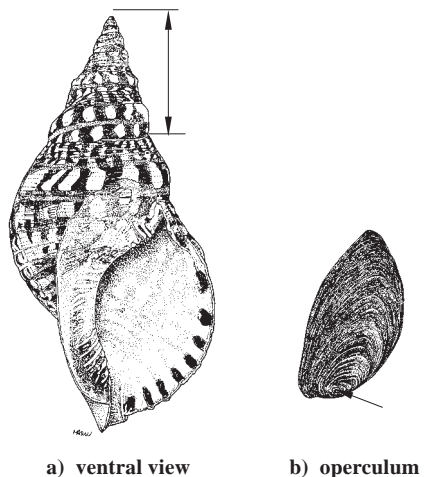
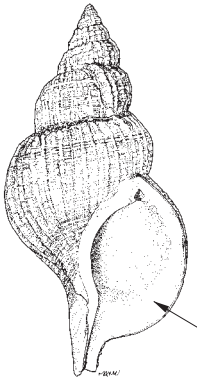
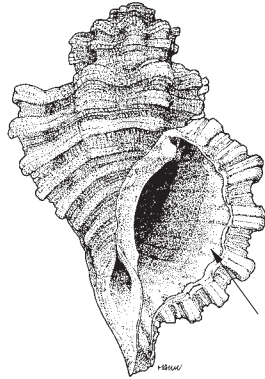


Fig. 4 *Charonia lampas*

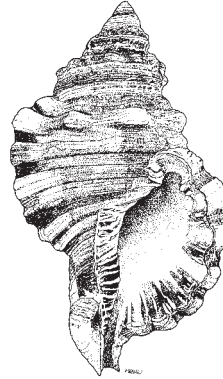
- 5a. Shell thick and heavy; outer lip strongly toothed → **6**
 5b. Shell light and thin; outer lip smooth (Fig. 5) *Fusitriton magellanicus murrayi*
- 6a. Inner lip smooth, save for a small posterior nodule and angulate edge anteriorly (Fig. 6)
 *Cabestana cutacea*
 6b. Inner lip conspicuously ridged → **7**
- 7a. Outer lip teeth grouped in pairs; inner lip dark brown with white ridges (Fig. 7)
 *Monoplex parthenopeus parthenopeus*
 7b. Outer lip teeth evenly spaced; inner lip plain off-white (Fig. 8) . . . *Monoplex corrugatus corrugatus*



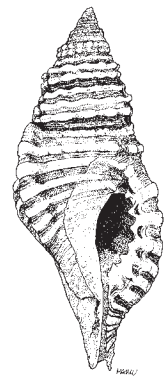
ventral view

Fig. 5 *Fusitriton magellanicus murrayi*

ventral view

Fig. 6 *Cabestana cutacea*


ventral view









Fig. 7 *Monoplex parthenopeus parthenopeus*

ventral view

Fig. 8 *Monoplex corrugatus corrugatus*

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

-  *Argobuccinum pustulosum* (Lightfoot, 1786).
-  *Cabestana cutacea* (Linnaeus, 1767).
-  *Charonia lampas* (Linnaeus, 1758).
-  *Charonia variegata* (Lamarck, 1816).
-  *Fusitriton magellanicus murrayi* (E.A. Smith, 1891).
-  *Monoplex corrugatus corrugatus* (Lamarck, 1816).
-  *Monoplex parthenopeus parthenopeus* (Salis, 1793).
-  *Ranella olearium* (Linnaeus, 1758).

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***Cabestana cutacea* (Linnaeus, 1767)**

Frequent synonyms / misidentifications: *Cabestana dolaria* (Linnaeus, 1767); *Cymatium africanum* (Adams, 1854); *C. cutaceum* (Linnaeus, 1767); *C. dolarium* (Linnaeus, 1767); *C. doliarum* [Incorrect spelling]; *Dolarium cutaceum* (Linnaeus, 1767); *Triton cutaceum* (Linnaeus, 1767) / None.

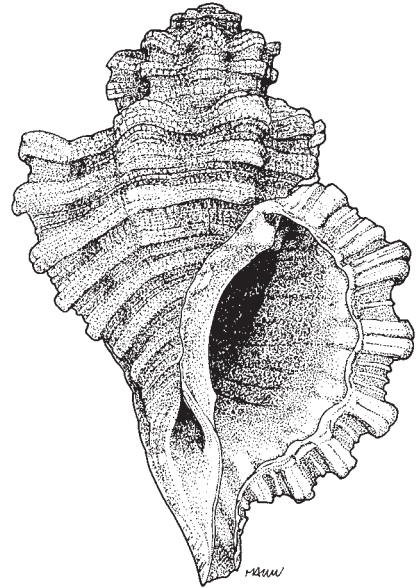
FAO names: **En** – Cuticle-clad triton; **Fr** – Triton cutacé; **Sp** – Tritón levantino.

Diagnostic characters: **Shell medium-sized** (up to 9 cm in length), thick and heavy, conical-ovate to barrel-shaped **with a medium-sized to short, stepped spire** with strongly shouldered whorls, **inflated body whorl and rather short anterior siphonal canal**. Main outer sculpture of **strong** (subdued in ssp. *africana*), **flat-topped spiral ribs** (2 on spire whorls, 6 to 8 on body whorl) **typically split in two** by a narrow median groove, and a few smaller cords on canal. Unequal fine spiral threads in rib interstices. Very low, broad axial undulations **often developed into rounded nodules** on peripheral ribs. **Numerous**, closely set **fine axial threads** crossing spiral elements **throughout the outer surface** of shell. **Axial varices** narrow, irregularly developed, spaced at **about 2/3 whorl intervals**, when present often **with short, blunt digitations** on top of the main spiral ribs. **Periostracum** finely **cancellate and velvety**. Aperture elliptical ovate, moderately calloused at periphery, with the main outer spiral sculpture showing through. Columellar callus rather narrow, not covering anteriorly the small, distinct umbilicus. **Outer lip strongly thickened** in adults, bordered exteriorly by a strong varix, and **with a series of short and coarse teeth** within. **Inner lip smooth, save for a small posterior nodule and angulate edge anteriorly**. Anterior siphonal canal short and sturdy, conical in shape, open ventrally. **Operculum elongate** ovate in outline, **with nucleus at anterior end and incomplete concentric growth lines**. **Colour:** **outside of shell light fawn to brown under the yellowish brown periostracum**. **Aperture and columella white**.

Size: Maximum shell length 9 cm, commonly to 6 cm (in South Africa, this species may reach 11 cm long).

Habitat, biology, and fisheries: On muddy and rocky bottoms, of sublittoral and upper shelf zones, preying upon ascidians. Occasionally collected for food and decorative purposes. Sold in Moroccan local markets.

Distribution: Two subspecies are generally recognized, with disjunct distributions: ssp. *cutacea* (Linnaeus, 1767), in the eastern Atlantic and Mediterranean, from northern Europe to Rio de Oro, Western Sahara and in Canary Islands; ssp. *africana* (A. Adams, 1854), in the southeast Atlantic and southwest Indian Ocean, from Namibia to Mozambique.



ventral view

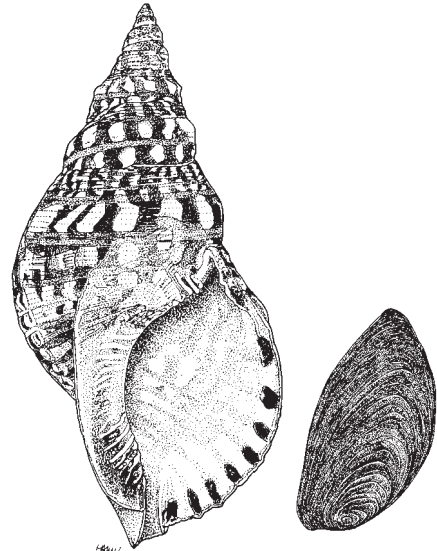


***Charonia lampas* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Charonia capax* Finlay, 1926; *C. mirabilis* Parenzan, 1970; *C. nodifera* (Lamarck, 1822); *C. rubicunda* (Perry, 1811); *Triton nodiferum* Lamarck, 1822; *T. sauliae* Reeve, 1844; *Tritonium pustulatum* Euthyme, 1889 / None.

FAO names: **En** – Knobbed triton; **Fr** – Triton nouveau; **Sp** – Corno.

Diagnostic characters: Shell large to very large-sized (up to 30 cm or more), with a moderately tall spire (about 30% of total shell length), swollen body whorl and short anterior siphonal canal. Whorls convex, with slightly undulating shallow sutures and well-developed axial varices spaced at about 2/3 whorl intervals, forming each one a usually prominent swelling across the whorl with a sharp, undercut edge in front. Sculpture of numerous, unequal low spiral ribs, some (1 or 2 on spire whorls, up to 10 on body whorl) much bigger and nodose, especially on shoulder. Periostracum very thin and smooth to indistinct, easily peeled off. Aperture broad and oval, pointed at both anterior and posterior ends. Outer lip markedly flaring, with strong, ridge-like teeth, a few of them sometimes grouped in pairs. Inner lip extended on the surface of body whorl, slightly detached anteriorly, with fine, poorly distinct transverse ridges and a strong tubercle near posterior end. Anterior siphonal canal rather short, distinctly open ventrally. Operculum thick, oval with an anterior subterminal nucleus and incomplete concentric growth lines. Colour: outside of shell variably patterned with widely spaced, small pale brown blotches to numerous, dark brown or reddish brown to fawn splashes on a whitish to pale cream background. Periostracum, when distinct, forming a thin, translucent yellowish brown film. Aperture porcelainous white, often with a series of brown bars on outer lip teeth. Inner lip white, sometimes with fawn hue on anterior end and on callus margin, but without dark brown tinge on interstices of ridges.



ventral view

operculum

Size: Maximum shell length 38.5 cm or more, commonly from 20 to 30 cm.

Habitat, biology, and fisheries: On rocky or muddy bottoms, or in seagrass areas, preying on various echinoderms (holothurians, sea urchins and starfish) or on ascidians. Infralittoral to continental shelf and upper slope, from a few metres to of about 700 m deep. Egg capsules almost cylindrical, with a weak ridge on each side, attached in large groups by means of a tough basal membrane. Capsules containing each from 300 to about 2 000 eggs, giving after 1 to 4 months free swimming larvae which hatch through an exit pore at top of the capsule. In the area, mainly collected off the northwest African coasts where it is most common. Caught with bottom trawls and nets, both for food and the attractive large shell. Used in stews or fried. Shell traditionally used as a horn, nowadays for collection and decorative purposes.

Distribution: Very wide and discontinuous occurrence around the world. East Atlantic, from southern British Isles and the English Channel to northern Namibia and the extreme southern tip of Africa, in Macaronesian islands (the Azores, Madeira and the Canaries) and St Helena Island. Mediterranean Sea (mainly in the Western Basin). Also present in the western Atlantic (Brazil) and in the Indo-Pacific fringes, in South Africa, St Paul and Amsterdam islands, southern and eastern Australia, New Zealand, New Caledonia, and Taiwan (Province of China) to Japan.

Remarks: Five subspecies of this widespread species were traditionally recognized around the world, each one occupying a restricted geographical area; however, these distinctions seem unwarranted, for they have been based on differences between shallow water forms only, whereas deep water specimens are closely similar to each other all around the world.

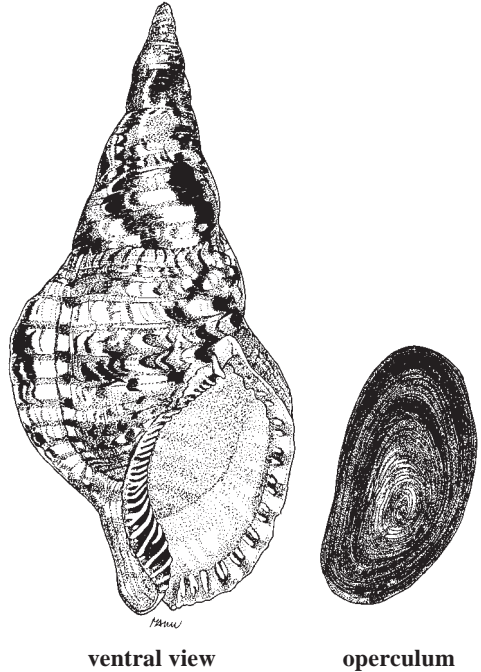


***Charonia variegata* (Lamarck, 1816)**

Frequent synonyms / misidentifications: *Triton variegatum* Lamarck, 1816; *Charonia seguenzae* (Aradas and Benoit, 1872); *Charonia tritonis variegata* (Lamarck, 1816) / *Charonia tritonis* (Linnaeus, 1758).

FAO names: En – Variegated triton; Fr – Triton émailié; Sp – Triton.

Diagnostic characters: Shell large to very large-sized (up to 30 cm or more), with a tall spire (about 40% of total shell length), swollen and strongly shouldered body whorl and short anterior siphonal canal. Whorls rounded, with slightly undulating suture and wide, smooth and rounded axial varices with a sharp, undercut edge in front and spaced at about 2/3 whorl intervals. Sculpture of broad, flat spiral ridges with 1 to 3 narrow cords in each interspace, and a spiral row of fine and short axial threads under the suture. Periostracum inconspicuous. Aperture large, elongate-ovate. Outer lip flaring, with strong short teeth that are usually grouped in pairs. Inner lip rather narrow, slightly detached anteriorly, bearing over its whole length many prominent transverse ridges that are irregular as to shape and spacing. Anterior siphonal canal short and fairly broad, open ventrally. Operculum thick, oval, with a central nucleus and complete concentric growth lines. **Colour:** outside of shell brightly patterned with crescent-shaped markings of purple brown and white on a cream to fawn background. Aperture whitish to cream, often flushed with light buff. Paired teeth of the outer lip whitish on rather large, dark brown background areas. Inner lip with white transverse ridges and dark brown interstices.



Size: Maximum shell length 35 cm, commonly from 25 to 30 cm.

Habitat, biology, and fisheries: On rock or rough gravel and mud bottoms, often hiding in crevices or under rocks during the day. Sublittoral to upper shelf zone, from a few metres to about 100 m depth; seems to be most common in shallow water, down to 50 m. Mostly feeding on the sea urchins *Echinaster* and *Diadema*. Mainly collected in the area for its large, highly decorative shell, occasionally for food. Actively collected in the Canaries, where it appears to be rather common and considered a delicacy. Formerly used as a trumpet by native people in Macaronesian islands.

Distribution: Widely distributed in the Atlantic Ocean. East Atlantic, from northern Spain to Angola (but probably rare to absent from northern Morocco to Benin), in Macaronesian islands (the Azores, Selvagens, Madeira and Canary islands), Cape Verde and Gulf of Guinea islands, and in mid-oceanic St Helena and Ascension islands. Mediterranean Sea, mostly in the Eastern Basin. Also occurring in the west Atlantic, from southern Florida and Bermuda Islands through the Caribbean to Brazil, but not in the Indo-West Pacific.



***Monoplex parthenopeus parthenopeus* (Salis, 1793)**

Frequent synonyms / misidentifications: *Cymatium costatum* (Born, 1778) [not of Pennant, 1777]; *C. parthenopeum* (Salis, 1793); *C. parthenopus* [Incorrect spelling]; *Monoplex australasiae* Perry, 1811; *Triton parthenopeum* (Salis, 1793); *T. succinctum* (Lamarck, 1816) / None.

FAO names: **En** – Neapolitan triton; **Fr** – Triton napolitain; **Sp** – Triton napolitano.

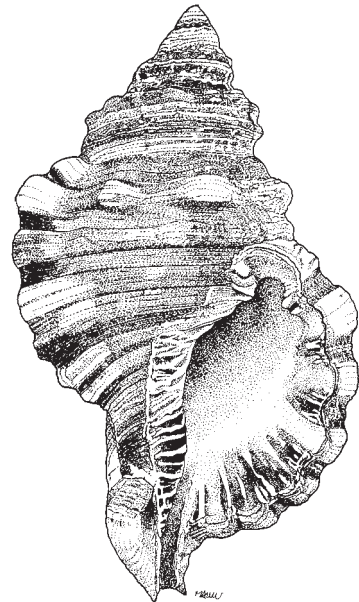
Diagnostic characters: Shell moderately large (up to 19.2 cm in length), rather heavy, conical-ovate in shape with a high and conical spire, inflated body whorl and moderately developed siphonal canal. Sculpture of broad, rounded, often somewhat nodulose spiral ribs (about 2 on spire whorls, 5 or 6 on body whorl), smaller cords on base and siphonal canal, and numerous fine spiral threads throughout the outer surface of shell; axial sculpture poorly developed, of low ridges mostly visible on upper part of whorls and numerous fine growth lines. Axial varices rounded, spaced at about 2/3 whorl intervals, irregularly developed, often with only 2 prominent ones (including the outer lip) in fully grown adult specimens. Periostracum rather fine and prominently bristled with numerous axial blades bearing long hair-like fringes, easily peeled off. Aperture rounded ovate, moderately calloused at periphery. Columellar callus rather thin and narrow, with the external sculpture of shell showing through. Outer lip thickened, with about 6 pairs of coarse teeth within. Inner lip with many irregular ridges (more distinct in siphonal canal area) oblique to the underlying spiral sculpture of shell, and a single large ridge near posterior end of aperture. Anterior siphonal canal moderately long, open ventrally and slightly bent dorsalward. Operculum elongate ovate in outline, with nucleus at anterior end and incomplete concentric growth lines.

Colour: outside of shell brownish yellow to chestnut brown under the dark golden brown periostracum. Varices often patterned with white on ribs and darker brown in interstices. Aperture white, sometimes flushed with dull orange on outer lip margin. Paired teeth of the outer lip whitish on dark brown areas. Inner lip dark brown with white ridges.

Size: Maximum shell length 19.2 cm, commonly to 10 cm.

Habitat, biology, and fisheries: Among littoral rocks, or deeper on sandy to muddy bottoms, preying on bivalves and other molluscs. May cause severe damage to natural and artificial banks of commercial bivalves when abundant. Low tide levels and sublittoral zone, to depths about 70 m. Collected both for food and shell trade, at low tide or with dredges, trawls and nets.

Distribution: Species widely distributed in warm waters all around the world. Distribution of ssp. *parthenopeus* very large: East Atlantic, from Portugal to Namibia, in Macaronesian islands (the Azores, Madeira and Canary islands), the Cape Verde Archipelago and Gulf of Guinea islands; western and central Mediterranean Basins; the tropical western Atlantic, and southern fringes of the Indo-Pacific, in South Africa, southern Australia. Species also occurring in the eastern Pacific (ssp. *keenae* Beu, 1970), and in the northern part of Indo-Pacific fringes, in northern Indian Ocean, China, Japan and Hawaii (ssp. *echo* Kuroda and Habe, 1961).



ventral view



Ranella olearium (Linnaeus, 1758)

Frequent synonyms / misidentifications: *Argobuccinum olearium* (Linnaeus, 1758); *A. giganteum* (Lamarck, 1816); *Bursa barcellosi* Matthews, Rios and Coelho, 1973; *Ranella gigantea* Lamarck, 1816; *R. olearia* (Linnaeus, 1758) [Unjustified emendation] / None.

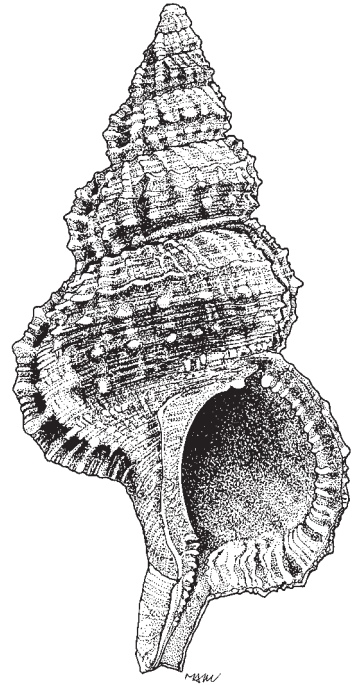
FAO names: En – Oil-vessel triton; Fr – Ranelle géante; Sp – Bocina.

Diagnostic characters: Shell large-sized (up to 20 cm or more), with a high conical spire, well inflated whorls with deep suture and rather long anterior siphonal canal. Axial varices prominent, rounded, at about 1/2 whorl intervals (a little more widely spaced than every 180°) but not aligned from whorl to whorl. Sculpture of narrow spiral ribs (about 5 on spire whorls, 8 or 9 on body whorl), separated by 3 to 6 fine intermediate threads and crossed by low axial ridges with nodules at the intersections. Periostracum finely velvety and easily peeled off. Aperture nearly circular, only moderately calloused at periphery. Outer lip thickened, strongly and shortly dentate within. Inner lip with many weak folds (more distinct in siphonal canal area) and a strong tubercle near posterior end, separated from the outer lip teeth by a deep gap. Anterior siphonal canal well developed, spirally ridged, rather slender and slightly bent dorsalward, its ventral side narrowly open. Operculum rounded ovate, with nucleus near anterior end and incomplete concentric growth lines. **Colour: outside of shell off-white, suffused in places with reddish brown.** Periostracum dark brown. Aperture and lips porcelaneous white.

Size: Maximum shell length 24.7 cm, commonly from 16 to 18 cm.

Habitat, biology, and fisheries: On sandy to muddy bottoms. Offshore, on continental shelf and upper slope, from about 20 to 800 m depth. Food requirements of this species poorly known, probably preying on echinoderms and other molluscs. May be locally common, especially in the Azores and in southern part of the Iberian Peninsula where rather dense populations occur. Collected with bottom trawls and nets, for food and for the large and oddly shaped shell.

Distribution: Disjunct distribution in the east Atlantic, from northern Europe to Sierra Leone, and from Angola to Namibia, in Macaronesian islands, the Cape Verde Archipelago and mid-oceanic St Helena Island. Mediterranean Sea. Also occurring in the west Atlantic (from Brazil to Uruguay), and in the southern Indo-West Pacific (in South Africa, St Paul, Amsterdam and Réunion islands, and in New Zealand).



ventral view

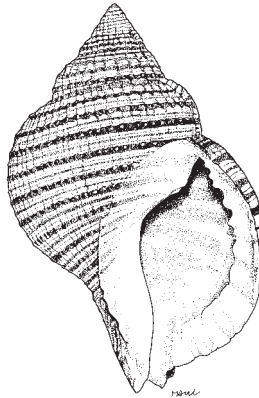


***Argobuccinum pustulosum* (Lightfoot, 1786)**

Frequent synonyms / misidentifications: *Argobuccinum argus* (Gmelin, 1791) / *Argobuccinum proditor* (Frauenfeld, 1865).

En – Argus triton; **Fr** – Triton argus; **Sp** – Tritón argus.

Maximum shell length 13.5 cm, commonly to 7.5 cm. Abundant in the intertidal zone in the Atlantic part of its range, chiefly among rocks or on gravels in low tide pools. Only occurring at sublittoral levels along the southwestern Indian coasts of South Africa, down to a depth of about 50 m. Feeds mainly on sedentary polychaete worms, squirting toxic saliva into the worm tube to paralyse and partially digest the prey, before sucking it with its extended snout. Collected at low tide and in shallow water for food and for the shell. Widely distributed in the southern oceans. Southeast Atlantic and southwest Indian Ocean (ssp. *pustulosum*), in Namibia and South Africa, east to Eastern Cape Province. Also occurring in southwest America [ssp. *ranelliforme* (King, 1832)] and in the southwest Pacific [ssp. *tumidum* (Dunker, 1862)].



ventral view

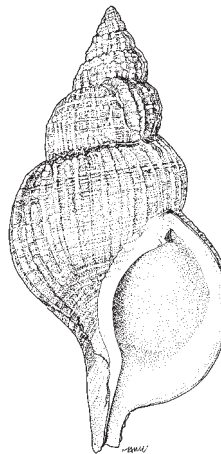


***Fusitriton magellanicus murrayi* (E.A. Smith, 1891)**

Frequent synonyms / misidentifications: *Fusitriton algoensis* Tomlin, 1947; *F. magellanicus* (Röding, 1798); *Triton cancellatum* Lamarck, 1816 / None.

En – Murray's triton; **Fr** – Triton de Murray; **Sp** – Tritón de Murray.

Maximum shell length 14.3 cm, commonly to 11 cm. Offshore, on muddy bottoms of the continental shelf and upper slope, from about 50 to 550 m depths. Probably feeding on Holothurians. Uses of this species unknown in the studied area, but it is commonly trawled by fishermen off South Africa. Species widely distributed in the southern oceans. Southeast Atlantic and southwest Indian Ocean (ssp. *murrayi*), from off Namibia to southern Mozambique. Also occurring in southwest America (ssp. *magellanicus*) and southwest Pacific in southern Australia [ssp. *retiolus* (Hedley, 1914)] and New Zealand (ssp. *laudandus* Finlay, 1926).



ventral view



***Monoplex corrugatus corrugatus* (Lamarck, 1816)**

Frequent synonyms / misidentifications: *Cymatium corrugatum* (Lamarck, 1816); *Triton corrugatus* Lamarck, 1816 / None.

En – Corrugated triton; **Fr** – Triton froncé; **Sp** – Tritón fruncido.

Maximum shell length 12 cm, commonly from 7 to 9 cm. On various types of hard to soft bottoms. Sublittoral zone to continental shelf, from about 15 to 200 m deep. Occasionally collected for food with dredges, bottom trawls and nets. In the Mediterranean, it may appear in local markets of southern France and northwestern Italy, often mixed with other gastropod species. East Atlantic (ssp. *corrugatus*), from the Gulf of Biscay (France) to Angola, in Macaronesian islands (Madeira and the Canaries). Mediterranean, mostly in the Western Basin. Also occurring in the west Atlantic [ssp. *krebsii* (Mörch, 1877)] from North Carolina to Florida (USA) and the Caribbean, and in the east Pacific [ssp. *amictus* (Reeve, 1844)] from the Gulf of California (Mexico) to Panama.



ventral view



TONNIDAE

Tun shells

Diagnostic characters: Shell thin, globose, with a short spire and very inflated, large body whorl. Sculpture only spiral, of relatively flat ribs or cords. No axial varices. Periostracum a thin smooth sheet. Aperture broad and extensive. Anterior siphonal canal short, a U-shaped notch. Outer lip generally thin, sometimes reflected and denticulate, in adult only. Inner margin with a more or less developed, glazed callosity, usually covering the umbilicus. Columella sometimes twisted. Operculum absent in the adult. Head with a relatively short but extremely extensible snout. Cephalic tentacles elongate, usually bearing eyes on bulges of their outer bases. Foot very large and wide, rather flat. Fleshy siphon long.

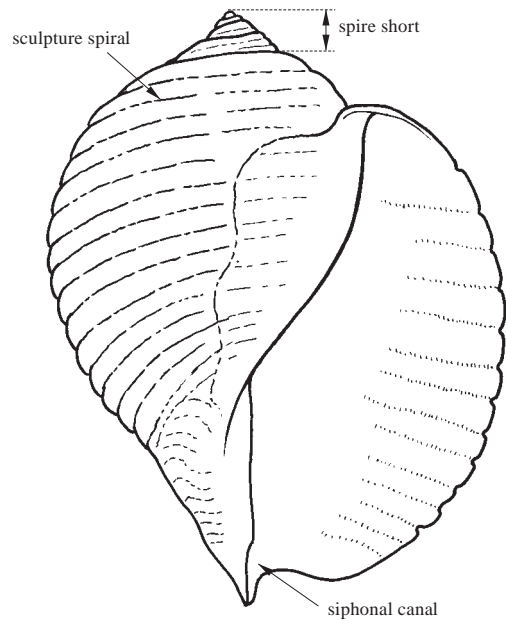
Habitat, biology, and fisheries: Tropical and warm temperate animals, mainly living on sandy bottoms, often where marine grasses abound. Can quickly bury themselves completely in the sand, save for the tip of the fleshy siphon. Feed mainly during the night on holothurians or on bivalves, which are first paralysed by a salivary secretion containing sulphuric acid and probably also a neurotoxin, then swallowed whole. Sexes separate, fertilization internal. Eggs laid in masses of broad, gelatinous ribbons. Free-swimming, planktonic stage very long, lasting 3 to 8 months. Occasionally collected for food in the area. Shells often used as decorative items.

Similar families occurring in the area

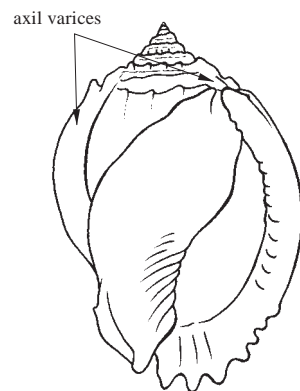
Cassidae: easily distinguishable by their thickened outer lip, axial varices and operculum. Columellar callus may be developed in a thick extensive shield.

References

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- Mifsud, C. 1995. A Note on the alimentary habits of *Tonna galea* (L., 1758) (Mollusca, Gastropoda, Tonnidae). *La Conchiglia*, 27(275): 31–32.



ventral view



ventral view

Cassidae

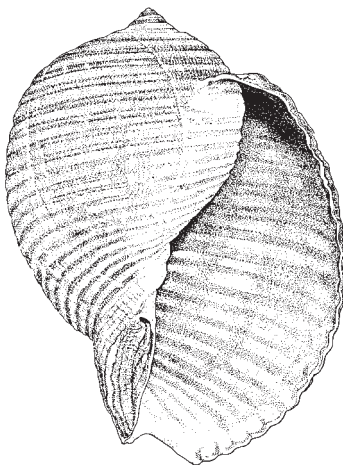
A single species of interest to fisheries occurring in the area.

***Tonna galea* (Linnaeus, 1758)**

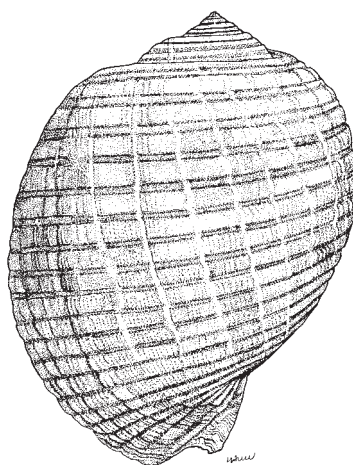
Frequent synonyms / misidentifications: *Dolium galea* (Linnaeus, 1758) / None.

En – Helmet tun; **Fr** – Tonne cannelée; **Sp** – Caracol tonel.

Maximum shell length 31.5 cm, commonly from 18 to 20 cm. On sand and mud bottoms. Sometimes found at extreme low tide and shallow subtidal levels, but mainly occurring in sublittoral and shelf zones from depths of 5 to 80 m, and down to about 130 m. Salivary secretion of the animal also used as a defense. Collected with bottom trawls and nets or by diving, for food and for the large shell which is locally used for decorative purposes. Eastern Atlantic, from Spain and Portugal to Angola, in Madeira, the Canaries and Cape Verde Islands; southern limit of distribution imperfectly known, perhaps extending to South Africa. Throughout the Mediterranean. Also occurring in the West Atlantic (from North Carolina and Texas, through the Caribbean to Brazil, Uruguay and northern Argentina) and in the midoceanic Ascension Island. Occurrence in the Indo-Pacific uncertain because of confusion with similar species such as *Tonna olearium* (Linnaeus, 1758), a possible synonym of *T. galea*.



ventral view



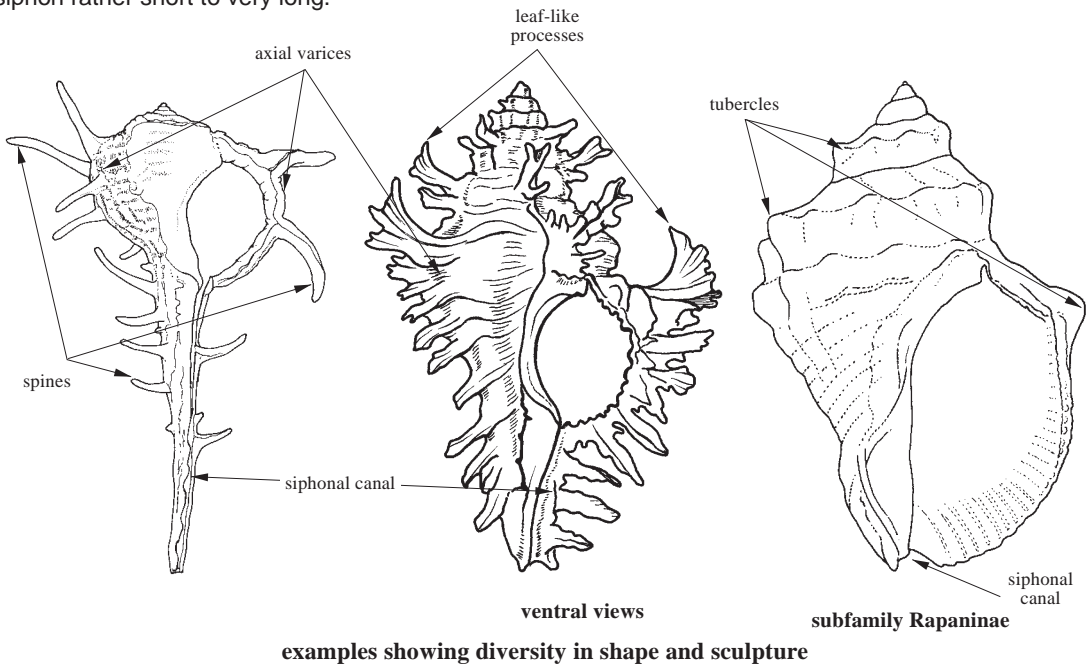
dorsal view



MURICIDAE

Purpuras, murex and rock shells

Diagnostic characters: Shell variably shaped, generally with a raised spire and strong sculpture with spiral ridges and often **axial varices** (3 or more in number on each whorl), bearing frequently **spines, tubercles or blade-like processes**. **Periostracum absent**. **Aperture** variable, ovate to more or less contracted, with a well-marked anterior **siphonal canal** that may be very long. Outer lip often denticulate within, sometimes with a toothlike process on margin. Columella smoothish to weakly ridged. **Operculum corneous**, thin to thick, with nucleus near the anterior end or at the right side margin of its outer surface. Head with a long, retractable snout and elongate, pointed tentacles bearing eyes at or slightly above their outer bases. Foot moderately long and somewhat truncated anteriorly. Fleshy pallial siphon rather short to very long.



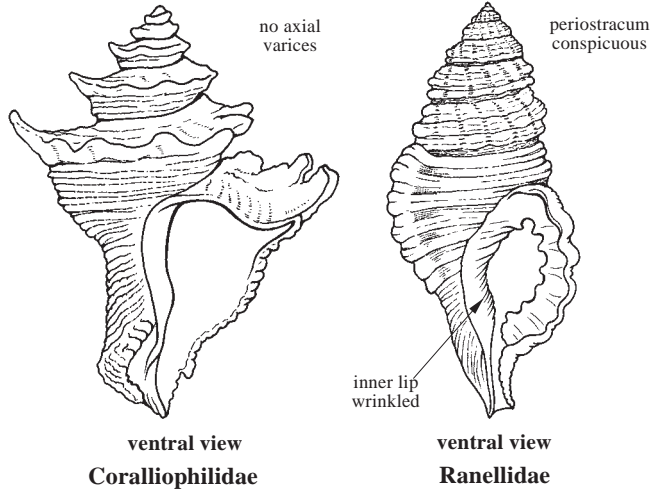
Habitat, biology, and fisheries: The Muricidae constitute a highly diverse group of species, most common in tropical and subtropical shallow waters. Active predators, generally feeding on other molluscs and barnacles. Typically, access to the soft parts of the prey is obtained by boring a hole through the shell by means of a softening secretion and the scraping action of the radula. In many species, the secretion, produced to anaesthetize the prey or for defense, turns to purple on exposure to light and air, and it has been used as a natural dye. Sexes separate, fertilization internal. Eggs laid in protective corneous capsules (the size and shape of which vary with species), hatching usually as crawling young or more rarely as planktonic larvae. Muricidae are commonly collected in the studied area, for their edible flesh or for their beautiful shell which is used in the shellcraft industries and is popular among shell collectors. Hand-collected at low tide and in shallow waters, especially by divers, or caught with fish traps and bottoms trawls. Some species are frequent in local markets. Because of their carnivorous mode of life, a few species are considered a pest, as they may cause important destructions in the exploited natural beds and areas of culture of the commercial bivalves.

Remarks: The family is here considered in a rather wide sense, and includes the less typical species (purpuras and rock shells) in the subfamily Rapaninae (= Thaidinae). As generic taxonomy of the West African muricid species is in a state of flux, we have often used here for them genus names in a relatively large meaning.

Similar families occurring in the area

Coralliophilidae: shell similar to Muricidae, but usually without axial varices and sculptured by spiral threads and sometimes lobe-like spines at the shoulder. Differ essentially by a parasitic mode of life on corals and sea-anemones. No radula.

Ranellidae (= Cymatiidae): periostracum often conspicuous, thick and hairy. No more than 2 axial varices per whorl. Inner lip frequently wrinkled.



Key to species of interest to fisheries occurring in the area

- 1a. Outer surface of shell with axial varices; siphonal canal medium-sized to very long (Fig. 1a) → 6
- 1b. Outer surface of shell without axial varices; siphonal canal short (Fig. 1b) → 2
- 2a. Body whorl with spiral rows of short stout tubercles → 3
- 2b. Body whorl without spiral rows of short stout tubercles → 5

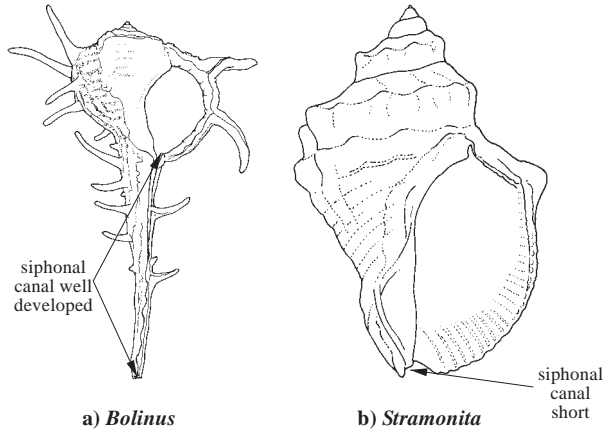


Fig. 1 ventral view

- 3a. Spire low, often eroded. Inner lip flattened and widely calloused, with 1 to 4 blackish brown knobs (Fig. 2) . . . *Thais nodosa*
- 3b. Spire short to tall and more or less pointing; inner lip convex and narrowly calloused, without blackish brown knobs → 4

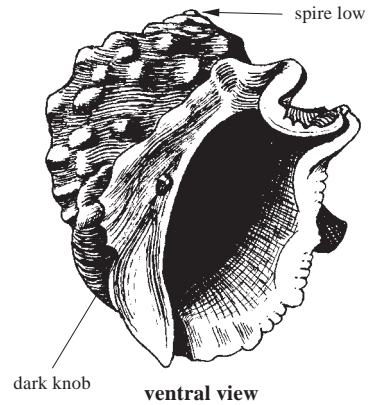
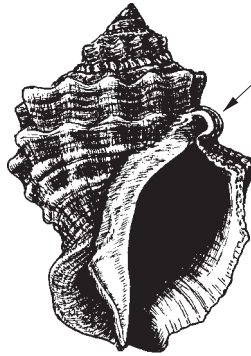


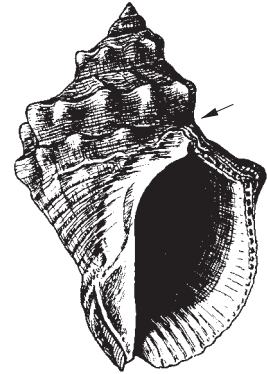
Fig. 2 *Thais nodosa*

4a. Shell shape rather globose, with a relatively short spire; a spiral row of rounded tubercles just under the suture, forming on aperture a prominent expansion at posterior end of outer lip (Fig. 3)
 ***Thaisella coronata***



ventral view

Fig. 3 *Thaisella coronata*

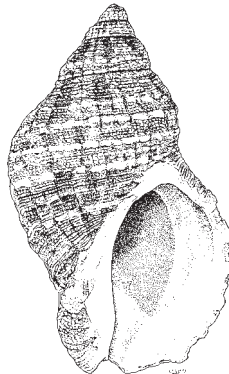


ventral view

Fig. 4 *Stramonita haemastoma*

4b. Shell shape rather elongate, with a relatively tall spire; no tubercles just under the suture; aperture devoid of prominent expansion at posterior end of outer lip (Fig. 4). ***Stramonita haemastoma***

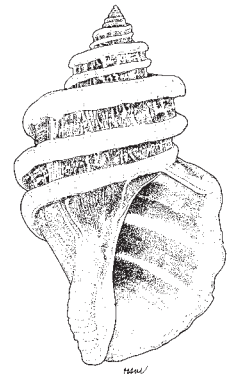
5a. Sculpture cancellate, with many fine spiral and axial ridges, forming small granules at their intersections (Fig. 5) ***Nucella squamosa***



ventral view

Fig. 5 *Nucella squamosa*

5b. Sculpture only spiral, typically with a few prominent expanded cords (1 to 6 in number on body whorl, mostly 3 or 4, rarely none) and fine threads in intervals (Fig.6) ***Trochia cingulata***



ventral view

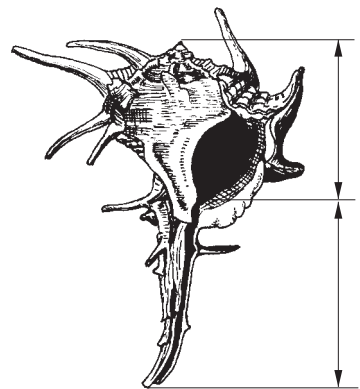
Fig. 6 *Trochia cingulata*

6a. Siphonal canal very long, as long as or longer than the length of the spire and aperture (Fig. 7). ***Bolinus cornutus***

6b. Siphonal canal medium-sized, much shorter than the length of the spire and aperture → 7

7a. Shape relatively slender, width of shell (spines of varices excluded) about half of length → 8

7b. Shape relatively squat, width of shell (spines of varices excluded) about two-thirds of length → 9

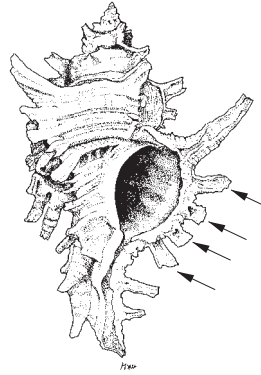


ventral view

Fig. 7 *Bolinus cornutus*

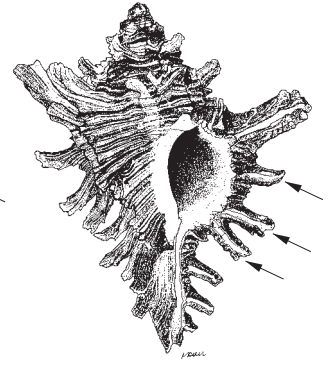
8a. Shell usually light coloured; body whorl varices with 4 shorter spines in front of the large shoulder spine (Fig. 8) ***Hexaplex saharicus***

8b. Shell usually dark coloured; body whorl varices with 3 shorter spines in front of the large shoulder spine (Fig. 9) ***Hexaplex megacerus***



ventral view

Fig. 8 *Hexaplex saharicus*

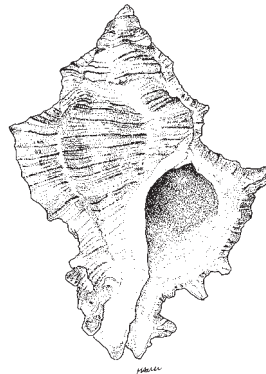


ventral view

Fig. 9 *Hexaplex megacerus*

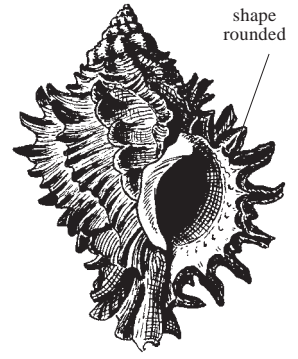
9a. Spire whorls with 3 axial varices per whorl, generally changing into 6 or more varices per whorl on the last 2 whorls (Fig. 10) . . . ***Chicoreus varius***

9b. Spire whorls with more than 3 axial varices per whorl → 10



ventral view

Fig. 10 *Chicoreus varius*



ventral view

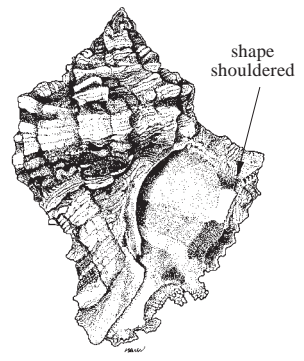
Fig. 11 *Hexaplex angularis*

10a. Shell relatively small (up to about 6 cm long); body whorl rounded, spines of axial varices equal-sized or absent (Fig. 11) ***Hexaplex angularis***

10b. Shell relatively large (up to about 9 cm long or more); body whorl distinctly shouldered, spines of axial varices larger at shoulder → 11

11a. Shell medium-sized (up to 9 cm long); 3 broad dark brown spiral bands on body whorl, very distinct inside the aperture; inner lip pale creamy pink; outer lip whitish, not rimmed with red or bright pink (Fig. 12) ***Hexaplex bifasciatus***

11b. Shell large-sized (up to 19 cm or more); when present on body whorl, spiral bands brown, narrow and inconspicuous, or reduced to dark blotches on axial varices and becoming red inside the aperture; inner lip bright pink to red, outer lip often with a red rim → 12

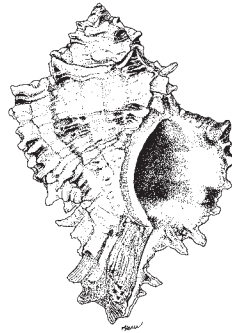


ventral view

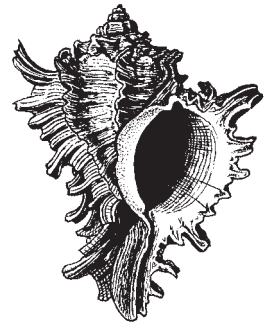
Fig.12 *Hexaplex bifasciatus*

12a. Body whorl usually with a single low node between axial varices, which are about 6 to 8 in number; coloured spiral bands of body whorl mostly reduced to darker brown blotches on axial varices and spines (Fig. 13) . ***Hexaplex rosarium***

12b. Body whorl generally devoid of nodes between axial varices, which are usually 9 or 10 (from 7 to 11) in number; coloured spiral bands of body whorl narrow, usually poorly developed to absent (Fig. 14) ***Hexaplex duplex***




ventral view

Fig. 13 *Hexaplex rosarium*

ventral view

Fig. 14 *Hexaplex duplex*

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

-  *Bolinus cornutus* (Linnaeus, 1758).
-  *Chicoreus varius* (G.B. Sowerby II, 1834).
-  *Hexaplex angularis* (Lamarck, 1822).
-  *Hexaplex bifasciatus* (A. Adams, 1853).
-  *Hexaplex duplex* (Röding, 1798).
-  *Hexaplex megacerus* (G.B. Sowerby II, 1834).
-  *Hexaplex rosarium* (Röding, 1798).
-  *Hexaplex saharicus* (Locard, 1897).
-  *Nucella squamosa* (Lamarck, 1816).
-  *Stramonita haemastoma* (Linnaeus, 1767).
-  *Thais nodosa* (Linnaeus, 1758).
-  *Thaisella coronata* (Lamarck, 1816).
-  *Trochia cingulata* (Linnaeus, 1758).

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***Bolinus cornutus* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Murex cornutus* Linnaeus, 1758; *M. tumulosus* Sowerby, 1841 / *Bolinus brandaris* (Linnaeus, 1758).

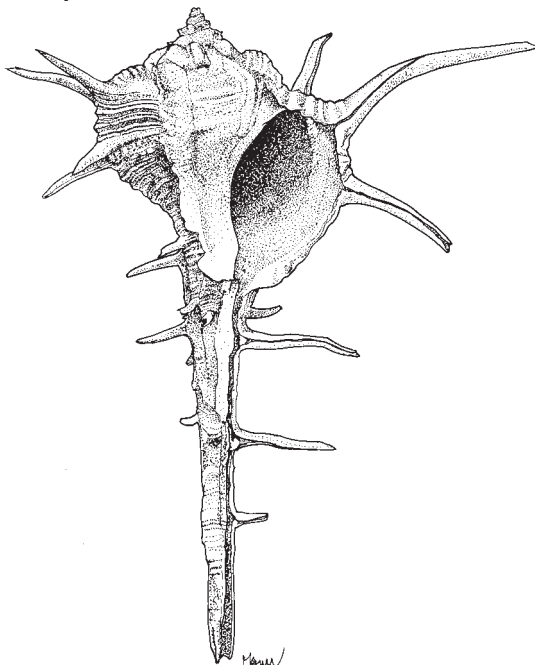
FAO names: **En** – Horned murex; **Fr** – Rocher cornu; **Sp** – Busano cornudo.

Diagnostic characters: Shell large and solid, club-shaped with a low conical spire, an inflated body whorl and a narrow, very long and about straight siphonal canal, as long as or longer than the length of the spire and aperture. Outer surface of shell with axial varices and numerous, slight, unequal and irregular spiral cords. Axial varices forming low, spineless ridges on the angulated spire whorls. Body whorl very large, broader than long, with 2 spiral angulations (1 on shoulder and 1 at mid-length of whorl), enhanced by spiral threads and with about 7 (from 5 to 8 in number) axial varices bearing 2 spiral rows of long, recurved spines where they cross the peripheral angulations. Shape of varices on body whorl varying from rounded ridges on shoulder slope, to very low lamellar thickenings between the 2 spiral rows of spines and on the base. Aperture ovate, longer than broad, outer lip margin somewhat crenulated. Inner lip with a broad columellar callus, adherent posteriorly and expanded beyond shoulder, becoming detached from body whorl and strongly concave anteriorly. Anterior siphonal canal narrowly open, straight to slightly curved dorsalward at anterior end, with 2 or 3 oblique spiral rows of shorter spines. **Colour:** outside of shell yellowish beige to tan, often with 3 darker spiral bands of brown on body whorl. Siphonal canal often with an axial series of brown blotches along left side of its ventral side and corresponding to various positions of its anterior end during growth. Aperture porcelainous white, often suffused with light orange on outer lip edge and columellar callus.

Size: Maximum shell length 20.7 cm, commonly from 12 to 15 cm.

Habitat, biology, and fisheries: Most common on soft bottoms, from extreme low tide levels to about 50 m depth. Frequently collected in bottom trawls and nets, or caught with fish traps, both for its edible meat and for its long spined and large shell. Also exploited in the past in Mauritania and Morocco, as a basic product for the famous West African purple dye (called “*purpura gaetulica*” by the ancient Romans).

Distribution: Eastern Atlantic, from Canary Islands and Mauritania to Angola. Northern limit of distribution imperfectly known, because of confusion with the similar Mediterranean species *Bolinus brandaris* (which probably does not occur in Morocco south of Tangiers).



ventral view



***Hexaplex angularis* (Lamarck, 1822)**

Frequent synonyms / misidentifications: *Hexaplex anguliferus* [unjustified emendation]; *Murex sexcostatus* Lamarck, 1816 / *Neptunea lyrata* (Gmelin, 1791); *Ocenebra inornatus* (Récluz, 1851).

FAO names: En – Angular murex; Fr – Rocher anguleux; Sp – Busano angular.

Diagnostic characters: Shell relatively small, broadly fusiform but squat in outline, with a rather tall conical spire and large, bulbous body whorl; width of shell (spines of varices excluded) about two-thirds of length. Spire whorls convex, with more than 3 axial varices per whorl and with a nodulous sculpture of rounded axial varices crossed by spiral cords. Body whorl rounded, with a variable sculpture of spinose axial varices and rather strong spiral cords interspersed with finer threads; varices number varying from 4 to 11 on body whorl (mostly from 7 to 9), spines of axial varices rather short, leaf-like and equal-sized or absent, depending on specimens. Aperture nearly circular, with a shallow notch at posterior end and a broad, moderately developed anterior siphonal canal, which is spinose on varices, narrowly open along its right side and forming a slight umbilical excavation with the ends of previous canals. Outer lip crenulated, with a series of short small ridges within. Inner lip with a narrow, entirely adherent callus and a small tubercle at posterior end. **Colour:** outer colour of shell variable, usually brown to black and often with a paler coloured, more or less eroded or incrustated spire, but not uncommonly orange or entirely white. Interior porcelaneous white to pale bluish grey.



ventral view

Size: Maximum shell length 6.1 cm, commonly to 5 cm.

Habitat, biology, and fisheries: In rocky areas. Low intertidal and sublittoral zones, to a depth of about 40 m. Common in Senegal, where it is collected for human consumption. Often caught in bottom nets in Angola. Mainly eaten in soups and seafood dishes with rice.

Distribution: Tropical East Atlantic, from Senegal to Gabon, but not in Cape Verde Islands.



Hexaplex duplex (Röding, 1798)

Frequent synonyms / misidentifications: *Murex duplex* (Röding, 1798); *M. hoplites* P. Fischer, 1876; *M. turbinatus* Lamarck, 1822; *Phyllonotus duplex* (Röding, 1798); *Trunculariopsis duplex* (Röding, 1798); *T. canariensis* Nordsieck, 1975 / *Hexaplex duplex* [of various authors, not of Röding, 1798] [= *H. rosarium*]; *H. trunculus* (Linnaeus, 1758); *Murex saxatilis* [of various authors, not of Linnaeus, 1758].

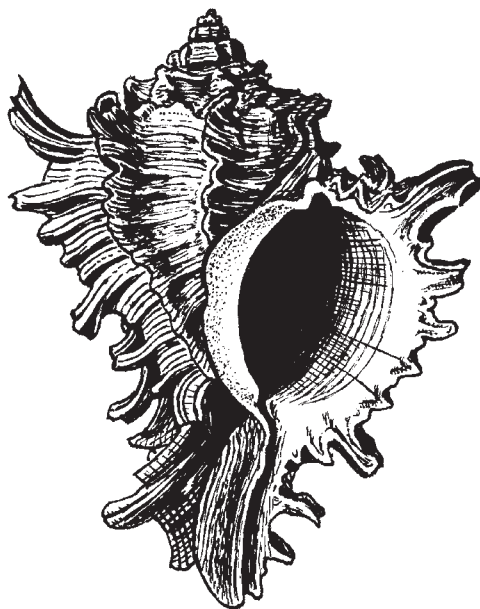
FAO names: En – Duplex murex; Fr – Rocher duplex; Sp – Busano espinuda.

Diagnostic characters: Shell large and stout, globose-ovate and relatively squat in outline, with a moderately low, pointed spire and tumid body whorl; width of shell (spines of varices excluded) about two-thirds of length. Spire whorls convex, with more than 3 axial varices per whorl. Body whorl large and globose, distinctly shouldered, with about 9 or 10 (from 7 to 11) more or less thick, spinose to nodulose axial varices, alternating stronger and smaller spiral cords and generally without distinct nodes between varices; spines of axial varices triangular to leaf-like, more or less strongly developed where spiral cords cross varices, longest at shoulder and slightly shorter just in front of it. Aperture large, rounded ovate, with a moderately deep and broad notch at posterior end and a medium-sized, broad and narrowly open anterior siphonal canal; about 2 spiral rows of short, open spines on siphonal canal and a variable umbilical excavation on left side, bordered by the ends of previous canals. Outer lip coarsely crenulated, with a series of short small ridges within. Inner lip with a narrow, entirely adherent callus and a spiral ridge at posterior end. **Colour:** outside of shell creamy white or yellow brown to pinkish brown, with somewhat darker, narrow brown spiral bands on body whorl, usually poorly developed to absent. Outer lip glossy light pink to whitish, often with reddish bands corresponding to the outer spiral pattern, inner lip bright orange pink to red.

Size: Maximum shell length 25 cm, commonly to 15 cm.

Habitat, biology, and fisheries: On various sublittoral bottoms, in shallow waters and deeper in the sublittoral zone, mainly between 20 and 40 m depths. Preys on other molluscs, including large species of the volutid genus *Cymbium*, which are immobilized with its powerful foot before introducing its snout to devour the head of the victim and a large part of the visceral hump. A common species, commercially fished for food and shell trade in Senegal. The large shell is often considered a choice collectors' item.

Distribution: East Atlantic, from Canary Islands and Rio de Oro, Western Sahara to Gambia.



ventral view



***Hexaplex rosarium* (Röding, 1798)**

Frequent synonyms / misidentifications: *Murex melonulus* Lamarck, 1822; *Phyllonotus rosarium* (Röding, 1798); *Trunculariopsis rosarium* (Röding, 1798) / *Hexaplex duplex*; *Murex pomiformis* Mörch, 1852 [= *Phyllonotus pomum* (Gmelin, 1791)].

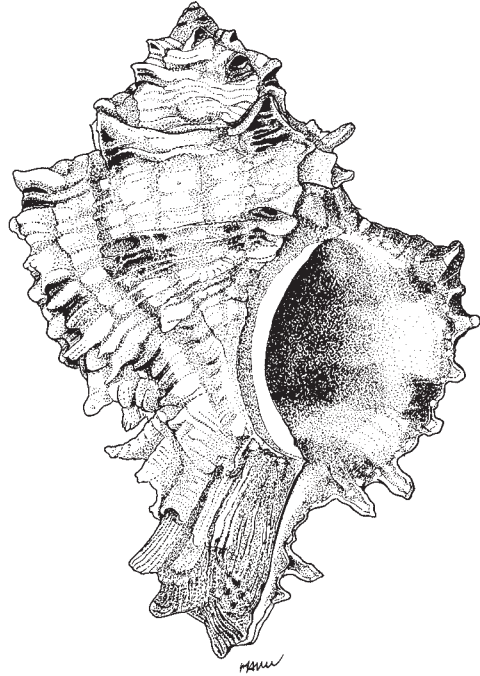
FAO names: **En** – Rosy-mouth murex; **Fr** – Murex hoplite; **Sp** – Busano rosa.

Diagnostic characters: Shell moderately large and stout, **globose-ovate and relatively squat** in outline, **with a moderately low, pointed spire** and tumid body whorl; **width of shell** (spines of varices excluded) **about two-thirds of length**. Spire whorls convex, with more than 3 axial varices per whorl. **Body whorl** large and globose, distinctly shouldered, **with about 6 to 8**, more or less thick, **spinose to knobby axial varices**, rather strong spiral cords interspersed with finer threads **and usually with a single low node between varices**; **spines of axial varices always larger at shoulder** but variably developed, **often reduced to knobs on median part of body whorl**. Aperture large, broadly ovate, with a shallow notch at posterior end and **a medium-sized, broad and narrowly open anterior siphonal canal**; about **2 spiral rows of short, straight spines on siphonal canal** and a slight umbilical excavation on left side, bordered by the ends of previous canals. **Outer lip crenulated**, with a series of short small ridges within. **Inner lip** with a narrow, **entirely adherent callus** and a small tubercle or spiral ridge at posterior end. **Colour:** **outside of shell whitish**, creamy white or light brown **to fawn**, somewhat darker on siphonal canal, **with 3 brown spiral bands** on body whorl (1 on shoulder, another one on anterior half of whorl and a third one, less distinct and paler, at basal end), **mostly reduced to darker brown blotches on axial varices and spines**. Aperture glossy white within, **inner lip bright pink to red**, **outer lip sometimes with a red rim and stained with reddish bands** corresponding to the outer spiral pattern.

Size: Maximum shell length 19.7 cm, commonly from 10 to 15 cm.

Habitat, biology, and fisheries: On sublittoral hard to soft bottoms, including rocks, coral and calcareous algae substrates, as well as sandy or muddy-sandy bottoms. Often partly buried near stones or large rocks from very shallow water to deeper sublittoral zone, from about 2 to 60 m depths or more; most frequent around 15 to 20 m deep. Preys mainly on bivalves, but without drilling their shell which is immobilized with the strong muscular foot; valves of the victim are then forced apart to have an access to soft parts. Frequently trawled or dredged for its edible foot. Abundantly collected with bottom nets in Angola.

Distribution: The tropical East Atlantic, from Senegal to Angola, in the Cape Verde Archipelago and Gulf of Guinea islands (São Tomé and Príncipe).



ventral view



***Hexaplex saharicus* (Locard, 1897)**

Frequent synonyms / misidentifications: *Chicoreus saharicus* (Locard, 1897); *Hexaplex saharicus ryalli* Houart, 1993; *Murex saharicus* Locard, 1897; *Muricanthus saharicus* (Locard, 1897) / *Hexaplex megacerus* (G.B. Sowerby II, 1834).

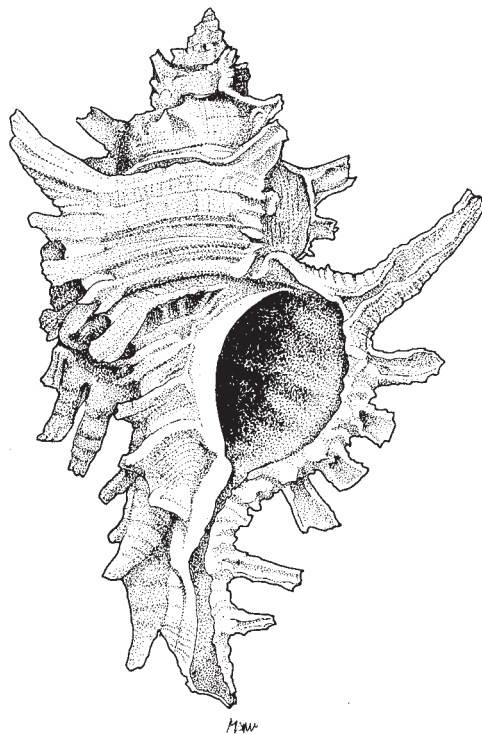
FAO names: En – Sahara murex; Fr – Murex saharien; Sp – Busano sahariano.

Diagnostic characters: Shell medium-sized, solid, roughly fusiform and relatively slender in outline, with a rather tall, acute conical spire and inflated body whorl; width of shell (spines of varices excluded) about half of length. Spire whorls markedly angulated at shoulder and spinose. Outer surface of shell with spinose axial varices, rather heavy spiral cords (5 on body whorl) and many fine intervening threads. Body whorl with 5 axial varices, and a single, often inconspicuous axial node between them; shoulder spine large, usually long, straight or slightly curved (reduced to an open triangular process on some specimens), followed by 4 shorter, straight open spines. Base of shell with (ssp. *saharicus*) or without (ssp. *ryalli*) a few small spines between the anteriormost spine of body whorl and the posteriormost spine of siphonal canal. Aperture ovate, with a small notch at posterior end. Outer lip crenulated on margin, smooth within. Inner lip with a narrow, entirely adherent callus and a small tubercle at posterior end. Anterior siphonal canal broad and moderately long, narrowly open, weakly bent distally to the right and dorsally, with 2 or 3 widely spaced, short, straight spines on each varix. **Colour:** outside of shell usually light coloured, creamy white or light greyish fawn, often with 2 poorly visible rusty brown spiral bands (1 around shoulder and 1 at base of body whorl), mostly appearing as faint elongated blotches just in front of each varix. Interior porcelainous white.

Size: Maximum shell length 9.9 cm, commonly from 5 to 6 cm.

Habitat, biology, and fisheries: On various hard bottoms. Sublittoral zone to continental shelf, from about 40 to 160 m depth. Collected for food and shell trade with bottom trawls and nets.

Distribution: East Atlantic, from Morocco to Guinea and the Canaries (ssp. *saharicus* Locard, 1897), and from Côte d'Ivoire to Ghana (ssp. *ryalli* Houart, 1993).



ventral view



***Stramonita haemastoma* (Linnaeus, 1767)**

Frequent synonyms / misidentifications: *Purpura haemastoma* (Linnaeus, 1767); *Thais haemastoma* (Linnaeus, 1758) / *Thais langi* Clench and Turner, 1948 [= *Thaisella forbesii* (Dunker, 1853)].

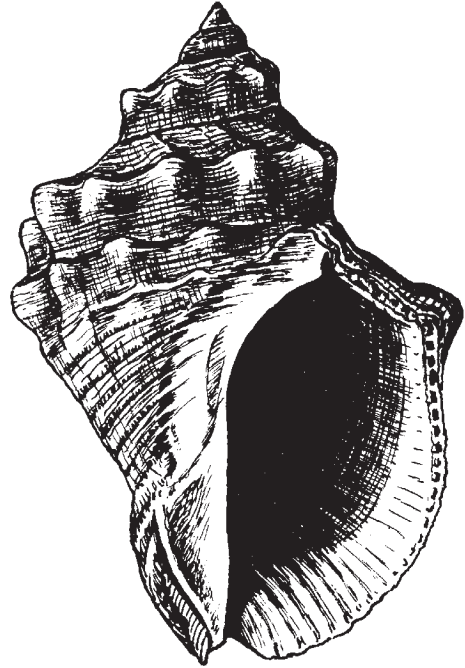
FAO names: **En** – Red-mouth rock shell; **Fr** – Ovarque-bouche de sang; **Sp** – Boca roja.

Diagnostic characters: **Shell** rather thick and heavy for its size, almost biconical in shape, **with a relatively tall, conical spire** and inflated body whorl. **Surface** of shell **with a variable sculpture of many fine incised spiral lines, and with a few spiral threads** often forming 2 or more **rows of short nodules on body whorl**, of which the shoulder ones are the strongest. Aperture broadly ovate, large, extending on two-thirds of shell length. **Outer lip** crenulated, **with numerous, strong spiral grooves** within. **Inner lip glazed, convex and narrowly calloused**, nearly smooth but for a single strong spiral ridge near posterior end of aperture, and sometimes a few faint oblique ridges on base of columella. Anterior **siphonal canal very short**, widely open. **Colour:** **outside** of shell **dull coloured**, creamy white or dirty grey to dark brown, **often more or less variegated with lighter and darker areas. Aperture deep salmon pink to light orange** (rarely nearly white), often tinged dark brown on grooves of the outer lip margin.

Size: Maximum shell length 12 cm, commonly from 6 to 8 cm.

Habitat, biology, and fisheries: Low intertidal and sublittoral zones, down to about 40 m depths. Very common on rocky bottoms in shallow water, feeding on a variety of prey such as barnacles, mussels, oysters or polychaete worms. Also occurring deeper, on muddy bottoms. Females often congregate before spawning, which usually occurs from April to May. Eggs laid in corneous capsules, arranged in clusters and with confluent bases. From the capsules hatch free-swimming planktonic larvae. Regularly collected and marketed for local consumption on the coasts of Western Africa. Shell sometimes used for decorative purposes in the local shellcraft industries. Together with the muricid *Bolinus cornutus*, this species has been exploited in the past on the Atlantic coast of northwest Africa, to prepare a highly prized dye known as the “Moorish purple” or “Gaetula purple”. Outside the area, the species is commercially fished in eastern Spain where it commonly appears in the markets; in the Mediterranean, it is also occasionally sold in coastal markets of northwestern Italy, Sicily, Cyprus and Turkey. Secretion of the salivary glands recently shown of strong potential interest for medical purposes.

Distribution: Eastern Atlantic, from the Bay of Biscay, France to Namibia, in the Macaronesian islands (the Canaries, Madeira and the Azores) and Cape Verde Islands. Throughout the Mediterranean, but most common in the Western Basin. Also occurring in the west Atlantic [ssp. *floridana* (Conrad, 1837)], from North Carolina throughout the Caribbean to Brazil and Uruguay, and in the mid-oceanic Ascension Island.



ventral view

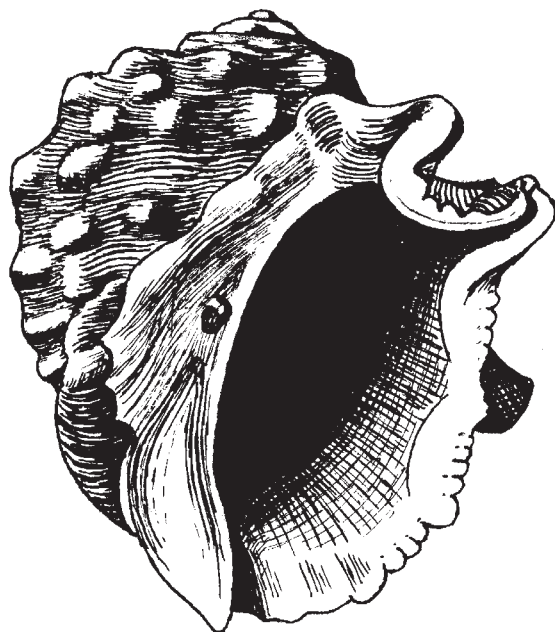


Thais nodosa (Linnaeus, 1758)

Frequent synonyms / misidentifications: *Purpura ascensionis* de Blainville, 1832; *Purpura nodosa* (Linnaeus, 1758); *Thais meretricula* Röding, 1798 / *Thais coronata* (Lamarck, 1816) [= *Thaisella coronata*].

FAO names: En – Nodose rock shell; Fr – Ovarque noueuse; Sp – *Purpura nudosa*.

Diagnostic characters: Shell thick and solid, **globose**, almost as wide as long and **with a very low to nearly flat**, often eroded **spire**. Spire whorls with a single row of blunt tubercles just under the suture. **Surface** of shell with numerous very fine and low spiral threads, generally covered by calcareous incrustations, and **with 4 or 5 spiral rows of short, blunt tubercular spines on body whorl**, which are stronger and longer on shoulder and peripheral rows. Aperture ovate, extending on most of the shell length, with a shallow oblique groove at posterior end and a **short, open anterior siphonal canal**. **Outer lip** widely convex, **smooth within**, with poorly marked short and shallow marginal crenulations. **Inner lip** smooth and glazed, **flattened and somewhat depressed**, **widely calloused**, **with 1 to 4** (usually 2) **rounded knobs** on columella. **Colour:** **outside** of shell **dirty white** to greyish or pale straw coloured, sometimes with brownish apex. **Interior glossy white**, **with blackish brown spots on columellar knobs**.



Size: Maximum shell length 7.8 cm in the area (up to 13.3 cm in the West Atlantic), commonly to 4 cm.

Habitat, biology, and fisheries: On rocks in the intertidal and subtidal zones, to a depth of about 5 m. Frequently collected and marketed for human consumption. Mainly used in soups.

Distribution: The tropical East Atlantic, from Mauritania to Angola and in the Cape Verde Islands. Also present in the western Atlantic Fernando do Noronha Island (Brazil) and mid-oceanic Ascension Island.

ventral view



***Thaisella coronata* (Lamarck, 1816)**

Frequent synonyms / misidentifications: *Cuma coronata* (Lamarck, 1816); *Purpura coronata* Lamarck, 1816; *P. guineensis* Schubert and Wagner, 1829; *Thais coronata* (Lamarck, 1816); *T. trinitatensis* Guppy, 1869 / *Purpura callifera* Lamarck, 1816.

FAO names: **En** – Crowned rock shell; **Fr** – Ovarque couronnée; **Sp** – *Purpura coronada*.

Diagnostic characters: Shell thick and solid, **globose ovate** in shape and slightly longer than wide, **with a relatively short, conical spire**. Surface of shell with many narrow small spiral threads crossed by irregular axial growth lines, and **with about 4 spiral rows of short stout tubercles on body whorl**, 1 on shoulder, 1 on mid-length of whorl and the others more anteriorly; tubercles most developed on shoulder row, smaller to sometimes obsolete on the 2 anteriormost rows. Base of body whorl with a **broad spiral ridge bordering the umbilical excavation**. A spiral row of rounded, hollow tubercles just under the suture, forming on aperture a prominent expansion at posterior end of outer lip; tubercles more or less closely spaced, either distinct and forming a series of scales, or quite fused together into a strong and rounded ridge. Aperture ovate, extending on two-thirds to three-quarters of the shell length, with a **short, open anterior siphonal canal**. Outer lip obtusely angulated at shoulder level, **with marginal crenulations**, distinct but not extending deeply within. **Inner lip** not flattened, **narrowly calloused, smooth**. **Colour:** outside of shell **dirty white** to beige or greyish, **plain coloured** or with spirally arranged **reddish brown marks**. Aperture and columellar callus **light orange** to fleshy pink.



ventral view

Size: Maximum shell length 5.1 cm, commonly from 3 or 4 cm.

Habitat, biology, and fisheries: Common among mangroves, on rocks and other hard substrates. Frequently climbing upon aerial roots of mangrove trees. Intertidal and very shallow subtidal levels, to about 0.5 m deep. Collected for food at low tide by coastal inhabitants and sold in local markets. Often used in soups.

Distribution: Tropical East Atlantic, from Mauritania to Angola, but probably not in the Cape Verde Archipelago. Also occurring in the West Atlantic, from Venezuela to northeastern Brazil.

Remark: Taxonomic status *Purpura callifera* is still disputed, and it is currently considered a separate species, distinct from the very similar *Thaisella coronata*.

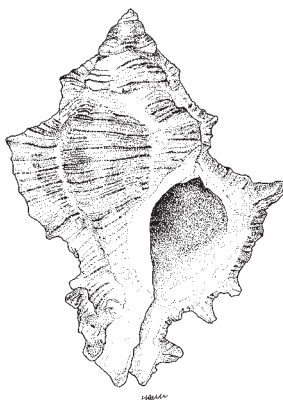


Chicoreus varius (G.B. Sowerby II, 1834)

Frequent synonyms / misidentifications: *Hexaplex varius* (Sowerby, 1834); *Murex clausii* Dunker, 1879; *M. varius* Sowerby, 1834; *Phyllonotus varius* (Sowerby, 1834); *Triplex varius* (Sowerby, 1834) / *Murex senegalensis* Gmelin, 1791 [= *Siratus senegalensis* (Gmelin, 1791)].

En – Varius murex; **Fr** – Murex varié; **Sp** – Busano variado.

Maximum shell length 7 cm, commonly to 5 cm. On various sandy or rocky sublittoral bottoms, from about 15 to 35 m depths. Fairly common locally. Collected for food with bottom trawls and nets. Tropical East Atlantic, from Senegal to Angola.



ventral view

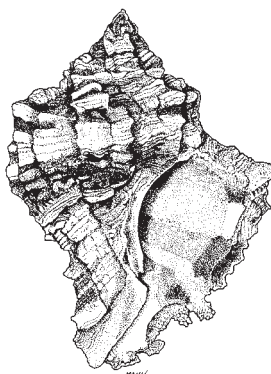


Hexaplex bifasciatus (A. Adams, 1853)

Frequent synonyms / misidentifications: *Murex bifasciatus* A. Adams, 1853; *Phyllonotus bifasciatus* (A. Adams, 1853); *Trunculariopsis bifasciatus* (A. Adams, 1853) / *Hexaplex rosarium*; *H. trunculus* (Linnaeus, 1758).

En – Two-banded murex; **Fr** – Murex bifascié; **Sp** – Busano de dos bandas.

Maximum shell length 9 cm, commonly from 6 to 7 cm. Between or under rocks, often partly buried in sand pockets. Sublittoral zone, between 2 and 10 m depths. Planktonic larval stage probably reduced or absent. Most frequent in small quiet bays around Boavista Island, where it is locally collected. Endemic to the Cape Verde Archipelago.



ventral view

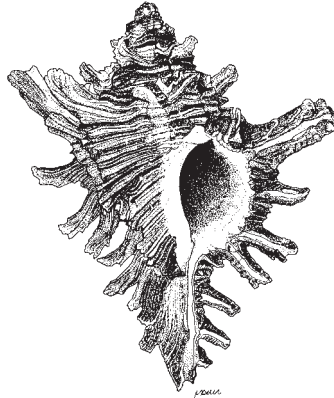


Hexaplex megacerus (G.B. Sowerby II, 1834)

Frequent synonyms / misidentifications: *Murex megacerus* Sowerby, 1834; *M. moquinianus* Duval, 1853; *Muricanthus megacerus* (Sowerby, 1834) / *Hexaplex saharicus*; *Murex bourgeoisii* Tournouër, 1875.

En – Thick-spined murex; **Fr** – Murex mégacère; **Sp** – Busano megaceros.

Maximum shell length 11 cm, commonly to 7 cm. In rocky areas. Intertidal zone and subtidally, down to a depth of about 40 m. Collected for food or for its shell, at low tide or more commonly with bottom nets. Tropical East Atlantic, from Senegal to Angola. Northern limit of distribution somewhat uncertain because of recurrent confusion with *Hexaplex saharicus*, perhaps extending to Mauritania.



ventral view

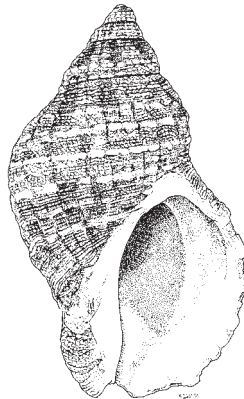


Nucella squamosa (Lamarck, 1816)

Frequent synonyms / misidentifications: *Purpura clathrata* de Blainville, 1832; *P. ovalis* de Blainville, 1832; *P. squamosa* (Lamarck, 1816) / None.

En – Squamose rock shell; **Fr** – Pourpre écailleuse; **Sp** – Purpura escamosa.

Maximum shell length 6 cm, commonly to 4.5 cm. Common in rocky areas or among seaweeds. Low tide levels and sublittoral zone, to about 50 m depth. Often found under rocks and stones in low tide pools and gulleys, dwelling among holdfasts of the giant kelp *Ecklonia* and covered in life with a prickly colony of the hydroid *Hydractinia altispira* Millard, 1955. Egg capsules about 1 cm high, wedge shaped with a very short basal stalk and a keel on each side. Locally collected for subsistence purpose where common. East Atlantic and Southwest Indian Ocean; north to Namibia and east to Eastern Transkei, South Africa.



ventral view

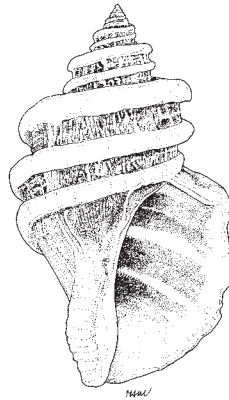


Trochia cingulata (Linnaeus, 1758)

Frequent synonyms / misidentifications: *Nucella cingulata* (Linnaeus, 1758); *Thais cingulata* (Linnaeus, 1758) / *Trochia dubia* (Krauss, 1848).

En – Corded rock shell; **Fr** – Pourpre cordée; **Sp** – Purpura encordada.

Maximum shell length 4.8 cm, commonly to 3 cm. Common in rocky areas, at low intertidal levels and sublittorally, down to a depth of about 20 m. Somewhat seasonally migrating between tides, with the highest concentrations in spring and autumn. Mainly preying on barnacles or on mussels in which they bore holes. May cause important destructions in banks of the cholga mussels *Aulacomya atra* (Molina, 1782). Egg capsules about 0.5 cm high, wedge shaped with a distinct though rather short stalk and a recurved flattened expansion over the top. Locally collected for subsistence purpose and for its curiously sculptured shell which is often abundant in beach drifts. Southeastern Atlantic coasts of Africa, from Namibia to False Bay, South Africa.



ventral view

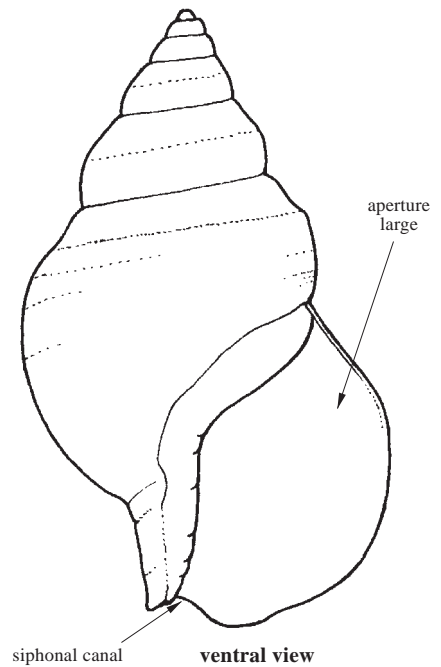


BUCCINIDAE

Whelks, goblets

Diagnostic characters: Shell globose, ovate-conical to fusiform in shape, generally with a fairly high spire and large body whorl. Outer surface smooth or with axial and spiral elements of sculpture, without axial varices and developed spines. Periostracum usually prominent. Aperture ovate to rounded, anterior siphonal canal usually rather broadly open and short. Operculum corneous, with its nucleus near the anterior end or submedian. Head with long snout and eyes at the outer bases of the tentacles. Foot large, broad and truncate anteriorly. Fleshy siphon well developed.

Habitat, biology, and fisheries: This large family contains numerous species living in various boreal, temperate and tropical environments, from intertidal and shallow waters to more than 3 000 m depths. Mostly carnivores and scavengers, feeding on worms or other molluscs, or on dead fishes and crabs. Sexes separate, fertilization internal. Eggs laid in horny capsules, either singly or in masses. In capsules, some eggs may provide food for the developing embryos. Hatching occurring generally at the crawling stage, but a planktonic free-swimming larval stage may exist in some species. Though whelks are actively exploited for their edible flesh in many parts of the world, their importance for fisheries appears rather limited in the studied area. However, some species are locally collected for subsistence purpose, and their shell utilized in the shellcraft industry.

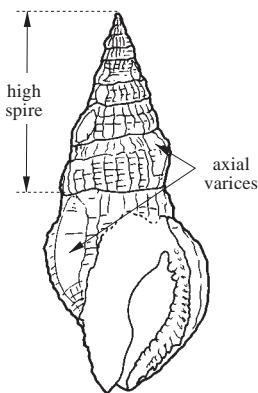


Similar families occurring in the area

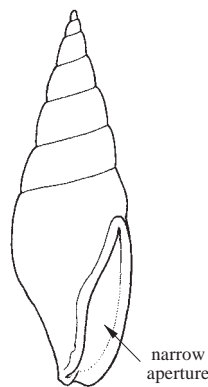
Colubrariidae: spire high, with many whorls. Axial varices present. Aperture short.

Columbellidae: aperture narrow, inner and/or outer lips denticulate. Operculum small to absent. (Best distinguishable on radular characters).

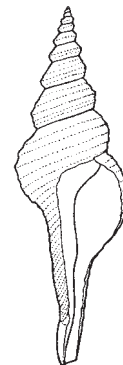
Fasciolariidae: *Fusinus* species very similar to the buccinid *Afer pseudofusinus* on shell features; readily distinguishable on radular characters only.



ventral view
Colubrariidae



ventral view
Columbellidae



ventral view
Fusinus species
Fasciolariidae

Key to species of interest to fisheries occurring in the area

- 1a. Shell sinistral (when the shell is in ventral view, with the apex upward, aperture stands on the left side of coiling axis) (Fig.1) ***Neptunea contraria***
- 1b. Shell dextral (when the shell is in ventral view, with the apex upward, aperture stands on the right side of coiling axis) → 2
- 2a. Siphonal canal long and slender, about one-third of shell length (Fig.2) ***Afer pseudofusinus***
- 2b. Siphonal canal relatively short and broad, much smaller than one-third of shell length → 3

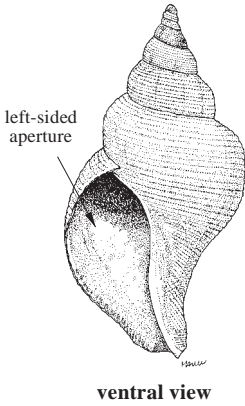


Fig. 1 *Neptunea contraria*

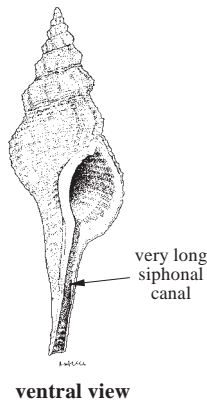


Fig. 2 *Afer pseudofusinus*

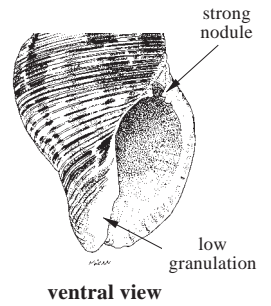


Fig. 3 *Gemophos viverratus*

- 3a. Inner lip of aperture somewhat granular anteriorly and with a strong nodule at posterior end (Fig.3) ***Gemophos viverratus***
- 3b. Inner lip of aperture smooth, at most with a weak knob at posterior end → 4
- 4a. Siphonal canal moderately long and narrow; no siphonal fasciole (Fig. 4) ***Afrocominella capensis***
- 4a. Siphonal canal very short and wide; siphonal fasciole prominent → 5
- 5a. Spiral sculpture well developed, with a deep furrow on shoulder slope and, as a rule, strong ridges (only occasionally reduced to nearly absent) with fine grooves in their intervals; shell colour uniform reddish brown (sometimes with light and dark marks on spiral ridges) under the thick, rough periostracum (Fig. 5) ***Burnupena cincta***
- 5b. Spiral sculpture poorly developed, with only a slight concavity on shoulder slope and fine spiral grooves; shell colour yellowish to grey with irregular, dark brown axial stripes under the thin periostracum (Fig. 6) ***Burnupena catarrhacta***

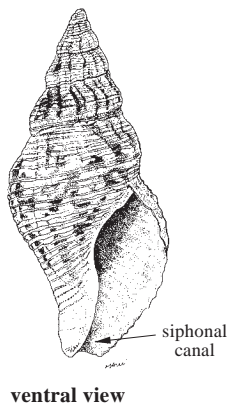


Fig. 4 *Afrocominella capensis*

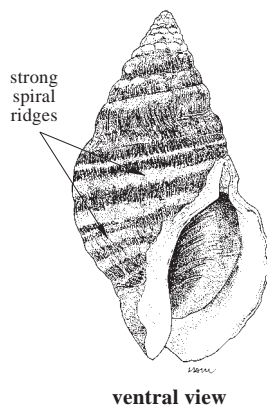


Fig. 5 *Burnupena cincta*

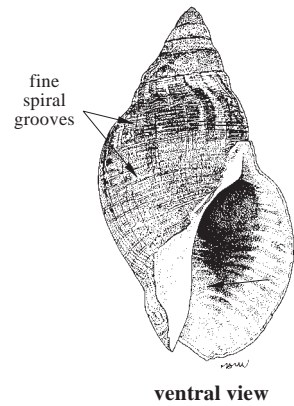



Fig. 6 *Burnupena catarrhacta*


List of species of interest to fisheries occurring in the area


The symbol  is given when species accounts are included.

 *Afer pseudofusinus* Fraussen and Hadorn, 2000.

 *Afrocominella capensis* (Dunker, 1844).

 *Burnupena catarrhacta* (Gmelin, 1791).

 *Burnupena cincta* (Röding, 1798).

 *Gemophos viverratus* (Kiener, 1834).

 *Neptunea contraria* (Linnaeus, 1771).

References

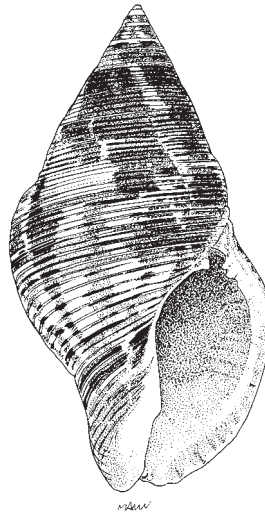
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- Tryon, G.W. Jr.** 1880–1881. *Manual of Conchology; Structural and Systematic. With illustrations of the species. Vol. 3. Tritonidae, Fusidae, Buccinidae*. Philadelphia, Academy of Natural Sciences: 310 p., 87 pls.
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***Gemophos viverratus* (Kiener, 1834)**

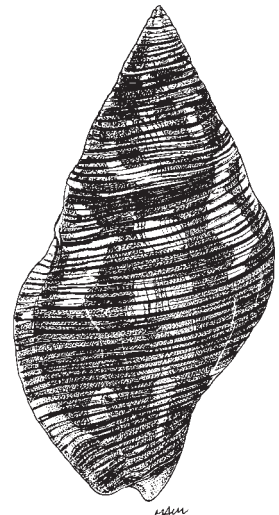
Frequent synonyms / misidentifications: ? *Cantharus sulcatus* (Gmelin, 1791); *C. variegatus* (Gray, 1839); *C. viverratus* (Kiener, 1834); *Pollia viverrata* (Kiener, 1834); *Tritonidea viverrata* (Kiener, 1834) / None.

FAO names: En – Civet goblet; Fr – Buccin civette; Sp – Caracolillo civeta.

Diagnostic characters: Shell thick and very solid, with a conical ovate and rather short shape, width nearly equalling three-fifths of the length. Spire well developed, conical, with straight sided to moderately convex whorls. Body whorl convex, rounded to somewhat shouldered, and more or less depressed to concave just under the suture. **Sculpture** variable, with numerous close set spiral grooves and threads, and sometimes rough axial undulations. **Outer lip** of the aperture distinctly **ridged inside**; **inner lip** somewhat **granular toward the base** and siphonal canal area, **with a strong nodule near posterior end**, separated from the outer lip teeth by a deep gap. Anterior **siphonal canal short and blunt**, moderately open ventrally and set off from the aperture



ventral view



dorsal view

by a basal thickening of columella. Siphonal fasciole distinct. Operculum elliptical ovate, with nucleus at anterior end. **Colour:** outside of shell **greyish blue to purplish brown, with several paler axial streaks and marked with narrow, crowded, interrupted darker and lighter spiral lines**. Siphonal fasciole pale coloured. Aperture white to pale greyish blue and glazed, sometimes flecked with orange to brown between the outer lip ridges and with the outer colour pattern of shell showing through the thin columellar glaze.

Size: Maximum shell length 5 cm, commonly to 3 or 4 cm.

Habitat, biology, and fisheries: On sandy or rocky bottoms. Intertidal and sublittoral zones to about 10 m depth. Very common in Gabon and Senegal, where it is collected at low tide and in shallow water, for subsistence and for its attractive shell.

Distribution: East Atlantic, from Mauritania to Angola, in the Canaries and Cape Verde Islands.



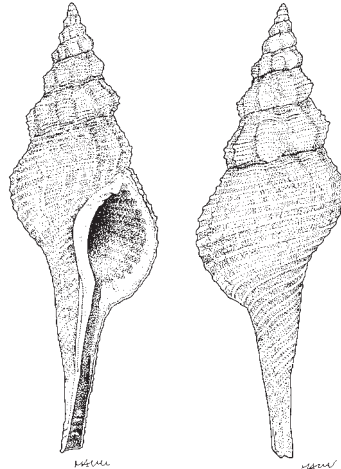
***Afer pseudofusinus* Fraussen and Hadorn, 2000**

Frequent synonyms / misidentifications: None / *Fusinus boettgeri* (Maltzan, 1884); *F. longicauda* (Lamarck, 1801) [= *F. colus* (Linnaeus, 1758)].

En – False spindle whelk; **Fr** – Buccin fusoïde; **Sp** – Caracolillo tulipán.

Maximum shell length 7.2 cm, commonly from 4 to 6 cm. On soft bottoms. Partly buried in sandy muddy bottoms, sometimes with shell grit. Mainly occurring on continental shelf, from about 85 to 300 m depths, but also present in shallower waters in Senegal and Côte d'Ivoire. Occasionally collected in number by shrimp trawlers, with bottom trawls or nets. Eastern Atlantic, from Mauritania to Côte d'Ivoire.

Remarks: Taxonomic status of this species long uncertain; till recently, it was mistaken with fasciolariid species, and genus *Afer* was included in family Turbinellidae.



ventral view

dorsal view

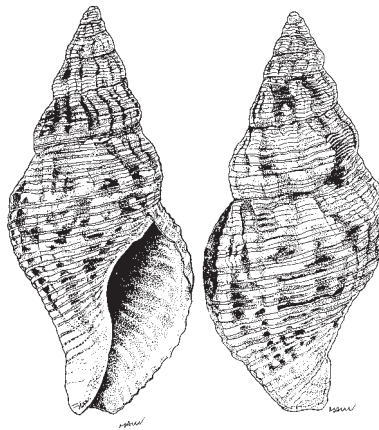


***Afrocominella capensis* (Dunker, 1844)**

Frequent synonyms / misidentifications: *Cominella capensis* (Dunker, 1844) / *Afrocominella elongata* (Dunker, 1857) [= *Afrocominella capensis simoniana* (Petit de la Saussaye, 1852)].

En – Cape whelk; **Fr** – Buccin du Cap; **Sp** – Caracolillo del Cabo.

Maximum shell length 5.8 cm, commonly to 4 cm. On sandy bottoms. Low intertidal and sublittoral zones, down to about 80 m depth. A common species, probably feeding on small red worms, often hidden under loose rocks and stones lying on sand on the shore, or in low tide pools. Most frequently found infratidally, but becoming more frequent in the intertidal zone when spawning. Egg capsules lens shaped, milky white with a transparent escape hatch on top. Sometimes collected in number with bottom trawls or nets. Eastern Atlantic, from Namibia to Cape Agulhas, South Africa.



ventral view

dorsal view

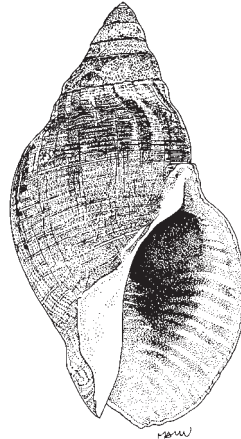


***Burnupena catarrhacta* (Gmelin, 1791)**

Frequent synonyms / misidentifications: *Burnupena delalandii* (Kiener, 1834) / *Burnupena lagenaria* (Lamarck, 1822); *B. papyracea* (Bruguière, 1789).

En – Delalande's burnupena; **Fr** – Buccin de Delalande; **Sp** – Caracolillo de Delalande.

Maximum shell length 5 cm, commonly to 4 cm. On tidal rocks or in gravel areas. Most common at mid-tidal levels, in pools, rock crevices, among gravels or mussels on which it frequently lays its clumps of egg capsules. Mainly feeding on dead or wounded animals they easily detect in the water. A common intertidal species, locally collected by coastal peoples for subsistence purpose. Eastern Atlantic, from Namibia to Hermanus, South Africa.



ventral view

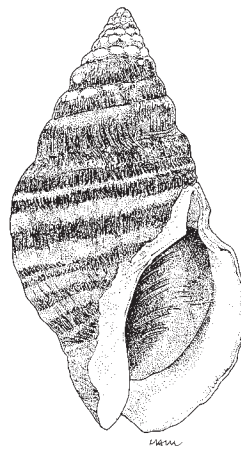


***Burnupena cincta* (Röding, 1798)**

Frequent synonyms / misidentifications: ? *Buccinum mexicanum* Bruguière, 1789 / *Burnupena papyracea* (Bruguière, 1789); *B. tigrina* (Kiener, 1834) [= *B. pubescens* (Küster, 1858)].

En – Girdled burnupena; **Fr** – Buccin gainé; **Sp** – Caracolillo zocato.

Maximum shell length 6.9 cm, commonly to 5 cm. On rocky littoral areas, from lower half of the intertidal zone to shallow subtidal levels. A common scavenger, rapidly converging on any freshly dead or damaged animal. Often found in pools or in rock crevices at low tide, it is used for subsistence purposes where common. Eastern Atlantic and southwestern Indian Ocean, from Namibia to eastern Transkei, South Africa; northern limit of distribution in West Africa uncertain, perhaps extending to Angola.



ventral view

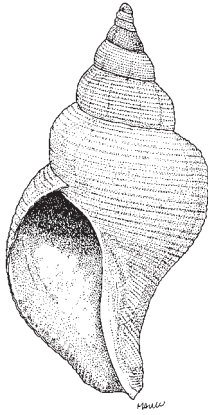


***Neptunea contraria* (Linnaeus, 1771)**

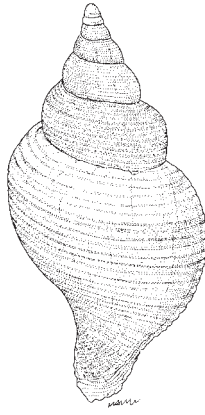
Frequent synonyms / misidentifications: None / None.

En – Left-handed neptune; **Fr** – Buccin sénestre; **Sp** – Caracolillo zurdo.

Maximum shell length 14.6 cm, commonly to 8 or 9 cm. On various bottoms, in rather deep water. Continental shelf and slope, at depths of about 100 to 1 000 m. Incidental bycatch of shrimp trawlers. East Atlantic, from the Gulf of Biscay and northern Spain to south Western Sahara.



ventral view



dorsal view

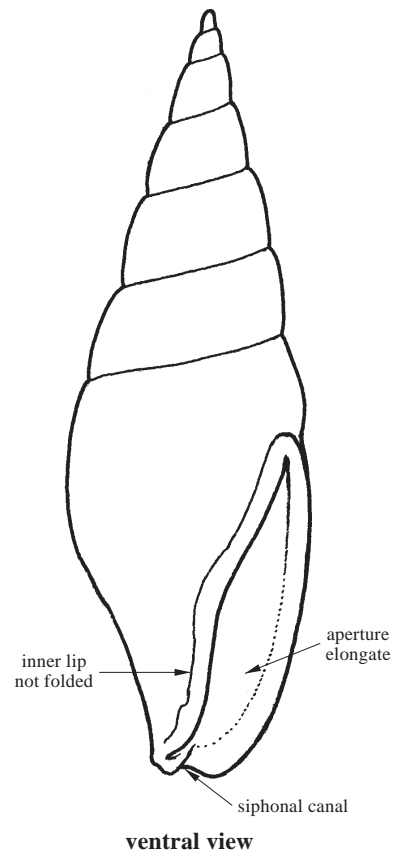


COLUMBELLIDAE

Dove shells

Diagnostic characters: Shell generally **small**, **fusiform** to biconic in shape, with a conical, more or less elongate spire. Outer surface without axial varices, ribbed or smoothish, **often boldly coloured**. Periostracum variably developed to absent. **Aperture rather long and narrow, with a rather short, anterior siphonal canal**. Outer lip commonly thick, smooth or denticulate within, sometimes with a shallow groove or slit posteriorly. **Inner lip smooth or denticulate, but not folded**. **Operculum corneous**, thin and small to absent, with an apical nucleus. Head with long and slender tentacles, bearing eyes at their outer bases. Foot rather strong and narrow, pointed behind. Fleshy siphon very long.

Habitat, biology, and fisheries: Very active, omnivorous crawlers, living in warm temperate and tropical marine environments. Often abundant in intertidal and shallow subtidal zones. Sexes separate, fertilization internal. Eggs protected by corneous capsules attached singly or in groups to the substrate by a flat basal disc. Hatching as free-swimming planktonic larvae, or directly as crawling young. In the area, dove shells are mainly collected for their brightly coloured, elegant shells.

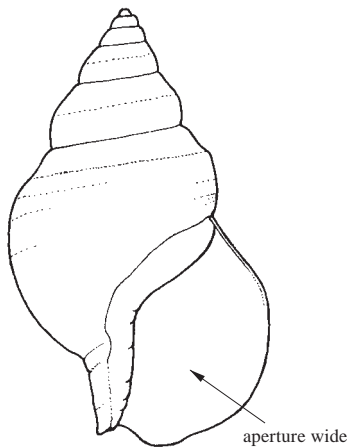


ventral view

Similar families occurring in the area

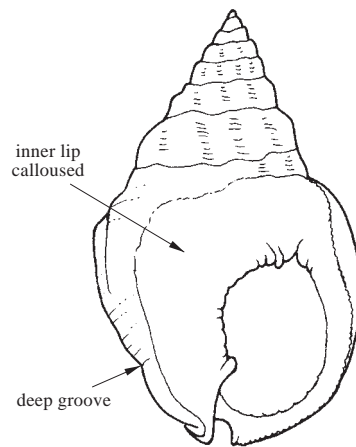
Buccinidae: aperture rather wide, lips usually not denticulate within. (Best distinguishable on radular characters).

Nassariidae: a deep groove at the base of the shell. Siphonal canal very short. Inner lip often with a strong callus, sometimes forming an extensive shield.



ventral view

Buccinidae



ventral view

Nassariidae

Key to species of interest to fisheries occurring in the area

- 1a. Apex with a paucispiral protoconch (Fig. 1a). *Columbella rustica*
 1b. Apex with a multispiral protoconch (Fig. 1b). *Columbella adansoni*

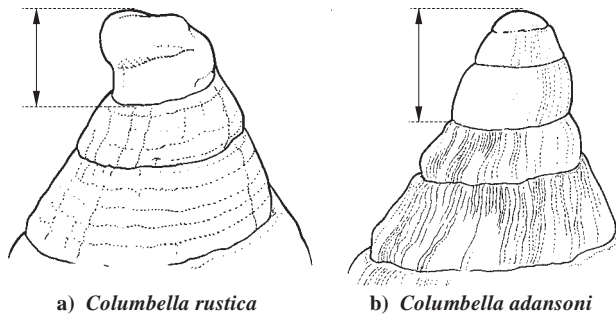





Fig. 1 protoconch

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

-  *Columbella adansoni* Menke, 1853.
 *Columbella rustica* (Linnaeus, 1758).

References

- Hernández, J.M. & Boyer, F.** 2005. Notes on the columbellid fauna from the infralittoral and circalittoral levels of the Canary Islands. *Iberus*, 23(2): 69–93.
- Moolenbeek, R.G. & Hoenselaar, H.J.** 1991. On the identity of “*Columbella rustica*” from West Africa and the Macaronesian islands. *Bulletin Zoölogisch Museum, Universiteit Van Amsterdam*, 13(6): 65–70.
- Pelorce, J. & Boyer, F.** 2005. La famille Columbellidae (Gastropoda: Muricoidea) dans l’infralittoral de la Péninsule du Cap Vert. *Iberus*, 23(2): 95–118.
- Rolán, E.** 2005. Columbellidae (Gastropoda, Neogastropoda) of the gulf of Guinea with description of eight new species. *Iberus*, 23(2): 119–156.
- Rolán, E. & Ryall, P.** 1999. The genus *Columbella* Swainson, 1840 (Gastropoda, Muricoidea) in the East Atlantic. *La Conchiglia*, 290: 57–58.
- Tryon, G.W. Jr.** 1883. Family Columbellidae. In: *Manual of Conchology; Structural and Systematic. With illustrations of the species. Vol.V.* Philadelphia, Academy of Natural Sciences: pp. 100–198, pl. 42–63.

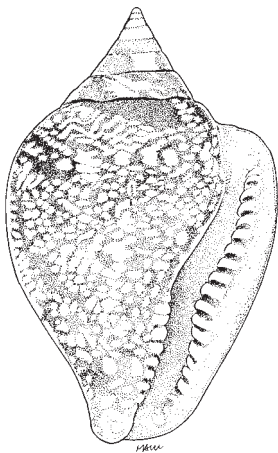
***Columbella adansoni* Menke, 1853**

Frequent synonyms / misidentifications: *Columbella rustica* var. *striata* of authors [not of Duclos, 1846]; *C. rufa* Menke, 1853 / *Columbella rustica*.

En – Adanson's dove shell; **Fr** – Colombelle d'Adanson; **Sp** – Columbela de Adanson.

Maximum shell length 2.5 cm, commonly to 1.5 cm. In stony to rocky areas, in the intertidal zone and at shallow subtidal depths. Egg capsules attached to algae, without stem, elliptical in outline with one end pointed and the other rounded. Eggs hatching as planktonic larvae through an oval escape opening located near the rounded end of the capsule. Planktonic stage long. Mainly collected for its decorative shell. Distribution imperfectly known, because of confusion with *Columbella rustica*. Eastern Atlantic, in Macaronesian islands (the Azores, Madeira and the Canaries), Cape Verde and Gulf of Guinea islands, and along the coasts of tropical West Africa, probably from Sierra Leone to central Angola.

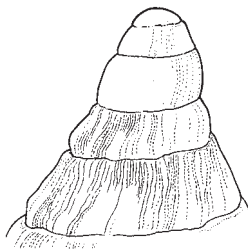
Remarks: Until recently, this species has been confused in the area with the very similar *C. rustica*. Specimens with a worn apex are not distinguishable on shell characters, and then study of the radula or biochemical analyses are necessary to discriminate the species.



ventral view



dorsal view



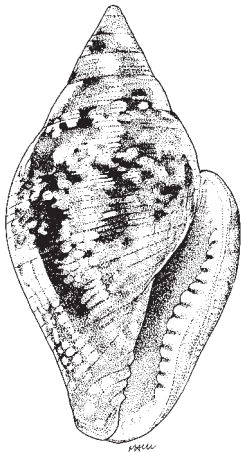
embryonic shell

***Columbella rustica* (Linnaeus, 1758)**

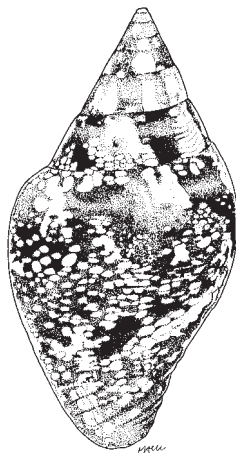
Frequent synonyms / misidentifications: *Columbella rustica* var. *striata* Duclos in Chenu, 1846 / *Columbella rustica* var. *striata* of authors [= *C. adansonii*].

En – Rustic dove shell; **Fr** – Colombelle rustique; **Sp** – Columbela rustica.

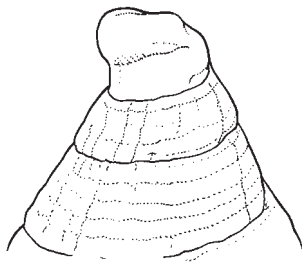
Maximum shell length 2.5 cm, commonly to 1.5 cm. Common under rocks and stones in the intertidal zone and at shallow subtidal depths, often associated with sea grass prairies. Egg capsules dome-shaped, containing about 40 to 60 eggs, of which only 1 or 2 develop and hatch as crawling young, the remaining ones being nurse eggs. Collected for its variable attractive shell, mainly to make necklaces and decorative items. Eastern Atlantic, from Portugal to Senegal, but neither more southward along West African mainland nor in oceanic islands. Throughout the Mediterranean.



ventral view



dorsal view



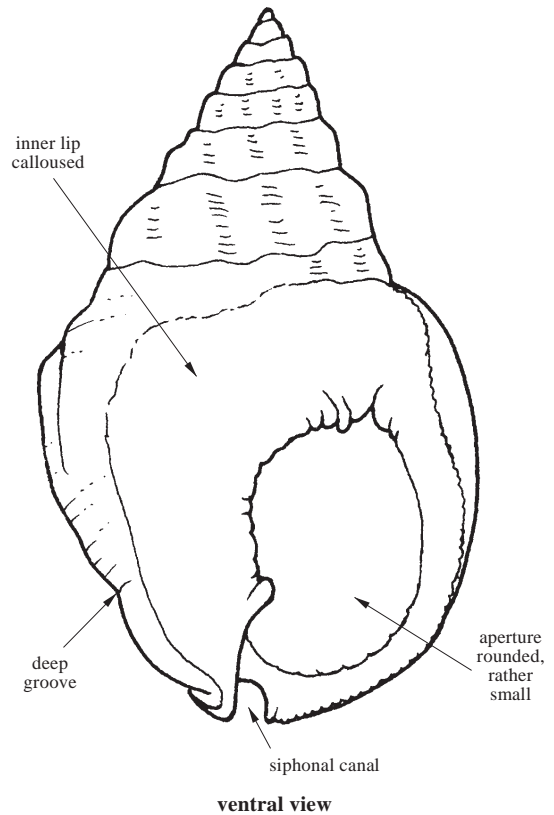
embryonic shell

NASSARIIDAE

Nassa mud snails

D **Diagnostic characters:** Shell ovately rounded, usually with a fairly high, conical spire and large body whorl anteriorly bordered by a strong spiral groove. Outer surface sculptured with axial ribs and spiral cords, sometimes smooth. No umbilicus. Aperture rather small and irregularly rounded, with a very short, recurved siphonal canal. Outer lip often somewhat thickened, smooth or denticulate inside, sometimes with a shallow groove or slot posteriorly. Inner lip smooth or weakly ridged but **not folded, calloused** and more or less expanded into a smooth shield. Operculum corneous, smaller than the aperture, with a subterminal nucleus and often serrate along margins. Head with long and slender tentacles bearing eyes on swellings at their outer bases. Snout long and extensible. Foot large, with lateral points anteriorly and typically a pair of posterior tentacles. Fleshy siphon very long.

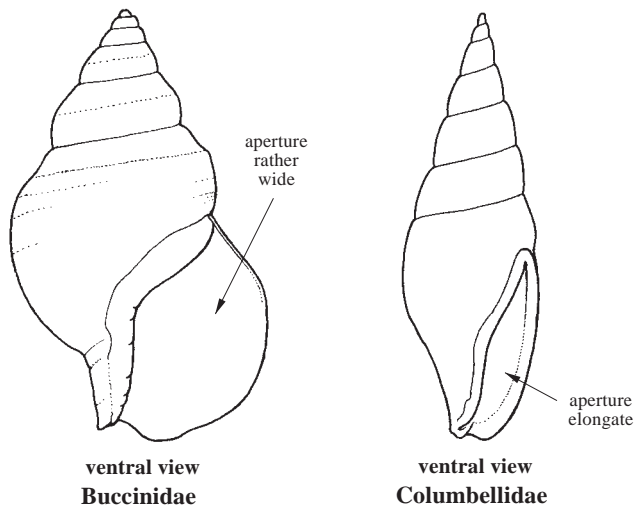
Habitat, biology, and fisheries: Most common on intertidal and sublittoral, temperate to tropical soft bottoms, in marine or brackish water environments. Mainly carrion-feeding, active animals. Can slide rapidly on sand or mud, with the fleshy siphon expanded as they search for food, or quickly bury themselves in the substrate. Often living in dense colonies. Sexes separate, fertilization internal. Eggs laid in corneous capsules, usually hatching as free-swimming larvae that persist relatively long (for 1 or 2 months) in the plankton before settlement. Nassariidae are locally used as food by coastal populations, and the shells are sometimes used in shellcraft.



Similar families occurring in the area

Buccinidae: aperture rather wide; outer sculpture, when developed, essentially concentric.


Columbellidae: no deep groove at base of shell; aperture elongate; inner lip without an extensive callus.








Key to species of interest to fisheries occurring in the area

- 1a. Shell with a prominent axial sculpture throughout → 2
- 1b. Shell without a prominent axial sculpture (axial ridges sometimes present on early spire whorls, fading out with growth) → 3
- 2a. Body whorl strongly convex, forming exteriorly a markedly protruding varix on outer lip margin; outer sculpture of axial ridges crossed by narrow spiral threads. Inner lip callus rather thin posteriorly, with many short ridges and tubercles ***Nassarius tritoniformis***
- 2b. Body whorl moderately convex, not forming a thick varix on outer lip margin; outer sculpture of axial ridges crossed by narrow spiral grooves. Inner lip callus rather thick posteriorly and nearly smooth ***Nassarius reticulatus***
- 3a. Body whorl distorted by a thick callus above the aperture ***Bullia callosa***
- 3b. Body whorl not distorted by a thick callus above the aperture → 4
- 4a. Shell globose ovate in shape (width more than half the length); spire with strongly convex whorls and well marked suture ***Nassarius mutabilis***
- 4b. Shell elongate ovate in shape (width less than half the length); spire with slightly convex whorls and shallow suture ***Dorsanum miran***

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

-  *Bullia callosa* (Wood, 1828).
-  *Dorsanum miran* (Bruguière, 1789).
-  *Nassarius mutabilis* (Linnaeus, 1758).
-  *Nassarius reticulatus* (Linnaeus, 1758).
-  *Nassarius tritoniformis* (Kiener, 1841).

References

- Adam, W. & Knudsen, J.** 1984. Révision des Nassariidae (Mollusca: Gastropoda Prosobranchia) de l'Afrique occidentale. *Bulletin, Institut royal des sciences naturelles de Belgique*, 55(9): 1–95, pl. 1–5.
- Allmon, W.D.** 1990. Review of the *Bullia* Group (Gastropoda: Nassariidae) with comments on its Evolution, Biogeography, and Phylogeny. *Bulletins of American Paleontology*, 99 (355): 1–179.
- Cernohorsky, W.O.** 1984. Systematics of the family Nassariidae. *Bulletin of the Auckland Institute and Museum*, (9): I–IV, 1–356, pl.1–51.

Bullia callosa (Wood, 1828)

Frequent synonyms / misidentifications: *Bullia sulcata* Sowerby, 1889 [not of Reeve, 1846]; *Dorsanum callosum* (Wood, 1828) / None.

En – Callused bullia; **Fr** – Bullie calleuse; **Sp** – Bulia callosa.

Maximum shell length 5.2 cm, commonly to 3.5 cm. In muddy sand bottoms. Common intertidally and in shallow subtidal waters, but also deeper to a depth of about 35 m. Collected for subsistence purposes and for its glossy shell. Used in soups. Southeast Atlantic and southwest Indian Ocean; north to Angola and east to northern Natal, South Africa.



ventral view

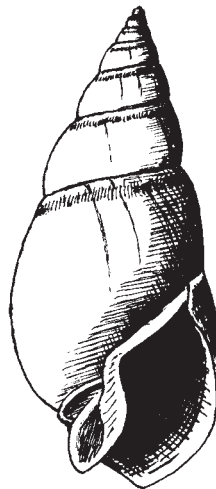


Dorsanum miran (Bruguière, 1789)

Frequent synonyms / misidentifications: *Bullia miran* (Bruguière, 1789); *B. polita* (Lamarck, 1822); *B. vitrea* (Reeve, 1846) / None.

En – Miran bullia; **Fr** – Bullie miran; **Sp** – Bulia miran.

Maximum shell length 3 cm, commonly to 2.5 cm. Common in fine sand and muddy sand bottoms. Intertidal and sublittoral zones to a depth of about 20 m. Collected for food by coastal people. Used in soups. Tropical east Atlantic, from southern Morocco and Mauritania to Senegal.



ventral view

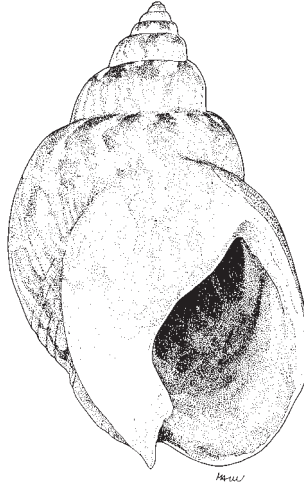


***Nassarius mutabilis* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Nassa inflata* (Lamarck, 1822); *N. mutabilis* (Linnaeus, 1758); *Sphaeronassa mutabilis* (Linnaeus, 1758) / None.

En – Changeable nassa; **Fr** – Nasse-ceinture; **Sp** – Mugarida lisa.

Maximum shell length 3.8 cm, commonly to 2.5 cm. On sand and muddy sand bottoms. Low intertidal and sublittoral zones, to at least 12 m depth. Very common on shallow, muddy sand bottoms where it may occur in dense colonies, this species becomes rarer and sparsely distributed in the southern parts of its geographical range. Mainly collected with dredges or bottom nets, and sometimes found on local markets in northern Morocco. Outside the area, it is regularly marketed in northwestern Italy, the Adriatic Sea and Sicily, raw or preserved in tins. East Atlantic, from Portugal to Mauritania, and perhaps also to Senegal and Gabon. Throughout the Mediterranean and in the northern Red Sea. Black Sea.



ventral view

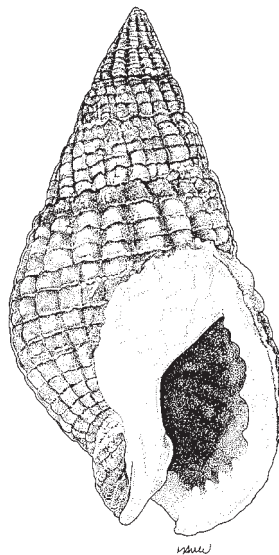


***Nassarius reticulatus* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Hinia reticulata* (Linnaeus, 1758); *Nassa reticulata* (Linnaeus, 1758); *Nassarius mammillatus* (Risso, 1826) / *Nassarius nitidus* (Jeffreys, 1867).

En – Netted nassa; **Fr** – Nasse réticulée; **Sp** – Mugarida reticulada.

Maximum shell length 3 cm, commonly to 2 cm. Common on sandy and muddy bottoms, or in rocky areas with pockets of soft material. Intertidal and sublittoral zones, to about 20 m depths. Also occurring in brackish waters of estuaries. Active scavenger and carrion feeder, crawling rapidly to gather in places where there is decaying organic matter. Eggs released in transparent, flattened vase-shaped capsules that are attached to stones, shells or sea weeds. Locally collected for food where common. Sometimes marketed in northern Morocco, it is also regularly present on Mediterranean markets in Sicily. East Atlantic, from northern Norway to Morocco, and in the Canaries and Madeira Islands. Throughout the Mediterranean and the Black Sea.



ventral view



***Nassarius tritoniformis* (Kiener, 1841)**

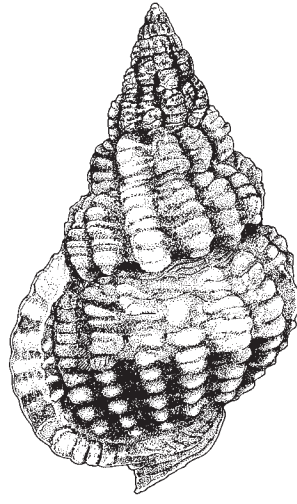
Frequent synonyms / misidentifications: *Nassa tritoniformis* Kiener, 1841 / None.

En – Triton nassa; **Fr** – Nasse triton; **Sp** – Mugarida tritono.

Maximum shell length 2.5 cm, commonly from 1.5 to 2 cm. On rock and sand bottoms. Low intertidal and sublittoral zones to about 40 m depths. A common species, locally collected for subsistence purposes. Shell sometimes used to make decorative objects. The tropical east Atlantic, from Mauritania to Angola.



ventral view



dorsal view



MELONGENIDAE

Melongenas

A single species occurring in the area.

Pugilina morio (Linnaeus, 1758)

Frequent synonyms / misidentifications: *Melongena morio* (Linnaeus, 1758); *Semifusus morio* (Linnaeus, 1758) / None.

FAO names: **En** – Giant hairy melongena; **Fr** – Mélongène noire; **Sp** – Melongena negra.

Diagnostic characters: Shell large and solid, **fusiform** in outline, with a rather **high spire and expanded body whorl**. Spire whorls convex, 9 or 10 in number in large specimens. Outer surface with a **single row of blunt spines on the angular shoulder, and with many low spiral threads all over**. Early whorls of spire with radial ribs. Umbilicus closed. **Periostracum thick and hairy**, somewhat deciduous and marked with fine axial growth lines. **Aperture large and subquadrate, anteriorly narrowing into an open, well-developed siphonal canal. Columella smooth and heavily glazed.** Outer lip of the aperture fairly thin, usually finely crenulated within. **Operculum thick and corneous, claw-shaped, with an apical nucleus. Colour: chocolate brown to black, with one or a few contrasting cream to red brown narrow spiral bands.** Inner side of the outer lip often more or less widely tinged radially with lighter colour. Operculum dark brown. Periostracum dull dark brownish in colour, thick enough to hide all colour of the shell.

Similar species occurring in the area

Fascioliidae: generally distinguishable by the low folds on columella and the bright red coloration of the animal.

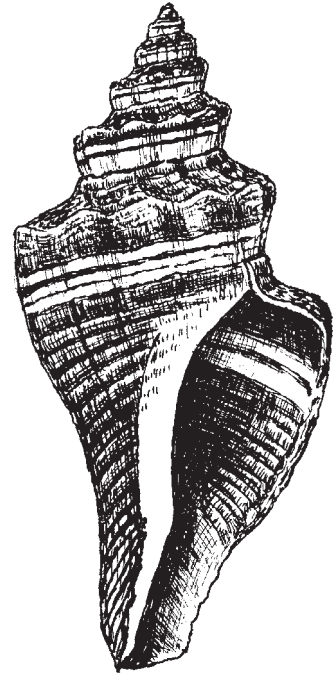
Size: Maximum shell length 24 cm, commonly to 16 cm.

Habitat, biology, and fisheries: Burrowing in sandy to muddy bottoms of coastal marine and brackish water environments, mostly in mangroves and near river estuaries. Common in littoral and shallow sublittoral zones, down to a depth of about 30 m. A slow moving predator, mainly feeding on bivalves and on varied carrion. Sexes separate, fertilization internal. Eggs laid in long strings of coin-shaped horny capsules. Used for food by coastal people since Neolithic times, the empty shells being sometimes utilized in lime making.

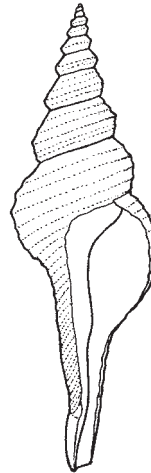
Distribution: Eastern Atlantic, from Mauritania to Angola, in the Canaries (Fuerteventura and Tenerife islands) and in the Cape Verde Archipelago. Also occurring in the tropical West Atlantic, from Venezuela and the southern Caribbean to Brazil.

Reference

Clench, W.J. & Turner, R.D. 1956. The family Melongenidae in the western Atlantic. *Johnsonia*, 3(35): 161–187.



ventral view



ventral view

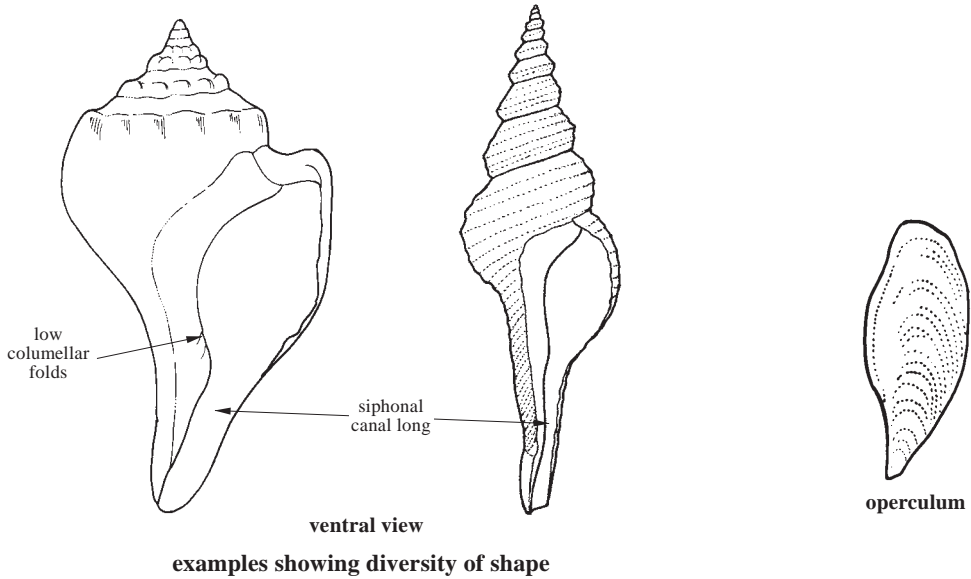
Fascioliidae



FASCIOLIARIIDAE

Spindle conchs, latirus shells

Diagnostic characters: Shell more or less elongate, **fusiform**, with a generally elevated spire and a **well-developed**, sometimes very long, **siphonal canal**. Sculpture variable, often strong and nodular or composed of spiral threads and axial ribs. Periostracum very thin to thick and fibrous. Aperture long and ovate. Outer lip smooth or with numerous inner spiral lirae. **Columella** often with a few **low basal folds**, or sometimes **smooth**. **Operculum** thick and **corneous**, ovate to claw-shaped, with a terminal nucleus. **Soft parts** of the animal **brilliant scarlet**. Head small and narrow, with short tentacles bearing eyes on their outer bases. Snout extensible, very long. Foot bluntly truncate anteriorly. Fleishy siphon well developed.

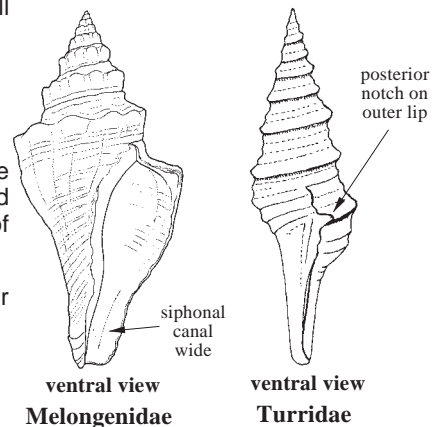


Habitat, biology, and fisheries: Large members of the Fascioliariidae mainly occur on sublittoral bottoms of sand, mud or rubble, sometimes forming large populations. Active predators, feeding on tube worms, vermetid and other molluscs. Sexes separate, fertilization internal. Eggs produced in capsules typically anchored to the substrate by a thin stalk, and hatching often as crawling young, but sometimes also as planktonic, free-swimming larvae. Shallow water, rock dwelling fascioliariids, are hand collected with or without scuba by divers, while other species are sometimes trawled in large quantities on soft bottoms of the continental shelf. These may represent a potential resource of fishing in some areas. Used as food and for the shell trade, their elegantly shaped shell enjoying popularity among collectors.

Similar families occurring in the area

Melongenidae: sometimes convergent in shape with the Fascioliariidae, but usually distinguishable by the shorter and wider siphonal canal, the smooth inner lip and the absence of bright red colouration of the soft parts.

Turridae: outer lip of aperture with a notch-like sinus at or near its posterior end.



Key to species of interest to fisheries occurring in the area

- 1a. Columella with a few low oblique folds; outer colour of shell with numerous dark brown spiral threads on a white ground (Fig. 1) ***Latirus filusus***
- 1b. Columella smooth; outer colour of shell white or differently patterned → 2

- 2a. Shell medium-sized to large (up to 18 cm long) and moderately elongated, width about one-third of the length; axial ribs well developed throughout the spire, extending from suture to suture on spire whorls (Fig. 2) ***Fusinus caparti***
- 2b. Shell large to very large (up to 33 cm long) and very elongated and slender, width about one-fifth or one-sixth of the length; axial ribs only developed on apical whorls and tending to fade away with growth and not extending from suture to suture on later whorls (Fig. 3) ***Fusinus meyeri***

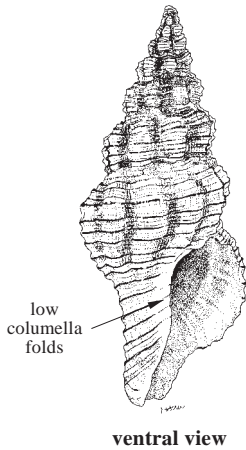


Fig. 1 *Latirus filusus*

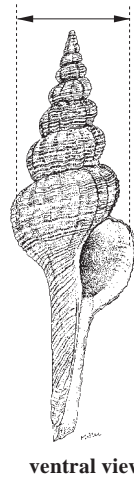


Fig. 2 *Fusinus caparti*

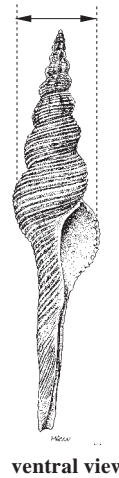






Fig. 3 *Fusinus meyeri*

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

-  *Fusinus caparti* Adam and Knudsen, 1955.
-  *Fusinus meyeri* (Dunker, 1869).
-  *Latirus filusus* (Schubert and Wagner, 1829).

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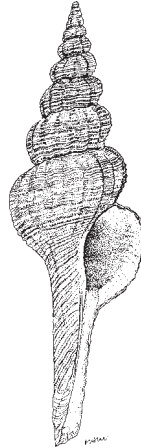
Snyder, M.A. 2003. Catalogue of the marine gastropod family Fascioliariidae. *Academy of Natural Sciences of Philadelphia, Special Publication*, 21: 1–431.

Fusinus caparti (Adam and Knudsen, 1955)

Frequent synonyms / misidentifications: *Fusus caparti* Adam and Knudsen, 1955 / *Fusinus boettgeri* (Maltzan, 1884).

En – Capart's spindle; **Fr** – Fuseau de Capart; **Sp** – Huso de Capart.

Maximum shell length 18 cm, commonly from 8 to 10 cm. On muddy or muddy sand bottoms, with or without coarse detritic elements like stones and shells. Offshore on continental shelf and upper slope, from about 45 to 230 m depths. Sometimes collected in numbers by shrimp trawlers, mainly for shell trade. Tropical east Atlantic, from Gabon to northern Angola.



ventral view



Fusinus meyeri (Dunker, 1869)

Frequent synonyms / misidentifications: None / None.

En – Meyer's spindle; **Fr** – Fuseau de Meyer; **Sp** – Huso de Meyer.

Maximum shell length 37 cm, commonly from 17 to 25 cm. On sandy muddy bottoms, often mixed with stones. In sublittoral waters and offshore, from about 20 to 100 m deep. Rather frequently collected in trawl nets. The tropical east Atlantic, from Sierra Leone to northern Angola.



ventral view

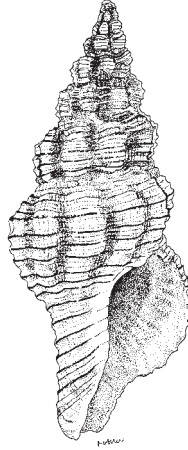


Latirus filusus (Schubert and Wagner, 1829)

Frequent synonyms / misidentifications: *Fusinus filusus* (Schubert and Wagner, 1829); *Lathyrus filusus* [Spelling error] / None.

En – Filose latirus; **Fr** – Fuseau fileté; **Sp** – Huso fileteado.

Maximum shell length 6.5 cm, commonly to 5 cm. On rocks and muddy sand bottoms. On shallow subtidal bottoms and upper shelf zone, from about 5 to 60 m depths. Accessorily used as food, this species is mostly appreciated by shell collectors for its beautiful shape and coloration. Tropical East Atlantic, from Senegal to Congo.



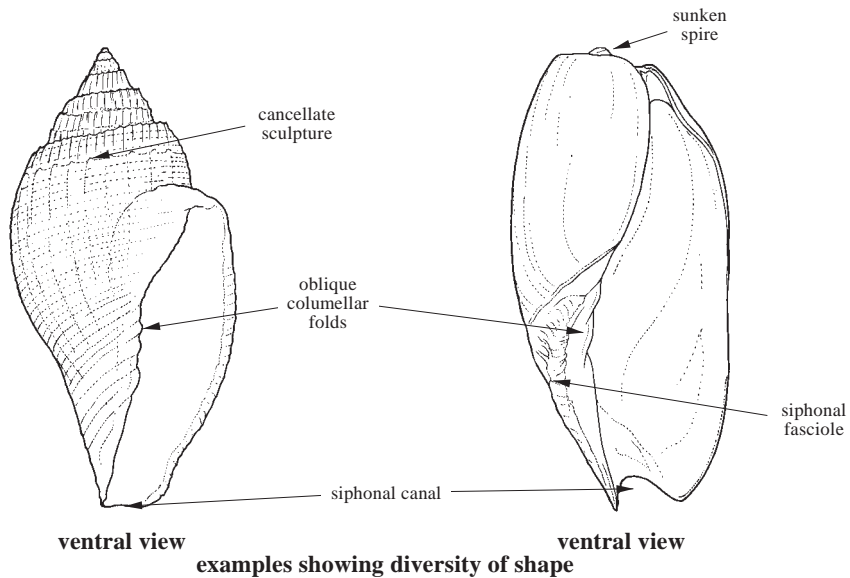
ventral view



VOLUTIDAE

Volutes

Diagnostic characters: Shell variable in shape, fusiform with a relatively **high pointed** spire, or subcylindrical to swollen and globose with a **low or sunken** to hidden spire. Surface of shell **often smooth and glossy, sometimes** nodose to ridged on shoulder, or **with cancellate sculpture**. Aperture long, with a **short** and wide **siphonal canal** anteriorly. **Inner lip** usually with **strong, oblique folds**, the **weaker** ones situated **posteriorly**. Periostracum present or absent, often covered in part or in full by enamel-like glaze. **Operculum absent**. Head small, flattened, with thin tentacles and sometimes with eyes at their base. Snout moderately short, covered by a hood. Foot broad and large to very large, often colourfully patterned, too big to be wholly retracted within the shell. Mantle well developed, with a long fleshy siphon anteriorly and partially enveloping the shell in life.



Habitat, biology, and fisheries: Active animals, living on sandy or muddy bottoms from the intertidal flats to deep waters of the continental shelf and slope. Can crawl very rapidly over the substrate with their powerful foot, or bury themselves completely, except for the tip of the long fleshy siphon. Scavengers or carnivores, feeding on a variety of invertebrates, mainly on other molluscs. They envelop their victim with their giant foot, and paralyse it with toxic saliva, before consumption. Sexes separate, fertilization internal. Eggs deposited in tough, horny capsules covered by a thin, calcareous surface layer. Each capsule contains many eggs, but only 1 or a few develop, consuming the others for growth. Planktonic larval stage absent, embryos generally hatching directly as crawling juveniles. In species of the genus *Cymbium*, egg capsules are brooded inside a greatly enlarged pedal gland in the sole of the female's foot.

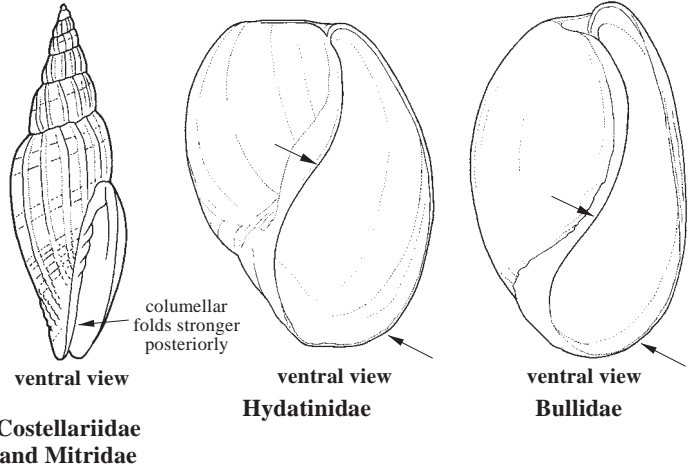
Along the sandy shores of West Africa, species of the genus *Cymbium* are of great economical value as food. They are commonly known there as "yets". After capture by diving or trawling, the animals are removed from their shell and exposed for a few hours in the sun. Their giant foot is then beaten to soften and flatten it, and cut into strips or small pieces. The resultant pieces of meat are exposed again in the sun to dry, and a chemical process gives them their best qualities as odorants. In Senegal, meat of "yet" is traditionally consumed in a popular dish with fish, rice and vegetables. Empty shells are used as scoops for soup, or for salt, sugar and flour. Shells of various species of *Cymbium* are often hung on stakes, as "gri-gri" to protect the rice cultures. In some areas, notably in Mauritania and Senegal, their large shells are common in important kitchen-midden concentrations of shells that are used for road pavement, ballasting of railway lines, or chalk burning. Since the 1990s, a fishing industry has developed in the South of Dakar (Senegal), for export to China. The entire foot is peeled fresh to whiten the meat, then deep-frozen and sent to Hong Kong by air mail. Trials of aquaculture and a fishing ban in February (the peak period of reproduction) have been attempted to protect the resource.

Remarks: West African volutes are still unsatisfactorily documented and need extensive field work before a reevaluation is possible. Other species of *Cymbium* have been described but are not included in this guide, as their taxonomic status is still controversial. Furthermore, species distribution is presently somewhat doubtful, as most data come from material collected by fishermen. However, the number of commercial *Cymbium* species will probably increase in the future, as anatomical and biological data become available.

Similar families occurring in the area

Costellariidae and Mitridae: shell characters somewhat convergent with *Volutocorbis*, but columellar folds stronger posteriorly.

Hydatinidae and Bullidae: shell much smaller than in *Cymbium*, without columellar folds. Aperture devoid of the wide, short and notched siphonal canal anteriorly.



Key to species of interest to fisheries occurring in the area

- 1a. Shell fusiform with a relatively high spire and small, pointed apex; siphonal fasciole absent; outer surface dull, devoid of periostracum, and with a cancellate sculpture (Fig. 1a) ***Volutocorbis lutosa***
- 1b. Shell cylindrical ovate to globose ovate, with a low or sunken to hidden spire and large, rounded apex. Siphonal fasciole present; outer surface nearly smooth, periostracum in part or all covered by an enamel-like glaze (Fig. 1b) → 2
- 2a. Apex decidedly raised above the last whorl; shoulder ridge rounded and deeply curled inward, with a narrow, U-shaped channel between it and the spire whorls (Fig. 2) . . . ***Cymbium olla***
- 2b. Apex not or hardly protruding above the last whorl; shoulder ridge differently shaped → 3

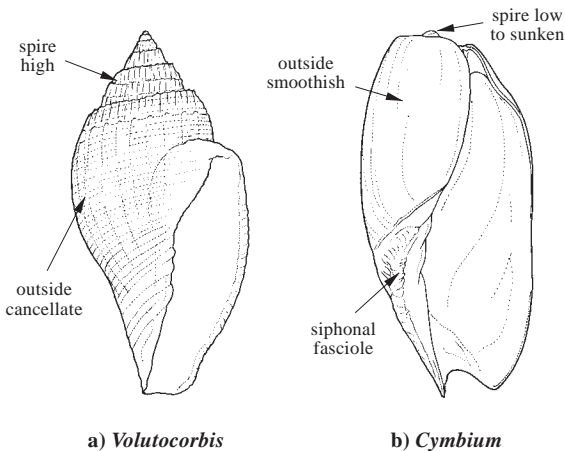


Fig. 1 ventral view of shell

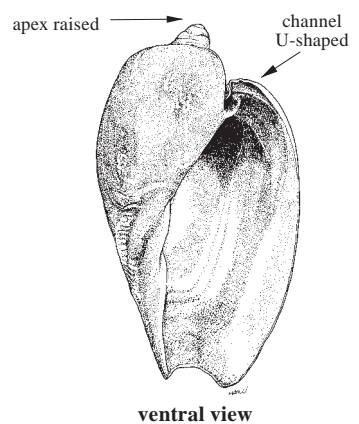
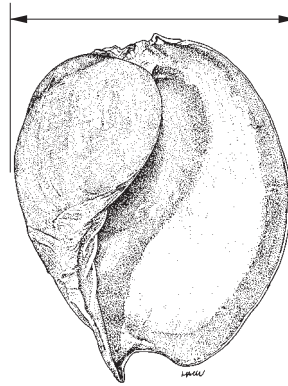
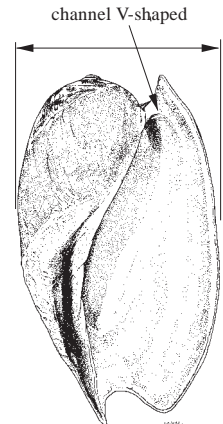


Fig. 2 *Cymbium olla*

- 3a. Shell shape globose ovate, width often nearly equalling the length (Fig. 3) *Cymbium pepo*
- 3b. Shell shape elongate to cylindrical ovate, width hardly reaching three-fifth of the length (Fig. 4) → 4
- 4a. Base colour of shell outside marbled white and reddish brown; channel between shoulder ridge and spire whorls V-shaped (Fig. 4) . . . *Cymbium marmoratum*
- 4b. Base colour of shell outside uniform or nearly so; when present, channel between shoulder ridge and spire whorls differently shaped → 5

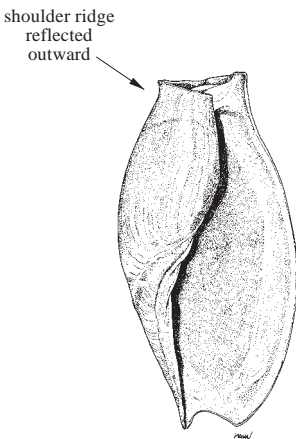


ventral view
Fig. 3 *Cymbium pepo*

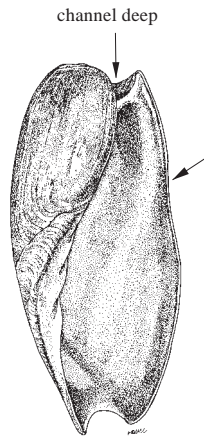


channel V-shaped
ventral view
Fig. 4 *Cymbium marmoratum*

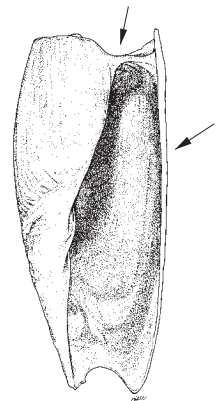
- 5a. Shoulder ridge reflected outward, forming a wide saucer-like platform around the sunken apex at posterior end of shell (Fig. 5) *Cymbium glans*
- 5b. Shoulder ridge neither reflected outward, nor forming a saucer-like platform at posterior end of shell → 6
- 6a. Shell shape irregularly cylindrical, the outer lip often slightly contracted around mid-length and somewhat flared anteriorly; shoulder ridge slightly reflected inward, with a deep channel between it and the spire; surface of body whorl entirely covered by an enamel-like glaze (Fig. 6) *Cymbium cucumis*
- 6b. Shell shape cylindrical, the outer lip regularly curved; shoulder ridge upstanding and sharp, perpendicular to a wide platform between it and the sunken, glazed over apex; less than half of the surface of body whorl covered by an enamel-like glaze (Fig. 7) *Cymbium cymbium*



shoulder ridge reflected outward
ventral view
Fig. 5 *Cymbium glans*











channel deep
ventral view
Fig. 6 *Cymbium cucumis*



ventral view
Fig. 7 *Cymbium cymbium*

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

-  *Cymbium cucumis* Röding, 1798.
-  *Cymbium cymbium* (Linnaeus, 1758).
-  *Cymbium glans* (Gmelin, 1791).
-  *Cymbium marmoratum* Link, 1807.
-  *Cymbium olla* (Linnaeus, 1758).
-  *Cymbium pepo* (Lightfoot, 1786).
-  *Volutocorbis lutosa* (Koch, 1948).

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- Weaver, C.S. & Dupont, J.E.** 1970. *Living volutes. A monograph of the recent Volutidae of the world*. Greenville, Museum of Natural History, 375 p.

***Cymbium cucumis* Röding, 1798**

Frequent synonyms / misidentifications: *Cymbium rubiginosum* (Swainson, 1822); *Yetus rubiginosus* (Swainson, 1822) / *Cymbium cymbium*; *Yetus marocanus* Pallary, 1930 [= *Cymbium tritonis* (Broderip, 1830)].

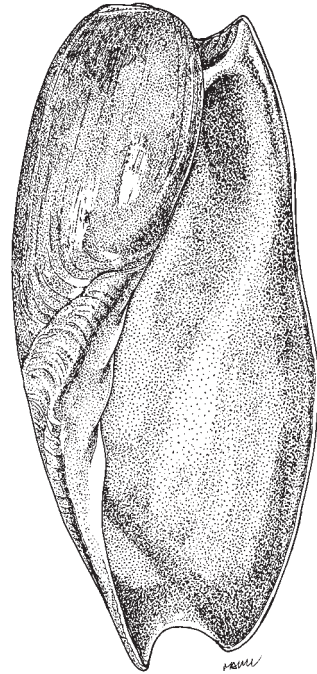
FAO names: En – Cucumber volute; Fr – Yet roux; Sp – Voluta pepino.

Diagnostic characters: Shell moderately large (up to 20 cm), rather thick, solid and heavy, irregularly cylindrical and rather narrow in shape (width slightly exceeding half of length). Spire very low, with a blunt apex, covered by a rather thick glazed callus. Shoulder ridge raised, sometimes slightly reflected inward, with a deep, concave channel between it and the spire. Outside of shell nearly smooth apart from axial growth marks, entirely covered by a glazed callus often forming wart-like pustules over trapped sand grains. Aperture long and moderately wide, with the outer lip often slightly contracted around mid-length and somewhat flared anteriorly. Columella arched, usually with 3 (from 2 to 5) oblique plaits. Siphonal fasciole well defined and strongly striated. Siphonal notch deep. **Colour:** outside of shell glossy, either rusty brown or pale greyish brown. Interior bright orange or cream coloured, depending on specimens. Animal colour light brown, without spotting.

Size: Maximum shell length 19.4 cm, commonly from 10 to 12 cm.

Habitat, biology, and fisheries: Relatively common on sandy bottoms from about 10 to 90 m depths. Frequently collected for food in West Africa, with trawls, nets or by diving.

Distribution: Eastern Atlantic from central Morocco to Senegal and Canary Islands. Southwestern Mediterranean in Morocco, and perhaps also Algeria.



ventral view



***Cymbium cymbium* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Cymba porcina* Lamarck, 1811; *Cymbium porcinum* (Lamarck, 1811) / *Cymba porcina* of Broderip, 1830 [not of Lamarck, 1811] [= *Cymbium souliei* Marche-Marchad, 1974].

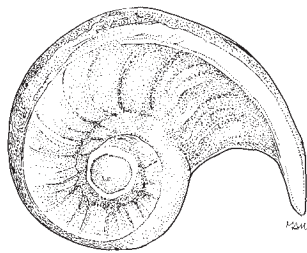
FAO names: **En** – Pig's snout volute; **Fr** – Volute trompe de cochon; **Sp** – Voluta trompa de cerdo.

Diagnostic characters: Shell moderately large (up to 20 cm), rather thick and solid, **cylindrical and rather narrow in shape** (width slightly exceeding half of length). Spire sunken, apex blunt and partly covered by or nearly hidden under a thick callus. Adult **body whorl** posteriorly expanded, about **as long as the total length of the shell**. **Shoulder ridge sharp, upstanding, perpendicular to a wide platform surrounding the glazed over apex**. **Outside of shell** nearly smooth apart from axial growth marks, **with** a rather thin periostracum and **a glazed callus** often forming pustules over adhering sand grains and **covering less than half of the surface**. Aperture long and relatively narrow for the genus, with the **outer lip regularly curved**. Columella widely arched, with 2 (rarely 3) very oblique plaits. Siphonal fasciole well defined and strongly striated. Siphonal notch deep. **Colour:** **outside** of shell in live specimens **uniform pale brown or brownish red** under a pale straw coloured periostracum, often fading to ivory-cream in dead shells. **Interior creamy orange or light pink**, often stronger or lighter coloured along the outer lip and toward anterior end of shell. Columellar folds whitish to light orange. Animal cream coloured, with densely spaced grey, brown and orange dots and splotches.

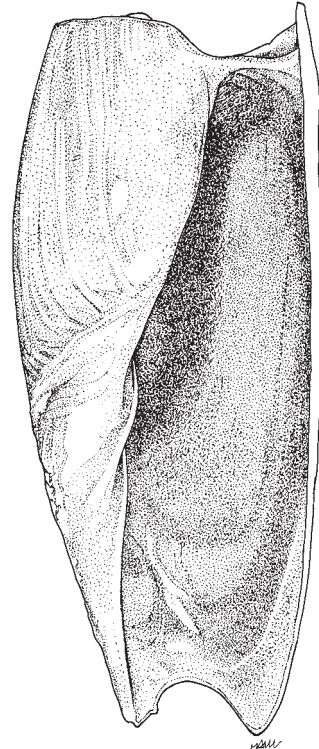
Size: Maximum shell length 20 cm, commonly from 10 to 12 cm.

Habitat, biology, and fisheries: On sandy bottoms, in shallow subtidal waters to about 90 m depth. Most common in the area south of Dakar, Senegal. Commercially fished along the sandy shores of West Africa by diving and trawling.

Distribution: The tropical East Atlantic, from Western Sahara, Canary Islands and Mauritania to Senegal; perhaps occurring also further South to Ghana.



apical view



ventral view

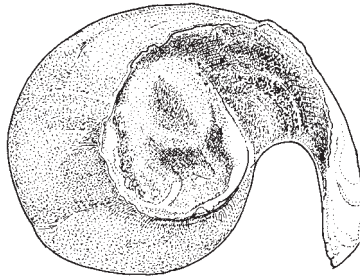


***Cymbium glans* (Gmelin, 1791)**

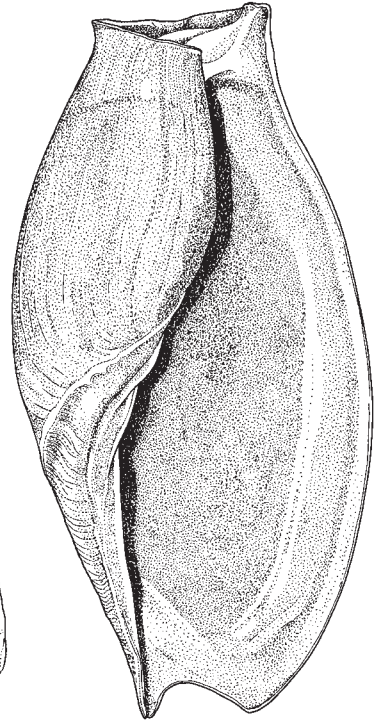
Frequent synonyms / misidentifications: *Cymba proboscoidale* (Lamarck, 1802); *Cymbium proboscoidale* (Lamarck, 1802) / *Cymbium cymbium* (Linnaeus, 1758).

FAO names: **En** – Elephant's snout volute; **Fr** – Volute trompe d'éléphant; **Sp** – Voluta trompa de elefante.

Diagnostic characters: Shell large to **very large** sized (up to 35 cm or more), roughly **cylindrical ovate** but swollen in the centre and **rather slender in shape** (width about half of the length). Spire sunken, **apex** barely visible or **hidden under a thick callus** in fully grown specimens. Adult **body whorl** very large and posteriorly expanded, about **as long as the total length of the shell**. **Shoulder ridge sharp and raised**, reflected outward and **forming a wide saucer-like platform around the hidden spire**. **Outside of shell** nearly smooth, **entirely covered by a glazed callus** often forming pustules over adhering sand grains. Siphonal fasciole strong, defined by a sharp ridge. Aperture long and flaring, due to the convex shape of outer lip. Columella concave, with about 4 very oblique plaits. Siphonal notch deep. **Colour:** **outside** of shell a **uniform rich creamy brown**, often **changing to dark chocolate brown posteriorly** where shoulder ridge is reflected. **Interior creamy orange or light pink**, often stronger coloured along the outer lip and darker toward anterior end of shell. Columellar folds whitish. Animal colour plain grey or olive grey, becoming yellowish white on the foot.



apical view



ventral view

Size: Maximum shell length 38.5 cm, commonly to 20 cm.

Habitat, biology, and fisheries: On soft sandy to muddy bottoms. Intertidal and sublittoral zones to about 40 m depth. A very large and common species, which can reach more than 10 kg in weight, due to the enormous hypertrophied foot. Actively exploited for food, especially in Senegal.

Distribution: The tropical East Atlantic, from southern Mauritania to Cameroon, but not in Angola.

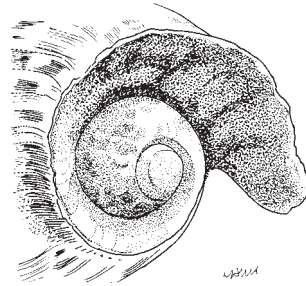


***Cymbium marmoratum* Link, 1807**

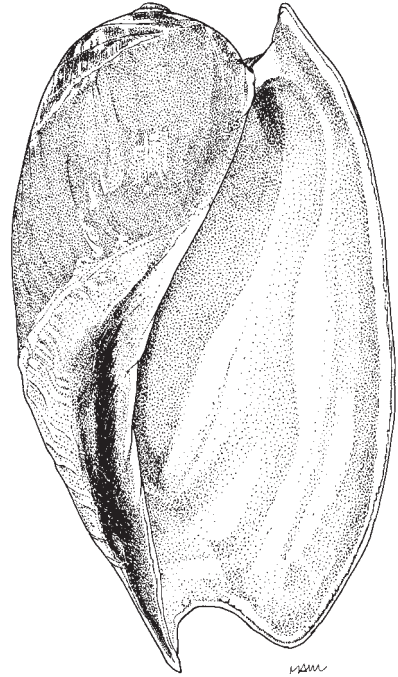
Frequent synonyms / misidentifications: None / *Cymbium cisium* Menke, 1828 [= *Cymbium cymbium*].

FAO names: **En** – Marbled volute; **Fr** – Volute marbrée; **Sp** – Voluta marmorada.

Diagnostic characters: Shell moderately large (up to 20 cm) and solid, **elongate ovate but somewhat inflated in shape** (width about three-fifths of the length). **Apex** hardly protruding above the last whorl, **not covered by a callus**. **Spire low, with deeply indented suture**. Body whorl large, posteriorly expanded into a sharp, raised and more or less protruding shoulder ridge. **A large, V-shaped channel developed between shoulder ridge and spire whorls**. Outer surface nearly smooth, only with axial growth marks, covered with a thin, mat periostracum. Siphonal fasciole defined by a well marked ridge and sturdily striated. **Glazed callus** rather thick, **covering** inner lip area, part of the fasciole and **less than one-third of the outer shell surface**. Aperture wide, elongate and semi-ovate. Columella widely arched, with 3 (sometimes 4) strongly oblique plaits. Siphonal notch deep. **Colour: outside of shell marbled white and reddish brown on a pale brown base**, often forming irregular zigzag patterns and with a lighter, less variegated spiral band about midlength of body whorl. Sutural channel tinged with chocolate brown. **Interior creamy white to orange**, sometimes suffused with blue grey and with a darker rim along outer lip margin and siphonal notch. Inner lip and columellar plaits covered with a large and rounded whitish fleck rimmed with chocolate brown. Animal colour dark chocolate brown to purple brown, with numerous white, blue or red spots and blotches.



posterior end



ventral view

Size: Maximum shell length 20 cm, commonly from 12 to 15 cm.

Habitat, biology, and fisheries: On sandy bottoms or buried in the sand near rocky areas. Intertidal zone and upper continental shelf to about 70 m depth. Common in southern Senegal, where it is collected for food and sold with other *Cymbium* species.

Distribution: Exact distribution imperfectly known, because of confusion with other species of genus *Cymbium*. Eastern Atlantic, from Morocco to Nigeria and perhaps to Canary Islands. Northernmost and southernmost occurrences need confirmation.



***Cymbium olla* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Cymbium papillatum* Schumacher, 1817; *C. productum* Lowe, 1861; *Yetus turriculatus* Pallary, 1930 / None.

FAO names: En – Olla volute; Fr – Volute jarre; Sp – Voluta coña.

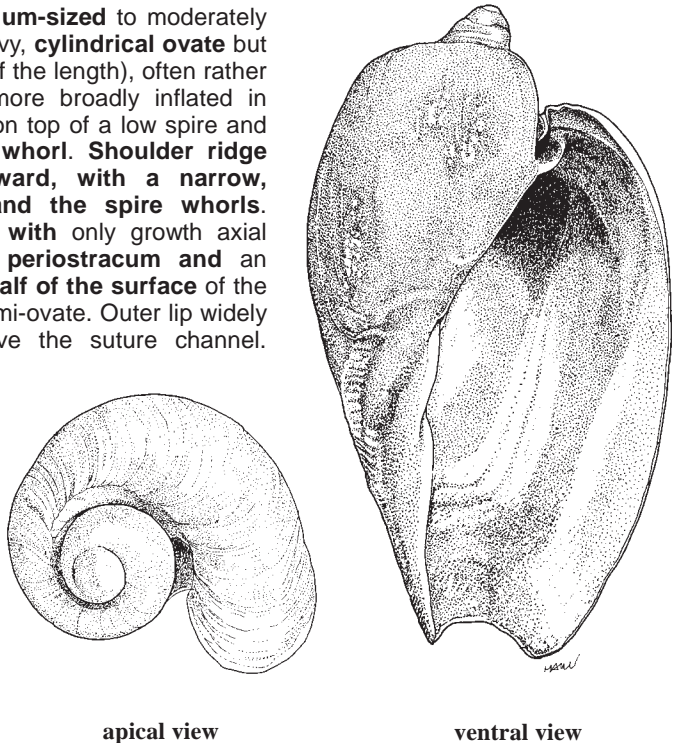
Diagnostic characters: Shell medium-sized to moderately large (up to 15 cm or more), not heavy, **cylindrical ovate** but variable in shape (width about half of the length), often rather slender in males and somewhat more broadly inflated in females. **Apex rounded**, protruding on top of a low spire and **decidedly raised above the last whorl**. **Shoulder ridge rounded and deeply curled inward**, with a narrow, **U-shaped channel between it and the spire whorls**. **Outside of shell nearly smooth**, with only growth axial marks, a **thin**, easily peeled off **periostracum** and an enamel-like **glaze covering about half of the surface** of the last whorl. Aperture elongate and semi-ovate. Outer lip widely convex, expanded posteriorly above the suture channel. Columella widely arched, with 2 (sometimes 3) strong oblique plaits. Siphonal fasciole well marked and wrinkled. Siphonal notch wide and rather deep.

Colour: **outside of shell light to medium brown with rust and orange shading**, often paler toward the shoulder; **glazed area generally forming a distinctly coloured surface** (sometimes light olive grey) **covering obliquely the ventral side of body whorl**, with a narrow orange tinted band along the inner lip of aperture. **Interior pinkish cream**, often becoming orange red at posterior end and toward siphonal notch. Animal colour dark chocolate brown with bright yellow and cream blotches.

Size: Maximum shell length 15.8 cm, commonly from 9 to 11.5 cm.

Habitat, biology, and fisheries: On sandy bottoms, from just below low tide line to upper continental shelf at about 90 m depth. Frequently found in relatively deep bottoms, from about 45 to 90 m depths, but common also in shallow water in area from Algarve (Portugal) to Larache (Morocco), where it is regularly trawled for food. In the Mediterranean Sea, the species is also frequently sold in markets in southern Italy, though it does not live in that area.

Distribution: Eastern Atlantic, from southern Portugal and Spain to Rio de Oro and perhaps to Senegal. Southwestern Mediterranean, from Straits of Gibraltar to Almeria, Spain, and along North Africa coasts eastward to Oran, Algeria.



Cymbium pepo (Lightfoot, 1786)

Frequent synonyms / misidentifications: *Cymbium neptuni* (Gmelin, 1791); *C. papillaris* (Gmelin, 1791); *Yetus neptuni* (Gmelin, 1791) / *Cymbium senegalensis* Marche-Marchad, 1978; *C. tritonis* (Broderip, 1830).

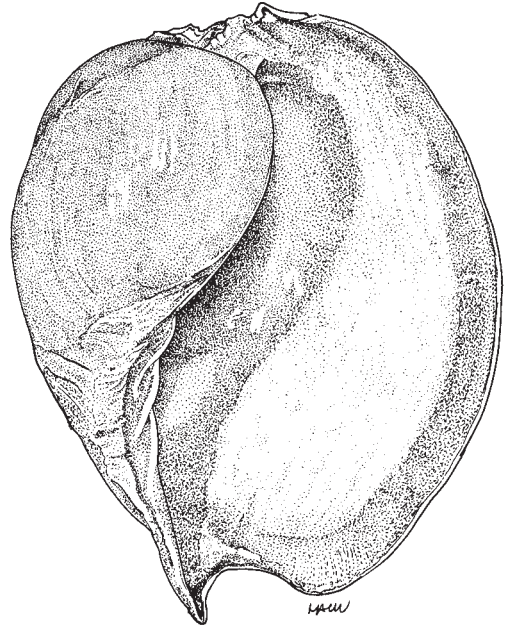
FAO names: **En** – Neptune's volute; **Fr** – Volute de Neptune; **Sp** – Voluta de Neptuno.

Diagnostic characters: Shell large and heavy, globose ovate and ventricose in shape. Width large, often nearly equalling the length (at least measuring more than two-thirds of the length). Visible part of the spire reduced to a large, plug-like apex, often more or less covered by a heavy callus in the adult and enveloped by semi-circular shoulder ridge at posterior end of the very large, inflated body whorl. Shoulder ridge short and sharp, raised to somewhat reflected inward over an excavated channel surrounding the apex. Outside of shell nearly smooth, with a strong periostracum and an enamel-like glaze covering about one-fourth of the surface. Aperture wide and semi-ovate. Columella deeply arched, with 3 to 4 strong, oblique plaits. Siphonal fasciole large, well defined and striated. Siphonal notch wide and rather deep. **Colour:** outside of shell a yellowish to reddish brown under an olive brown to dark chocolate brown periostracum. Interior bright orange, often becoming orange red posteriorly and darker along the outer lip and siphonal notch. Animal colour plain slate grey to greyish red, lateral surface of the foot strongly riddled.

Size: Maximum shell length 30 cm, commonly from 15 to 20 cm.

Habitat, biology, and fisheries: On sand, or sand and mud bottoms, in the intertidal and sublittoral zones to about 40 m. Living also in lagoon areas and near estuaries. Young expelled from the female pedal gland after brooding may attain a shell length of 55 mm. Commonly collected by trawling and diving along the shores of tropical West Africa, where it is processed and sold with other species of *Cymbium*. In coastal lagoon and estuarine areas, it can be caught easily by hand at low tide and in shallow water. In Senegal, meat of this species is considered to have the most delicious taste.

Distribution: The tropical East Atlantic, from Rio de Oro to Benin. Limits of occurrence somewhat uncertain, perhaps extending north to Morocco and south to southern Gulf of Guinea.



ventral view

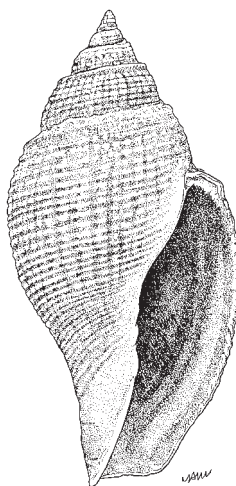


***Volutocorbis lutosa* (Koch, 1948)**

Frequent synonyms / misidentifications: *Athleta lutosa* (Koch, 1948); *Volutocorbis nicklesi* Rosso, 1976; *V. emmanuelae* Rosso, 1985 / *Athleta abyssicola* (Adams and Reeve, 1848)

En – Grimy volute; **Fr** – Volute de Nicklès; **Sp** – Voluta de Nicklès.

Maximum shell length 11 cm, commonly from 6 to 7 cm. Living on clay and mud substrates of the continental shelf and upper slope, from about 30 to 1800 m depths. Locally common, notably along the coasts of Angola. A by-catch of shrimp trawlers commonly collected at 30 to 200 m depths. Usually found encased in a layer of stiff reddish-brown clay. Sometimes appearing on Senegalese markets, in Dakar area. Exact distribution not known. At least from Angola to off Cape Point, South Africa, but probably occurring further North to Senegal.



ventral view

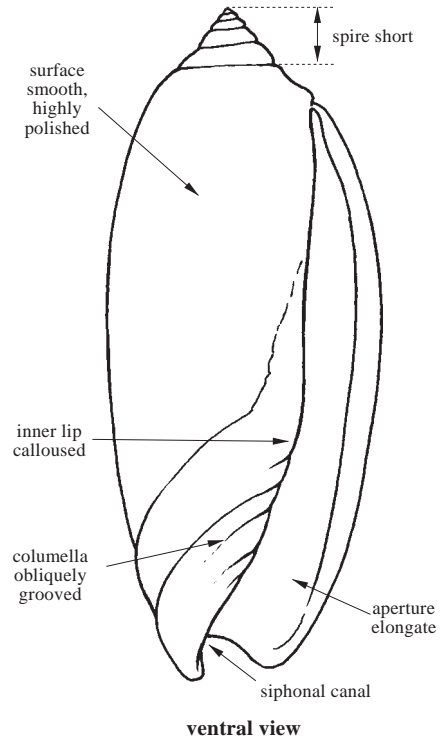
OLIVIDAE

Olive shells, ancillas

Diagnostic characters: Shell thick and porcelaneous, elongate-ovate, with a short spire, a large body whorl and usually deeply channelled sutures. Surface smooth, highly polished and often vividly coloured. No periostracum. Aperture elongate, with a wide and short anterior siphonal canal and an indistinct posterior notch. Outer lip slightly thickened in adult stage, smooth. Inner lip calloused, often with fine transverse lirae, and with oblique, columellar grooves anteriorly. Columellar callus usually bordered posteriorly by a distinct, calloused spiral band. Operculum often absent. Head broad but poorly defined, with an extensible snout and reduced tentacles. Eyes small to absent. Foot large and wide, with a distinct, more or less triangular to shield-shaped anterior part. Posterior part of the foot voluminous, its sides partially reflecting over the shell when expanded. Mantle with a long, cylindrical fleshy siphon anteriorly.

Habitat, biology, and fisheries: Sand-dwelling, active animals, inhabiting the intertidal and shallow sublittoral areas of most tropical or subtropical seas. Crawl on top of the substrate, or most commonly below the surface, with only the tip of the fleshy siphon exposed, leaving a characteristic trail. Carnivores or scavengers, mostly feeding on various invertebrates which are captured and held with the large foot. Sexes separate, fertilization internal. Eggs released in small capsules which may be free-floating, attached together and half buried in the sediment, or even fixed with mucus to the shell of a living, burrowing bivalve. Though sometimes collected for food, olives are mostly sought for their glossy and vividly coloured shells which are much favoured by shell collectors. Some species are used in the local shellcraft industries for their decorative shell. At least 1 of these species was formerly used as a currency in a part of the area, where it replaced the cowries. To find olives, fishermen commonly look for their conspicuous trails in the sand, or bait them with fish remains or other rotting meat.

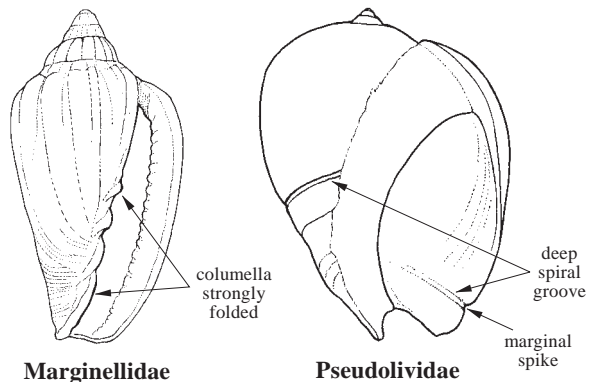
Remarks: Some recent studies show this family is probably heterogeneous, and genus *Olivella* and similar genera are then sometimes allocated to the distinct family Olivellidae. Pending a thorough revision of the group, the Olividae family is here considered in its conservative, wide sense.



Similar families occurring in the area

Marginellidae: columella with 3 or 4 strong oblique folds, most prominent anteriorly.


Pseudolividae: shell of genus *Pseudoliva* rather similar to true olives, but easily distinguished by the strong spiral groove on the anterior part of body whorl, ending in a distinct spike on the outer lip of aperture.






Key to species of interest to fisheries occurring in the area

- 1a. Shell relatively small, up to 2 cm long; pear shaped, with a very short swollen spire and prominent apex; operculum present ***Olivella nana***
- 1b. Shell relatively large, up to 5 cm long or more; elongate ovate in shape, with a moderately developed conical spire and sharp apex; operculum absent → 2
- 2a. Aperture rather narrow, not flaring in the anterior part; columellar callus well developed ***Agaronia acuminata***
- 2b. Aperture rather large, flaring in the anterior part; columellar callus poorly developed ***Agaronia hiatula***

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

-  *Agaronia acuminata* (Lamarck, 1811).
-  *Agaronia hiatula* (Gmelin, 1791).
-  *Olivella nana* (Lamarck, 1811).

References

Burch, J.Q. & Burch, R.L. 1964. The genus *Agaronia* J.E. Gray. *Nautilus*, 77(4): 110–112.

Iroko, A.F. 1990. Mollusc money - shells in Africa - The Fortune of Money. *UNESCO Courier*, Jan. 1990.

Kantor, Y. 1991. Morphology and relationships of some oliviform gastropods. *Ruthenica*, 1(1–2): 17–52.

López, A., Montoya, M. & López, J. 1988. A Review of the Genus *Agaronia* (Olividae) in the Panamic Province and the Description of Two New Species from Nicaragua. *The Veliger*, 30(3): 295–304.

Olsson, A.A. 1956. Studies on the genus *Olivella*. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 108: 155–225, pl. 8–16.

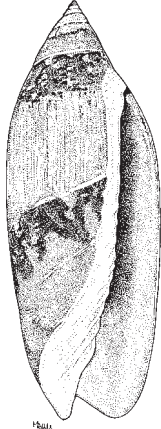
Sterba, G.H.W. 2003. *Olividae: Fibel der Schalen (Mollusca, Neogastropoda). Mit 1550 abgebildeten Schalen auf 62 Farbtafeln und mit zahlreichen Zeichnungen.* Markkleeberg, Sterba, 168 p., 62 pls.

***Agaronia acuminata* (Lamarck, 1811)**

Frequent synonyms / misidentifications: *Anazola acuminata* (Lamarck, 1811); *Olivancillaria acuminata* (Lamarck, 1811) / *Agaronia (Anazola) annotata* (Marrat, 1871).

En – Pointed ancilla; **Fr** – Ancillaire piquante; **Sp** – Oliva puntiaguda.

Maximum shell length 9.4 cm, commonly to 6 cm. On sandy bottoms. Common at low intertidal and shallow sublittoral levels, but also occurring to a depth of about 50 m. Occasionally collected where common for food and shell trade. The tropical east Atlantic, from Rio de Oro to Angola, in the Cape Verde and Gulf of Guinea islands.



ventral view



dorsal view

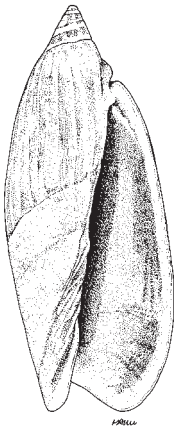


***Agaronia hiatula* (Gmelin, 1791)**

Frequent synonyms / misidentifications: *Oliva maculata* Schumacher, 1817; *Olivancillaria hiatula* (Gmelin, 1791) / None.

En – Olive-grey ancilla; **Fr** – Ancillaire agaron; **Sp** – Oliva agaron.

Maximum shell length 9 cm, commonly to 5 cm. On sand to muddy sand bottoms, and in seagrass beds. Common at low tide and in sublittoral zone. Occasionally collected for food and shell trade, at low tide and in shallow water. Exact distribution imperfectly known in the tropical east Atlantic; from Mauritania to the Gulf of Guinea and the Cape Verde Islands, perhaps extending further to Gabon in the south.



ventral view



dorsal view

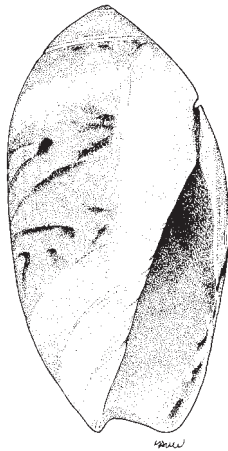


***Olivella nana* (Lamarck, 1811)**

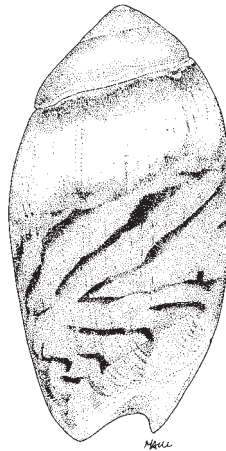
Frequent synonyms / misidentifications: *Micana nana* (Lamarck, 1811); *Oliva micans* Dillwyn, 1817; *O. nana* Lamarck, 1811; *Olivancillaria nana* (Lamarck, 1811) / None.

En – Sparkling dwarf olive; **Fr** – Olive naine; **Sp** – Oliva enana.

Maximum shell length 2 cm, commonly to 1.5 cm. On littoral soft bottoms, where it may occur abundantly. Used as a decorative element by local shellfish industries. Formerly, this species was the most common shell used as a currency in the Niger Bent, until the Portuguese arrived in the late fifteenth century. Known as the “nzimbu”, this monetary reserve was used exclusively by the rulers of the Kongo kingdom. In order to ruin them, the Portuguese introduced other species of olives from the Brazilian coast and cowries from the Indian Ocean, until the nzimbu was forced out of the circulation. Tropical east Atlantic, from Congo to Angola.



ventral view



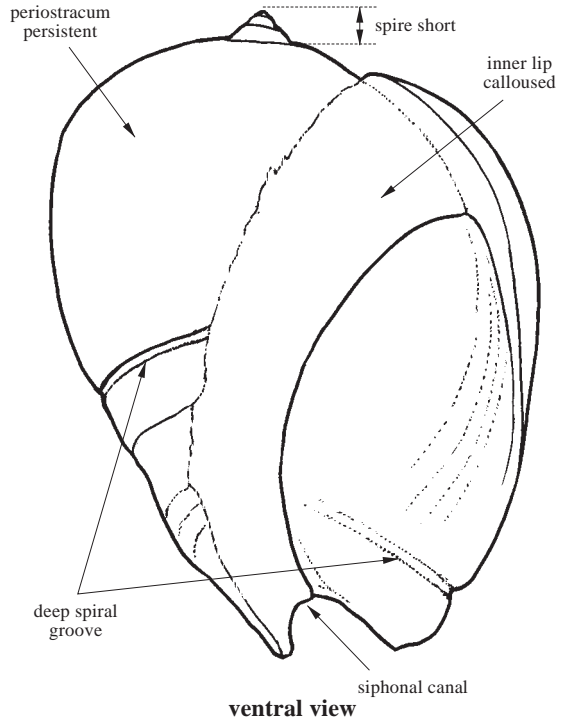
dorsal view



PSEUDOLIVIDAE

False olive shells

Diagnostic characters: Shell fusiform or ovate to globose, with a medium-sized to short spire and large body whorl. Surface with a deep spiral groove on the anterior half of body whorl, smooth and glossy or with a mainly spiral sculpture of threads or cords that increase in degree of expression anteriorward; axial sculpture, when present, restricted to posterior part of whorls. **Periostracum persistent**, thin to thick. **Aperture elongate** ovate, with a wide and **short** anterior siphonal canal and usually with a distinct posterior notch. **Outer lip thin**, sharp at the edge, its inner margin with a **small spike corresponding to the spiral groove of the outer surface**, and small crenulations anteriorward, when spiral sculpture is present. **Inner lip smooth, more or less strongly calloused**. **Operculum corneous, large** and ovate, with a nearly terminal nucleus. Head broad but poorly defined, with a very short snout and a pair of short and broad tentacles with small eyes on their outer basal lobes. Foot large and wide, but without a distinct anterior part. Mantle with a long, cylindrical fleshy siphon anteriorly. Posterior part of the foot voluminous, partially reflecting over the shell when expanded.



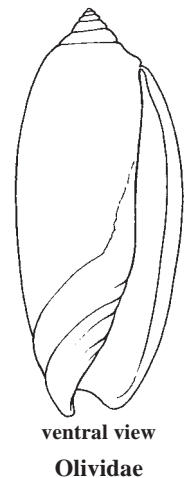
Habitat, biology, and fisheries: Sand-dwelling, active animals, mainly inhabiting the intertidal and shallow sublittoral areas, but also occurring in deep water (bathyal to abyssal) environments. Crawl on top of the substrate, or most commonly below the surface. Carnivores or scavengers, mostly feeding on various invertebrates which are captured and held with the large foot. Sexes separate, fertilization internal. Eggs released in small capsules which may be free-floating, attached together and half buried in the sediment, or even fixed with mucus to the shell of a living, burrowing bivalve. One common littoral species is known to be collected for food and for baiting in the area.

Similar families occurring in the area

Olividae: shell often similar to that of genus *Pseudoliva*, but devoid of the deep spiral groove on the anterior half of body whorl and of the corresponding small spike on the outer lip.

References

- Kantor, Yu. 1991. On the morphology and relationship of some oliviform gastropods. *Ruthenica*, 1: 17–52.
- Kilburn, R.N. 1989. A new genus and species of Pseudolivinae, with a note on the status of *Sylvanocochlis* Melvill, 1903 (Mollusca: Gastropoda: Olividae). *Annals of the Natal Museum.*, 30: 177–184.
- Vermeij, G.J. 1998. Generic Revision of the Neogastropod Family Pseudolividae. *The Nautilus*, 111(2): 53–84.



A single species of interest to fisheries occurring in the area.

Pseudoliva crassa (Gmelin, 1791)

Frequent synonyms / misidentifications: *Pseudoliva plumbea* (Chemnitz, 1785) [Invalid name]; *P. plumbea* (Dillwyn, 1817) / None.

En – Leaden false olive; **Fr** – Olivette orange; **Sp** – Oliva falsa ploma.

Maximum shell length 5.2 cm, commonly to 4 cm. Common in intertidal and shallow subtidal sandy bottoms. Collected locally for baiting and for human consumption; used in soups. Distribution restricted to Angola.



ventral view



MARGINELLIDAE

Marginellas

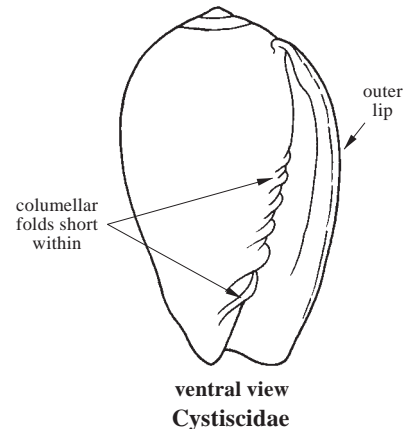
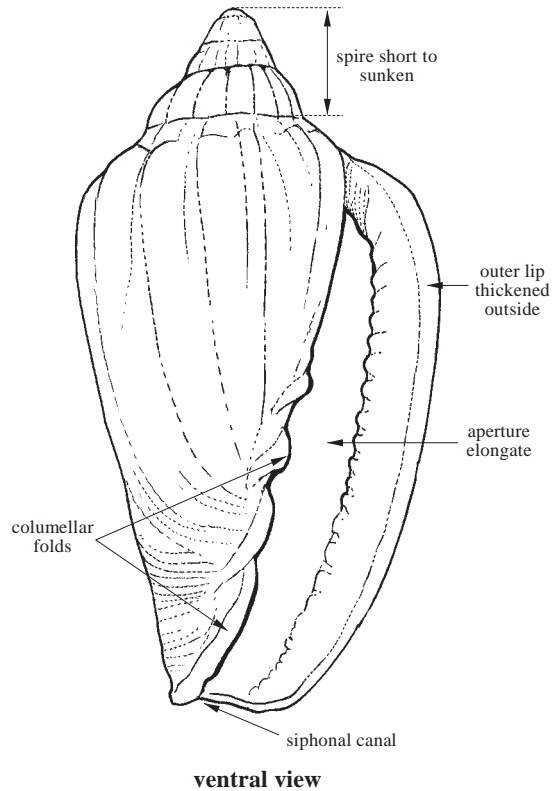
Diagnostic characters: Shell elongate **ovate**, with a large body whorl and relatively small, sometimes almost sunken spire. Surface usually **smooth and highly polished, often brightly patterned**, sometimes with low axial ribs. **Aperture elongate, with a short anterior siphonal canal. Outer lip thickened** and reflected **externally** into a strong rim at mature stage, smooth or toothed interiorly. **Columella with strong oblique folds, often most prominent anteriorly and extending deep within the shell. No operculum.** Head small, with rather short snout and a pair of prominent, thin tentacles bearing eyes at their outer bases. Foot relatively long, narrow to wide, rather square in front. Mantle frequently expanded to cover the greater part of the shell, with a long, fleshy siphon anteriorly.

Habitat, biology, and fisheries: Shallow burrowers of sandy to muddy bottoms, or living under rocks, stones and among seaweeds. Active predators, feeding mainly on small living gastropods and bivalves, though carrion is also eaten. Prey is enveloped in the posterior part of the foot, immobilized through the use of a poison gland opening in the mouth, and dragged beneath the sand surface for consumption. Sexes separate, fertilization internal. Eggs usually laid individually in domed or lens-shaped capsules, attached in groups to rocks or shells by their flat base. Large supply of albumen provided for nourishment of the embryo within each capsule. Hatching probably occurring directly as crawling young in most species.

Because of their highly glazed and colourful attractive shell, the family Marginellidae is very popular for shell collectors, and the group is best represented in tropical West Africa and in Australia. In the former area, some species have been used as currency in the past. Shells are also known to be used for traditional decorative or religious purposes, but the lack of precise data does not enable us presently to identify the different species involved in this activity. Then, only a restricted number of large-sized and common species is included hereafter.

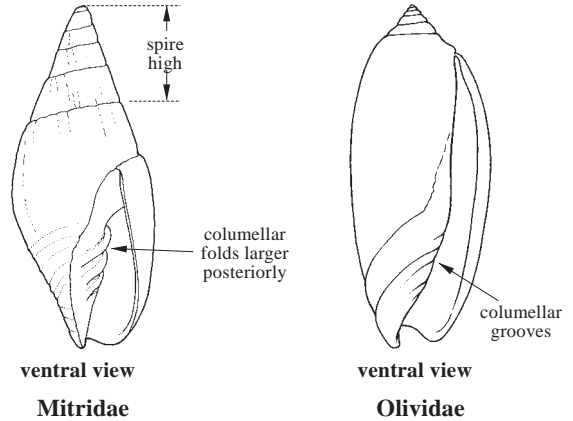
Similar families occurring in the area

Cystiscidae: shell small and white, very similar to Marginellidae. Interior hollowed out by resorption of internal whorls. Posteriormost columellar folds short, not extending much inside the shell. Outer lip always without an external thickening.



Mitridae: spire high and tapering, never sunken. Margin of the outer lip not strongly thickened in the adult. Columellar folds larger posteriorly.

Olividae: shell shape somewhat convergent with some Marginellidae species. Columella obliquely grooved anteriorly, but devoid of strong folds.




Key to species of interest to fisheries occurring in the area





- 1a. Shell small (up to 1.5 cm long), with a low, blunt spire *Volvarina sowerbiana*
- 1b. Shell relatively large (up to 5 cm long or more), with a well-developed conical spire → 2

- 2a. Shell large-sized (up to 8.8 cm long), elongate ovate and rather slender in shape (mean length twice larger or more than width) *Marginella desjardini*
- 2b. Shell medium-sized (hardly exceeding 7 cm long), subovate and not slender in shape (mean length about 1.8 larger than width) → 3

- 3a. Shell relatively large (up to 7.3 cm long); white spots well defined, rather regularly and sparsely distributed on the outer surface; animal bright pink with white rounded spots *Marginella sebastiani*
- 3b. Shell relatively small (up to 5.3 cm long); white spots often poorly defined, rather irregularly and densely distributed on the outer surface; animal purplish red with fine, pale coloured streaks *Marginella glabella*

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

-  *Marginella desjardini* Marche-Marchad, 1957.
-  *Marginella glabella* (Linnaeus, 1758).
-  *Marginella sebastiani* Marche-Marchad and Rosso, 1979.
-  *Volvarina sowerbiana* (Petit de la Saussaye, 1851).

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Covert, G.A. & Covert, H.K. 1995. Revision of the Supraspecific Classification of Marginelliform Gastropods. *Nautilus*, 109(2–3): 43–110.

Cossignani, T. 2006. *Marginellidae and Cystiscidae of the world. Atlas with over than 2 600 photos.* Ancona, l'Informatore Piceno, 408 p.

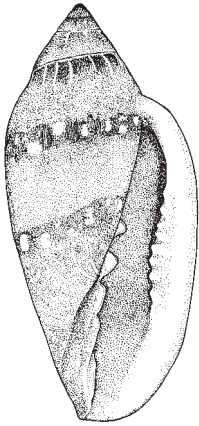
Marche-Marchad, I. & Rosso, J.-C. 1979. Une nouvelle marginelle de la côte occidentale d'Afrique: *Marginella sebastiani* sp. nov. (Gastropoda, Marginellidae). *Bolletino Malacologico*, 15(7–8): 197–208.

***Marginella desjardini* Marche-Marchad, 1957**

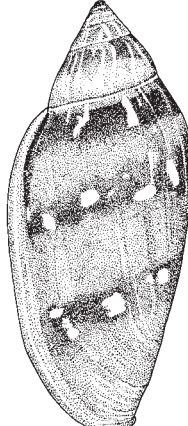
Frequent synonyms / misidentifications: None / *Marginella glabella*.

En – Desjardin's marginella; **Fr** – Marginelle de Desjardin; **Sp** – Marginella de Desjardin.

Maximum shell length 8.8 cm, commonly from 4 to 5 cm. On muddy sand bottoms. Offshore on continental shelf and upper slope, down to depths of about 350 m. Moderately common locally; collected for its elegant shell with dredges, bottom trawls or nets. Tropical east Atlantic, from Senegal to Guinea.



ventral view



dorsal view

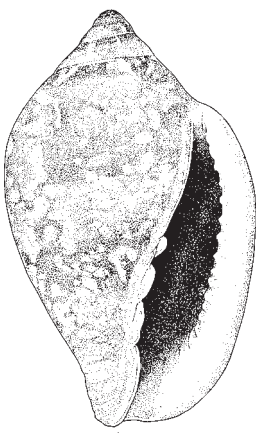


***Marginella glabella* (Linnaeus, 1758)**

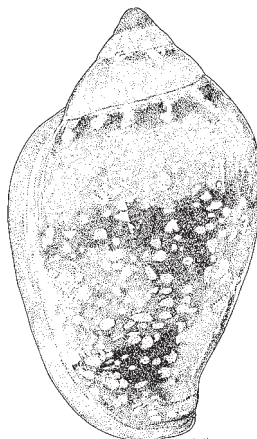
Frequent synonyms / misidentifications: *Marginella glabella* (Linnaeus, 1767) / *Marginella rosea* Lamarck, 1822.

En – Shiny marginella; **Fr** – Marginelle porcelaine; **Sp** – Marginella porcellana.

Maximum shell length 5.3 cm, commonly from 3 to 4 cm. Common on sandy bottoms, intertidally and in shallow subtidal waters, but also occurring offshore to a depth about 80 m. Mainly collected for its highly prized shell, which is used for decoration and personal handicrafts. Appears also on the Moroccan markets. East Atlantic, from Morocco to Senegal and Guinea-Bissau, in the Canaries and perhaps also in Cape Verde Islands.



ventral view



dorsal view

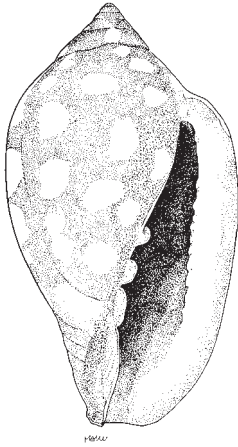


***Marginella sebastiani* Marche-Marchad and Rosso, 1979**

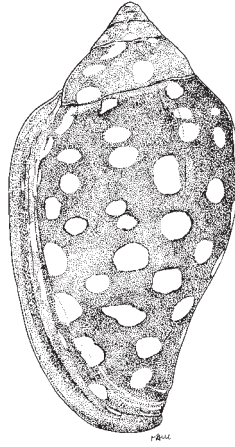
Frequent synonyms / misidentifications: None / *Marginella desjardini*; *M. glabella*; *M. goodalli* Sowerby, 1825.

En – Sebastian's marginella; **Fr** – Marginelle de Sebastian; **Sp** – Marginella de Sebastian.

Maximum shell length 7.3 cm, commonly to 4.5 cm. Moderately common on offshore sandy muddy bottoms, mainly from 80 to 160 m depths. Collected for its beautiful shell, with dredges or with bottom trawls and nets. Tropical east Atlantic, restricted to Senegal.



ventral view



dorsal view

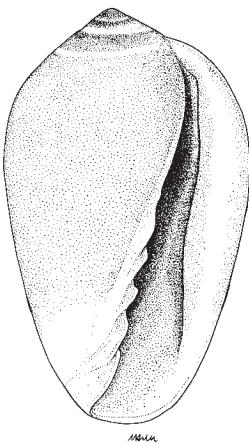


***Volvarina sowerbiana* (Petit de la Saussaye, 1851)**

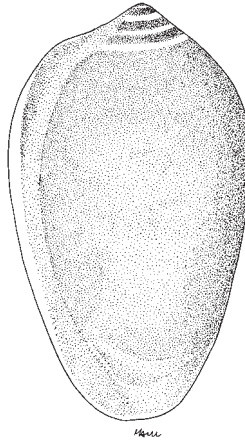
Frequent synonyms / misidentifications: *Marginella sowerbianum* Petit de la Saussaye, 1851 / *Marginella monilis* (Linnaeus, 1758) [= *Volvarina monilis* (Linnaeus, 1758), an Indian Ocean species].

En – Necklace marginella; **Fr** – Marginelle à collier; **Sp** – Marginella de collar.

Maximum shell length 1.5 cm, commonly to 1 cm. Abundant in sand, at low tide levels and in shallow subtidal waters. Collected in great quantity in Casamance (Senegal) to make necklaces, thanks to a very special technique: burrowing crabs living in the same sandy beaches as marginellas are crushed and their fragments spread on the sand at rising tide; numerous marginellas then get out of the sand, attracted by this delicious bait. Tropical east Atlantic, from Mauritania to Guinea.



ventral view



dorsal view

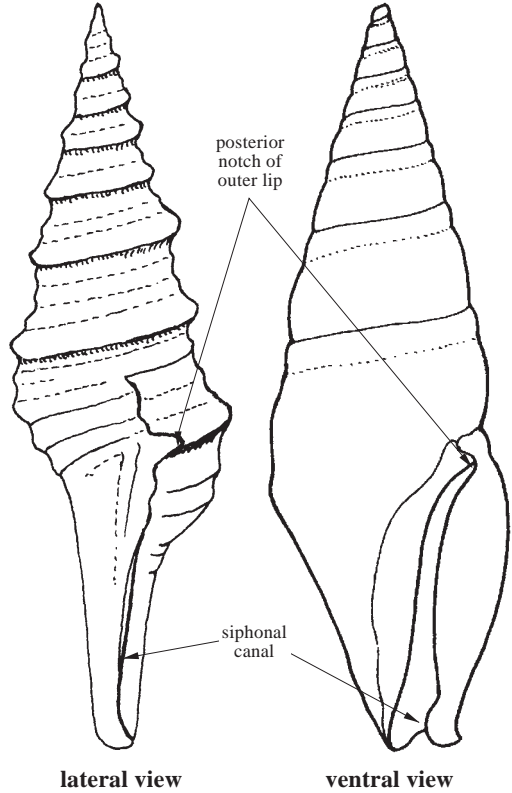


TURRIDAE

Turrids

Diagnostic characters: Shell variable in shape, generally fusiform, with a high slender spire. Outer surface with many sculptural patterns composed of spiral or axial to oblique ribs and cords, grooves, nodules or spines. Periostracum often present. Aperture more or less elongate, anterior siphonal canal well marked, short to long. Outer lip generally thin and sharp. A characteristic slit or notch along the posterior part of the outer lip, which is reflected in the growth lines made by the lip. Inner lip mostly smooth. Operculum corneous, with a terminal or lateral nucleus, sometimes absent. Head with a long snout and widely separated tentacles bearing eyes at or near their bases. Fleshy siphon well developed.

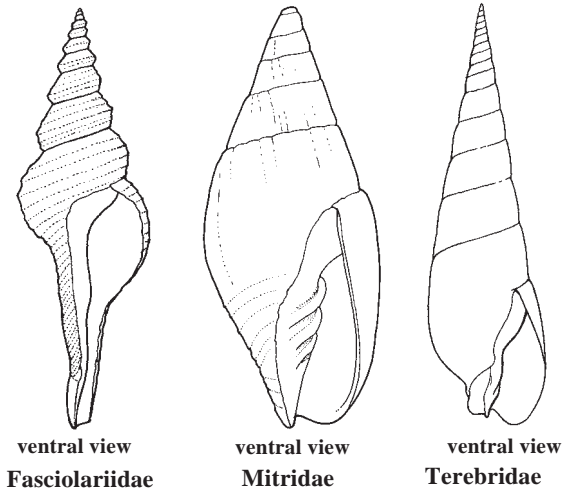
Habitat, biology, and fisheries: Mostly living in soft substrates, but some species also occurring in rock and coral reef habitats. May abound in sublittoral and shelf zones. Active predators, rasping prey with their radula or stabbing it with detachable, needle-like teeth charged with venom. Sexes generally separate, fertilization internal. Eggs produced in corneous capsules with a flat attachment base. Though turrids may be caught in numbers by shrimp trawlers on the continental shelf, they are not used much in the area and only 1 shallow water species, presently known to be locally collected, is included in this guide. However, other species may represent a potential resource to the local consumption of seashells in the future, when a research effort on the exploitable species will be undertaken.



Remarks: Family Turridae is considered here in a wide sense though since 20 years, traditional systematics of this family and the related Conidae and Terebridae have been strongly questioned by modern phylogenetic studies. It has been shown that family Turridae was not monophyletic and had to be split in a number of distinct units. In the last proposed classification (2011), the old Turridae have been split into 12 families, the definition of which is beyond the scope of this guide. The species included here should then belong to family Clavatulidae.

Similar families occurring in the area

None. The notch-like posterior sinus at the outer lip of aperture mostly distinguishes Turridae from other fusiform gastropods exhibiting an anterior siphonal canal, such as Fascioliariidae, Mitridae, or Terebridae.



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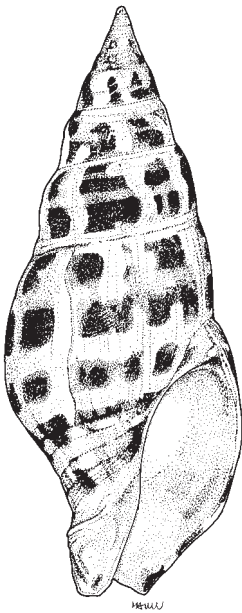
A single species of interest to fisheries occurring in the area.

***Pusionella nifat* (Bruguière, 1789)**

Frequent synonyms / misidentifications: *Clavatula nifat* (Bruguière, 1789); *Perrona nifat* (Bruguière, 1789) / None.

En – Nifat turrid; **Fr** – Pleurotome nifat; **Sp** – Pleurotoma nifat.

Maximum shell length 8.3 cm, commonly to 5 cm. Common on sand and mud bottoms, from low intertidal and shallow subtidal levels to depths of about 50 m. Frequently collected in bottom trawls and nets, and occasionally used for food by coastal people. The tropical east Atlantic, from Senegal to Angola and probably in the Canary Islands, but not in the Mediterranean.



ventral view



dorsal view



CONIDAE

Cone shells

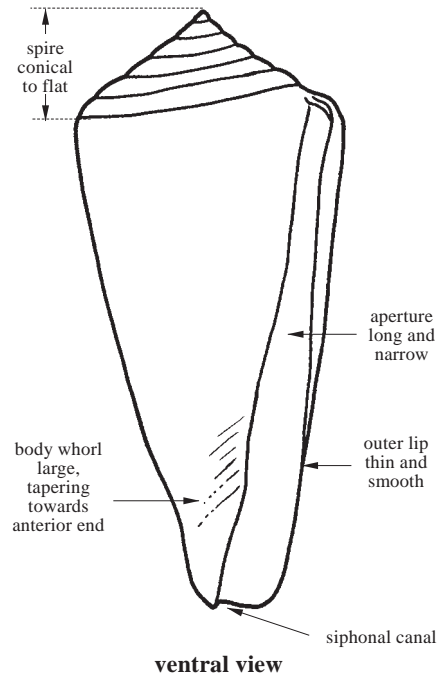
Diagnostic characters: Shell cone-shaped, with a moderately low, conical to flat **spire** and a well-developed **body whorl tapering towards the narrow anterior end**. Sculpture variable but generally reduced, sometimes tuberculate on shoulder. Periostracum thin to thick and fibrous, sometimes obscuring the external colour patterns. **Aperture very long and narrow**, with a small notch at the posterior end and a **short, wide siphonal canal** anteriorly. Outer lip thin and smooth, inner lip without callus and folds. **Operculum corneous, quite small**, ovate to claw-shaped and with a terminal nucleus, sometimes absent. Head with a produced tubular sheath covering the snout which is capable of considerable distension, and with eyes on small stalks near the extremities of the tentacles. Foot long and rather narrow, rounded or truncated anteriorly and obtusely pointed posteriorly. Fleishy siphon of the mantle well developed.

Habitat, biology, and fisheries: Mostly reef-dwellers, living in clean or muddy-sand bottoms under rocks or corals, or in silty crevices. Most common in intertidal and shallow sublittoral zones, but also occurring deeper on the continental shelf and slope to a depth of about 600 m. Often partly or completely buried in the sediment, emerging when the tide turns or at night to search for food. Active predators, armed with sharp arrow-like teeth and a poisonous gland which secretes a powerful nerve toxin. Most species feed on marine worms, but others prey on molluscs or even on small fishes. Sexes separate, fertilization internal. Eggs laid in compressed corneous capsules attached in rows or groups by a flat basal disk. Females often gather for spawning. Planktonic larval stage of variable duration, rarely absent.

The Conidae is a favourite family for shell collectors throughout the world, and the group is best represented in the tropical Indo-West Pacific with several hundred species. Careful recent research has proved that the West African fauna was considerably more diverse than previously thought. Cones are then commercially important in the area, and actively collected for shell trade. They have been also locally collected as food since prehistoric times in tropical West Africa, and their shells are still used for traditional decorative or religious purposes. Very recently, cones have been exploited as a new source of pharmaceuticals. Living cones must be handled with great care, for their bites may be painful or even occasionally fatal to humans. Due to the temperature sensitivity of the venom, cones are however edible without danger after cooking. Because of the scarcity of precise data, only species with a wide distribution and occurring in quantities in the area have been tentatively included in this section. However, many shallow water and beautifully patterned endemic species, recently found in Angola and the Cape Verde Islands, may also represent a target for shell trade nowadays. Furthermore, small-sized species, such as those used in jewellery in Senegal, will have to be added in the future, when detailed information on local fisheries becomes available.

Similar families occurring in the area

None. Shell characters are very distinctive.

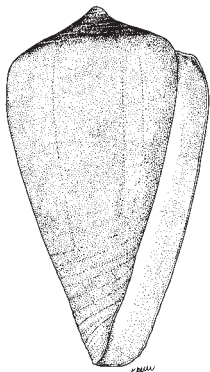


Key to species of interest to fisheries occurring in the area

- 1a. Outer shell colour plain white or yellowish white, with sometimes brown dots and stripes near the suture (Fig. 1) ***Conus tabidus***
- 1b. Outer shell colour not uniform, more or less strongly patterned on body whorl → 2

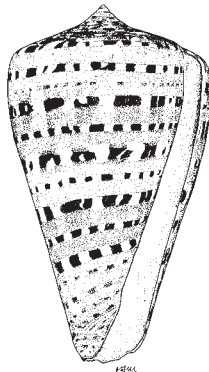
- 2a. Body whorl heavily patterned with variously sized spiral rows of often squared, alternating dark brown to black and white dashes, bars or dots (Fig. 2) ***Conus genuanus***
- 2b. Body whorl differently patterned → 3

- 3a. Shell large (up to 25 cm long); sides of body whorl rather straight in shape; outer colour cream to white with a pattern of numerous brown dots and dashes often more or less fused into wide spiral bands (Fig. 3) ***Conus pulcher***
- 3b. Shell medium-sized (up to 10 cm long); sides of body whorl widely convex posteriorly; outer colour very variable, irregularly marbled with brown, dark blue or blackish on a light ground colour (Fig. 4) ***Conus ermineus***



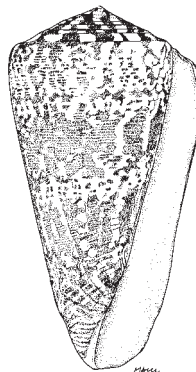
ventral view

Fig. 1 *Conus tabidus*



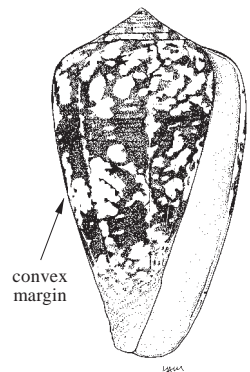
ventral view

Fig. 2 *Conus genuanus*



ventral view

Fig. 3 *Conus pulcher*








convex margin

ventral view

Fig. 4 *Conus ermineus*

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

-  *Conus ermineus* Born, 1778.
-  *Conus genuanus* Linnaeus, 1758.
-  *Conus pulcher* Lightfoot, 1786.
-  *Conus tabidus* Reeve, 1844.

References

Da Motta, A.J. 1991. *A systematic classification of the gastropod family Conidae at the generic level.* Rome, *La Conchiglia*, 48 p.

Monteiro, A., Tenorio, M.J. & Poppe, G.T. 2004. The family Conidae. The West African and Mediterranean species of *Conus*. In G.T. Poppe & K. Groh, eds. *A Conchological Iconography.* Hackenheim, Conch Books, 102 p., 164 pls.

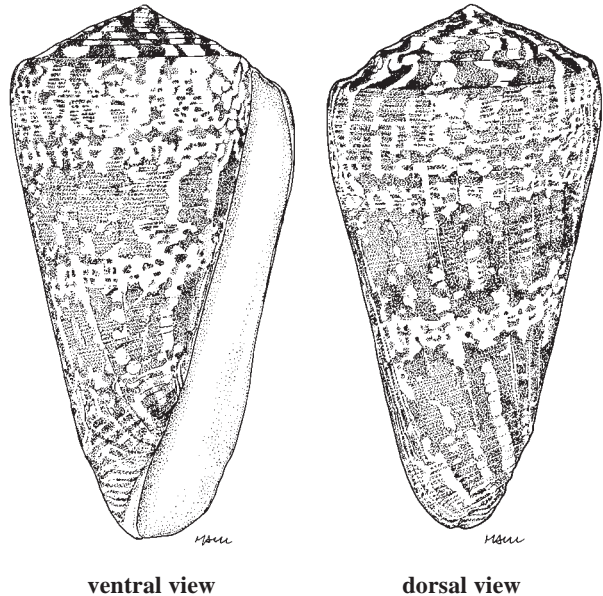
Walls, J.G. 1978. *Cone shells: a synopsis of the living Conidae.* Neptune City, T.F.H., 1011 p.

Conus pulcher Lightfoot, 1786

Frequent synonyms / misidentifications: *Conus papilionaceus* Hwass, 1792; *C. prometheus* Hwass, 1792; *C. siamensis* Hwass, 1792; *Kalloconus pulcher* (Lightfoot, 1786) / *Conus spurius* Gmelin, 1791.

FAO names: En – Butterfly cone; Fr – Cône papillon; Sp – Cono mariposa.

Diagnostic characters: Shell large to very large (up to about 25 cm long), thick and heavy to rather fine and light for its size, somewhat variable in shape with a nearly flat or low to moderately high conical spire and slightly elevated to sharply pointed apex. Spire whorls flattish to shallowly concave, finely striate axially, with poorly distinct spiral threads and incised suture. Shoulder well marked, roundly angular and slightly concave below suture. Sides of body whorl rather straight in shape, with a low gloss (often more glossy in small specimens), without conspicuous sculpture but with several spiral grooves anteriorly (often becoming obsolete with growth) and numerous fine spiral and axial lines throughout the surface. Periostracum conspicuous, rather fine to thick. Aperture fairly narrow, slightly broader anteriorly. Outer lip fine and sharp. **Colour:** outside of shell cream to white, with a pattern of numerous golden brown (ssp. *pulcher*) to dark brown (ssp. *byssinus*) or violet brown (ssp. *siamensis*) dots and dashes forming interrupted spiral lines and often more or less fused into wide spiral brown bands. Anterior end white. Spire whorls with numerous, alternating brown and white radiating areas. Outer colour pattern often more clearly defined and brighter in rather small specimens. Aperture pure white inside, sometimes with brown spots of the outer colour showing near the fine and sharp outer lip.



ventral view

dorsal view

Size: Maximum shell length 25.4 cm, commonly from 10 to 15 cm.

Habitat, biology, and fisheries: On various soft to hard bottoms, preying on molluscs. Common at intertidal and shallow subtidal levels, but also occurring deeper to about 50 m. It has been used for food in Mauritania during prehistoric times. Locally collected at low tide by coastal people or trawled at shallow depths, for subsistence and shell trade. Large specimens sometimes deposited as offers at the foot of sacred trees or fetishes in Casamance, Senegal. *Conus pulcher* is often targeted by shell collectors as being the largest cone species of the world, though shells of large specimens are rarely in a fine condition.

Distribution: The tropical East Atlantic, from Rio de Oro to Angola, in Macaronesian Islands (the Canaries and Madeira Islands) and Gulf of Guinea islands.

Remarks: The taxonomy of the *Conus pulcher* complex has long been confusing; it comprises a number of forms that are nowadays generally grouped in 3 distinct subspecies: ssp. *byssinus* in northern part of West African mainland, ssp. *pulcher* in southern part and ssp. *siamensis* in Macaronesian islands.

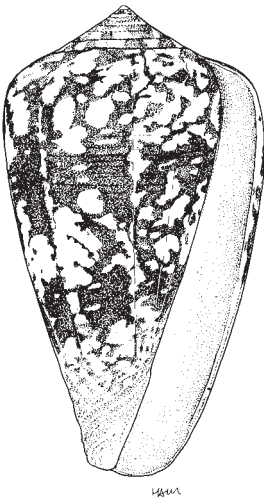


***Conus ermineus* Born, 1778**

Frequent synonyms / misidentifications: *Chelyconus ermineus* (Born, 1778); *Conus narcissus* Lamarck, 1810; *C. testudinarius* Hwass, 1792; *Dendroconus ermineus* (Born, 1778) / *Conus mercator* Linnaeus, 1758; *C. ranunculus* Hwass, 1792 [= *Conus achatinus* Gmelin, 1791]; *C. venulatus* Hwass, 1792.

En – Turtle cone; **Fr** – Cône tortue; **Sp** – Cono tortuga.

Maximum shell length 10.3 cm, commonly from 5 to 7 cm. In coral reef areas and on sandy bottoms. Lower levels of the intertidal zone to continental shelf, down to about 100 m. Adults feeding on small fish, but possibly on polychaete worms at young stages. Must be handled with care, for its venom is strong enough to cause injury to man. A rather common species, frequently caught by trawlers. Collected for shell trade and medical purposes. Pharmaceutical research on a toxin recently extracted from its venom revealed that this peptide may be a valuable tool for studying human neuronal Na⁺ channel properties, and for designing new drugs to counteract the effects of some myasthenias and of multiple sclerosis on muscle contractility. Widespread in the tropical Atlantic; eastern Atlantic, from Senegal to Angola, Canary Islands, the Cape Verde Archipelago, São Tomé and Príncipe islands; western Atlantic, from the Gulf of Mexico and the Caribbean to Suriname.



ventral view



dorsal view

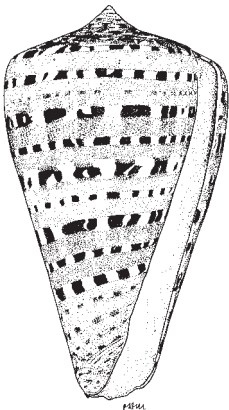


***Conus genuanus* Linnaeus, 1758**

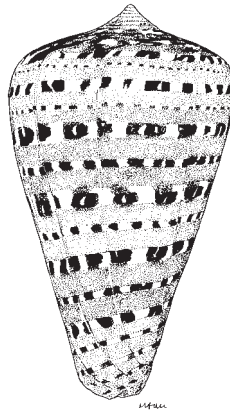
Frequent synonyms / misidentifications: *Conus fasciatus* Perry, 1811; *C. papilio*; *Genuaconus genuanus* (Linnaeus, 1758) / None.

En – Garter cone; **Fr** – Cône jarretière; **Sp** – Cono liga.

Maximum shell length 7.5 cm, commonly from 5 to 6 cm. On sand, preying on both worms and molluscs. Fairly common in shallow subtidal waters and offshore to about 50 m depth. This beautifully patterned cone is actively collected for shell trade, by diving in shallow water or deeper with bottom trawls and nets. The tropical east Atlantic, from Senegal to Angola, in the Canaries, Cape Verde Archipelago and in São Tomé and Príncipe islands.



ventral view



dorsal view

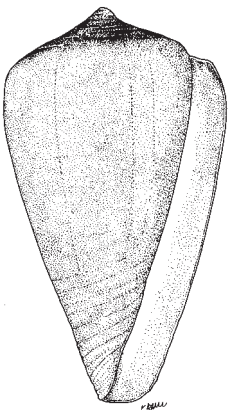


***Conus tabidus* Reeve, 1844**

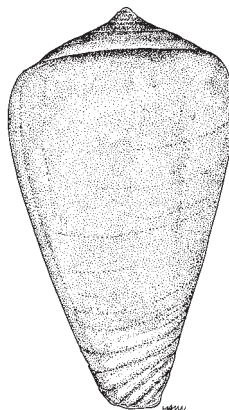
Frequent synonyms / misidentifications: *Monteiroconus tabidus* (Reeve, 1844) / *Conus ambiguus* Reeve, 1844.

En – Tabid cone; **Fr** – Cône tabide; **Sp** – Cono pasado.

Maximum shell length 5.5 cm, commonly from 3 to 4 cm. Locally common, preying on worms. At low subtidal levels and offshore, to about 30 m deep. Collected for its elegant white shell. The tropical east Atlantic, from Senegal to Angola, the Cape Verde Archipelago and in São Tomé and Príncipe islands.



ventral view



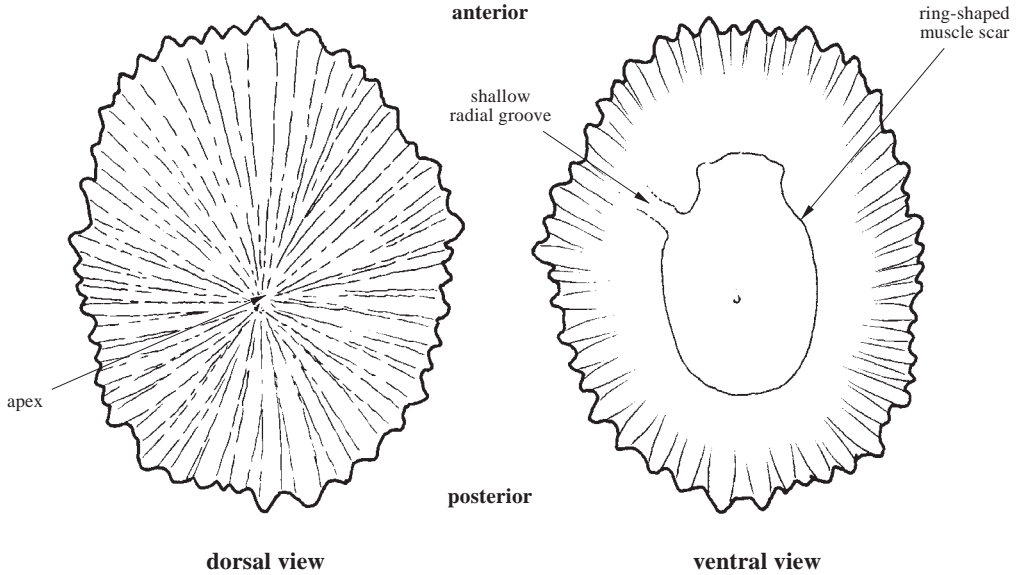
dorsal view



SIPHONARIIDAE

False limpets

Diagnostic characters: Shell conical, mostly dark in colour, often with a weak marginal lobe on the right side. Apex submedian or somewhat posterior. Sculpture more or less well developed, essentially radial. Outline of the aperture irregularly ovate. **Interior non nacreous, often shining, with a ring-like muscle scar interrupted on the right side, where there is a shallow siphonal radial groove.** No operculum. Head wide, devoid of tentacles. Foot large and rounded, very strong. Mantle cavity modified into a pulmonary chamber opening on the right side of the body, along the internal radial groove of the shell.

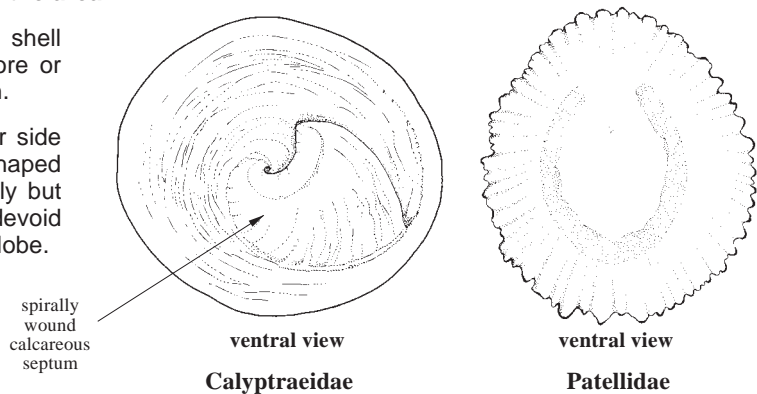


Habitat, biology, and fisheries: Sedentary, air-breathing animals, common on intertidal rocks where they clamp by means of their strong foot. Graze on encrusting lichens and algae with a powerful radula. Mostly hermaphrodites. Eggs laid in a gelatinous ribbon, hatching as free-swimming larvae or as crawling young. Siphonariidae are locally collected for food by coastal populations and their shells sometimes used in local handicraft.

Similar families occurring in the area

Calyptraeidae: inner side of shell with a calcareous septum more or less covering the apical region.


Lottiidae and Patellidae: inner side of shell with a horseshoe-shaped muscle scar, opened anteriorly but not on the right side which is devoid of radial groove and marginal lobe.



Key to species of interest to fisheries occurring in the area

- 1a.** Outer sculpture of very fine and usually numerous radial threads (up to 100 or more in number); shell margin almost smooth; interior with dark radial lines, often forked near shell margin, and converging inward to form a dark concentric belt ***Siphonaria pectinata***
- 1b.** Outer sculpture of low and less numerous radial ribs (up to about 50 in number), slightly raised near periphery; shell margin slightly crenulated; interior with white radial bands on a black bottom, not converging inward ***Siphonaria capensis***

List of species of interest to fisheries occurring in the area

The symbol  is given when species accounts are included.

 *Siphonaria capensis* Quoy and Gaimard, 1833.

 *Siphonaria pectinata* (Linnaeus, 1758).

References

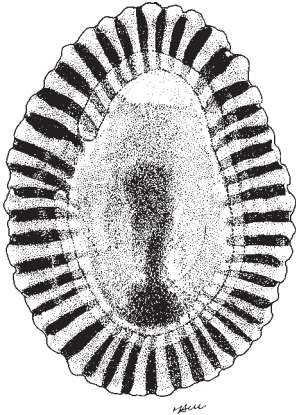
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***Siphonaria capensis* Quoy and Gaimard, 1833**

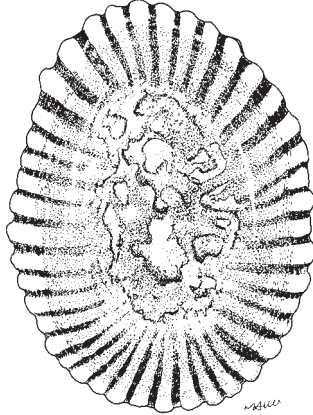
Frequent synonyms / misidentifications: None / *Siphonaria lineolata* d'Orbigny, 1842 [= *Siphonaria pectinata*].

En – Cape false limpet; **Fr** – Siphonaire du Cap; **Sp** – Sifonaria del Cabo.

Maximum shell length 3.5 cm, commonly from 2 to 3 cm. Common on upper mid-tidal rocks, in groups, each individual forming a home-scar. On open sea coasts and in estuaries. Feed on green algae and black lichens. Occasionally collected for food by coastal people. Distribution imperfectly known because of confusion with other species. Southeast Atlantic and southwest Indian Ocean; north to Namibia or Angola, and east to Mozambique.



ventral view



dorsal view

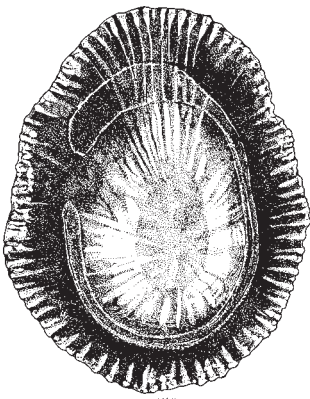


***Siphonaria pectinata* (Linnaeus, 1758)**

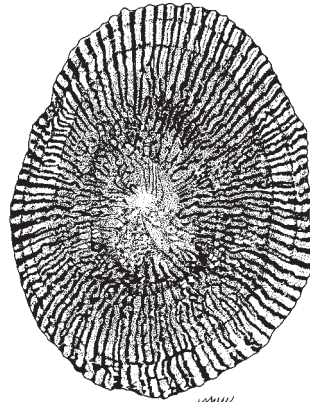
Frequent synonyms / misidentifications: *Siphonaria adansoni* de Blainville, 1827; *S. algesirae* Quoy and Gaimard, 1832; *S. grisea* Gmelin, 1791; *S. lineolata* d'Orbigny, 1842 / *Lottia leucopleura* (Gmelin, 1791); *Siphonaria capensis*.

En – Striped false limpet; **Fr** – Siphonaire mouret; **Sp** – Sifonaria peine.

Maximum shell length 3.5 cm, commonly to 2.5 cm. Very common on rocky shores, often close to low water marks so as to remain wet, but also occurring higher on the shore. Eggs laid in soft, gelatinous strings, hatching as free-swimming planktonic larvae. Locally collected for food by coastal populations. Eastern Atlantic, from central Portugal to Angola; Cape Verde and Macaronesian islands, in the Azores and the Canaries. Western Mediterranean; north to Motril, southern Spain, and east to Algiers, Algeria. Introduced to the western Atlantic on the ships of Europeans; north to eastern Florida and Texas, and south to Brazil.



ventral view



dorsal view



HAGFISHES

by B. Fernholm¹ and M.M. Mincarone²

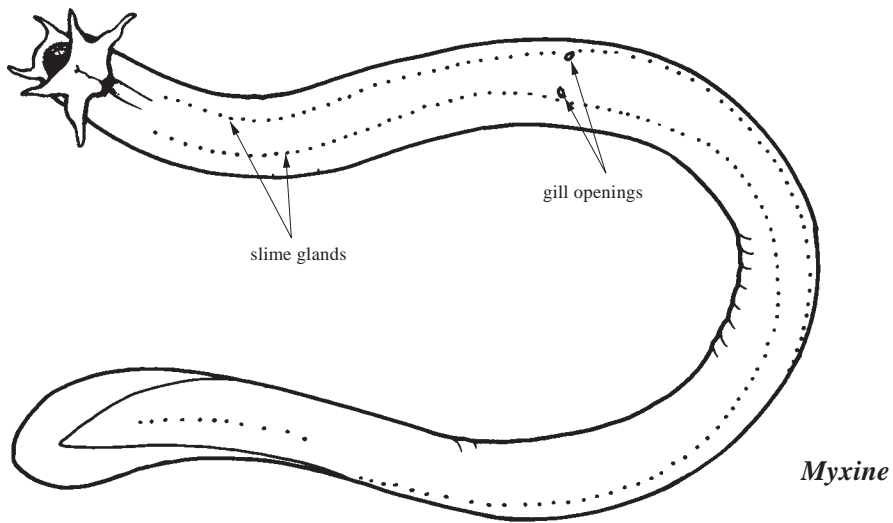
¹Swedish Museum of Natural History, Stockholm, Sweden;

²Universidade Federal do Rio de Janeiro, Macaé, Brazil

MYXINIDAE

Hagfishes

Diagnostic characters: Moderate-sized (128 cm total length worldwide, 52 cm total length in the area), very elongate with eel-like-shaped body. Eyes reduced. **Mouth jawless, with lateral biting horny teeth. No operculum; 1 to 14 pairs of external gill openings ventrally. Pharyngocutaneous duct on the left side opening to the exterior. Single nostril dorsal to mouth leading respiratory water through the nasopharyngeal duct to the pharynx and gill pouches. Three pairs of barbels on head; 2 pairs adjacent to nostril; 1 pair immediately adjacent to oral cavity. No paired fins. A caudal fin around the tip of the tail and a low median ventral fin-fold (VFF) on the trunk in some species. A ventrolateral row of slime glands and pores associated along each side of body. No scales. Skeleton cartilaginous.**



Habitat, biology, and fisheries: Benthic fishes, often burrowing in mud, from inshore to deep sea. Some species live among rocky and deep-reef habitats. Feed often on dead or disabled fishes. As scavengers, they represent one of the most important mechanisms for the rapid cleanup and processing of carrion-falls. In areas subject to intensive commercial fisheries, hagfish probably play a key role in the removal and recycling of discarded bycatch. Rare to common, most efficiently taken in baited traps. A few species of commercial interest for skin ("eel" skin) industry.

Remarks: Three subfamilies, Eptatretinae, Rubicundinae and Myxiniinae with about 78 species throughout the world's oceans in tropical and temperate latitudes; tropical species usually occur in deep water. Only 2 species of Myxiniinae have been recorded in the area. In addition, it is likely that *Myxine capensis* occurring along the southwestern coast of Africa north to latitude 26°S could be found in the southern part of the area (Mincarone *et al.*, 2011). On the southern coast of Africa 3 species of *Eptatretus* (*E. hexatrema*, *E. octatrema*, and *E. profundus*) have been recorded. A review of the family is needed; the most recent overview is that of Fernholm (1998).

Similar families occurring in the area

None.

Key to species occurring in the area

- 1a.** Six pairs of gill pouches; anterior unicusps 4 to 7; total cusps 29 to 38 *Myxine glutinosa*
1b. Seven pairs of gill pouches; anterior unicusps 9 to 11; total cusps 45 to 51. *Myxine ios*

List of species occurring in the area

The symbol \supset is given when species accounts are given.

\supset *Myxine glutinosa* Linnaeus, 1758.

\supset *Myxine ios* Fernholm, 1981.

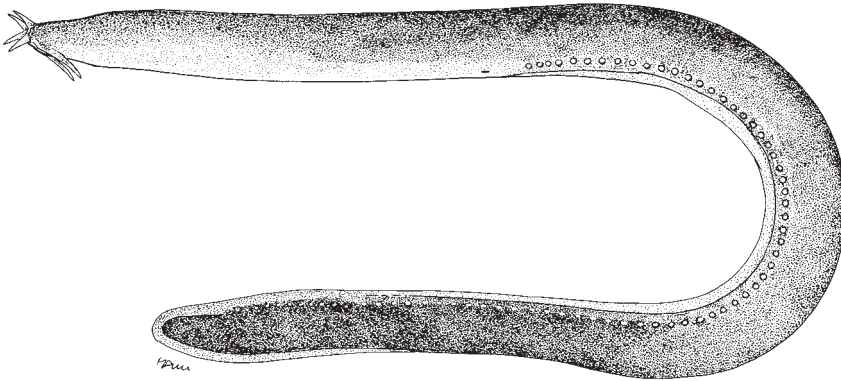
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***Myxine glutinosa* Linnaeus, 1758**

Frequent synonyms / misidentifications: *Gastrobranchus coecus* Bloch, 1792; *Petromyzon myxine* Walbaum, 1792; *Myxine glutinosa* var. *septentrionalis* Putnam, 1874 [in part, specimens from England] / None.

FAO names: En – Hagfish (Atlantic hagfish); Fr – Myxine; Sp – Pez moco.



Diagnostic characters: Body elongated, its depth 5 to 8% total length. Rostrum triangular, bluntly pointed. One single conspicuous nasal-sinus papilla in the mid-dorsal surface of the nasal sinus. **Six (rarely 7) pairs of gill pouches.** Each gill pouch with efferent branchial ducts on either side combined into a single external gill aperture posterior to the gill pouches. Counts: multicusp pattern 2/2; **anterior unicusps 4 to 7;** posterior unicusps 5 to 8; **total cusps 29 to 38.** Prebranchial pores 20 to 36; trunk pores 50 to 63; tail pores 8 to 15; total pores 85 to 108. Body proportions (in percentage of TL): prebranchial length 24 to 30; trunk length 55 to 60; tail length 13 to 17; body width 3 to 6; body depth including VFF 5 to 9; body depth excluding VFF 5 to 8; body depth over cloaca 4 to 6; tail depth 4 to 6. **Colour:** body light to dark brown on live specimens; head the same colour as body; ventral area of prebranchial region lighter than body; ventral finfold pale; caudal finfold without pale margin; gill apertures and slime pores usually with pale margins; no pale stripe on dorsal midline.

Size: Maximum total length 450 mm.

Habitat, biology, and fisheries: On shelves and slopes at depths from 40 to 1 200 m. No interest to fisheries.

Distribution: Eastern North Atlantic, from Murmansk (Russia) to northern Morocco, including the western Mediterranean Sea (north Morocco, Algeria, and Adriatic Sea, but probably occurs along all coastal regions of the western Mediterranean).

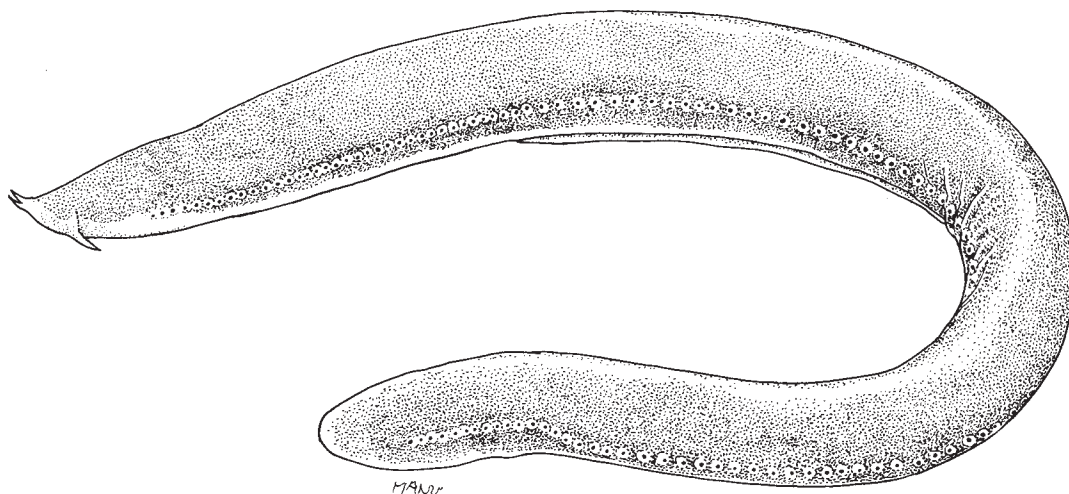
Note: A western North Atlantic congener, *Myxine limosa* Girard, 1859, occurs from Greenland to Florida, USA (including few records in the Gulf of Mexico) and has been assigned by some authors as junior synonym of *M. glutinosa* (Martini *et al.*, 1998, Martini and Flescher, 2002). On the other hand, Wisner and McMillan (1995) suggested assigning this population to a different species based on differences in size at maturity and colour differences in preserved specimens. In a recent phylogenetic study based on molecular data, the validity of *M. limosa* as distinct from *M. glutinosa* was confirmed (Fernholm *et al.*, 2013). Morphometrical and meristic data presented herein follow Wisner and McMillan (1995).



Myxine ios Fernholm, 1981

Frequent synonyms / misidentifications: None / None.

FAO names: En – None; Fr – None; Sp – None.



Diagnostic characters: (West African population): Body elongated, its depth 4 to 6% total length. Rostrum bluntly rounded. One single conspicuous nasal-sinus papilla in the mid-dorsal surface of the nasal sinus. **Seven (rarely 6) pairs of gill pouches.** Each gill pouch with efferent branchial ducts on either side combined into a single external gill aperture posterior to the gill pouches. Counts: multicusp pattern 2/2; **anterior unicusps 9 to 11;** posterior unicusps 9 to 11; **total cusps 45 to 51.** Prebranchial pores 28 to 35; trunk pores 61 to 73; tail pores 9 to 12; total pores 101 to 116. Body proportions (in percentage of TL): prebranchial length 25 to 29; trunk length 59 to 64; tail length 12 to 14; body width 3 to 5; body depth including VFF 5 to 7; body depth excluding VFF 4 to 6; body depth over cloaca 3 to 5; tail depth 4 to 5. **Colour** (in alcohol): body grey, occasionally with a whitish ventral finfold. The Irish population is distinguished by having a whitish head, gill apertures and slime pores with a whitish margin and usually a lighter mid-dorsal and/or midventral stripe.

Size: Maximum total length 522 mm.

Habitat, biology, and fisheries: The West African specimens were collected in baited traps on the lower slope at depths from 614 to 976 m. Angolan specimens were trawled on the lower slope at depths from 703 to 734 m. All the West African material was caught in March and contains no ripe individuals (largest maturing eggs found are 5 to 9 mm). The Irish specimens were caught in semi-balloon otter trawls on the Porcupine Seabight, an amphitheatre-shaped embayment in the continental margin to the southwest of Ireland, at depths from 985 to 1 650 m. No interest to fisheries.

Distribution: Known from 2 populations as defined by Fernholm (1981). The West African population is known off Western Sahara, from Cap Boujdour to Cap Blanc, and from 2 specimens (CAS 223405 and SAIAB 66087) recently trawled off Angola. The Irish population is mainly known from Porcupine Seabight, southwestern Ireland.



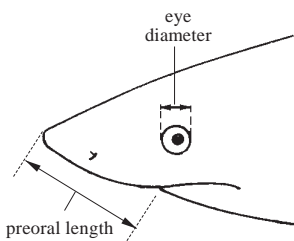
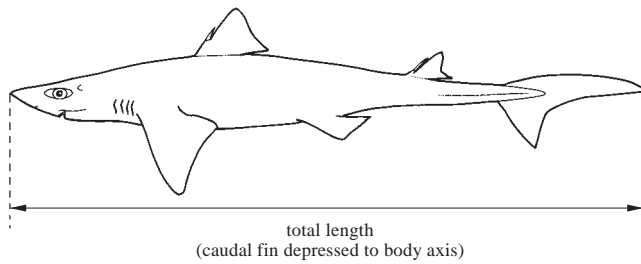
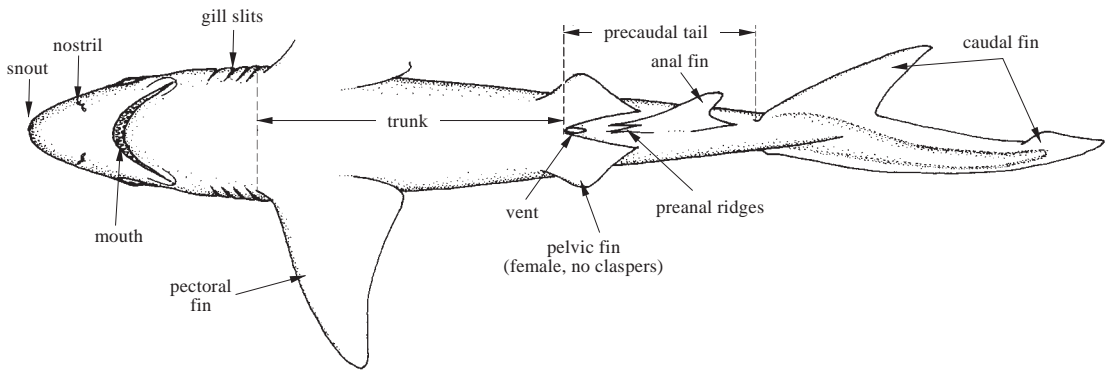
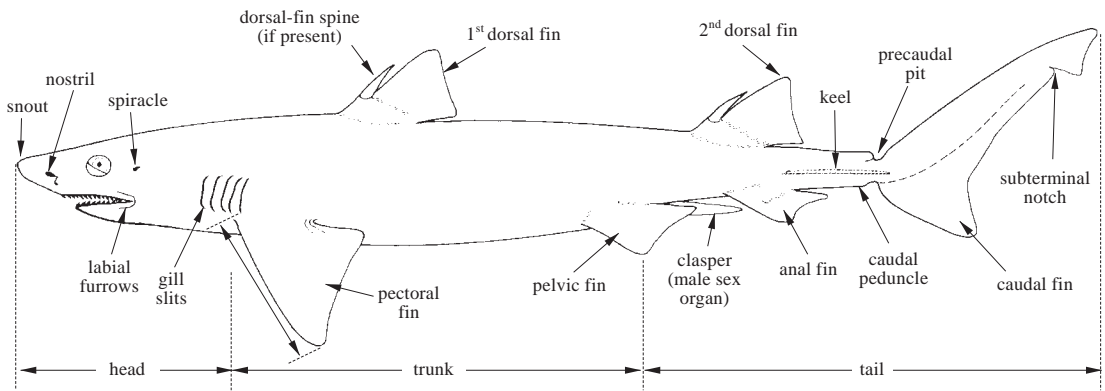
SHARKS

by L.J.V. Compagno

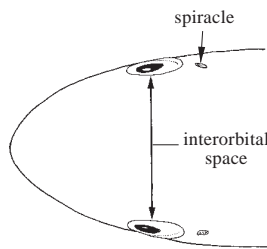
Sharks Research Center, South African Museum, Cape Town, South Africa

TECHNICAL TERMS AND MEASUREMENTS

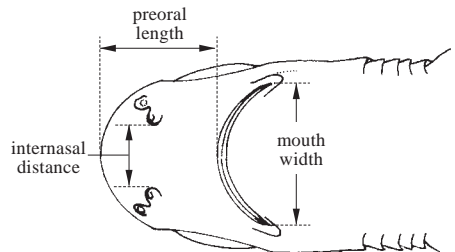
(Straight-line distances)



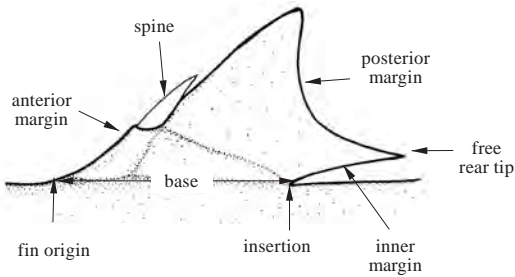
head (lateral view)



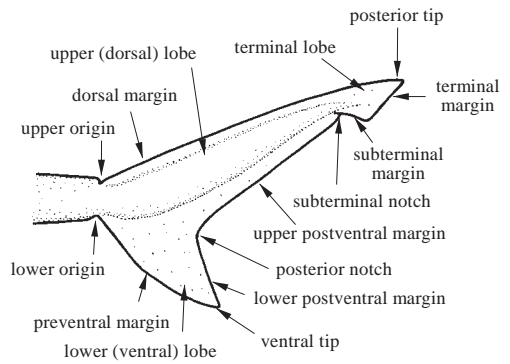
head (dorsal view)



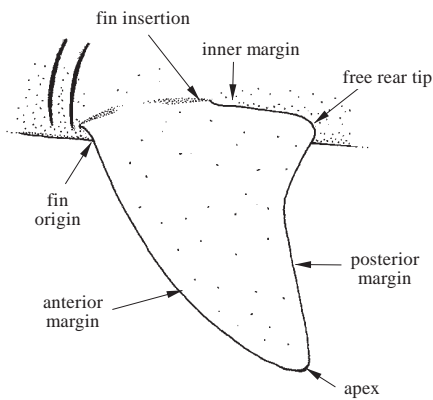
head (ventral view)



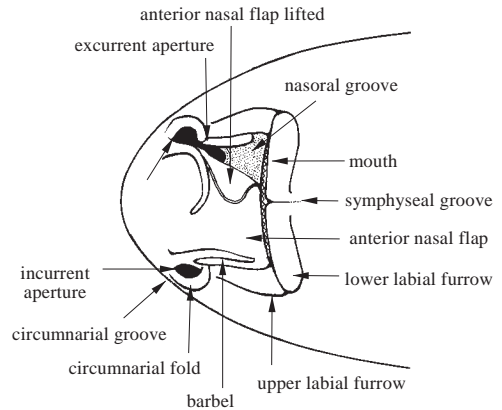
dorsal fin



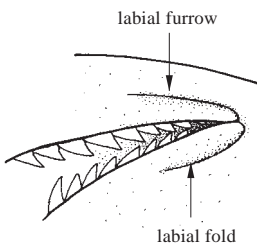
caudal fin



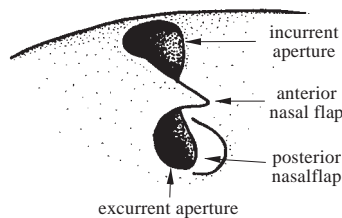
pectoral fin



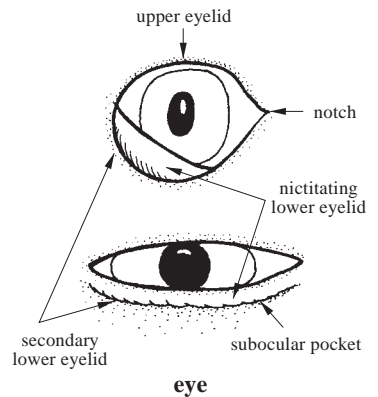
**head of an orectoloboid shark
(ventral view)**



mouth corner



nostril



eye

GENERAL REMARKS

Sharks include a variety of cylindrical, elongated, or depressed, jawed fishes with paired pectoral and pelvic fins and relatively simple internal skeletons made of cartilage and lacking internal or external bones, plate-like bony scales, and bony fin rays. Living sharks are members of the Class Chondrichthyes (the cartilaginous fishes or shark-like fishes), which includes the Subclass Elasmobranchii (the elasmobranchs or plate-gilled fishes, including living sharks and rays, and fossil relatives), and the Subclass Holocephali (chimaeras and fossil relatives). It is traditional to classify living elasmobranchs into two formal taxonomic groups, sharks (Selachii) and rays (Batoidea or batoids), but modern morphological studies of elasmobranch phylogeny show that the rays comprise a single group of highly derived and extremely diverse 'flat' or 'winged' sharks that is closest to the small group of sawsharks (Pristiophoridae) and which nests within one of two superorders of living sharks, the Squalomorphii. On the other hand, some recent molecular studies support the traditional dichotomy. Whatever its validity phyletically, the traditional shark-ray dichotomy serves for simple identification as used here and in previous FAO species identification guides.

Traditional sharks, or non-batoid sharks, differ from the rays or batoids in having **lateral gill openings (or gill slits) and the pectoral fins not fused to the sides of the head over the gill openings** (both primitive character states with derived states in rays). The flattened angel sharks (Family Squatinidae) might be mistaken for rays at first sight and are the immediate relatives of the rays and sawsharks; they have large, broad, ray-like pectoral fins that extend as triangular lobes alongside the gill openings, but are not fused to the head above them.

Non-batoid sharks have eyes on the dorsal surface or sides of the head. There are usually **5 gill openings on each side of the head, rarely 6 or 7**; spiracles (when present) are on the dorsal or dorsolateral surfaces of the head between the mouth and first gill openings. **The mouth is usually ventral or subterminal on the head**, but terminal or nearly so in a few species. **The teeth on the jaws are set in numerous transverse rows (or tooth families) and are constantly replaced from inside the mouth**. Most species of sharks are more or less **covered by small (occasionally enlarged) tooth-like placoid scales or dermal denticles**. The tail and caudal fin are always well developed and serve to propel the animal by lateral undulations; the pectoral fins are mostly not used for propulsion through the water but aid in stabilizing and steering the shark. Most sharks have **two (rarely one) dorsal fins**, sometimes with spines on their front edges; **an anal fin is usually present**, but missing in several families.

Male sharks have cylindrical copulatory organs or **claspers** on their pelvic fins, used for internal fertilization of eggs in females; about one-third of the species of non-batoid sharks have females that deposit eggs in rectangular or conical capsules, formed of a horn-like material, on bottom (oviparity); the remainder are livebearers (viviparous). Some livebearing sharks, including many houndsharks (Triakidae), most requiem sharks (Carcharhinidae), and all hammerheads (Sphymidae) are viviparous (placental viviparous), with yolk sacs of fetuses forming a placenta with the maternal uterus for nutrient transfer; other livebearing sharks are ovoviviparous (aplacental viviparous), without a placenta. A few ovoviviparous carcharhinoid sharks (family Pseudotriakidae, genera *Gollum* and *Pseudotriakis*), orectoloboid sharks (Family Ginglymostomatidae, genus *Nebrius*) and possibly all lamnoid sharks (reproductive mode unknown for Family Mitsukurinidae) practice uterine cannibalism, in which one or more fetuses in each uterus resorb their yolk sacs and then devour eggs passed down the oviducts for nutriment (oophagy) and grow to considerable size with massive yolk stomachs before birth. In the Odontaspidae (*Carcharias taurus*) the largest fetus kills and eats its siblings (adelphophagy) and only one fetus survives in utero, while several young may cohabit the uterus in the other families.

Mature sharks vary in total length from about 15 to 19 cm (dwarf species of Etmopteridae, Dalatiidae and Proscylliidae) to 18 m or more (whale shark, Family Rhincodontidae) and range in weight from between 10 and 20 g to at least 30 tonnes. Most sharks are of small or moderate size; about 50% are small, between 15 cm and 1 m; 32% between 1 and 2 m; 14% between 2 and 4 m; and only 4% are over 4 m in total length.

All sharks are predators, with a wide prey range from planktonic crustaceans and benthic invertebrates to pelagic cephalopods, small to large bony fishes, other cartilaginous fishes, marine mammals, and other marine and terrestrial vertebrates. Sharks are primarily marine, but a few requiem sharks (Carcharhinidae) have broad salinity tolerances, and one species (bull shark, *Carcharhinus leucas*) is wide-ranging in tropical lakes and rivers with sea access as well as shallow inshore waters. No non-batoid sharks are known to be confined to fresh water, unlike several species of stingrays (families Dasyatidae and Potamotrygonidae). Sharks are widely distributed in all oceans, from the Arctic to subantarctic islands, and from close inshore on reefs, off beaches, and in shallow, enclosed bays to the lower continental slopes, the abyssal plains, sea mounts and ridges, and the high seas. They are most diverse in continental waters of tropical and warm-temperate seas, from inshore waters down to upper continental slopes, but are less so in colder waters, at great depths (below 2 000 m), in the open ocean and off oceanic islands. The richest shark faunas occur in the Indo-West Pacific from South Africa and the Red Sea to Australia and Japan.

Shark diversity in the area: The present area (eastern central Atlantic, Area 34 and the northern half of the eastern South Atlantic, Area 47) has a moderately diverse shark fauna compared to other parts of the world, including 26 families, 49 genera, and at least 91 species. Several additional genera and species occur in the southern half of Area 47, including southern African endemics. Worldwide there are 34 families, 107 genera, and between 421 and 518 species of traditional sharks (estimate as of 30 January 2007). Several genera and families are poorly known and require further taxonomic study. Several species of sharks are endemic to the area and have restricted ranges within it. Several species (including inshore species) are known from one or a few museum specimens only, and a wealth of new species have been collected in deepwater, offshore continental, and even inshore habitats in the past forty years (some of which are still undescribed). Undoubtedly more new species and many records of described species will be discovered with further collecting in poorly known parts of the area. Knowledge of the shark fauna of the present area is very sketchy, and many maritime countries need further surveys to determine which species occur there. Basic knowledge of the biology of many species, particularly deepwater taxa, is often very deficient or entirely lacking, and fishery workers can contribute much new information on this subject. If possible, representative material of rare or uncommon species should be forwarded to large national museum collections, and basic information, such as total length, weight, sex, maturity, stomach contents, locality of capture, date, collector, method of collection, depth of capture, as well as photographs of the sharks in side, top and bottom views, should be recorded. Difficulties with the keys, or the possible use of better field characters, should be brought to the attention of the author, so that modifications can be made in subsequent versions of this section. Problems might also arise from the occurrence, in the area, of previously unrecorded species, new species, or variations within species not taken into consideration in the present keys and species accounts.

Shark-bite incidents: The 'shark attack' hazard has been grossly exaggerated over the past few decades, including almost universal use of the emotive term 'shark attack' for the minor phenomenon of sharks biting and occasionally killing people. Large carcharhinids, sphyrnids and lamnids, and less frequently other sharks, may occasionally bite people in the water or bite or hit boats, but are far less hazardous than the water itself. The negative fascination of sharks to the public, and particularly to the news and entertainment media, elevates the perceived importance of shark-bite incidents beyond their modest reality of less than 100 bites per year worldwide with less than a fifth being fatalities. A spate of shark incidents off Florida in the United States during the summer of 2001 triggered a nation-wide and international media 'feeding frenzy' of enormous proportions for several months, that was abruptly terminated by a real disaster (the 9/11 terrorist attack). During the last half-decade the City of Cape Town in South Africa (a major and burgeoning centre of touristic and media activity), fell into intensive 'hype-fests' after every white shark bite incident in the metropolitan area. In the past decade media attention to sharks has improved markedly due to positive coverage of their conservation problems although some media still indulge in major and seemingly irresistible lapses of profitable but socially irresponsible 'shark-attack' hype and fanned hysteria. In reality sharks are not really 'dangerous' in the sense of being a major threat to human life. Certain big cats (tiger, lion), domestic dogs, some large herbivorous mammals including domestic livestock, and large crocodilians kill and injure more people than sharks, but their toll is very small compared to deaths from poisonous snakes and miniscule compared to deaths from mosquito-borne micro-organisms that cause major diseases.

Shark fisheries worldwide: Unfortunately, the 'shark attack' issue had tended to obscure the vast 'human attack' problem and its implications for shark conservation in the face of burgeoning fisheries driven by the expanding world human population, increasingly sophisticated fisheries technology, and enormous, increasing markets for shark products including meat, fins, liver oil, skins, and cartilage. It was recognized over the past five decades that aspects of the life history strategy of sharks (long lives, long maturation times,

and low fecundity, plus relatively large size) made them very vulnerable to overexploitation, and that several targeted shark fisheries had suddenly collapsed after recruitment had been impaired by overexploiting the breeding stocks. However, only in the past decade and a half has there been widespread concern about world trends in fisheries for sharks and other cartilaginous fishes. Data for this survey is extracted from the 1950–2004 FAO World Fisheries Production database (published 2006), using FAO FishStat 2003 statistical software, and from the FAO Yearbooks of Fisheries Statistics from 1953 through 1993. These statistics represent 'nominal catches' (abbreviated as 'catches' here) as estimated live weights of sharks that are computed by FAO from recorded landed weights of various shark products (including processed parts such as dressed carcasses, fins and livers) from 141 countries reporting cartilaginous fish landing data to FAO.

After the Second World War world fisheries for cartilaginous fishes approximately tripled in reported catches to FAO over a half-century, with catches in 1950 being 33% of those in 2004 (272 versus 810 thousand metric tonnes). Total cartilaginous fish catches have not kept pace with the approximately eightfold increase in total fisheries catches worldwide (20 million tonnes in 1950 versus 156 million tonnes in 2004), and declined in proportion from about 1.4% of the total catch in 1950 to 0.5% in 2004. Much of the shark catch worldwide may be utilized and discarded bycatch of fisheries driven by larger catches of more exploitation-resistant bony fishes or other marine organisms such as crustaceans or cephalopods with far higher fecundity. Shark bycatch in such fisheries can plummet with little impact on the targeted non-shark species, while targeted shark fisheries can decline drastically in a decade or two without proper management. More recent increases in demand and prices for shark products such as fins, jaws, cartilage, oil and meat have encouraged more extensive targeted fisheries, greater utilization of bycatch, and greater utilization of fins and other shark products that were formerly discarded from sharks that were utilized and marketed for their meat. Shark products (especially fins) from several species (including basking, whale, white, mako, blue and hammerhead sharks) have soared enormously in value, encouraging continued exploitation of depleted populations of these sharks because of the great value of each individual that is caught.

World catches of cartilaginous fishes reported to FAO apparently had a leveling or plateau from 1996 through 2004 at 810 to 881 (average 846) thousand metric tonnes. However, total fisheries catches have continued to increase from 129 to 156 million metric tonnes from 1996 through 2004. This suggests that there is little if any scope for further increases in shark catches despite greater total catches, higher and sometimes inflated values for various shark products, and greater incentives to develop targeted shark fisheries and promote greater utilization of shark bycatch. On a world basis shark exploitation is currently mostly unregulated and out of control, as are the compounding factors of modification and degradation of their habitats.

Shark fisheries in the area: Countries that reported cartilaginous fish catches to FAO in the area from 1950 to 2004 include Angola, Benin, Cameroon, Cape Verde, China, Democratic Republic of the Congo, Ivory Coast (Côte d'Ivoire), Cuba, Equatorial Guinea, Estonia, France, Gabon, Gambia, Germany, Ghana, Greece, Guinea, Guinea-Bissau, Honduras, Iceland, Italy, Japan, Republic of Korea, Latvia, Liberia, Lithuania, Mauritania, Morocco, Namibia, Nigeria, Panama, Philippines, Portugal, Republic of the Congo, Romania, Russian Federation, São Tomé and Príncipe, Saint Helena, Senegal, Sierra Leone, Spain, South Africa, Taiwan Province of China, Togo, Ukraine, and the former USSR. The area has an important, enormous and varied international fishing component of offshore fleets that catch sharks along with other fishes. Major catches averaging 10 000 tonnes per year or more of cartilaginous fishes were made in the area by Nigeria and Spain in the last decade (1994 to 2004) while catches averaging between 1 000 and 9 000 tonnes per year were made during the same period by Gambia, Ghana, Morocco, Namibia, Portugal, and Senegal. Other countries had smaller catches below 1 000 tonnes in the area. Spain reported an unusually large catch of 39 922 tonnes in 1997 for the area but catches per country per year were otherwise lower than 20 000 tonnes in 1990 to 2004.

The total catch of sharks from Fishing Area 34 and 47 is uncertain. Total reported catches of cartilaginous fishes reported to FAO from both areas between 1950 and 2004 increased from 4 900 to 67 885 metric tonnes. Catches of cartilaginous fishes in Fishing Area 34 and 47 increased almost 14 times compared to a three times increase in world catches of cartilaginous fishes from 1950 to 2004. Area 47 ranged from 6 to 68% of the catch in Area 34 from 1950 to 2004. There was a steady increase in catches in Area 34 and 47 from the 1950s to the early 1960s, and a sharp increase from 1963 to a peak at 58 162 tonnes in 1978, after which collective catches declined sharply in the mid-1980s and flattened out until 1995, when they rose precipitously to the 76 105 tonne catch of 1997 and declined to a plateau averaging 64 073 tonnes from 1988 through 2004. Catches dropped considerably in Area 34 (presumably due to overexploitation) but in Area 47 the mid-1990s saw, in contrast, a modest increase in catches of cartilaginous fishes to 2004. The 2004 catch of 67 885 tonnes for both areas included 19 286 tonnes of sharks, 13 308 tonnes of batoids (rays), 22 226

tonnes of mixed elasmobranchs, 12 506 tonnes of unspecified chondrichthyans, and 559 tonnes of chimaeras (Cape elephantfish, *Callorhynchus capensis*).

Area 34 plus 47 have a relatively small catch of cartilaginous fishes (8% of the world total in 2004). Data on gear used in the area is sketchy, but line gear (including pelagic and demersal longlines, handlines, and rod-and-reel), fixed and floating gillnets, bottom trawls, pelagic trawls and purse seines are used to target sharks or take sharks as a bycatch. Sharks are taken in artisanal fisheries, by local inshore and offshore commercial fisheries, and by large international fishing fleets in offshore waters.

Many countries fishing in Areas 34 and 47 report their catches as elasmobranchs without further breakdown, while others separate batoids and some give lower taxonomic categories of sharks at the ordinal, family and genus level (eg., Squaliformes, Squalidae, *Alopias* spp.). Species-specific fisheries data has been supplied for non-batoid sharks by several countries in the area particularly in the last 2 decades, including Benin, China, Côte d'Ivoire, Guinea-Bissau, Liberia, Namibia, Romania, Philippines, Portugal, South Africa, and Spain. Data on ten species of sharks were reported including important large pelagic fisheries sharks such as *Alopias superciliosus*, *A. vulpinus*, *Carcharhinus falciformis*, *Isurus oxyrinchus*, *Lamna nasus*, *Prionace glauca* and *Sphyrna lewini*, but species-specific data is unavailable for most species of sharks in the area and for most countries that fish sharks in the area at present. Requiem sharks (Carcharhinidae) and hammerheads (Sphyrnidae) are especially important in local fisheries, but considerable numbers of threshers (Alopiidae) and makos (Lamnidae, genus *Isurus*) are fished offshore, and a number of other families, including nurse sharks (Ginglymostomatidae) and sand tigers (Odontaspidae) are or were formerly taken in inshore fisheries. Dogfish (Order Squaliformes) are caught in offshore fisheries targeting sharks for liver oil.

Shark utilization in the area: In the eastern central Atlantic sharks are used primarily for human food in local fisheries; shark meat is marketed fresh, frozen, smoked, and dried-salted, fins are utilized for the oriental soup-fin market, and liver oil is used for vitamins and cosmetics. Sharks are probably utilized also for fishmeal, curios, leather, and medicinals, although details of utilization in the area are poorly known. Directed shark fisheries have been important in some parts of the area, particularly off Senegal in the 1950s and currently off Namibia, but mostly are sketchily documented. Quite possibly most countries in Area 34 and 47 follow the circumtropical pattern of primarily landing sharks as utilized bycatch but also running targeted fisheries for local and international consumption, with dried meat, fins, liver oil, cartilage and possibly dried jaws as an increasingly profitable and practical export byproducts. Sharks are sought by sports anglers in Namibia, Guinea-Bissau, Sierra Leone and Cape Verde Islands and possibly elsewhere in the area.

Sharks and rays are increasingly important for ecotouristic diving and underwater film-making in the world, including shark-diving in the Cape Verde Islands, and may have scope for further development in the present area. Sharks of importance to ecotourism worldwide include cow sharks (Hexanchidae), requiem sharks (Carcharhinidae), hammerheads (Sphyrnidae), sand tigers (Odontaspidae), nurse sharks (Ginglymostomatidae), zebra sharks (Stegostomatidae), whale sharks (Rhincodontidae), basking sharks (Cetorhinidae) and mackerel sharks (Lamnidae, especially the white shark and shortfin mako). It is likely that viewing and filming of live sharks in the area is potentially far more valuable than utilizing them for fisheries catches as in other areas where shark diving has displaced fisheries for them. The positive economics of shark ecotourism and filming could be a factor in future conservation and fisheries management of sharks in the area provided there are enough live sharks left for ready viewing. Ecotouristic diving and responsible underwater film-making tends to demythologize sharks and gives perspective to the relatively low risk of shark-bite incidents and high risk that sharks face from human activities. Several of the shark species that are popular for underwater 'shark watching', including tiger sharks (*Galeocerdo cuvier*), bull sharks (*Carcharhinus leucas*) and especially white sharks, have unsavory reputations as 'man-eaters' that are belied by their largely docile and inoffensive responses to divers that encounter them.

Shark conservation: Shark conservation was a non-issue before 1990, but it increasing became a high-visibility issue in the 1990s due to fisheries exploitation of large sharks and declining shark populations which was enhanced by the emotive animal-rights issue of 'finning' large sharks. There has been a tendency for conservationists during the last 2 decades to view shark conservation as primarily an issue of fisheries impact and regulation of important fisheries species, and not part of the broader anthropogenic impact issues of biodiversity destruction including bycatch problems and habitat damage from fisheries, habitat modification and destruction, and potentially lethal pollution from human activities. Species of sharks and other cartilaginous fishes without discernable fisheries were sometimes regarded by conservationists as being

'safe' from harm, although this may not be the case due to pollutants and other environmental problems that are more insidious and more difficult to study than data from fisheries catches.

To address the problems of uncontrolled shark fisheries FAO proposed an International Plan of Action for managing and regulating shark fisheries and biodiversity in 1999 that requests member countries to draw up National Plans of Action for sharks in their territorial waters, which were supposed to be presented in 2001. Development and implementation of the plans are voluntary and will depend upon resources and political will being available to the member countries. At date of writing (January, 2007) few countries have proposed (much less implemented) their national plans of action, with Namibia being one country in the area to have done so (2004). A regional West African Action Plan for sharks has been developed under the management of the Subregional Commission of Fisheries (CSRP) including Mauritania, Senegal, Gambia, Cape Verde, Guinea-Bissau, Sierra Leone, and Guinea. Mauritania currently has regulations against commercial shark netting in the National Park of Banc d'Arguin, a marine reserve.

Ninety-seven species of cartilaginous fishes were included on the IUCN Red List for 2000 (including several from the present region), with 17 being listed as endangered under IUCN criteria. For 2007 the entire Class Chondrichthyes (approximately 1 200) is due to be listed by the IUCN Shark Specialist Group. A few sharks have been nominated for listing under CITES (Convention for International Trade in Endangered Species), which has caused fierce political battles over the past decade. Two shark species, the basking shark (*Cetorhinus maximus*) and the whale shark (*Rhincodon typus*), were placed on the CITES II list in 2002 despite an epic battle during the CITES Congress of Parties (the subscribing nations to CITES). The white shark (*Carcharodon carcharias*) was nominated and placed on the CITES II list in 2004 with far less of a struggle. For 2007, two shark species, the spotted spurdog (*Squalus acanthias*) and the porbeagle (*Lamna nasus*), are being nominated for CITES listing. As of 2006 the CMS or Bonn Convention (Convention on Migratory Species of Wild Animals) has the basking shark and white shark on its Appendix I list and whale shark and white shark on its Appendix II list.

It is anticipated that in the next decade international conservation measures, including further CITES and CMS listings, development of national marine reserves and transnational reserves, national and regional protection acts for sharks, recovery plans for sharks such as those implemented for Australia for the white shark and gray nurse shark (*Carcharias taurus*), and national and regional action plans for regulating shark catches will be gradually implemented with the intention of protecting a variety of sharks and other cartilaginous fishes from overexploitation.

Whether these measures succeed in conserving viable populations of these fishes at this stage is questionable in the author's opinion and may be too little and too late in view of the massive and continuing threats to the aquatic biosphere from human activities including fisheries that may have decimated some species in relatively well-studied areas (eg. the North Atlantic). Extinction of some sharks, particularly inshore and euryhaline species that penetrate fresh water and endemics with limited bathymetric, geographic, and habitat ranges, is possible during the twenty-first century and could be already happening. Sharks are integral to marine ecosystems as apical and subapical predators and their decimation or loss may cause a 'cascade effect' to unbalance and deplete other species that they interact with. However, this may be overshadowed by direct damage to marine ecosystems by broad-spectrum human exploitation along with massive human-induced habitat change and degradation from direct modification of aquatic environments, pollutants that are concentrated in the bodies of apical predators, and global warming influenced by combustion of fossil fuels and other human activities.

KEY TO FAMILIES OCCURRING IN THE AREA

- 1a. No anal fin → 2
- 1b. Anal fin present → 9

- 2a. Body strongly depressed and ray-like; pectoral fins greatly enlarged, with anterior triangular lobes that overlap gill slits; mouth terminal (Fig. 1) **Squatinaidae**
- 2b. Body cylindrical, compressed, or slightly depressed, not ray-like; pectoral fins small, without anterior lobes; mouth ventral. → 3

- 3a. Trunk very high and compressed, triangular in section; dorsal fins very high; fin spine of first dorsal fin inclined forward (Fig. 2) **Oxynotidae**
- 3b. Trunk low and cylindrical, dorsal fins lower; fin spine of first dorsal fin, when present, inclined backward → 4

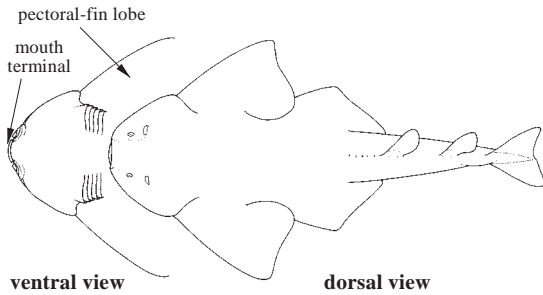


Fig. 1 Squatinidae

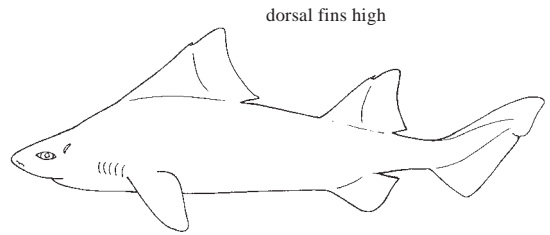


Fig. 2 Oxynotidae

- 4a. Body set with sparse, large, plate-like denticles with single or multiple cusps; spiracles small and well behind eyes; fifth pair of gill slits abruptly longer than others; first dorsal-fin origin over or posterior to pelvic-fin origins; pelvic fins much larger than second dorsal fin (Fig. 3) **Echinorhinidae**
- 4b. Fifth gill slits not abruptly larger than first to fourth; spiracles larger and close behind eyes; first dorsal-fin origin well anterior to pelvic origins; pelvic fins usually about as large as second dorsal fin or smaller → 5

- 5a. Dorsal-fin spines without grooves; teeth similar and blade-like in both jaws, with a deflected horizontal cusp, a low blade, and no cusplets; caudal peduncle with a precaudal pit (eastern central Atlantic species) and always with strong lateral caudal keels; subterminal notch absent from caudal fin (Fig. 4). **Squalidae**
- 5b. Dorsal-fin spines, where present, with lateral grooves; teeth variable but not blade-like and with cusp not horizontal in both jaws; caudal peduncle without precaudal pits and usually without lateral keels (weak ones in some dalatiids); subterminal notch usually present and well developed → 6

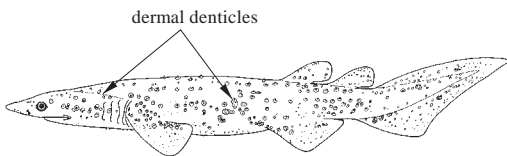


Fig. 3 Echinorhinidae

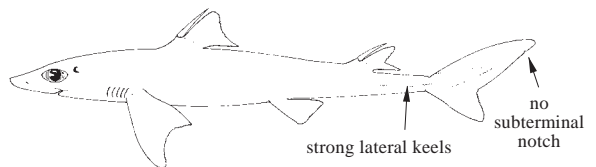


Fig. 4 Squalidae

- 6a. Upper teeth with a cusp and lateral cusplets; ventral surface of body, flanks and sides of tail usually with more or less conspicuous dense black markings indicating the presence of numerous light organs (photophores) (Fig. 5) **Etmopteridae**
- 6b. Upper teeth with a cusp but without lateral cusplets; underside of body, flanks and tail without conspicuous black markings and light organs → 7
- 7a. Upper teeth broad and blade-like, with roots imbricated; lower teeth low and wide (Fig. 6) **Centrophoridae**
- 7b. Upper teeth relatively narrow and not blade-like, with roots not imbricated, lowers high and wide → 8

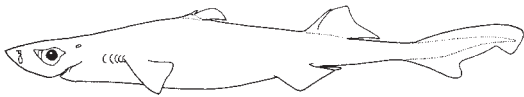


Fig. 5 Etmopteridae



Fig. 6 Centrophoridae

- 8a. Head moderately broad and somewhat flattened or conical; snout flat and narrowly rounded to elongate-rounded in lateral view; abdomen usually with lateral ridges; both dorsal fins with low fin spines in species known from the area (absent in the extralimital *Scymnodalutias* and *Somniosus*) (Fig. 7) **Somniosidae**
- 8b. Head narrow and rounded-conical; snout conical and narrowly rounded to elongate-rounded in lateral view; abdomen without lateral ridges; dorsal fins usually without spines (except for a small spine present on the first dorsal fin of *Squaliolus*) (Fig. 8) **Dalatiidae**

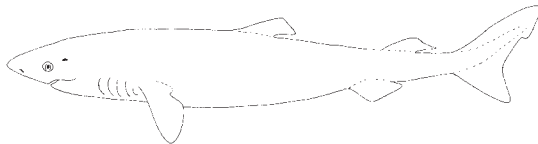


Fig. 7 Somniosidae

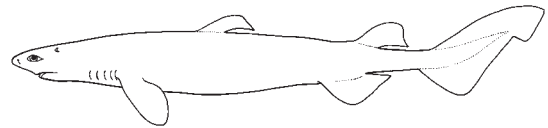


Fig. 8 Dalatiidae

- 9a. One dorsal fin, far posterior on back; 6 or 7 gill slits on each side → 10
- 9b. Two dorsal fins; 5 gill slits on each side → 11
- 10a. Six pairs of gill slits, with the first pair connected across the underside of the throat; body elongated and eel-shaped; teeth tricuspidate and similar in both jaws (Fig. 9) **Chlamydoselachidae**
- 10b. Six or 7 pairs of gill slits, with the first pair not connected across the underside of the throat; body fairly stocky, not eel-shaped; anterior teeth unicuspidate in upper jaw and comb-shaped in lower jaw (Fig. 10) **Hexanchidae**



Fig. 9 Chlamydoselachidae

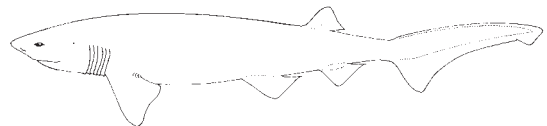


Fig. 10 Hexanchidae

- 11a. Head with lateral expansions or blades, like a double-edged axe (Fig. 11) **Sphyrnidae**
- 11b. Head normal, not expanded laterally → 12

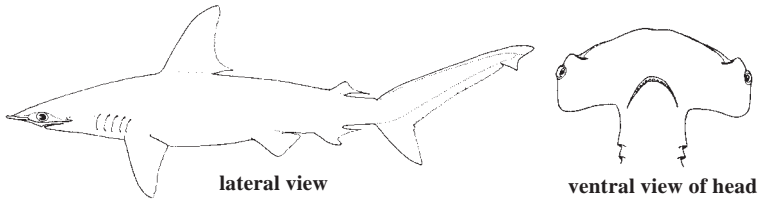


Fig. 11 Sphyrnidae

- 12a. Eyes behind mouth; deep nasoral grooves connecting nostrils and mouth → 13
- 12b. Eyes partly or entirely over mouth; nasoral grooves absent or shallow grooves present in eastern central Atlantic representatives → 14

- 13a. Mouth huge and nearly terminal; external gill slits very large, internal gill slits inside mouth cavity with filter screens; caudal peduncle with strong lateral keels; caudal fin with a strong ventral lobe, but with a vestigial terminal lobe and subterminal notch; dorsal surface with prominent light spots and stripes (Fig. 12) **Rhincodontidae**
- 13b. Mouth smaller and subterminal; external gill slits small, internal gill slits without filter screens; caudal peduncle without strong lateral keels; caudal fin with a weak ventral lobe or none, but with a strong terminal lobe and subterminal notch; dorsal surface plain or with dark spots in young (Fig. 13) **Ginglymostomatidae**

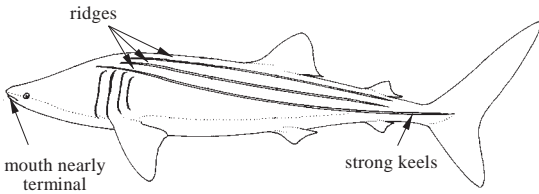


Fig. 12 Rhincodontidae

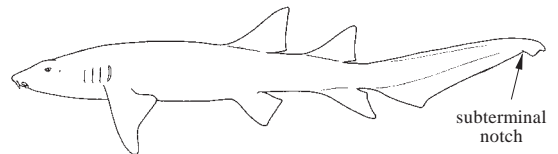


Fig. 13 Ginglymostomatidae

- 14a. A strong keel present on each side of caudal peduncle; caudal fin crescentic and nearly symmetrical, with a long lower lobe → 15
- 14b. No keels on caudal peduncle, or weak ones; caudal fin asymmetrical, not crescentic, with ventral lobe relatively short or absent → 16

- 15a. Gill openings large but not extending onto upper surface to head; no gillrakers; teeth large and few, sharp-edged (Fig. 14) **Lamnidae**
- 15b. Gill openings huge, extending onto upper surface of head; gillrakers present on internal gill openings in throat, sometimes absent because of periodic shedding; teeth minute and very numerous, not sharp-edged (Fig. 15) **Cetorhinidae**

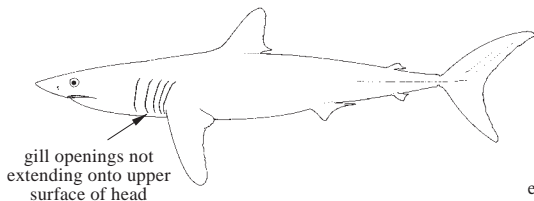


Fig. 14 Lamnidae

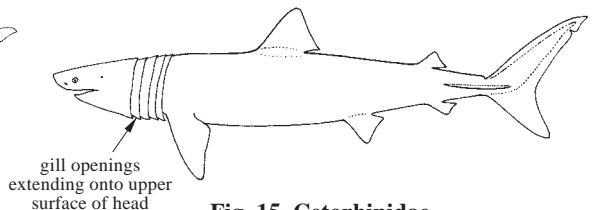


Fig. 15 Cetorhinidae

- 16a. Caudal fin about as long as rest of shark (Fig. 16) **Alopiidae**
- 16b. Caudal fin less than half the length of rest of shark → 17

- 17a. Mouth terminal on head, level with snout; internal gill openings screened by numerous long papillose gillrakers (Fig. 17) **Megachasmidae**
- 17b. Mouth subterminal on head, behind snout tip; internal gill openings either without gillrakers, or with a few low papillose gillrakers along their edges → 18

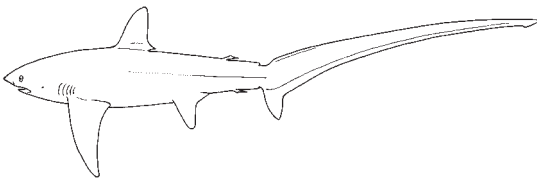


Fig. 16 Alopiidae

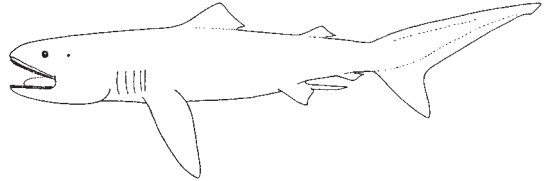


Fig. 17 Megachasmidae

- 18a. No nictitating eyelids (Fig. 18a), largest teeth in mouth are 2 or 3 rows of anterior teeth on either side of lower jaw symphysis; upper anterior teeth separated from large lateral teeth at sides of jaw by a gap that may have one or more rows of small intermediate teeth (Fig. 18b); all gill slits in front of pectoral fins → 19
- 18b. Nictitating eyelids present (Fig. 19a); largest teeth in mouth are well lateral on dental band, not on either side of symphysis; no gap or intermediate teeth separating large anterior teeth from still larger lateral teeth in upper jaw (Fig. 19b); last 1 or 2 gill slits over pectoral-fin bases → 21

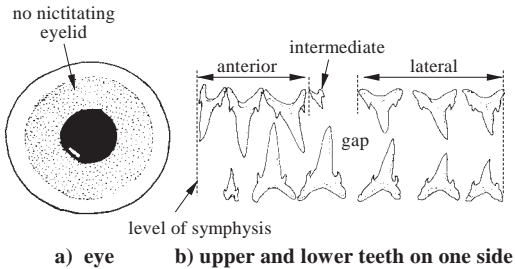


Fig. 18

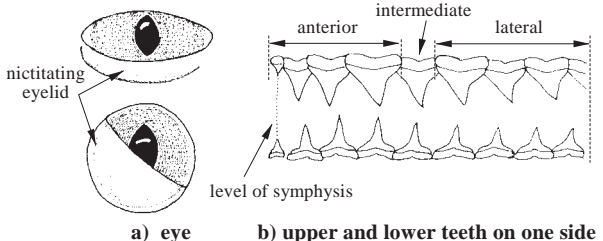


Fig. 19

- 19a. Snout elongated and blade-like; anal fin much larger than dorsal fins; no precaudal pits; caudal fin without ventral lobe (Fig. 20) **Mitsukurinidae**



Fig. 20 Mitsukurinidae

- 19b. Snout conical or flattened, short and not blade-like; anal fin subequal to dorsal fins in size or smaller than them; upper and sometimes lower precaudal pits present → 20

- 20a. Eyes very large; gill slits extending onto upper surface of head; both upper and lower precaudal pits present; a low keel on each side of caudal peduncle (Fig. 21) . . . **Pseudocarchariidae**
- 20b. Eyes smaller; gill slits not extending onto upper surface of head; lower precaudal pit absent; no keels on caudal peduncle (Fig. 22) **Odontaspidae**

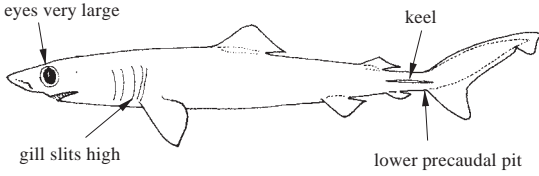


Fig. 21 Pseudocarchariidae

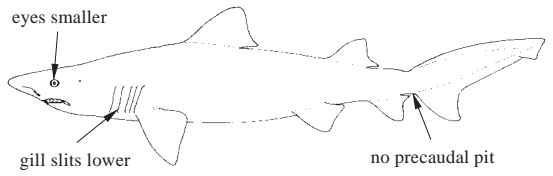


Fig. 22 Odontaspidae

- 21a. Origin of first dorsal fin over or behind pelvic-fin bases (Fig. 23) **Scyliorhinidae**

- 21b. Origin of first dorsal fin well ahead of pelvic-fin bases. → 22

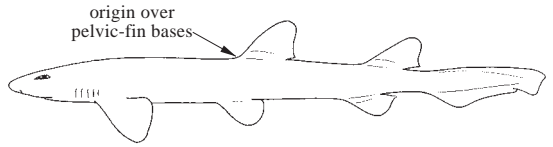


Fig. 23 Scyliorhinidae

- 22a. Precaudal pits and rippled dorsal caudal-fin margin present (Fig. 24) → 23
- 22b. No precaudal pits, dorsal caudal-fin margin smooth (Fig. 25) → 24

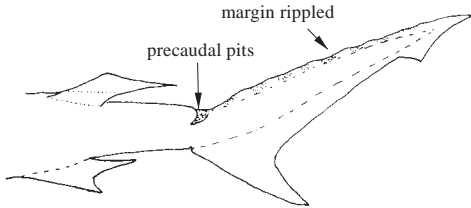


Fig. 24 Carcharhinidae

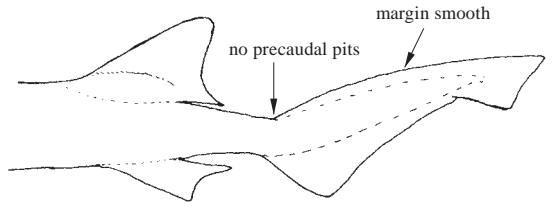


Fig. 25 Pseudocarchariidae

- 23a. Nostrils with well-developed posterior nasal flaps on their excurrent apertures; spiracles present; symphyseal teeth present in both jaws; intestinal valve of spiral type (Fig. 26) **Hemigaleidae**
- 23b. Nostrils without posterior nasal flaps on their excurrent apertures; spiracles usually absent (present in *Galeocerdo*); intestinal valve of scroll type (Fig. 27) **Carcharhinidae**

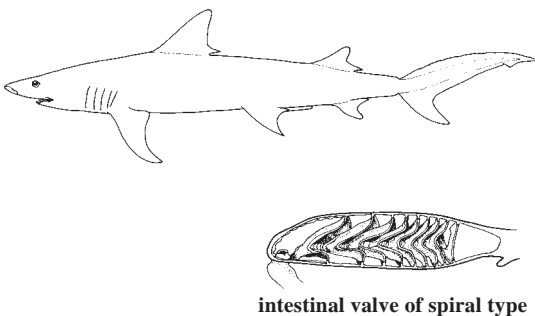


Fig. 26 Hemigaleidae

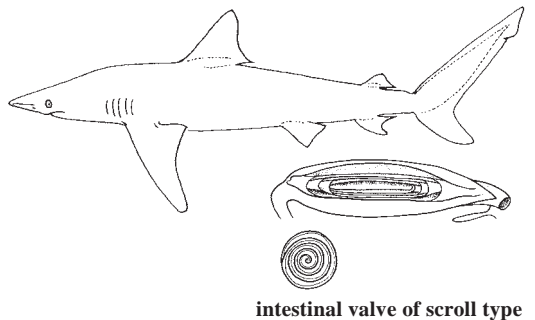


Fig. 27 Carcharhinidae

24a. First dorsal fin long, about the length of caudal fin (*Pseudotriakis* only), and formed as a low, rounded keel; teeth tiny, in over 200 rows of teeth in each jaw; spiracles nearly or not quite as long as eyes (Fig. 28) **Pseudotriakidae**

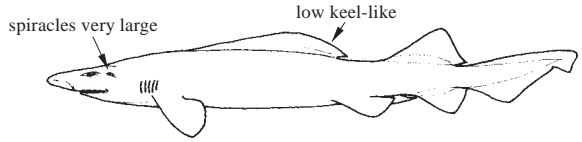


Fig. 28 Pseudotriakidae

24b. First dorsal fin short, about two-thirds of caudal fin or less, subtriangular in shape; adults with less than 100 rows of teeth in each jaw; spiracles much smaller than eyes → **25**

25a. Long slender barbels on nostrils; labial furrows extremely long (Fig. 29) **Leptochariidae**

25b. Barbels not developed on nostrils of eastern central Atlantic species; labial furrows shorter, extending anteriorly for a greater or lesser distance on lips (Fig. 30) **Triakidae**

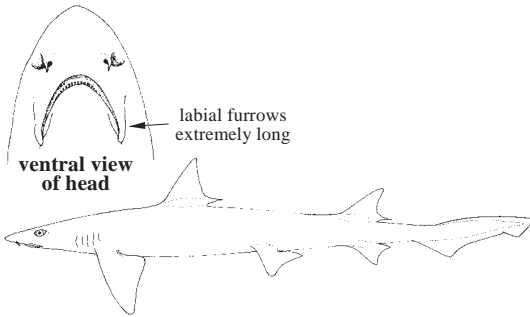


Fig. 29 Leptochariidae

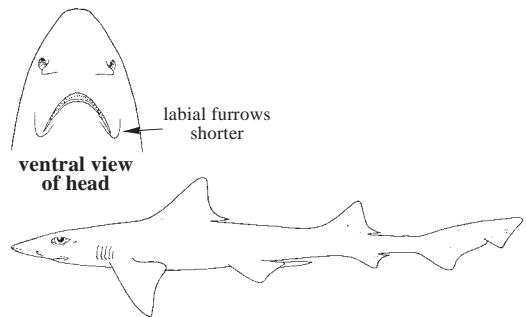





Fig. 30 Leptochariidae

LIST OF ORDERS, FAMILIES AND SPECIES OCCURRING IN THE AREA^{1/}





The symbol  is given when species accounts are included. A question mark (?) indicates that presence in the area is uncertain.

Order HEXANCHIFORMES : Cow and frilled sharks

CHLAMYDOSELACHIDAE : Frilled sharks

-  *Chlamydoselachus anguineus* Garman, 1884.
-  *Chlamydoselachus africana* Ebert and Compagno, 2009.

HEXANCHIDAE : Sixgill and sevengill sharks, cow sharks

-  *Heptranchias perlo* (Bonnaterre, 1788).
-  *Hexanchus griseus* (Bonnaterre, 1788).
-  *Hexanchus nakamurai* Teng, 1962.
-  *Notorynchus cepedianus* (Péron, 1807).

^{1/} The sixgill sawshark (*Pliotrema warreni* Regan, 1906, Family Pristiophoridae, Order Pristiophoriformes) occurs in the extreme Eastern South Atlantic (False Bay, west of Cape Agulhas, South Africa) but is not known to occur in the ECA region. Sawsharks otherwise are known from the Western North Atlantic and Indo-West Pacific.

Order ECHINORHINIFORMES: Bramble sharks

ECHINORHINIDAE : Bramble sharks.

✦ *Echinorhinus brucus* (Bonnaterre, 1788).**Order SQUALIFORMES : Dogfish sharks**

SQUALIDAE : Dogfish sharks

✦ *Squalus acanthias* Linnaeus, 1758.✦ *Squalus blainville* (Risso, 1827).✦ *Squalus megalops* (Macleay, 1881).✦ *Squalus mitsukurii* Jordan and Snyder, in Jordan and Fowler, 1903.

CENTROPHORIDAE : Gulper sharks

✦ *Centrophorus granulosus* (Bloch and Schneider, 1801).✦ *Centrophorus lusitanicus* Barbosa du Bocage and de Brito Capello, 1864.^{2/}✦ *Centrophorus niaukang* Teng, 1959.^{2/}✦ *Centrophorus squamosus* (Bonnaterre, 1788).✦ *Centrophorus* sp.✦ *Deania calcea* (Lowe, 1839).✦ *Deania hystricosa* (Garman, 1906).✦ *Deania profundorum* (Smith and Radcliffe, 1912).✦ *Deania quadrispinosum* (McCulloch, 1915).

ETMOPTERIDAE: Lantern sharks

✦ *Centroscyllium fabricii* (Reinhardt, 1825).✦ *Etmopterus baxteri* Garrick, 1957.^{3/}✦ *Etmopterus bigelowi* Shirai and Tachikawa, 1993.✦ *Etmopterus* cf. *brachyurus* Smith and Radcliffe, 1912.✦ *Etmopterus gracilispinis* Krefft, 1968.✦ *Etmopterus polli* Bigelow, Schroeder and Springer, 1953.✦ *Etmopterus princeps* Collett, 1904.✦ *Etmopterus pusillus* (Lowe, 1839).✦ *Etmopterus spinax* (Linnaeus, 1758).

SOMNIOSIDAE : Sleeper sharks

✦ *Centroscyrnus coelolepis* Barbosa du Bocage and de Brito Capello, 1864.✦ *Centroscyrnus owstonii* Garman, 1906.✦ *Centroselachus crepidater* (Barbosa du Bocage and de Brito Capello, 1864).✦ *Scymnodon ringens* Barbosa du Bocage and de Brito Capello, 1864.✦ *Somniosus rostratus* (Risso, 1827).✦ *Zameus squamulosus* (Günther, 1877).

^{2/} *Centrophorus lusitanicus* and *C. niaukang* are currently considered to be synonyms of *C. granulosus* according to Eschmerer's Catalogue of Fishes. This guide retains the old taxonomy and users should note the new decision in their identifications.

^{3/} Junior synonym of *Etmopterus granulosus* (Günther, 1880).

OXYNOTIDAE : Roughsharks

- ✦ *Oxynotus centrina* (Linnaeus, 1758).
- ✦ *Oxynotus paradoxus* Frade, 1929.

DALATIIDAE : Kitefin sharks

- ✦ *Dalatias licha* (Bonnaterre, 1788).
- ✦ *Euprotomicrus bispinatus* (Quoy and Gaimard, 1824).
- ✦ *Isistius brasiliensis* (Quoy and Gaimard, 1824).
- ✦ *Isistius plutodus* Garrick and Springer, 1964.
- ✦ *Squaliolus laticaudus* Smith and Radcliffe, 1912.

Order SQUATINIFORMES : Angelsharks**SQUATINIDAE : Angelsharks**

- ✦ *Squatina aculeata* Duméril, in Cuvier, 1829.
- ✦ *Squatina oculata* Bonaparte, 1840.
- ✦ *Squatina squatina* (Linnaeus, 1758).

Order LAMNIFORMES : Mackerel sharks**ODONTASPIDIDAE : Sand tiger sharks**

- ✦ *Carcharias taurus* Rafinesque, 1810.
- ✦ *Odontaspis ferox* (Risso, 1810).
- ✦ *Odontaspis noronhai* (Maul, 1955).

MITSUKURINIDAE : Goblin sharks

- ✦ *Mitsukurina owstoni* Jordan, 1898.

PSEUDOCARCHARIIDAE : Crocodile sharks

- ✦ *Pseudocarcharias kamoharai* (Matsubara, 1936).

MEGACHASMIDAE : Megamouth sharks

- ✦ *Megachasma pelagios* Taylor, Compagno and Struhsaker, 1983.

ALOPIIDAE : Thresher sharks

- ✦ *Alopias superciliosus* Lowe, 1841.
- ✦ *Alopias vulpinus* (Bonnaterre, 1788).

CETORHINIDAE : Basking sharks

- ✦ *Cetorhinus maximus* (Gunnerus, 1765).

LAMNIDAE : Mackerel sharks

- ✦ *Carcharodon carcharias* (Linnaeus, 1758).
- ✦ *Isurus oxyrinchus* Rafinesque, 1810.
- ✦ *Isurus paucus* Guitart Manday, 1966.
- ✦ *Lamna nasus* (Bonnaterre, 1788).

Order ORECTOLOBIFORMES : Carpet sharks

GINGLYMOSTOMATIDAE : Nurse sharks

✦ *Ginglymostoma cirratum* (Bonnaterre, 1788).

RHINCODONTIDAE : Whale sharks

✦ *Rhincodon typus* Smith, 1828.**Order CARCHARHINIFORMES : Ground sharks**

SCYLIORHINIDAE : Catsharks

✦ *Apristurus laurussoni* (Saemundsson, 1922).✦ *Apristurus saldanha* Barnard, 1925.✦ *Galeus atlanticus* (Vaillant, 1888).✦ *Galeus melastomus* Rafinesque, 1810.✦ *Galeus polli* Cadenat, 1959.✦ *Haploblepharus pictus* (Müller and Henle, 1838).✦ *Scyliorhinus canicula* (Linnaeus, 1758).✦ *Scyliorhinus cervigoni* Maurin and Bonnet, 1970.✦ *Scyliorhinus stellaris* (Linnaeus, 1758).

PSEUDOTRIAKIDAE : False catsharks and gollumsharks

✦ *Pseudotriakis microdon* de Brito Capello, 1868.

LEPTOCHARIIDAE : Barbelled houndsharks

✦ *Leptocharias smithii* (Müller and Henle, 1839).

TRIAKIDAE : Houndsharks

✦ *Galeorhinus galeus* (Linnaeus, 1758).✦ *Mustelus asterias* Cloquet, 1819.✦ *Mustelus mustelus* (Linnaeus, 1758).✦ *Mustelus palumbes* Smith, 1957.✦ *Mustelus punctulatus* Risso, 1827.✦ *Triakis megalopterus* (Smith, 1839).

HEMIGALEIDAE : Weasel sharks

✦ *Paragaleus pectoralis* (Garman, 1906).

CARCHARHINIDAE : Requiem sharks

✦ *Carcharhinus amboinensis* (Müller and Henle, 1839).✦ *Carcharhinus brachyurus* (Günther, 1870).✦ *Carcharhinus brevipinna* (Müller and Henle, 1839).✦ *Carcharhinus falciformis* (Bibron, in Müller and Henle, 1839).✦ *Carcharhinus galapagensis* (Snodgrass and Heller, 1905).✦ *Carcharhinus leucas* (Valenciennes, in Müller and Henle, 1839).✦ *Carcharhinus limbatus* (Valenciennes, in Müller and Henle, 1839).✦ *Carcharhinus longimanus* (Poey, 1861).

- ✦ *Carcharhinus obscurus* (Lesueur, 1818).
- ✦ *Carcharhinus plumbeus* (Nardo, 1827).
- ✦ *Carcharhinus signatus* (Poey, 1868).
- ✦ *Galeocerdo cuvier* (Péron and Lesueur, in Lesueur, 1822).
- ✦ *Negaprion brevirostris* (Poey, 1868).
- ✦ *Prionace glauca* (Linnaeus, 1758).
- ✦ *Rhizoprionodon acutus* (Rüppell, 1837).

SPHYRNIDAE : Hammerhead sharks

- ✦ *Sphyrna lewini* (Griffith and Smith, in Cuvier, Griffith and Smith, 1834).
- ✦ *Sphyrna mokarran* (Rüppell, 1837).
- ✦ *Sphyrna zygaena* (Linnaeus, 1758).

Prepared by L.J.V. Compagno, Shark Research Center, Iziko - South African Museum, Cape Town, South Africa, lcompagno@iziko.org.za and Shark Research Institute, lcompagno@sharks.org. This general account and the 26 family accounts on sharks are derived but extensively modified from the original FAO Area 34 and 47 species sheets written by Compagno (1981), with additional families, genera and species added and new maps and figures prepared. The general and family accounts were reviewed by B. Seret, J.D. McEachran and M. de Carvalho. The accounts were used by testers trying to identify sharks (*S. zaera*, chief tester for sharks) during the FAO workshop in July 2004 at the Centro Oceanografico de Canarias, Instituto Espanol de Oceanographia, in Santa Cruz del Tenerife, Canary Islands. Reviewer's and tester's comments were incorporated into the accounts.

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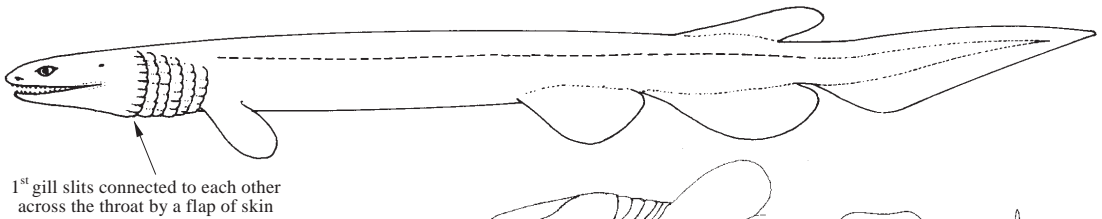
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Order HEXANCHIFORMES

CHLAMYDOSELACHIDAE

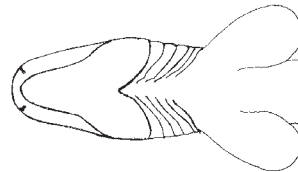
Frimled sharks

Diagnostic characters: Medium-sized sharks (maximum length to 196 cm) with long, eel-like bodies. **Head with 6 pairs of long and frilly gill slits, the last in front of pectoral-fin origins, the first connected to each other across the throat by a flap of skin;** no gillrakers on inner gill slits; nostrils without barbels or nasoral grooves; no nictitating lower eyelids; snout very short, bluntly rounded; **mouth extremely long, extending far behind the eyes, and nearly terminal;** **teeth of upper and lower jaws same, with 3 strong cusps and a pair of minute cusplets between them, not compressed or blade-like.** **A single low dorsal fin, posterior to pelvic fins;** anal fin present; caudal fin strongly asymmetrical, with subterminal notch vestigial or absent and without a ventral caudal lobe. Caudal peduncle compressed, without keels or precaudal pits. Intestinal valve of spiral type. **Colour:** grey-brown to chocolate brown above, sometimes lighter below, fins dusky.



Habitat, biology, and fisheries: These are rare to moderately common deepwater sharks that are found in deep bays down to the continental slopes and submarine canyons, near the bottom or

well above it at depths of 120 to 1 280 m, sometimes at the surface. Frilled sharks are widely but sporadically distributed in most seas. They eat a variety of cephalopods, bony fishes, and other sharks. Mode of reproduction ovoviviparous (aplacental viviparous), with huge eggs and litters of 8 to 12 young. Uncommonly caught as bycatch of bottom trawls, but also in bottom gillnets, pelagic trawls and deepset longlines. Utilized for fishmeal and for human consumption. Frilled sharks have occasionally been kept in aquaria in Japan and observed underwater off Japan and the United States. Usually considered a single species but the southern African representative is apparently distinct and is considered separately below.



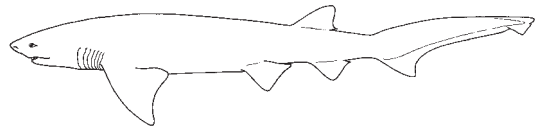
ventral view of head



upper and lower teeth

Similar families occurring in the area

Hexanchidae: snout longer, mouth subterminal, body more stocky and cylindrical, comb-like cutting teeth in the lower jaw, first gill slits not connected across the throat, higher, more anterior dorsal fin, and strong subterminal notch on the caudal fin.



Hexanchidae


No other sharks in the area have a single dorsal fin and 6 gill slits.


Key to species of Chlamydoselachidae occurring in the area

- 1a.** Small upper medial teeth usually absent; head shorter, usually less than 16% of total length, abdomen longer, 26 to 32% of total length; intestinal valve count 35 to 49; vertebrae more numerous, total count 174 or more ***Chlamydoselachus anguineus***
- 1b.** Small upper medial teeth usually present; head longer, 17 to 18% of total length, abdomen shorter, 23 to 28% of total length. Intestinal valve count 26 to 28; vertebrae less numerous, 147 . ***Chlamydoselachus africana***

**Fig. 1** *Chlamydoselachus anguineus***List of species occurring in the area**

The symbol  is given when species accounts are included.

 *Chlamydoselachus anguineus* Garman, 1913.

 *Chlamydoselachus africana* Ebert and Compagno, 2009.

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***Chlamydoselachus anguineus* Garman, 1884**

En – Frilled shark; **Fr** – Requin lézard; **Sp** – Tiburón anguila.

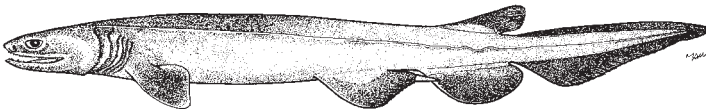
Maximum total length about 196 cm. Demersal and pelagic on upper continental slopes and well above them in depths of 120 to 1 280 m, sometimes at the surface and in shallow inshore waters. Number of young 8 to 12 per litter. Feeds on cephalopods and bony fishes. Rarely taken in bottom trawls and other gear, used for fishmeal in the area. A wide-ranging shark, sporadic in its occurrence in the area and elsewhere. It is known in the area from off Morocco, Mauritania, Western Sahara, Madeira, and possibly Gulf of Guinea, and northward to northern Scotland, western Ireland, and northern Norway. It also occurs in the western Atlantic and the western, central and eastern Pacific.



***Chlamydoselachus africana* Ebert and Compagno, 2009**

En – African frilled shark; **Fr** – Requin-lézard africain; **Sp** – Tiburón anguila africano.

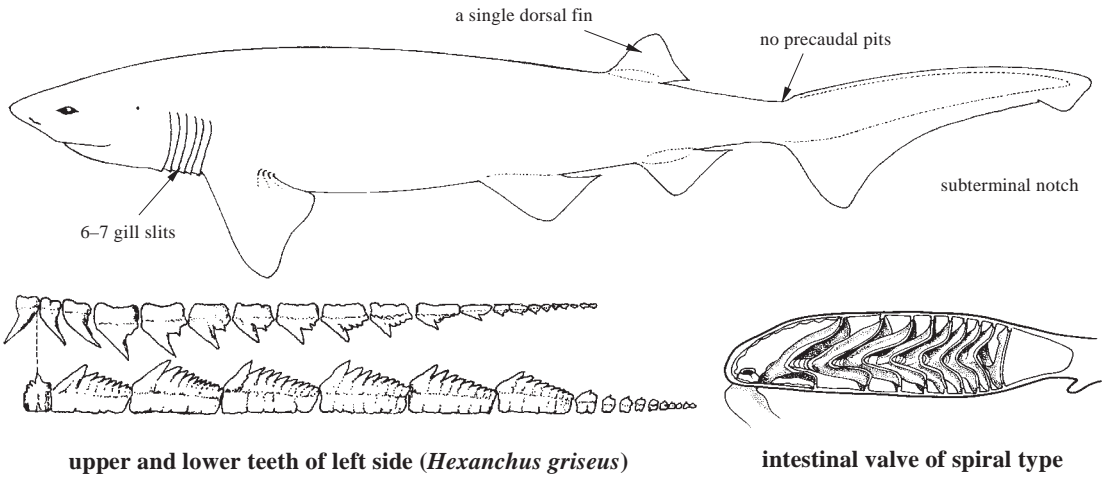
Maximum total length to at least 96 cm. Demersal and pelagic on upper continental slopes and well above them in depths of 260 to 500 m, sometimes in shallow inshore waters. Probably ovoviviparous (aplacental viviparous), but with pregnant females not collected and with litter size unknown. Feeds on small demersal deepwater sharks. Rarely taken in bottom trawls and sometimes other gear, most often with bottom trawl gear off central Namibia, utilization not recorded in the region and probably discarded in bycatch. At present known from off Angola, Namibia and South Africa. Difficult to distinguish externally from frilled shark, but has differences in its chondrocranium morphology, vertebral counts and calcification patterns, pectoral-fin skeletal morphology and radial counts, intestinal valve counts, and apparently by reaching a smaller size.



HEXANCHIDAE

Cowsharks, sixgill and sevensgill sharks

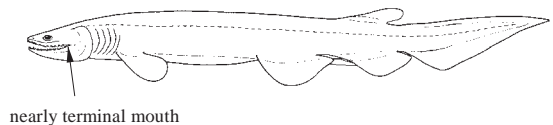
Diagnostic characters: Small to large sharks with slender to stout bodies, not eel-shaped. Head with **6 or 7 pairs of long gill slits**, the last in front of pectoral-fin origins, **the first pair not connected across throat**; short dermal gillrakers present on inner gill slits; spiracles present, small; nostrils without barbels or nasoral grooves; no nictitating lower eyelids; snout short, acutely to bluntly pointed; mouth very long and extending far behind the eyes; **teeth of upper and lower jaws unlike at sides of mouth**, uppers small, narrow, with a main cusp and often smaller cusplets, **lowers very large, broad, compressed and saw-like**, with a series of cusps or large cusplets. **A single dorsal fin, posterior to pelvic fins**; anal fin present; caudal fin much less than half the total length, strongly asymmetrical, with a pronounced subterminal notch but the lower lobe very short. Caudal peduncle not depressed, without keels; no precaudal pits. Intestinal valve of spiral type. **Colour:** grey, blackish or brown above, lighter below, one species with small dark spots and sometimes small light spots.



Habitat, biology, and fisheries: These are moderately abundant, inshore to deepwater sharks, found in shallow bays down to the continental slopes and submarine canyons, near the bottom or well above it. They eat a wide variety of bony fishes, other sharks, batoid fishes, marine mammals, cephalopods, and crustaceans. Mode of reproduction ovoviviparous (aplacental viviparous), with 9 to 108 young per litter. They are or have been taken in deep water and inshore line fisheries for sharks in the area and elsewhere, are occasionally targeted in Namibian waters, and are incidentally caught in demersal trawls in the area. Cow sharks are relatively unimportant but regular components of targeted shark fisheries and bycatches of other fisheries. They may snap during capture or when otherwise provoked. Divers encountering the larger species underwater have found them to be docile, and at least one species is the subject of ecotouristic dive trips outside Areas 34–47.

Similar families occurring in the area

Chlamydoselachidae: the frilled sharks (*Chlamydoselachus* spp.) have a single dorsal fin and 6 gill slits, but are distinguished by a nearly terminal mouth, first pair of gill slits connected across the throat by a flap of skin, small, 3-cusped teeth in both jaws, a vestigial subterminal notch on the caudal fin, and a long, almost eel-like body.



Chlamydoselachidae

No other sharks in the area have a single dorsal fin and 6 or 7 gill slits.

Key to species of Hexanchidae occurring in the area

- 1a. Six gill slits (*Hexanchus*) → 2
- 1b. Seven gill slits → 3

- 2a. Snout very short and blunt; lower jaw with 6 rows of large comb-like teeth on each side; dorsal-fin base separated from upper caudal-fin origin by a distance about equal to, or slightly greater than its length; size very large, up to 4.8 m (Fig. 1) *Hexanchus griseus*
- 2b. Snout longer and more pointed; lower jaw with 5 rows of large comb-like teeth on each side; dorsal-fin base separated from upper caudal-fin origin by a distance much greater than its length; size smaller, up to 1.8 m (Fig. 2) *Hexanchus nakamurai*

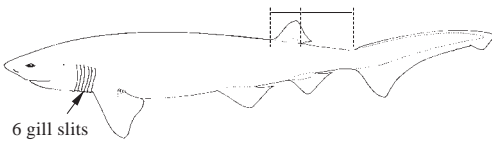


Fig. 1 *Hexanchus griseus*

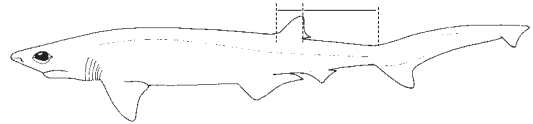


Fig. 2 *Hexanchus nakamurai*

- 3a. Eyes very large, head extremely narrow and pointed; body plain without spots; size small, to about 1.4 m in total length (Fig. 3) *Heptranchias perlo*
- 3b. Eyes small, head broad and rounded; body usually with scattered small black spots and sometimes white spots; size larger, to about 2.9 m in total length (Fig. 4) *Notorynchus cepedianus*



Fig. 3 *Heptranchias perlo*

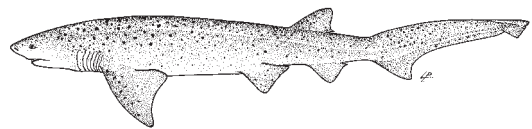






Fig. 4 *Notorynchus cepedianus*

List of species occurring in the area

The shark symbol  is given when species accounts are included.

-  *Heptranchias perlo* (Bonnaterre, 1788).^{1/}
-  *Hexanchus griseus* (Bonnaterre, 1788).
-  *Hexanchus nakamurai* Teng, 1962.^{2/}
-  *Notorynchus cepedianus* (Péron, 1807).^{3/}

^{1/} Sometimes placed in its own family, Heptranchidae.
^{2/} Senior synonym of *Hexanchus vitulus* Springer and Waller, 1969.
^{3/} Sometimes placed in its own family, Notorynchidae.

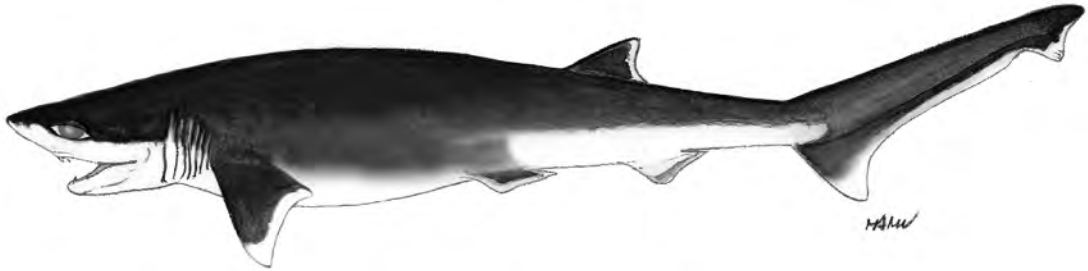
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Hepranchias perlo (Bonnaterre, 1788)

Frequent synonyms / misidentifications: None None.

FAO names: En – Sharpnose sevengill shark; Fr – Requin perlon; Sp – Cañabota bocadulce.



Diagnostic characters: A small, slender shark. **Head with 7 gill slits; head and snout very narrow; eyes very large;** teeth of upper and lower jaws unlike at sides of mouth, uppers smaller, narrower, with a main cusp and a few small cusplets, lowers larger, compressed, elongated and comb-like, with a long main cusp and several cusplets, their inner edges with **a few short cusplets but no serrations**. A single dorsal fin, separated from origin of caudal fin by over twice its base length; a short lower caudal-fin lobe in adults. **Colour:** grey-brown above, pale below, the young with dark tips on dorsal fin and terminal lobe of caudal fin, lost in adults, with lateral line inconspicuously lighter.

Size: Maximum: probably to 137 cm, most adults below 110 cm.

Habitat, biology, and fisheries: A tropical to warm temperate, primarily deepwater species, found on the outer continental shelves and upper slopes down to at least 1 000 m, commonest in 100 to 400 m, but also sometimes occurring in shallow waters. Apparently an active swimmer near the bottom. Nine to 20 young per litter. Size at birth near 27 cm. Feeds on a wide variety of bony fishes, including hake, small elasmobranchs, crustaceans, and cephalopods. Aggressive when captured, but too small to be of much harm to people. Captured in offshore waters in the area. Separate statistics are not reported for this species. Caught in bottom trawls; also in pelagic trawls. Utilized for fishmeal.

Distribution: In the area it is found in the eastern Atlantic from off the Straits of Gibraltar and Morocco to Namibia, and ranges southwards to South Africa and northwards to Ireland and England. Elsewhere almost circumglobal in tropical and temperate seas, including the Mediterranean Sea, western Atlantic, southwestern Indian Ocean, western Pacific, and southeastern Pacific.



Hexanchus griseus (Bonnaterre, 1788)

Frequent synonyms / misidentifications: None / None.

FAO names: **En** – Bluntnose sixgill shark; **Fr** – Requin griset; **Sp** – Cañabota gris.



Diagnostic characters: A very large, heavy-bodied shark with 6 gill slits. Head and snout broad, eyes relatively small, teeth of upper and lower jaws unlike at sides of mouth, uppers smaller, narrower, with a long main cusp and a few cusplets, lower anterolateral large, compressed, elongated and comb-like, in six rows on each side of mouth, with a short main cusp and short cusplets, their inner edges serrated. A single dorsal fin separated from origin of caudal fin by about its base length; lower caudal lobe weak in adults, hardly indicated in immature individuals. **Colour:** pale grey, dark grey, dark brown, or blackish above, often lighter below or even whitish, with a conspicuous narrow light band along the lateral line.

Size: Adults to at least 482 cm, maturing at about 450 cm.

Habitat, biology, and fisheries: A large temperate to subtropical, mostly deepwater shark, perhaps occurring at greater depths closer to the equator. On the outer continental and insular shelves and upper slopes and on seamounts and off oceanic islands down to at least 1 875 m, commonest between 500 and 1 100 m, occasionally at the surface and close inshore. The young occur in bays and at the heads of submarine canyons, also on the uppermost slope. Benthic or pelagic, sluggish, bottom-dwelling. Twenty-two to 108 young per litter. An apical deepwater predator, which has a wide prey range. Eats small to moderately large bony fishes including dolphinfishes, small marlin and swordfish, grenadiers, hake, ling, other cartilaginous fishes, marine mammals, carrion, gastropods, squid, crabs and shrimp. Not known to be harmful to people, including divers who encounter them, although the young will snap when captured. Separate statistics are usually not reported for this species. Caught by sports angling gear, in bottom trawls, and occasionally in pelagic trawls. Utilized for fishmeal and oil and a subject of ecotouristic diving.

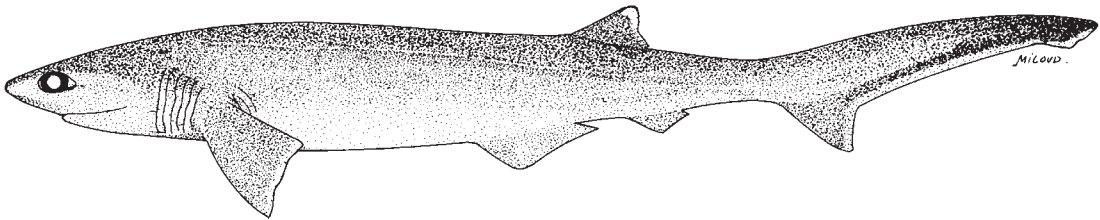
Distribution: Within the area, from Morocco, Mauritania, the Canary Islands, Madeira, the Azores, Senegal, possibly Côte d'Ivoire and Nigeria, possibly Gulf of Guinea, Congo Republic, Angola, and Namibia. Elsewhere almost circumglobal in tropical and temperate seas, wide-ranging in the Mediterranean and northeastern Atlantic northwards to Norway, and south to South Africa; also in the western Atlantic, southwestern Indian Ocean, and western and eastern Pacific.



Hexanchus nakamurai Teng, 1962

Frequent synonyms / misidentifications: *Hexanchus vitulus* Springer and Waller, 1969 / *Hexanchus griseus* (Bonnaterre, 1788).

FAO names: **En** – Bigeyed sixgill shark; **Fr** – Requin vache; **Sp** – Cañabota ojigrande.



Diagnostic characters: A small to moderate-sized, slender-bodied shark with 6 gill slits. Head and snout narrow, eyes relatively large, teeth of upper and lower jaws unlike at sides of mouth, uppers smaller, narrower, with a long main cusp and a few cusplets, lower anterolateral teeth large, compressed, elongated and comb-like, in five rows on each side of mouth, with a short main cusp and short cusplets, their inner edges serrated. A single dorsal fin separated from origin of caudal fin by a space much greater than its base length; lower caudal lobe strong in adults, prominent in immature individuals. **Colour:** grey or brown above, body usually sharply bicolorate with underside lighter than dorsal surface and whitish; most fins with prominent white posterior margins and tips but sometimes dusky; with an inconspicuous narrow light band along the lateral line.

Size: Adults to at least 180 cm, maturing at about 123 to 142 cm.

Habitat, biology, and fisheries: A small, warm temperate to tropical, mostly deepwater shark, occurring on the continental and insular shelves and upper slopes usually near the bottom and at depths from 90 to 621 m. Benthic or pelagic, sluggish, bottom-dwelling. Thirteen to 26 young per litter. Feeds on small bony fishes and crustaceans. Not harmful to people. Separate statistics are not reported for this species. Caught on line gear and in bottom trawls. Possibly utilized for fishmeal in the area, and for human consumption elsewhere.

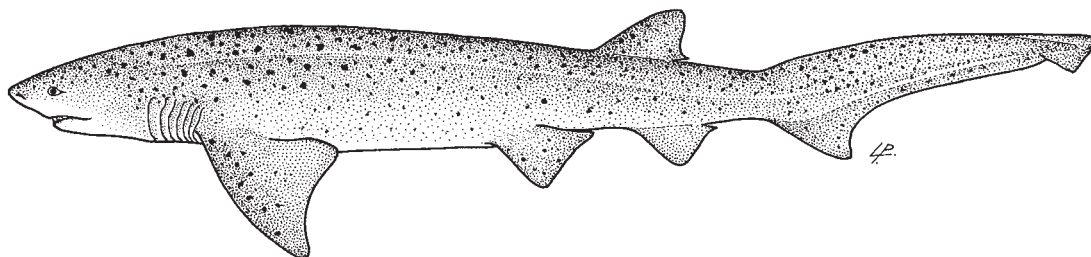
Distribution: Apparently occurring only in the extreme north of the area off the Gibraltar region including Morocco and possibly off Côte d'Ivoire and Nigeria, north to Mediterranean Sea and the North Atlantic coast of Spain and France; elsewhere from the western Atlantic from Florida to Venezuela and the Guyanas; and the Indo-West Pacific off eastern and southern Africa and Japan, Taiwan Province of China, Philippines, New Caledonia, Tahiti and Australia.



***Notorynchus cepedianus* (Péron, 1807)**

Frequent synonyms / misidentifications: *Notidanus indicus* Agassiz, 1838; *Notorynchus maculatus* Ayres, 1855; *Hepranchias pectorosus* Garman, 1884 / None.

FAO names: **En** – Broadnose sevengill shark; **Fr** – Platnez; **Sp** – Cañabota gata.



Diagnostic characters: A large, heavy-bodied shark with 7 gill slits. Head and snout broad, eyes relatively small, teeth of upper and lower jaws unlike at sides of mouth, uppers smaller, narrower, with a long main cusp and a few cusplets, lower anterolateral large, compressed, comb-like, and very high, in six rows on each side of mouth, with a short main cusp and short cusplets, their inner edges serrated. A single dorsal fin separated from origin of caudal fin by about its base length; lower caudal lobe weak in adults, hardly indicated in immature individuals. **Colour:** greyish to brownish above, white below, usually with numerous small black spots and sometimes white spots on the dorsal surface and an inconspicuous narrow light band along the lateral line; dorsal fin and upper caudal lobe with black tips in newborn young but lost in larger specimens.

Size: Adults to at least 290 cm and possibly over 300 cm, maturing at about 130 to 186 cm.

Habitat, biology, and fisheries: A large temperate-water shark of the continental and insular shelves from the intertidal and the surfline to at least 136 m, but mostly in coastal waters less than 50 m deep. Benthic or pelagic, bottom-dwelling, strong-swimming. Pregnant females not examined but with litter size of 67 to 104 young estimated from ovarian eggs. A powerful inshore apical predator in temperate waters, feeding primarily on other cartilaginous fishes, bony fishes, and marine mammals (seals and small cetaceans), but also on seabirds, hagfish, terrestrial mammals, gastropods, bivalves, crabs, squid and octopuses. Occasionally bites or threatens divers and swimmers but not a hazard to people; individuals snap when captured or otherwise provoked. Separate statistics are infrequently reported for this species and not in the area. Caught in small-scale targeted fisheries with line gear by sports anglers and commercial fishers, also largely as bycatch with gillnets and demersal trawls. Utilized for human consumption, for leather, and for liver oil which has high vitamin A content.

Distribution: Within the area, known to occur from off southern Angola and Namibia; elsewhere from the western South Atlantic from Brazil to Argentina, eastern South Atlantic and southwestern Indian Ocean off South Africa, northern Indian ocean from off India and Sri Lanka; western Pacific from possibly Russia, Japan, and the Koreas to China and possibly Viet Nam, and southern Australia and New Zealand; eastern Pacific from Alaska to southern California and Mexico, and off Colombia to Chile.



Order ECHINORHINIFORMES

ECHINORHINIDAE

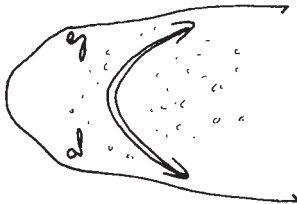
Bramble sharks

A single species occurring in the area.

Echinorhinus brucus (Bonnaterre, 1788)

Frequent synonyms / misidentifications: None / None.

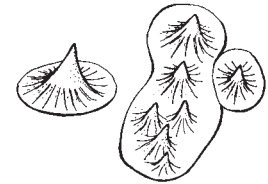
FAO names: En – Bramble shark; Fr – Squale bouclé; Sp – Tiburón de clavos.



ventral view of head



upper and lower teeth

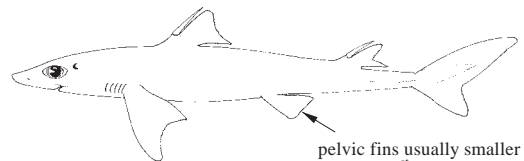


dermal denticles

Diagnostic characters: Large sharks (to 3.1 m long) with stout cylindrical bodies and no abdominal ridges. Head moderately depressed; last (fifth) gill slits abruptly expanded in width; spiracles present, very small, well behind eyes; nostrils far apart from each other; snout short; mouth broadly arched, with **very short labial furrows** that do not encircle mouth, lips not papillose; **teeth same in both jaws, strongly compressed and blade-like, with a cusp and up to three side cusplets in adults**, but with a cusp only in young. **Two small spineless posterior dorsal fins, both smaller than the pelvic fins, situated close together, the origin of the first dorsal fin behind the pelvic-fin origins; anal fin absent; caudal fin without a subterminal notch. Dermal denticles sparsely scattered on body, very large and thorn-like, some forming large plates with several cusps.** Intestinal valve of spiral type. **Colour:** blackish to greyish brown above and below.

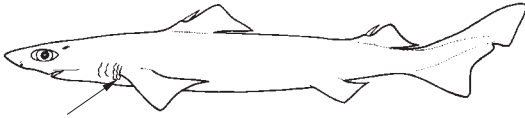
Similar families occurring in the area

Squalidae, Centrophoridae, Somniosidae, Etmopteridae, Dalatiidae: fifth gill slits not abruptly larger than first to fourth; spiracles larger; first dorsal-fin origin well anterior to pelvic origins; pelvic fins usually about as large as second dorsal fin or smaller.



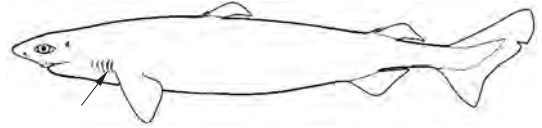
Squalidae

pelvic fins usually smaller than 1st dorsal fin

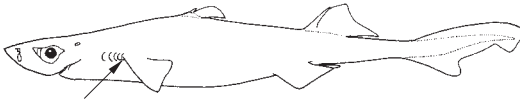


5th gill slits not abruptly larger than 1st to 4th

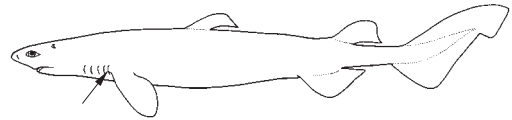
Centrophoridae



Somniosidae

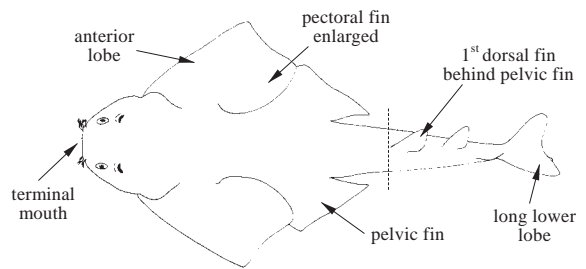


Etmopteridae



Dalatiidae

Squatinae: trunk much flattened dorsoventrally; mouth terminal; eyes on upper surface of head; teeth not blade-like, with a single cusp and no cusplets; origin of first dorsal fin posterior to pelvic-fin bases; anterior margins of pectorals expanded as triangular lobes past the gill slits and partly concealing them; both the pectorals and pelvics very large and wing-like; caudal fin nearly symmetrical, but with a lower lobe longer than the upper.



Squatinae

All other shark families: anal fin present.

Size: Maximum total length about 3.1 m; size at birth about 45 to 48 cm; size at maturity about 200 to 220 cm for females and near 150 cm for males.

Habitat, biology, and fisheries: A rare inhabitant of the outer continental shelves and upper continental slopes of temperate to tropical seas, mostly found at depths between 400 and 900 m, but also occurring in shallow waters close inshore and in the intertidal zone. A bottom-dwelling species, probably slow-swimming. Ovoviviparous (aplacental viviparous), with up to 24 young per litter. Feeds on small bony fishes, other sharks, and crabs. Rarely caught; separate statistics are not reported for this species. Caught in bottom trawls; sometimes with line gear and even by anglers on rod-and-reel. Used for fishmeal; probably also discarded bycatch.

Distribution: A wide ranging but sporadically occurring shark found off Morocco, Mauritania, Western Sahara, Canary Islands, Azores, Senegal, Côte d'Ivoire, and southwards to southern Angola and Namibia; elsewhere, in the Mediterranean, northward to off Scotland and Ireland, southwards to South Africa (northern and western Cape). Wide-ranging in the western Atlantic, Indian Ocean, and western Pacific.



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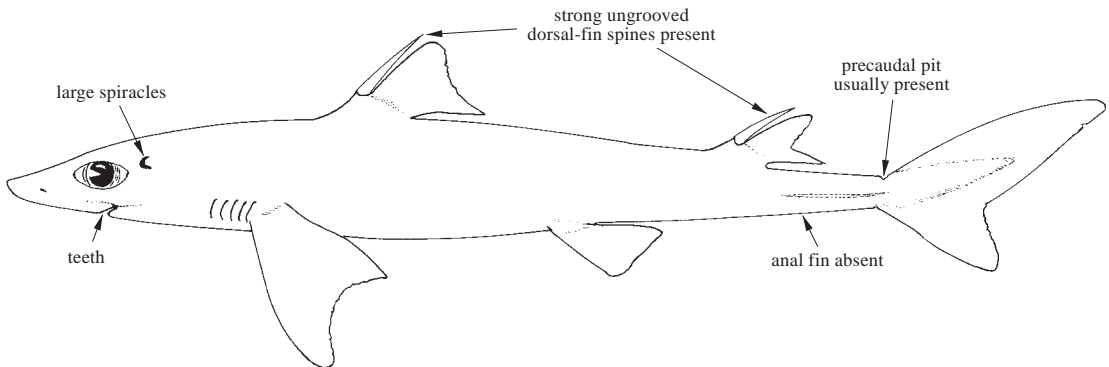
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Order SQUALIFORMES

SQUALIDAE

Spurdogs, spiny dogfish, spined dogfish

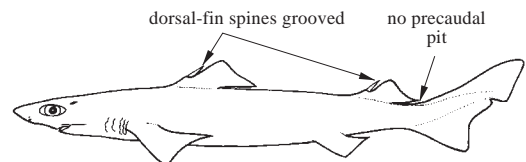
Diagnostic characters: Small to moderately large sharks, with cylindrical bodies; no ridges between pectoral and pelvic fins, caudal keels and usually precaudal pits present on caudal peduncle. **Head with 5 gill slits, all anterior to pectoral fins, the fifth not abruptly longer than the others; spiracles always present, large and just behind eyes; eyes on sides of head, without nictitating eyelids.** Snout short to moderately elongated, broad, flattened, not formed as a rostral saw; no barbels on snout; nostrils wide-spaced, internarial width greater than nostril width; mouth short and nearly transverse, lips smooth; **teeth strong-cusped, similar in both jaws, compressed, broad, blade-like and without cusplets, adjacent teeth imbricated, upper teeth nearly as large as lowers. Two dorsal fins with a long strong ungrooved spine present** on their anterior margins; dorsal fins large, angular, broad, and with **strongly concave posterior margins**; first dorsal fin larger or subequal in area to second dorsal fin; origin of first dorsal fin far in front of pelvic-fin origins, over or behind pectoral-fin insertions, and in front of or just behind pectoral fin free rear tips; pelvic fins subequal to or smaller than second dorsal; **no anal fin**; caudal fin strongly asymmetrical, with subterminal notch present and with a ventral lobe varying from virtually absent to strong. Dermal denticles close-set, not greatly enlarged and plate-like. **Colour:** body and fins greyish or brownish, without conspicuous black marks and luminescent organs but with white spots in some species.



Habitat, biology, and fisheries: Spiny dogfishes mostly occur in deeper water (50 m and more) on the outer shelves and uppermost slopes in warm-temperate and tropical seas such as those of Areas 34 and 47; those occurring in cold-temperate and boreal water (to the north of Fishing Area 34) range close inshore and may enter the intertidal zone. Spiny dogfishes often form schools and may be among the most abundant of living sharks; they feed mainly on fishes and small marine invertebrates and may cause damage to fishing gear when preying on the catch. Some species are highly appreciated as food. The family has importance as a major fishery resource for human consumption and for liver oil and has been fished intensively in many areas both as target fisheries and as utilized and discarded bycatch. Some species have conservation problems due to overfishing despite their present (or former) abundance, because they are very long-lived, have long maturation periods and low fecundity. Separate statistics for species of spiny dogfish caught in the area are not available, although a few countries list dogfish catches under Squalidae or Squaliformes.

Similar families occurring in the area

Centrophoridae, Etmopteridae, Somniosidae and Dalatiidae: upper teeth conspicuously smaller than lower teeth, dorsal-fin spines either absent or grooved, no precaudal pits, most species without strong precaudal keels.

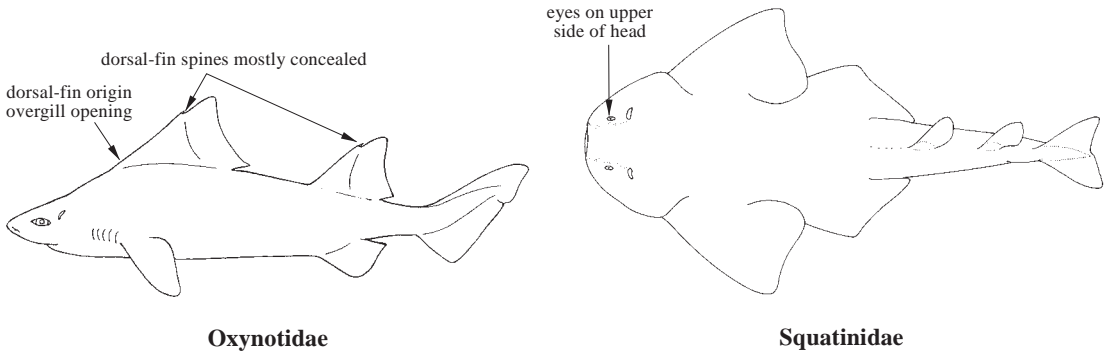


Centrophoridae

Oxynotidae: body strongly compressed, very high, and triangular in cross-section; with lateral ridges between the pectoral and pelvic-fin bases; dorsal fins broad-based, triangular, sail-like, and with large spines mostly concealed within them; first dorsal fin with its origin extending far forward over gill openings.

Squatinae: trunk much flattened dorsoventrally; eyes on upper side of head; anterior margins of pectoral fins extending forward past gill openings and partly concealing them; pelvic fins also very broad, wing-like.

All other shark families: anal fin present.



Key to species of Squalidae occurring in the area

- 1a. Nostrils with a single anterior nasal flap and no accessory lobe (Fig. 1 a); first dorsal fin more posterior, its spine behind level of inner corners of pectoral fins; pectoral fins narrower; white spots usually present on sides (occasionally absent in adults) ***Squalus acanthias***
- 1b. Nostrils with a well-developed accessory lobe in addition to the anterior nasal flap (Fig. 2a); first dorsal fin further forward, its spine anterior to, or over, inner corners of pectorals; pectoral fins broader; no white spots → 2
- 2a. Distance from tip of snout to inner corner of nostril less than that from inner corner of nostril to upper labial furrow (Fig. 2b); posterior margins of pectoral fins usually deeply concave and inner corners acutely pointed; denticles on sides of body narrow and unicuspidate (Fig. 2c) ***Squalus megalops***
- 2b. Distance from tip of snout to inner corner of nostril greater than or equal to that from inner corner of nostril to upper labial furrow; posterior margin of pectoral fins weakly concave, their inner corners rounded; denticles broad and tricuspidate on sides of body → 3

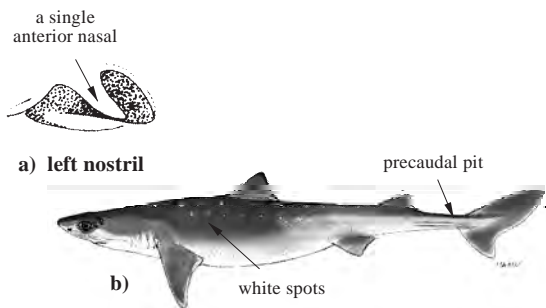


Fig. 1 *Squalus acanthias*

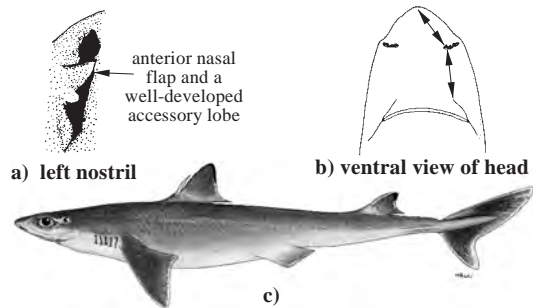


Fig. 2 *Squalus megalops*

- 3a. First dorsal fin high and erect, about 0.75 of fin length, with first dorsal spine about as long as fin base; precaudal vertebral counts 90 to 96 *Squalus blainville*
- 3b. First dorsal fin lower, about 0.67 of fin length or less, first dorsal spine shorter than fin base; precaudal vertebral counts 83 to 89 *Squalus mitsukurii*

1st dorsal-fin spine about as long as fin base

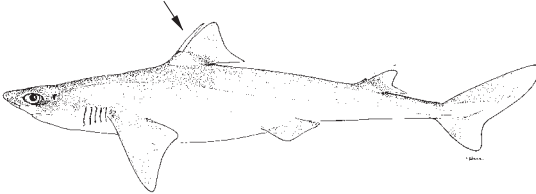


Fig. 3 *Squalus blainville*





1st dorsal-fin spine shorter than fin base



Fig. 4 *Squalus mitsukurii*

List of species occurring in the area

The shark symbol  is given when species accounts are included.^{1/}

-  *Squalus acanthias* Linnaeus, 1758.
-  *Squalus blainville* (Risso, 1827).^{2/}
-  *Squalus megalops* (Macleay, 1881).^{3/}
-  *Squalus mitsukurii* Jordan and Snyder in Jordan and Fowler, 1903.^{2/}

^{1/} *Cirrhigaleus asper* (Merrett, 1973) is a wide-ranging species of spiny dogfish from the western North Atlantic, western Indian Ocean, and central Pacific. Although not yet reported from Fishing Areas 34 or 47, it should be watched for in trawl catches of dogfish from warm-temperate and tropical waters as it occurs on the southeast coast of South Africa (Eastern Cape). It is characterized by a heavy body, a broad head and snout, large tricuspid denticles in adults (giving it a rougher appearance than other spiny dogfish), very large accessory lobes on the anterior nasal flaps, a short snout (distance from snout tip to inner edge of nostril about equal to that from nostril to anterior end of upper labial groove), moderately long fin spines, first dorsal fin positioned more posteriorly, with its origin about over, and its spine posterior to inner corners of pectorals, the second dorsal fin about as large as the first, very broad pectoral fins with bluntly rounded inner corners and nearly straight posterior margins, and a weaker ventral caudal lobe than species of *Squalus*.

^{2/} Large *Squalus* dogfish with broad, tricuspidate lateral trunk denticles, broadly angular pectoral fins, and anteriorly situated first dorsal fins (the *Squalus mitsukurii* group) are often attributed to two species in the area and include a dogfish with high first dorsal fin and spine (often termed *S. blainville*) and a second species with low first dorsal fin and spine that is sometimes attributed to *S. "fernandinus"* (not *S. fernandinus* Molina, 1781 = *S. acanthias*). The two species are ascribed to *Squalus blainville* and *S. mitsukurii* respectively in this account, but the systematics and nomenclature of the group in the area and elsewhere is in much need of clarification and the nomenclature (following the forthcoming revision of the 1984 FAO shark catalog by the present author) is provisional.

^{3/} It is likely that in the area, as in southern Africa and the Mediterranean Sea, *S. blainville*, *S. megalops* and *S. mitsukurii* have been routinely confused with one another. *Squalus uyatus* Rafinesque, 1810, from the Mediterranean Sea has recently been reclassified as *Centrophorus uyato* (Rafinesque, 1810). It is more likely to be a senior synonym of the local representative of *S. megalops* or *S. mitsukurii* than of *S. blainville* (because of its low dorsal fins), and is clearly not synonymous with *S. acanthias*.

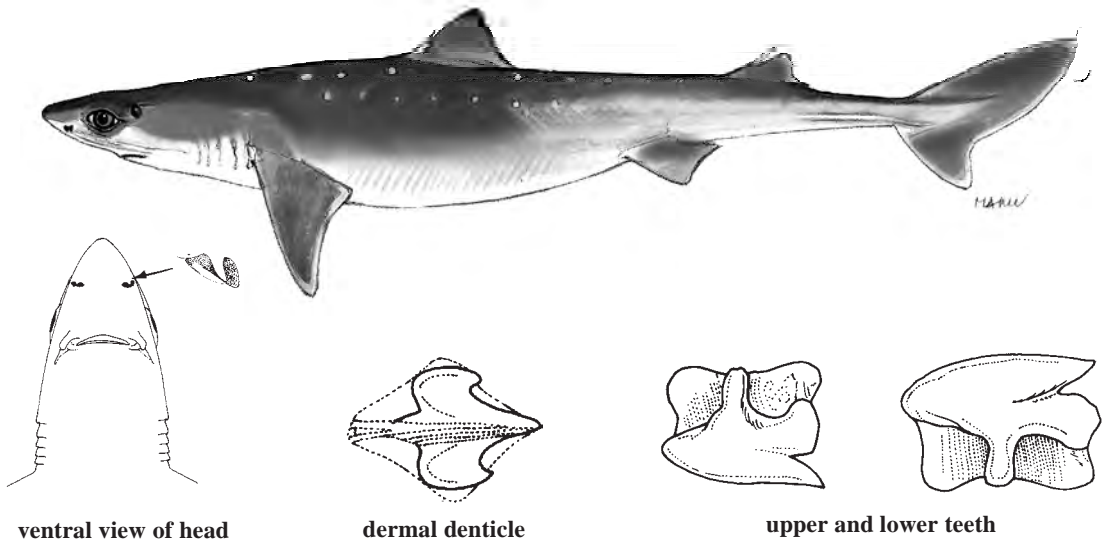
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***Squalus acanthias* Linnaeus, 1758**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Piked dogfish (AFS: Spiny dogfish); Fr – Aiguillat commun; Sp – Mielga.



Diagnostic characters: Body elongate and spindle-shaped. **Snout and head narrow, snout pointed;** anterior nasal flap narrow and without an accessory lobe; distance from tip of snout to inner corner of nostril slightly more, about equal, or slightly less than that from inner corner of nostril to upper labial furrow; spiracle large, half-moon shaped; mouth only very slightly arched. **Teeth same in both jaws, small, compressed and with a single cusp deeply notched, outward end strongly oblique. Skin smooth, denticles on sides of body narrow and unicuspid in young but broad and tricuspidate in adults. First dorsal fin low, height about 0.67 of its length or less. A strong, long spine without lateral grooves on anterior margin of both dorsal fins; first dorsal-fin spine low, length much shorter than first dorsal-fin base, spine origin behind pectoral fin rear tips; second dorsal fin much smaller than first; pectoral fins narrow and falcate or semifalcate, free rear tips of pectoral fins narrowly rounded, posterior margins of fins weakly to moderately concave; midbases of pelvic fins much closer to origin of second dorsal fin than to insertion of first dorsal fin. Caudal peduncle flattened below, with an obscure longitudinal keel low down on each side; upper precaudal pit strongly developed, no lower precaudal pit. Caudal fin without a subterminal notch. Precaudal vertebral counts 68 to 85. **Colour:** bluish grey or grey above and lighter grey to whitish below, **white spots or dashes often present on sides** (occasionally absent in adults); dorsal fins with black apical patches and white posterior markings in young but plain or with dusky tips in adults; iris green.**

Size: Maximum total length exceptionally to about 200 cm (Black Sea population) but most adults smaller than 130 cm; size at birth 18 to 33 cm; size at maturity 52 to over 104 cm for males and 66 to over 120 cm in females.

Habitat, biology, and fisheries: A common to abundant strong-swimming dogfish on the continental and insular shelves and upper and middle slopes of boreal to subtropical seas, at depths from the intertidal and shallow bays commonly down to 200 m but may extend to 950 m or more; this species tends to occur close inshore in higher latitudes and in deep water closer to the equator. Highly mobile and migratory, occurs or formerly occurred in huge schools of a single sex. Ovoviviparous, number of young 3 to 11 in the eastern Atlantic but 1 to 32 elsewhere; gestation period 18 to 22 months. Feeds primarily on bony fishes, particular on

schooling species but including both demersal and pelagic species, but also eats small cartilaginous fishes, cephalopods, crustaceans, gastropods, bivalves, polychaete worms, sea cucumbers, jellyfish and comb jellies. Caught in bottom trawls and with limited importance to fisheries in the area compared to the North Atlantic where massive catches have been reported. Utilized fresh and dried-salted for human consumption; the hides are processed for leather. Populations are apparently depleted in the North Atlantic, with limitations on existing fisheries and even a CITES listing being suggested for its management and conservation.

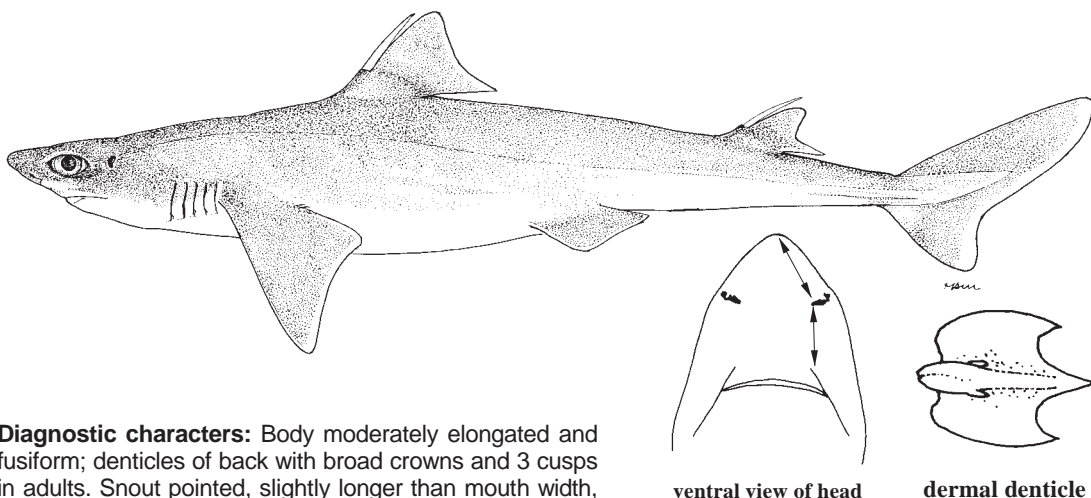
Distribution: A temperate to boreal shark that occurs in the area off Morocco (where it is very rare), Madeira, the Canary Islands, possibly the Azores, Western Sahara, Mauritania, Senegal; also northward to Iceland and the Murmansk coast and in the Mediterranean and the Black Sea, and southwards off the west coast of South Africa. Elsewhere, populations occur in the western side of the North and South Atlantic, and in the South and North Pacific. Widely distributed in temperate and subtropical parts of most oceans; possibly a species complex.



Squalus blainville (Risso, 1827)

Frequent synonyms / misidentifications: *Squalus* “*fernandinus*” not of Molina, 1782, in part. Name also spelled *S. blainvillii* or *S. blainvillei* / None.

FAO names: **En** – Longnose spurdog; **Fr** – Aiguillat coq; **Sp** – Galludo.



Diagnostic characters: Body moderately elongated and fusiform; denticles of back with broad crowns and 3 cusps in adults. Snout pointed, slightly longer than mouth width, the distance from its tip to inner edge of nostril greater than that from latter point to anterior end of upper labial groove; nostrils with elongated anterior flaps having short accessory lobes on their medial edges; teeth same in both jaws, small, compressed, and with a single, strongly oblique cusp, a notched outer edge, and no cusplets or serrations. **Skin smooth, denticles on sides of body broad and tricuspidate in young and adults. First dorsal fin larger and higher than second, very tall, its height about 0.75 of its length, a strong, very long, ungrooved spine on both dorsal fins reaching or extending above their apices; first dorsal spine about as long as first dorsal-fin base, its base over inner margins of pectoral fins; pectoral fins rather broad, their inner corners narrowly rounded and their posterior margins nearly straight; caudal fin asymmetrical, without a subterminal notch but with a strong ventral lobe. Caudal peduncle with a low lateral keel on each side and an upper precaudal pit. Precaudal vertebral counts 90 to 96. Colour: back more or less dark brown, belly whitish.**

Size: To at least 95 cm.

Habitat, biology, and fisheries: A tropical to temperate, offshore shark trawled in the area near the bottom at depths between 16 and 440 m, but elsewhere to, at least, 750 m. Ovoviviparous, number of fetuses 4 to 9, size at birth 22 to 26 cm. Feeds on bony fishes, cephalopods and crustaceans. Offshore in the area. Separate statistics are not reported for this species. Caught in bottom trawls and with gillnets and line gear. Utilized fresh, dried-salted, and smoked.

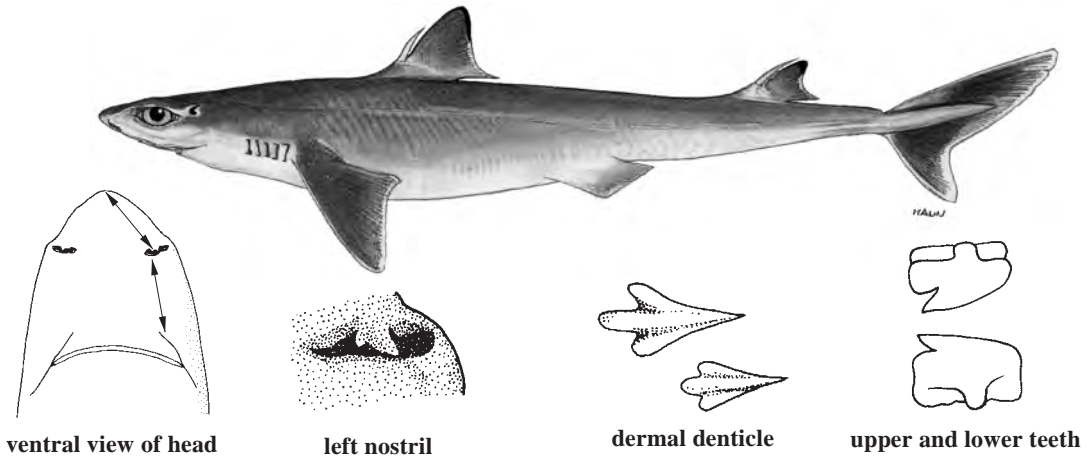
Distribution: In the area, from Morocco, the Canaries, Senegal and possibly Gabon to Angola and Namibia, but with confirmed records sporadic; also, northward to the Bay of Biscay and in the Mediterranean. Elsewhere, this species or a close relative occurs in the western Pacific. Records in the western Atlantic, Indian Ocean, and western, central and southeastern Pacific are in part based on *Squalus mitsukurii* or close relatives. Material was examined from Angola during the FAO 2004 eastern central Atlantic workshop in Tenerife.



***Squalus megalops* (Macleay, 1881)**

Frequent synonyms / misidentifications: None / *Squalus acutipinnis* Regan, 1908.

FAO names: En – Shortnose spurdog; Fr – Aiguillat nez court; Sp – Galludo ñato.



Diagnostic characters: Body moderately elongated and fusiform; **denticles of back with slender, lanceolate crowns and a single cusp in adults.** Snout pointed and slightly longer than mouth width, **the distance from its tip to inner edge of nostril less than that from latter point to anterior end of upper labial groove;** nostrils with **elongated anterior flaps having short accessory lobes** on their medial edges; teeth same in both jaws, small, compressed, and with a single, strongly oblique cusp, a notched outer edge, and no cusplets or serrations. **Skin smooth, denticles on sides of body narrow and unicuspid in young and adults.** First dorsal fin larger and higher than second, height about half its length, **its origin over inner margins of pectoral fins, close to pectoral-fin insertions; a strong, moderately long ungrooved spine on both dorsal fins; first dorsal spine rather long although half or less of first dorsal-fin base, over inner margins of pectoral fins, its tip falling just below the fin apex; second dorsal spine long and reaching above fin apex; pectoral fins rather broad, their inner corners usually acutely pointed and their posterior margins deeply concave;** caudal fin asymmetrical, without a subterminal notch but with a strong ventral lobe. Caudal peduncle with a low lateral keel on each side and an **upper precaudal pit.** Precaudal vertebral counts 78 to 86. **Colour:** dark brown or grey above, cream-white below; no white spots on sides.

Size: Maximum: about 71 cm, most adults between 40 and 70 cm.

Habitat, biology, and fisheries: A tropical to temperate, offshore shark living in groups of considerable numbers at moderate depths (in the area between 16 and 250 m; elsewhere to at least 450 m). Ovoviviparous, number of fetuses in a litter 2 to 4, size at birth between 18 and 24 cm. Feeds primarily on bony fishes, also on cephalopods, crustaceans, and other elasmobranchs. Probably offshore. Information not recorded for this species, probably because of its being confused with *Squalus blainville* or *S. mitsukurii* in catch reports. Probably taken in bottom trawls. Utilized fresh, dried-salted, and smoked.

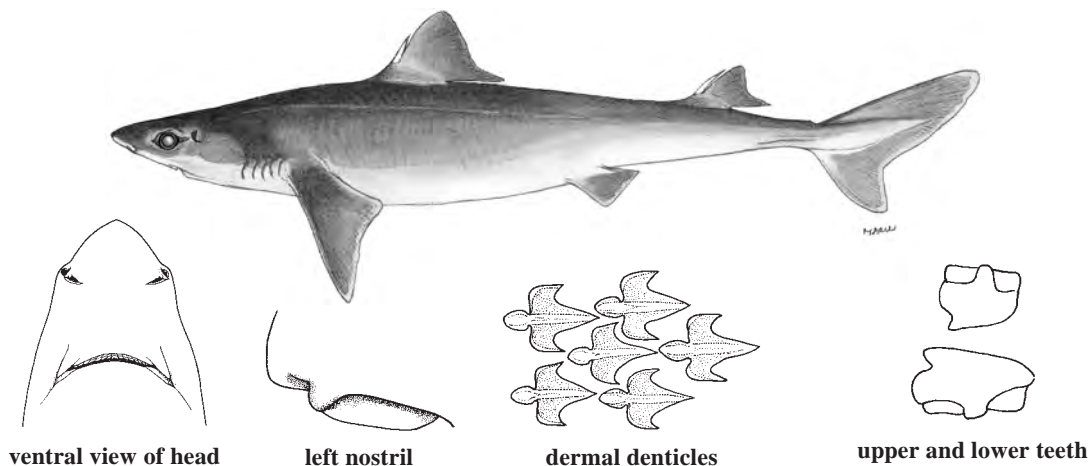
Distribution: In the area found off Mauritania, Guinea, and from Gabon to Angola and Namibia including Canary Islands. North of the area off Spain and Portugal and in the western Mediterranean, south off the Atlantic coast of South Africa, the southwestern Indian Ocean and western Pacific. May represent a species complex, with the local form possibly not conspecific with *Squalus megalops* (type locality from Australia).



Squalus mitsukurii Jordan and Snyder, 1903

Frequent synonyms / misidentifications: None / None.

FAO names: En – Shortspine spurdog; Fr – Aiguillat épinette; Sp – Galludo espinilla.



Diagnostic characters: Body elongate and spindle-shaped. Snout and head broad, snout parabolic; anterior nasal flap moderately wide; distance from tip of snout to inner corner of nostril slightly greater than that from inner corner of nostril to upper labial furrow; spiracle large, half-moon shaped; mouth only very slightly arched. Teeth same in both jaws, small, compressed and with a single cusp deeply notched outward end strongly oblique. Skin smooth, denticles on sides of body broad and tricuspidate in young and adults. First dorsal fin larger and higher than second dorsal fin but low, its height about 0.67 of its length or less. A strong, long spine without lateral grooves on anterior margin of both dorsal fins; first dorsal spine shorter than first dorsal-fin base, its origin over pectoral fin inner margins and well in front of their rear tips; pectoral fins fairly broad and semifalcate, free rear tips of pectoral fins narrowly rounded, posterior margins of fins slightly concave; midbases of pelvic fins closer to second dorsal insertion than first dorsal insertion. Caudal peduncle flattened below, with an obscure longitudinal keel low down on each side; upper precaudal pit strongly developed, no lower precaudal pit. Caudal fin without a subterminal notch. Precaudal vertebral counts 83 to 89. **Colour:** grey or grey-brown above, paler grey to whitish below, no white markings on sides; webs of both dorsal fins dusky but without conspicuous black apices; irises green.

Size: Maximum total length about 125 cm; size at birth about 21 to 30 cm; males mature between 47 and 85 cm and females between 50 and 100 cm, with size at maturity varying in different populations.

Habitat, biology, and fisheries: On the continental and insular shelves and slopes at depths of 4 to 954 m elsewhere, mostly offshore between 100 and 500 m in the area. Ovoviviparous, with 2 to 15 young per litter. Feeds primarily on bony fishes, cephalopods and crustaceans, also tunicates and polychaete worms. Interest to fisheries uncertain in the area due to confusion with other species of *Squalus*, but undoubtedly caught in bottom trawls and utilized to some extent.

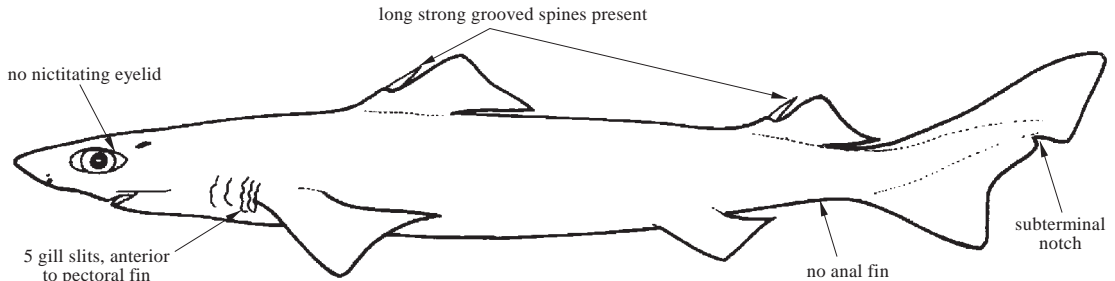
Distribution: In the area this species ranges from the Straits of Gibraltar south to Morocco, Western Sahara and Mauritania and also off Namibia, but records are sketchy because of confusion with *Squalus blainville* and probably *S. megalops*. It also occurs in the western Mediterranean Sea off Spain and the eastern Atlantic north of the area off Portugal and Spain and south off the west and southeast coasts of South Africa; the species or species-complex is otherwise wide-ranging in the western Atlantic, the Indo-West Pacific, and the central Pacific.



CENTROPHORIDAE

Gulper sharks

Diagnostic characters: Small to moderately large sharks (adults 43 to 169 cm total length), with cylindrical or slightly compressed bodies, without ridges between pectoral and pelvic fins and without precaudal pits and caudal keels. **Head with 5 gill slits, all anterior to pectoral fins**, the fifth not abruptly longer than the others; **spiracles always present, large and just behind eyes**; **eyes on sides of head, without nictitating eyelids**. Snout short to elongated, broad, flattened, not formed as a rostral saw; no barbels on snout; nostrils wide-spaced, internarial width greater than nostril width; mouth short and nearly transverse, lips smooth; **teeth strong-cusped, dissimilar in both jaws, compressed, broad, blade-like and without cusplets, adjacent teeth imbricated, upper teeth much smaller than lowers**. **Two dorsal fins with a long strong grooved spine present** on their anterior margins; dorsal fins large, angular, broad, and with weakly concave posterior margins; first dorsal fin larger or subequal in area to second dorsal fin; origin of first dorsal fin far in front of pelvic-fin origins, over or just behind pectoral-fin insertions, and always in front of pectoral fin free rear tips; pelvic fins subequal to or smaller than second dorsal fin; **no anal fin**; caudal fin strongly asymmetrical, **with subterminal notch present** and with a lower lobe varying from virtually absent to short. Dermal denticles close-set, not greatly enlarged and plate-like. **Colour:** body and fins greyish to blackish brown, without conspicuous black marks and luminescent organs.



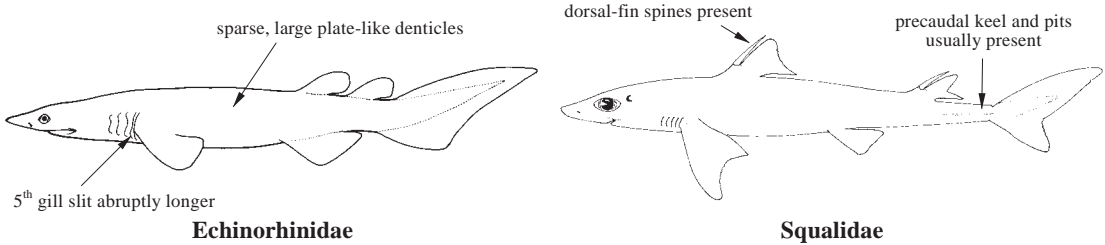
upper and lower teeth
(*Centrophorus granulosus*)

Habitat, biology, and fisheries: Gulper sharks mostly occur in deep water near the bottom on the continental and insular slopes between 200 and at least 2 400 m, with one photographed from a bathyscaphe on the ocean floor below 4 000 m and another caught in the open ocean between the surface and 1 250 m depth in water nearly 4 000 m deep. Occasional individuals venture onto the continental shelves up to 50 m, and one was found by a diver in shallow water. These dogfishes are circumglobal in most seas, and range from the tropics to high latitudes up to Iceland in the North Atlantic. Some of the species form immense schools, and are among the most abundant deepwater sharks. Gulper sharks feed mostly on bony fishes and cephalopods, but also small sharks, chimaeras, shrimp, lobsters and tunicates. Reproduction is ovoviviparous, with one to 12 young per litter. In the eastern Atlantic and the Far East these sharks are commonly fished with line gear, demersal and pelagic trawls, and fixed bottom nets for human consumption and for their livers, which are extremely large, oily, and have a high squalene content. This is possibly the most important family of deepwater sharks for fisheries purposes.

Similar families occurring in the area

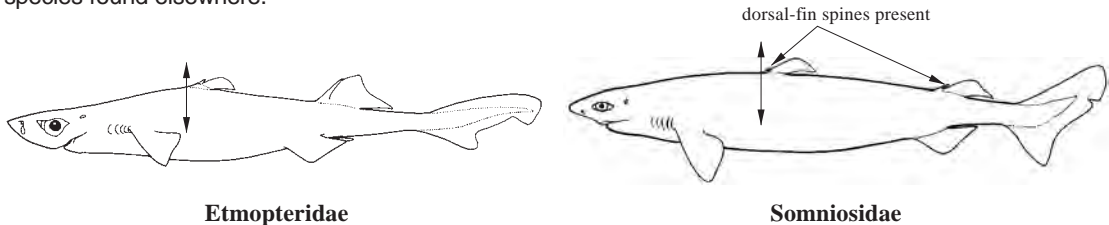
Echinorhinidae: body set with sparse, large, plate-like bucklers or thorny tubercles; spiracles small and well behind eyes; fifth pair of gill slits abruptly longer than others; mouth broadly rounded; teeth not imbricated, upper teeth nearly as large as lower teeth, with cusplets present in large juveniles and adults; no dorsal-fin spines; first dorsal-fin origin over or posterior to pelvic-fin origins; pelvic fins much larger than second dorsal fin.

Squalidae: upper teeth nearly as large as lower teeth; precaudal keels and usually precaudal pits present; dorsal-fin spines without grooves; second dorsal fin falcate; no subterminal notch on caudal fin.



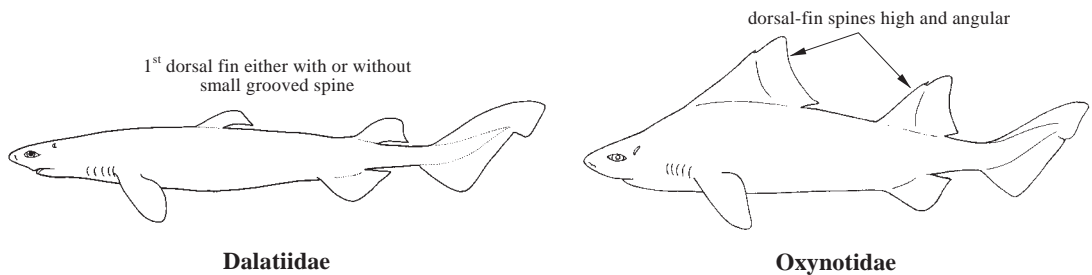
Etmopteridae: cusplets present on non-imbricated upper teeth; origin of first dorsal fin over or behind the pectoral fin free rear tips, second dorsal fin larger than first dorsal fin and more or less falcate; body usually with conspicuous black markings and luminescent organs on lower flanks and under the tail; most species small, adult at below 70 cm.

Somniosidae: upper teeth narrow and not imbricated; lateral keels present on abdomen; origin of first dorsal fin usually behind pectoral fin free rear tips; dorsal-fin spines greatly reduced in species in the area, absent in species found elsewhere.



Dalatiidae: upper teeth narrow and not imbricated; origin of first dorsal fin behind pectoral free rear tips; dorsal-fin spine either present on first dorsal fin only (*Squaliolus*) or absent.

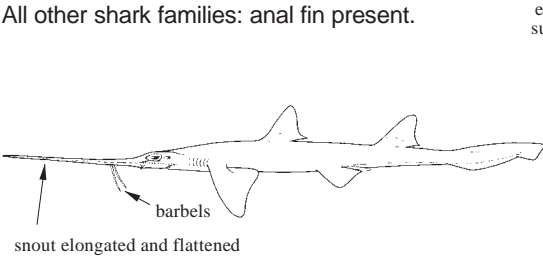
Oxynotidae: upper teeth narrow and not imbricated; body high and compressed; conspicuous lateral keels present on abdomen; dorsal fins very high and angular; dorsal-fin spines large but buried in the dorsal fins with only the tips exposed.



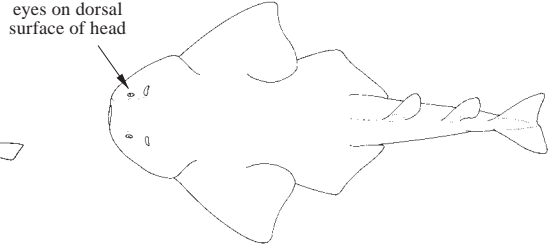
Pristiophoridae: snout elongated into a flattened blade with lateral teeth; barbels present in front of nostrils.

Squatinae: trunk much flattened dorsoventrally; eyes on upper side of head; anterior margins of pectoral fins extending forward past gill openings and partly concealing them; pelvic fins also very broad, wing-like.

All other shark families: anal fin present.



Pristiophoridae



Squatinae

Key to species of Centrophoridae occurring in the area

- 1a. Snout short to moderately elongated; first dorsal fin high and more angular; second dorsal spine slightly larger than first, pectoral fin free rear tip angular to elongated; dermal denticles with crowns on low pedicels or with sessile crowns, denticles not pitchfork-shaped (Fig. 1) **(Centrophorus) → 2**
- 1b. Snout greatly elongated, first dorsal fin low and keel-shaped; second dorsal spine much larger than first; pectoral fin free rear tip rounded; dermal denticles pitchfork-shaped, crowns on tall, slender pedicels (Fig. 2) **(Deania) → 6**

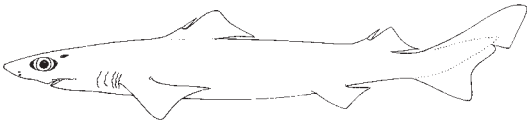


Fig. 1 Centrophorus

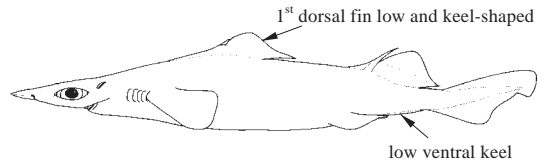


Fig. 2 Deania

- 2a. Lateral trunk denticles with leaf-like flattened crowns on elevated narrow to broad pedicels extending above the denticle bases; crowns with strong medial and lateral cusps on their posterior ends (Fig. 3a) **Centrophorus squamosus**
- 2b. Lateral trunk denticles with flat sessile crowns on the denticle bases, without separate pedicels; crowns usually with or sometimes without a posterior medial cusp but no lateral cusps (Fig. 3b) **→ 3**
- 3a. Free rear tips of pectoral fins moderately elongated and attenuated, usually not extending behind first dorsal spine; lateral trunk denticles with more or less elongated crowns and a prominent angular cusp in adults; a large species with adults about 110 to 169 cm long (Fig. 4) **Centrophorus niaukang**
- 3b. Free rear tips of pectoral fins greatly elongated and usually extending well behind first dorsal spine; lateral trunk denticles with rounded or oval crowns and a low obtusely angular cusp (sometimes absent in large adult *C. granulosus*); smaller species, with adults usually below 100 cm but possibly up to 110 cm **→ 4**

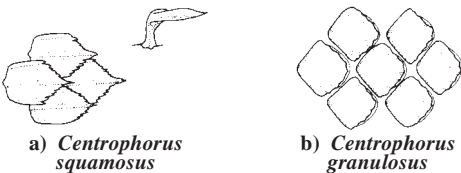


Fig. 3 dermal denticles

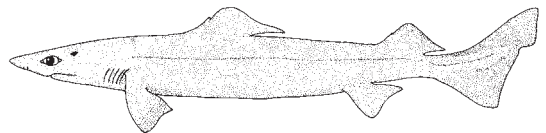


Fig. 4 dermal denticles

- 4a. First dorsal fin very low and greatly elongated, first dorsal height 2.4 to 3.8 times in base length, first dorsal base 16.2 to 22.4% of total length (Fig. 5) . . . ***Centrophorus lusitanicus***
- 4b. First dorsal fin higher and shorter, first dorsal height 1.4 to 2.5 times in base length, first dorsal base 8.8 to 15.8% of total length → 5

- 5a. Snout shorter and broader, preoral length 0.9 to 1.2 times mouth width; colour grey above and below in typical form (Fig. 6) ***Centrophorus granulosus***
- 5b. Snout longer and narrower, preoral length about 1.9 times mouth width; colour blackish grey above and below ***Centrophorus sp.***

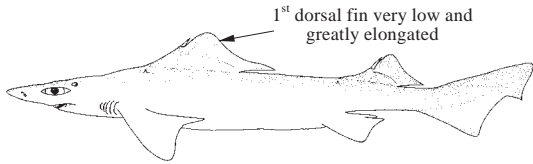


Fig. 5 *Centrophorus lusitanicus*

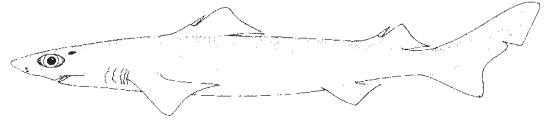


Fig. 6 *Centrophorus granulosus*

- 6a. A subcaudal keel on the lower surface of the caudal peduncle (Fig. 7) . . . ***Deania profundorum***
- 6b. No subcaudal keel on the lower caudal peduncle → 7

- 7a. First dorsal fin rather high, angular, and short, distance from its spine origin to free rear tip about two-thirds of distance from free rear tip to origin of second dorsal spine (Fig. 8) ***Deania quadrispinosa***
- 7b. First dorsal fin rather low, rounded, and long, distance from its spine origin to its free rear tip greater than distance from free rear tip to origin of second dorsal spine → 7

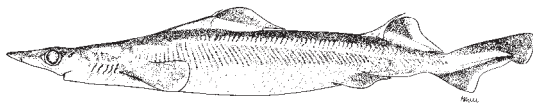


Fig. 7 *Deania profundorum*

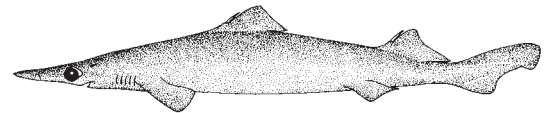


Fig. 8 *Deania quadrispinosa*

- 8a. Lateral trunk denticles moderately large, crown length about 0.5 mm; colour often medium grey-brown, sometimes light grey to dark brown (Fig. 9) ***Deania calcea***
- 8b. Lateral trunk denticles very large, crown length about 1 mm; colour often blackish brown, sometimes lighter (Fig. 10) ***Deania hystricosa***













Fig. 9 *Deania calcea*



Fig. 10 *Deania hystricosa*

List of species occurring in the area

The shark symbol  is given when species accounts are included.^{1/}

-  *Centrophorus granulosus* (Bloch and Schneider, 1801).^{2/}
-  *Centrophorus lusitanicus* Barbosa du Bocage and de Brito Capello, 1864.^{3/}
-  *Centrophorus niaukang* Teng, 1959.^{3/}
-  *Centrophorus squamosus* (Bonnaterre, 1788).^{4/}
-  *Centrophorus* sp.
-  *Deania calcea* (Lowe, 1839).
-  *Deania hystricosa* (Garman, 1906).
-  *Deania profundorum* (Smith and Radcliffe, 1912).
-  *Deania quadrispinosa* (McCulloch, 1915).

^{1/} The genus *Centrophorus* is in need of a worldwide revision. The arrangement here follows the first volume of the revised FAO shark catalog (Compagno, in prep.) It is not certain if the five species currently known from the area are the only ones that occur there. Care should be taken when examining *Centrophorus* specimens to make sure that other species are not being misidentified under the names of the five known species. Species to watch out for include the following: *C. moluccensis* Bleeker, 1860, which occurs off the east coast of South Africa and Mozambique (as well as the eastern Indian Ocean and western Pacific); *C. acus* Garman, 1906, which is nominally recorded from the western Atlantic as well as the western North Pacific; and a long-snouted light-coloured species sometimes referred to '*C. uyato*' from the east coast of South Africa which is close to and possibly identical to *C. harrissoni* McCulloch, 1915 from Australia.

The arrangement of *Deania* used here is provisional also, with the caveat that more than one species may be included under *D. calcea* and the nomenclature of some species may change. *Nasisqualus profundorum* Smith and Radcliffe, 1912, was described from the Philippine Islands (= *Deania profundorum*) but possibly has a senior synonym in *Centrophorus crepidalbus*. Barbosa du Bocage and de Brito Capello, 1864 from off Portugal. *C. crepidalbus* was briefly described and illustrated without reference to types or other specimens. The species is apparently a *Deania* and its illustration has a short dorsal fin as in *D. profundorum* and *D. quadrispinosa* Barbosa du Bocage and Brito Capello (or a reviewer of the paper) were apparently dubious of the validity of this species as someone wrote in English (after the description in Latin and French) the comment: 'An *Acanthidium calceus*, Lowe?' The species was synonymised with *D. calcea* by Krefft and Tortonese (1973) but has been used by K. Yano (in lit.) as *D. crepidalbus*. Three specimens of '*C. crepidalbus*' in the Natural History Museum of London, the Museum National d'Histoire Naturelle in Paris, and the Humboldt Museum in Berlin have been considered syntypes (Eschmeyer, 1998 and on-line Catalog of Fishes, 2007). One of these possible syntypes (BMNH-1867.7.23.1) was recently examined by the writer (2007) and is apparently conspecific with *D. profundorum*, but the ambiguity and lack of specimen references or type designations in the brief description of *C. crepidalbus* make its substitution for *D. profundorum* premature at present in the writer's estimate.

^{2/} The young of *Centrophorus granulosus* and possibly other species are often termed *C. uyato* (Rafinesque, 1810), which is not available for this genus (see family Squalidae). *Centrophorus machiquensis* Maul, 1955 from off Madeira was listed in Compagno (1981) as a separate species, but apparently is a junior synonym of *C. granulosus*. The possible syntypes of *C. bragancae* Regan, 1906, in the Natural History Museum of London were recently reexamined by the writer (2007) and appear to be based on *C. granulosus* as tentatively suggested by Krefft and Tortonese (1973) and followed by the writer (Compagno, 1981, 1984).

^{3/} *Centrophorus lusitanicus* and *C. niaukang* are currently considered to be synonyms of *C. granulosus* according to Eschmeyer's Catalog of Fishes. This guide retains the old taxonomy and users should note the new decision in their identifications.

^{4/} *C. squamosus* is sometimes placed in a separate genus, *Lepidorhinus* Bonaparte, 1838, but this is regarded here as a synonym of *Centrophorus* following Compagno (1981, 1984, 2007 in prep).

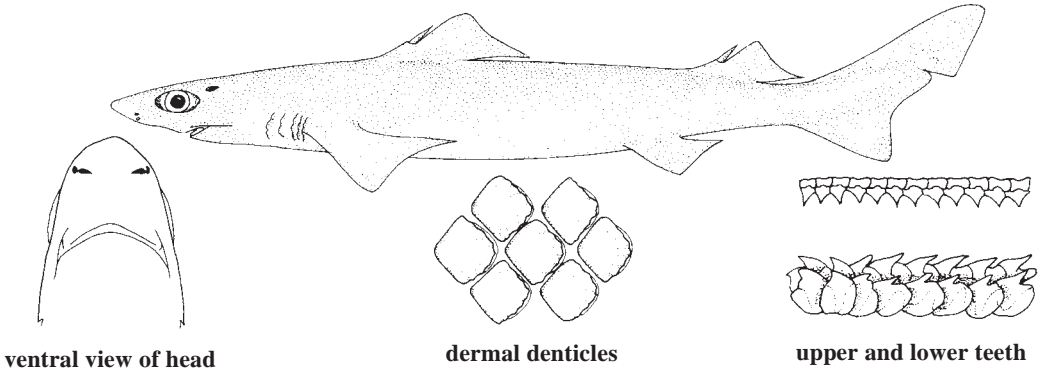
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***Centrophorus granulosus* (Bloch and Schneider, 1801)**

Frequent synonyms / misidentifications: *Centrophorus lusitanicus* Barbosa du Bocage and de Brito Capello, 1864^{5/}; *C. machiquensis* Maul, 1955; *C. niaukang* Teng, 1959 / *Centrophorus uyato* (Rafinesque, 1810).

FAO names: **En** – Gulper shark; **Fr** – Squale-chagrin commun; **Sp** – Quelvacho.



Diagnostic characters: Body elongate and slightly compressed; **dermal denticles of back widely separated and not overlapping, low crowned, thorn-like in young but broad and rounded in adults, without cusps and with low ridges confined to their posterior edges. Snout pointed, moderately elongated, slightly shorter to slightly longer than mouth width** but about equal to or shorter than distance from mouth to pectoral-fin origins. Teeth differing in upper and lower jaws; **uppers much smaller, relatively broad and blade-like, with high, erect to oblique cusps** and no cusplets; lowers large, compressed, blade-like, with a single oblique cusp, no cusplets, a deeply notched outer edge, and serrations in adults. A short, strong spine with lateral groove on anterior edges of both dorsal fins; **first dorsal fin relatively high and short, second dorsal fin lower than first, its base about half to four-fifths the length of first dorsal base; inner corners of pectoral fins greatly elongated, produced as narrow, pointed lobes that extend to behind the level of first dorsal spine**; caudal fin with a strong subterminal notch. Caudal peduncle without dermal keels or precaudal pits. **Colour:** dark grey or grey-brown above, slightly lighter below, fins somewhat darker than back.

Size: Maximum total length to about 105 to 110 cm total length; size at birth about 30 to 42 cm, males mature at 80 to 94 cm, females at 100 to 110 cm.

Habitat, biology, and fisheries: A little known, relatively common deepwater shark taken near the bottom along the outer continental shelves and upper slopes from 50 to 1 440 m depth, but most records between 200 and 600 m. Ovoviviparous, litter size one or two. Eats bony fishes including argentines, hake (Merlucciidae), cods (Gadidae), rattails (Macrouridae), epigonids, lanternfish (Myctophidae), ommastrephid squid, and crabs. Separate statistics are not reported for this species. Caught with bottom trawls, line gear, in fixed bottom nets and pelagic trawls. Utilized smoked, dried-salted, and processed for oil, fishmeal, and cartilage (medicinal pills). Valuable for the large liver with high concentrations of squalene (over 80%) in the liver oil.

Distribution: In the area known from off Morocco, Western Sahara, Senegal, Madeira and the Canary Islands, Liberia, Côte d'Ivoire to Nigeria, Cameroon to Congo, Angola, and Namibia; also northward off Spain, Portugal and France and in the Mediterranean Sea (absent from the Black Sea), and southward to the west coast of South Africa. Elsewhere nominally in the western Atlantic from Gulf of Mexico and Caribbean to Brazil; also in the Indo-West Pacific from South Africa to Australia and possibly the central Pacific.

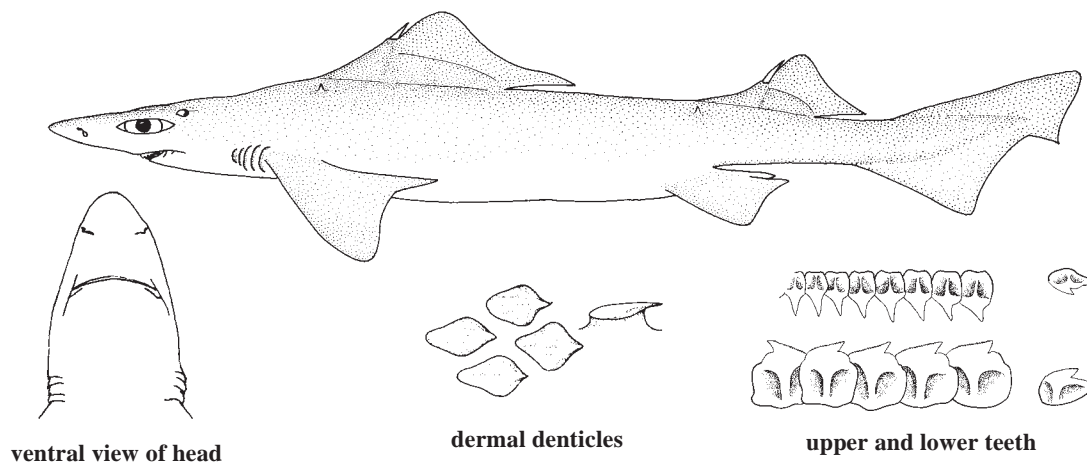


^{5/} *Centrophorus lusitanicus* and *C. niaukang* are currently considered to be synonyms of *C. granulosus* according to Eschmeyer's Catalog of Fishes. This guide retains the old taxonomy and users should note the new decision in their identifications.

Centrophorus lusitanicus Barbosa du Bocage and Brito de Capello, 1864

Frequent synonyms / misidentifications: *Centrophorus granulosus* (Bloch and Schneider, 1801); *C. niaukang* Teng, 1959^{6/} / None.

FAO names: **En** – Lowfin gulper shark; **Fr** – Squalé-chagrin à longue dorsale; **Sp** – Quelvacho lusitánico.



Diagnostic characters: Body elongate and slightly compressed; **dermal denticles of back widely separated and not overlapping, low-crowned, thorn-like in young but broader in adults, with low ridges running the length of the crown** and a very short cusp on their posterior edges. Snout pointed and moderately long, longer than mouth width and slightly shorter to slightly longer than the distance from mouth to pectoral-fin origins. Teeth differing in upper and lower jaws, **uppers much smaller, relatively broad and blade-like, with low, oblique cusps** and no cusplets; lowers large, compressed, blade-like, with a single oblique cusp, no cusplets, a deeply notched outer edge, and serrations in adults. A short, strong spine with lateral grooves on anterior edges of both dorsal fins; **first dorsal fin extremely low and long, second dorsal fin slightly lower than first dorsal fin, its base only about half the length of first dorsal base; inner corners of pectoral fins greatly elongated**, produced as narrow, pointed lobes reaching opposite or past the first dorsal spine; caudal fin with a strong subterminal notch. Caudal peduncle without dermal keel or precaudal pits. **Colour:** grey-brown or grey above, slightly lighter below, with dusky fin webs.

Size: Maximum total length about 100 cm; size at birth between 30 and 40 cm; adult males 75 cm, adult females 86 to 95 cm long.

Habitat, biology, and fisheries: A little known deepwater shark living along the edge of the continental shelves and upper slopes at depths between 300 and 1 400 m, but mostly between 300 to 600 m. Ovoviparous, number of fetuses in a litter one. Probably feeds on bony fishes, squids and crustaceans. Separate statistics are not reported for this species. Caught in bottom trawls, also in fixed bottom nets and with line gear. Utilized dried-salted, and processed for fishmeal.

Distribution: In the area it is found off Morocco, the Canary Islands, Senegal, Nigeria, Côte d'Ivoire, Ghana, Gulf of Guinea, and Cameroon. Elsewhere in the eastern Atlantic, off Portugal but so far not recorded from the Mediterranean Sea or off Namibia but possible there; western Indian Ocean off Mozambique, western Pacific off Philippines and Taiwan Province of China.

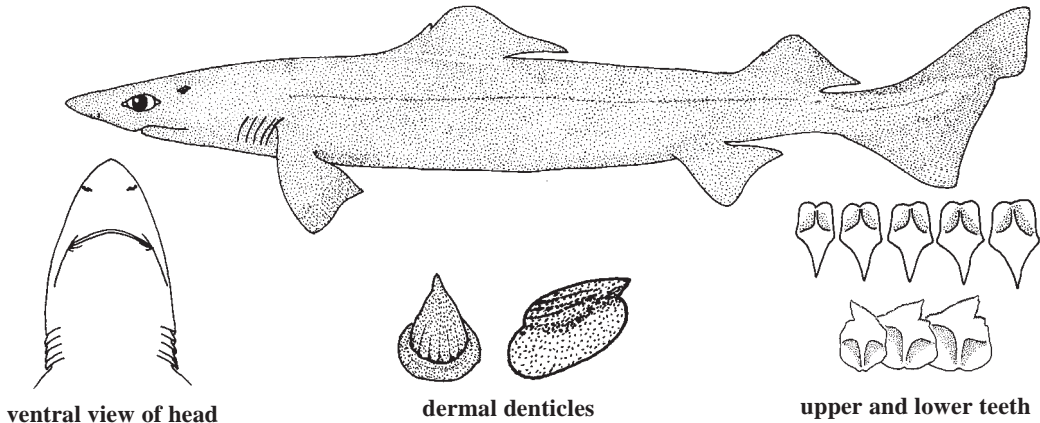


^{6/} *Centrophorus lusitanicus* and *C. niaukang* are currently considered to be synonyms of *C. granulosus* according to Eschmeyer's Catalog of Fishes. This guide retains the old taxonomy and users should note the new decision in their identifications.

***Centrophorus niaukang* Teng, 1959**

Frequent synonyms / misidentifications: *Centrophorus granulosus* (Bloch and Schneider, 1801); *C. lusitanicus* Barbosa du Bocage and de Brito Capello, 1864⁷¹ / None.

FAO names: En – Taiwan gulper shark; Fr – Squale-chagrin quelvacho; Sp – Quelvacho chino.



Diagnostic characters: Body stocky and slightly compressed; **dermal denticles of back close-set but not overlapping, low-crowned, narrow and thorn-like in young but broader in adults, with low ridges running the length of the crown and a long prominent cusp on their posterior edges.** Snout broadly parabolic and moderately long, shorter than mouth width and equal or shorter than the distance from mouth to pectoral-fin origins. Teeth differing in upper and lower jaws, **uppers much smaller, relatively broad and blade-like, with low, oblique cusps** and no cusplets; lowers large, compressed, blade-like, with a single oblique cusp, no cusplets, a deeply notched outer edge, and serrations in adults. A short, strong spine with lateral grooves on anterior edges of both dorsal fins; **first dorsal relatively low and long, second dorsal slightly lower or about as high as first, its base about half to four-fifths the length of first dorsal base; inner corners of pectoral fins moderately elongated**, produced as broad pointed lobes reaching from just in front of to just behind the first dorsal spine; caudal fin with a strong subterminal notch. Caudal peduncle without dermal keel or precaudal pits. **Colour:** dark grey or grey-brown above, slightly lighter below; fin webs and margins dusky, without prominent markings.

Size: Maximum total length to at least 169 cm (one of the largest gulper sharks). Size at birth between 35 to 45 cm long; females adult at 130 to 169 cm; males adult at 110 to 128 cm.

Habitat, biology, and fisheries: A little known deepwater shark living along the outer continental shelves and upper slopes at depths of 98 to about 1 000 m. Ovoviviparous, number of fetuses in a litter 1 to 6 (mostly 4 to 6). Feeds on bony fishes including anglers (Lophiidae) and cod (Gadidae), other dogfish sharks, skates, squids and lobsters. Separate statistics are not reported for this species. Caught in bottom trawls and on deep-set longlines. Utilized dried-salted for human consumption, and processed for fishmeal.

Distribution: In the area it is found off Morocco and the Canary Islands but presumably is more wide-ranging; Elsewhere in the eastern Atlantic possibly from off Portugal and recently collected from off the west coast of South Africa. Western North Atlantic off the east coast of the United States, southwestern Indian Ocean off South Africa, Mozambique, possibly Aldabra, and the Maldives; western Pacific off Taiwan Province of China, Japan, possibly Australia, and possibly Papua-New Guinea. Nomenclature provisional at time of writing.

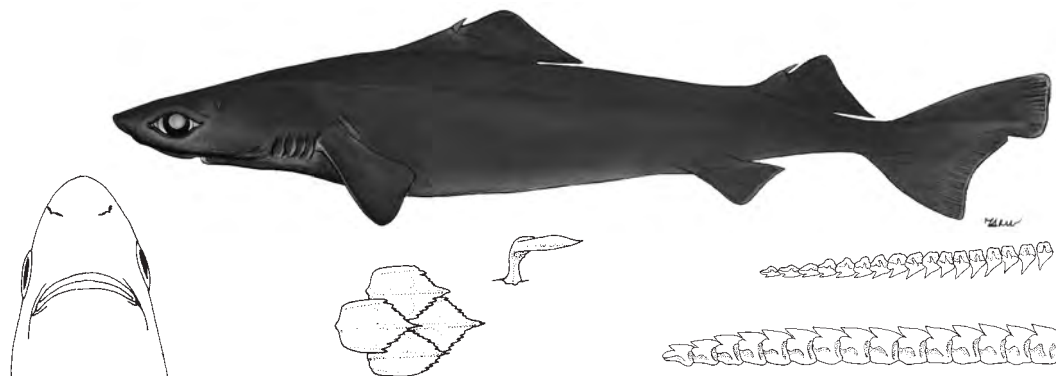


⁷¹ *Centrophorus lusitanicus* and *C. niaukang* are currently considered to be synonyms of *C. granulosus* according to Eschmeyer's Catalogue of Fishes. This guide retains the old taxonomy and users should note the new decision in their identifications.

***Centrophorus squamosus* (Bonnaterre, 1788)**

Frequent synonyms / misidentifications: *Lepidorhinus squamosus* (Bonnaterre, 1788) / None.

FAO names: **En** – Leafscale gulper shark; **Fr** – Squale-chagrin de l'Atlantique; **Sp** – Quelvacho negro.



ventral view of head

dermal denticles

upper and lower teeth

Diagnostic characters: Body elongate, stocky and slightly compressed; **dermal denticles of back overlapping each other, with stalked, leaf-like crowns**, a strong main cusp and 3 or more side cusps on their posterior edges (numbers of cusps increasing with denticle replacement during growth), and **ridges running the length of the crown**. Snout pointed, broadly parabolic and moderately long, slightly longer to slightly shorter than mouth width but slightly greater to much shorter than distance from mouth to pectoral-fin origins. Teeth differing in upper and lower jaws; uppers much smaller, relatively broad and blade-like, with cusps varying from erect to semi-oblique (more erect in adult males than in adult females and in immatures of both sexes) and without cusplets; lowers large, compressed, blade-like, with a single oblique cusp, no cusplets, a deeply notched outer edge, and serrations in adults. A short, strong spine with lateral grooves on anterior edges of both dorsal fins; first dorsal relatively low and long, second dorsal usually slightly higher than first, its base about half to over three-fourths the length of first dorsal base; **inner corners of pectoral fins hardly elongated and not reaching the level of first dorsal spine**; caudal fin with a strong subterminal notch. Caudal peduncle without dermal keels or precaudal pits. **Colour:** uniform dark grey, medium to light greyish brown, brown or rufous-brown above, underside sometimes slightly lighter, fin webs can be slightly darker than body.

Size: Maximum total length to about 160 cm; size at birth probably between 30 and 40 cm; females adult at 116 to 158 cm, males adult at 104 to 109 cm.

Habitat, biology, and fisheries: A deepwater shark found on the continental and insular slopes at depths from 229 to 2 359 m on or near the bottom, also oceanic in the upper 1 250 m in water 4 000 m deep; commonest at depths of 400 to 1 500 m. This shark eats bony fishes including hake (Merluccidae), codfish (Gadidae), grenadiers (Macrouridae), slickheads (Alepocephalidae), horse mackerel (Carangidae), spinyfins (Diretmidae), chimaeras (Chimaeridae), squids, and shrimp. Ovoviviparous, litters of 5 to 8 or possibly 9 young. Small catches in the area reported by Portugal in 2000 (28 tonnes). In the eastern central Atlantic area it is caught in bottom trawls, fixed bottom nets and with line gear. Utilized fresh, frozen or dried-salted for human consumption and for fishmeal.

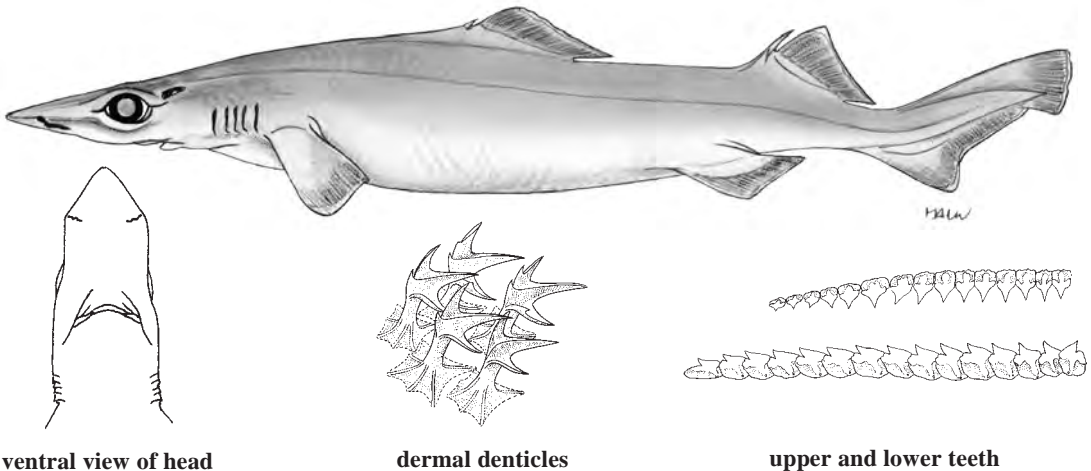
Distribution: In the area, from Morocco, Madeira and the Canary Islands, Western Sahara, Mauritania, Senegal, Gabon to Democratic Republic of the Congo, and Namibia; also northwards off the Azores and along the Atlantic slope to the Faeroes and Iceland, and southwards from southern Namibia and South Africa. Elsewhere in the western North Atlantic off Venezuela; southwestern Indian Ocean off South Africa, Aldabra and the Assumption Islands; western Pacific off Japan, the Philippines, southeastern Australia, and New Zealand; and eastern Pacific off Chile.



Deania calcea (Lowe, 1839)

Frequent synonyms / misidentifications: *Centrophorus crepidalbus* Barbosa du Bocage and de Brito Capello, 1864 / None.

FAO names: En – Birdbeak dogfish; Fr – Squalé savate; Sp – Tollo pajarito.



ventral view of head

dermal denticles

upper and lower teeth

Diagnostic characters: Body moderately stout and compressed; **dermal denticles of back with high crowns and cusps resembling small pitchforks, crown length about 0.5 mm. Snout extremely long, more so than distance from mouth to origin of pectoral fins;** upper labial grooves moderately long, the distance between their anterior ends equal to or greater than their lengths (taken from their anterior ends to mouth angles). Teeth unlike in upper and lower jaws, uppers smaller, broad and blade-like but with elongated, erect cusps and no cusplets; lowers much larger, blade-like, broad and unserrated, with erect or oblique cusps (more erect in adult males than adult females or juveniles of both sexes), no cusplets, and a deeply notched outer edge. **A moderately large spine on first dorsal fin, and a much larger one on second dorsal, both spines with grooves; first dorsal fin very long and low, its base longer than second dorsal-fin base but its height less than second dorsal height, first dorsal origin opposite or anterior to free rear tips of pectoral fins; distance from origin of first dorsal-fin spine to first dorsal rear tip equal or usually much greater than distance from first dorsal free rear tip to second dorsal-fin spine;** pectoral fins with rounded-angular free rear tips, not attenuated and elongated posteriorly; caudal fin with a well-developed subterminal notch and a weak lower lobe. Caudal peduncle **without dermal keels** or precaudal pits. **Colour:** body colour varying from uniform light or dark grey or grey-brown above and below to dark brown, fins darker, fin webs dusky to blackish.

Size: Maximum: Adults to about 110 cm.

Habitat, biology, and fisheries: A deepwater shark, occurring on the upper continental slopes and outer shelves from about 460 to 1 430 m depth. Ovoviviparous, number of young not reported. Offshore. Separate statistics are not reported for this species. Caught in pelagic trawls and possibly other types of gear.

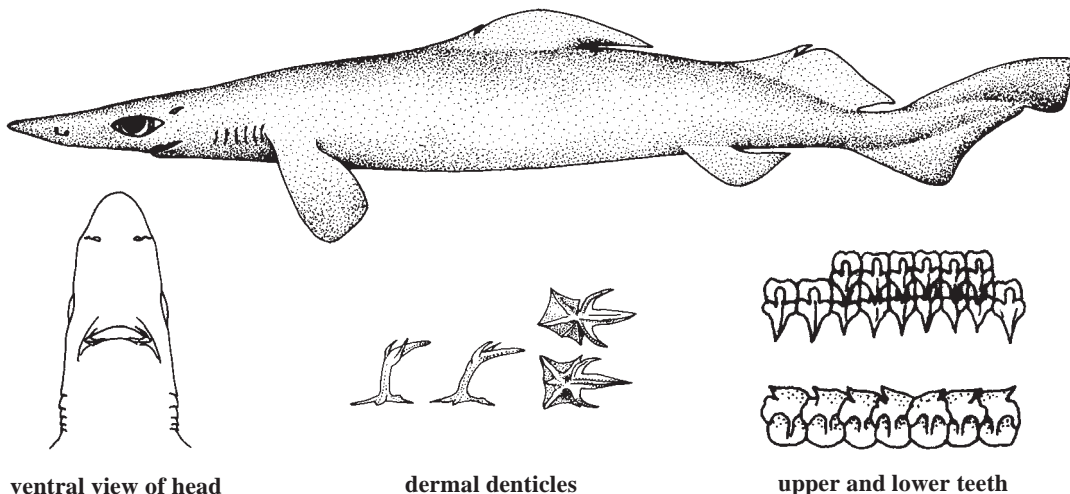
Distribution: In the area it occurs from Morocco to Mauritania, including Madeira, possibly Canaries, Azores and possibly to Senegal; also Namibia; northward along the Atlantic slope to the Faeroe Islands and Iceland. Elsewhere in the western Indian Ocean, western Pacific, and eastern South Pacific.



Deania hystricosa (Garman, 1906)

Frequent synonyms / misidentifications: None / None.

FAO names: En – Rough longnose dogfish; Fr – Squale-savate rude; Sp – Tollo raspa.



Diagnostic characters: Body moderately stout and compressed; **dermal denticles of back very large, with high crowns and cusps resembling small pitchforks, crown length about 1.0 mm. Snout extremely long, more so than distance from mouth to origin of pectoral fins;** upper labial grooves moderately long, the distance between their anterior ends equal to or greater than their lengths (taken from their anterior ends to mouth angles). Teeth unlike in upper and lower jaws, uppers smaller, broad and blade-like but with elongated, erect cusps and no cusplets; lowers much larger, blade-like, broad and unserrated, with erect or oblique cusps (more erect in adult males than adult females or juveniles of both sexes), no cusplets, and a deeply notched outer edge. **A moderately large spine on first dorsal fin, and a much larger one on second dorsal, both spines with grooves; first dorsal fin very long and low, its base longer than second dorsal-fin base but its height slightly less than second dorsal height, first dorsal origin anterior to free rear tips of pectoral fins; distance from origin of first dorsal-fin spine to first dorsal rear tip much greater than distance from first dorsal free rear tip to second dorsal-fin spine;** pectoral fins with rounded-angular free rear tips, not attenuated and elongated posteriorly; caudal fin with a well-developed subterminal notch and a weak lower lobe. Caudal peduncle **without dermal keels** or precaudal pits. **Colour:** body colour blackish brown to grey-brown, fins slightly darker than body.

Size: Maximum total length 111 cm. Size at birth uncertain; females adult at 106 to 109 cm; males adult at 84 cm.

Habitat, biology, and fisheries: A little-known demersal shark, occurring on the upper continental slopes from about 471 to 1 300 m depth. Food not recorded, probably pelagic bony fishes and squids. Ovoviviparous, number of young possibly about 12. Separate statistics are not reported for this species. Caught on vertical longlines and probably benthic trawls, utilized for liver oil and for meat.

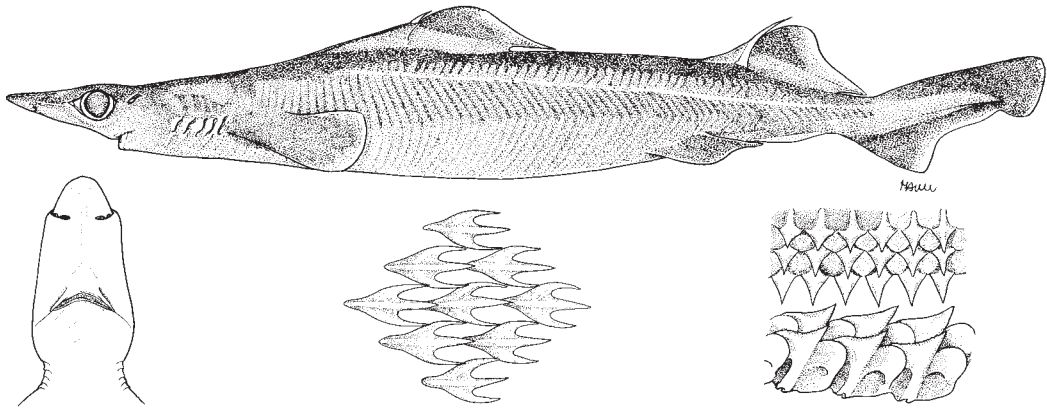
Distribution: In the area it occurs from off Madeira, the Canary Islands, and Namibia; also off the Azores and the west coast of South Africa in the eastern Atlantic. Elsewhere from the western Pacific; off Japan and New Zealand.



***Deania profundorum* (Smith and Radcliffe, 1912)**

Frequent synonyms / misidentifications: None / None.

FAO names: **En** – Arrowhead dogfish; **Fr** – Squalé-savate-lutin; **Sp** – Tollo flecha.



ventral view of head

dermal denticles

upper and lower teeth

Diagnostic characters: Body moderately stout and compressed; **dermal denticles of back with high crowns and cusps resembling small pitchforks. Snout extremely long, more so than distance from mouth to origin of pectoral fins;** upper labial grooves moderately long, the distance between their anterior ends equal to or greater than their lengths (taken from their anterior ends to mouth angles). Teeth unlike in upper and lower jaws, uppers smaller, broad and blade-like but with elongated, erect cusps and no cusplets; lowers much larger, blade-like, broad and unserrated, with erect or oblique cusps (more erect in adult males than adult females or juveniles of both sexes), no cusplets, and a deeply notched outer edge. **A moderately large spine on first dorsal fin, and a much larger one on second dorsal,** both spines with grooves; **first dorsal fin very long and low,** its base slightly longer than second dorsal-fin base but its height less than second dorsal height, **first dorsal origin anterior to free rear tips of pectoral fins; distance from origin of first dorsal-fin spine to first dorsal rear tip equal to distance from first dorsal free rear tip to second dorsal-fin spine;** pectoral fins with rounded-angular free rear tips, not attenuated and elongated posteriorly; caudal fin with a well-developed subterminal notch and a weak lower lobe. Caudal peduncle **with a low subcaudal dermal keel on the ventral surface of the caudal peduncle;** no precaudal pits. **Colour:** body medium to dark grey or grey brown above and below, fins dusky.

Size: Maximum total length about 97 cm, but most adults smaller. Size at birth above 31 cm; adult females 62 to 80 cm, adult males 43 to 67 cm.

Habitat, biology, and fisheries: A deepwater shark, occurring on the upper continental and insular slopes from about 275 to 1 785 m depth. Eats small benthic and midwater bony fishes, including lanternfish, also squid and crustaceans. Ovoviviparous, number of young possibly 5 to 7 per litter. Separate statistics are not reported for this species. Probably caught in bottom trawls and certainly on line gear in the area, utilized for human consumption and for liver oil.

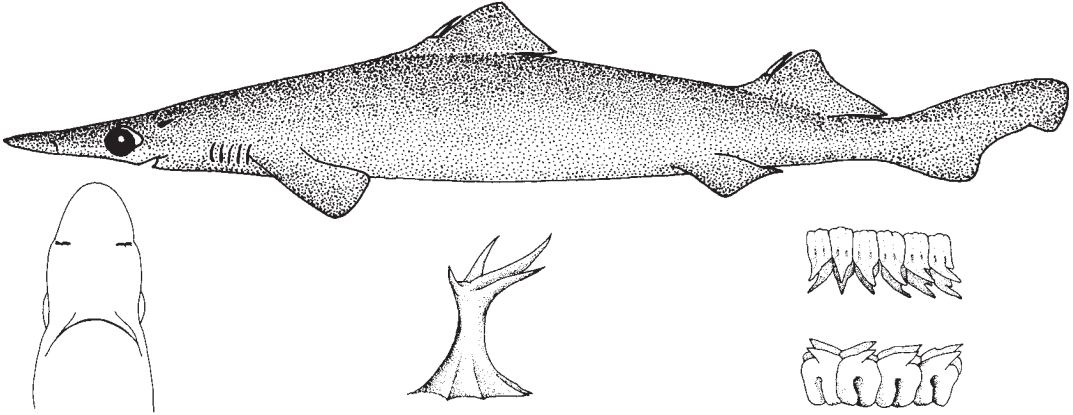
Distribution: In the area it occurs off Morocco, Western Sahara, Mauritania, Senegal, the Canary Islands, Nigeria, Gabon, Congo Republic, and Namibia; in the eastern Atlantic it also occurs off the Azores and on the west coast of South Africa. Elsewhere it occurs in the western North Atlantic off the United States and in the lesser Antilles; in the Indo-West Pacific it occurs on the east coast of South Africa, on Walters Shoal, in the Gulf of Aden, and off the Philippine Islands.



***Deania quadrispinosa* (McCulloch, 1915)**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Longsnout dogfish; Fr – Squale-savate à long nez; Sp – Tollo trompalarga.



ventral view of head

dermal denticles

upper and lower teeth

Diagnostic characters: Body moderately stout and compressed; **dermal denticles of back with high crowns and cusps resembling small pitchforks. Snout extremely long, more so than distance from mouth to origin of pectoral fins;** upper labial grooves moderately long, the distance between their anterior ends equal to or greater than their lengths (taken from their anterior ends to mouth angles). Teeth unlike in upper and lower jaws, uppers smaller, broad and blade-like but with elongated, erect cusps and no cusplets; lowers much larger, blade-like, broad and unserrated, with erect or oblique cusps (more erect in adult males than adult females or juveniles of both sexes), no cusplets, and a deeply notched outer edge. **A moderately large spine on first dorsal fin, and a much larger one on second dorsal,** both spines with grooves; **first dorsal fin short and low,** its base slightly longer than second dorsal-fin base and its height less than second dorsal height, **first dorsal origin anterior to free rear tips of pectoral fins; distance from origin of first dorsal-fin spine to first dorsal rear tip less than distance from first dorsal free rear tip to second dorsal-fin spine;** pectoral fins with rounded-angular free rear tips, not attenuated and elongated posteriorly; caudal fin with a well-developed subterminal notch and a weak lower lobe. Caudal peduncle without keels or precaudal pits. **Colour:** body brown, grey, grey-brown or black above and below, fins dark, juveniles with a black blotch on the anterior half of the fin web of both dorsal fins and with black caudal fin webs.

Size: Maximum total length about 114 cm; adult male 87 cm; adult female 110 cm.

Habitat, biology, and fisheries: Deepwater shark, occurring on the upper continental slopes and outer shelves from about 150 to 1 360 m depth with most records on the slopes below 400 m. Eats bony fish. Probably ovoviviparous, number of young not reported. Separate statistics are not reported for this species. Probably caught in demersal trawls in the area, utilization unknown.

Distribution: Marginal in the area, eastern Atlantic off Namibia, south to the west coast of South Africa; elsewhere, Indo-West Pacific off the east coast of South Africa and off Mozambique, on seamounts south of Madagascar and east of South Africa, off Australia, New Zealand, deep water between New Zealand, Queensland, and New Caledonia, also Norfolk Islands, Loyaute Islands, and Vanatu Islands, and Taiwan Province of China.



***Centrophorus* sp.**

En – Dark gulper shark.

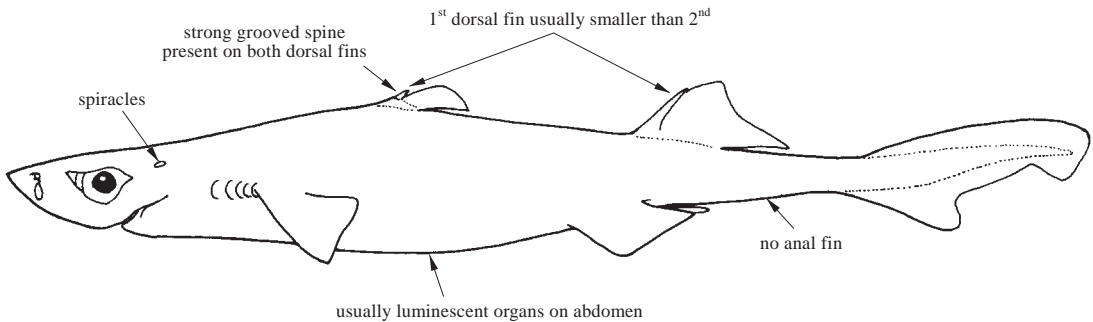
Maximum total length uncertain, possibly less than 90 cm. Occurs on continental slopes below 200 m. Biology unknown. Interest to fisheries unknown, possibly taken as bycatch of deepwater demersal fisheries. In the area, from off Angola. A blackish grey, very-long-nosed gulper shark close to and possibly identical to the blackfin gulper shark, *Centrophorus isodon* (Chu, Meng, and Liu, 1981), from the South China Sea, Philippines and the Maldives, and the Seychelles gulper shark, *C. seychellorum* Baranes, 2003 from the Seychelles (itself possibly synonymous with *C. isodon*). A single specimen from deep water off Angola was examined and photographed by the writer during the 2004 FAO workshop at Tenerife.



ETMOPTERIDAE

Lantern sharks and black dogfishes

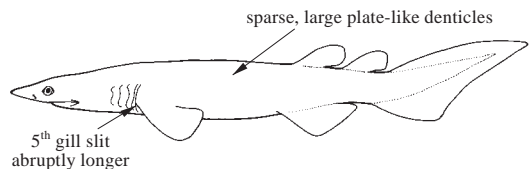
Diagnostic characters: Small sharks with cylindrical or slightly compressed bodies, without ridges between pectoral and pelvic fins and without precaudal pits and caudal keels. **Head with 5 gill slits, all anterior to pectoral fins**, the fifth not abruptly longer than the others; **spiracles always present, large and just behind eyes; eyes on sides of head, without nictitating eyelids**. Snout short, flattened or conical, not formed as a rostral saw; no barbels on snout; nostrils fairly wide-spaced, internarial width greater than or subequal to nostril width; mouth short and nearly transverse or arcuate, lips smooth; teeth strong-cusped, not blade-like in upper jaw, upper teeth with slender cusps and cusplets present; lower teeth either similar to uppers (*Centroscyllium*) or compressed, broad, blade-like, imbricated, without cusplets, and much larger than uppers. **Two dorsal fins with a long strong grooved spine present** on their anterior margins; dorsal fins small, angular, and with straight to strongly concave posterior margins; **first dorsal fin usually smaller than second dorsal fin**; origin of first dorsal fin far in front of pelvic fin origins, well behind pectoral-fin insertions, and over or behind pectoral free rear tips; pelvic fins subequal to or smaller than second dorsal fin; **no anal fin**; caudal fin strongly asymmetrical, with subterminal notch present and with a ventral lobe low or absent. Dermal denticles close-set, not greatly enlarged and plate-like. **Colour:** body and fins greyish to blackish brown, **usually with conspicuous black marks and luminescent organs on the abdomen, over the pelvic-fin bases, on the caudal peduncle, and on the caudal-fin base.**



Habitat, biology, and fisheries: Lantern sharks mostly occur in deep water near the bottom on the continental and insular slopes between 200 and at least 2 213 m. Some species venture onto the continental shelves up to 70 m and a few species are oceanic, ranging far from land. These dogfishes are circumglobal in most seas, and range from the tropics to high latitudes up to Iceland in the North Atlantic. Some of the species form large schools, and can be among the most abundant deepwater sharks in limited areas. Lantern sharks feed on small bony fishes, cephalopods, crustaceans, and tunicates. Reproduction is ovoviviparous, with 6 to 20 young per litter. In the eastern Atlantic and the Far East these sharks are commonly fished with line gear and bottom trawls for human consumption and for their livers, which are extremely large, oily, and have a high squalene content.

Similar families occurring in the area

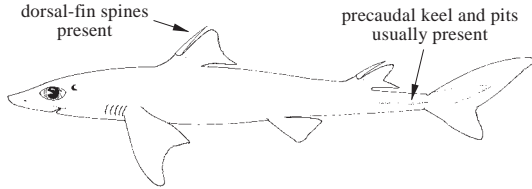
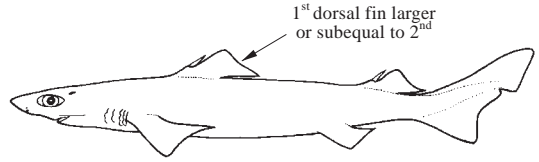
Echinorhinidae: body set with sparse, large, plate-like denticles; spiracles small and well behind eyes; fifth pair of gill slits abruptly longer than others; no dorsal-fin spines; first dorsal-fin origin over or posterior to pelvic-fin origins; pelvic fins much larger than second dorsal fin; large sharks, reaching over 2 m long.



Echinorhinidae

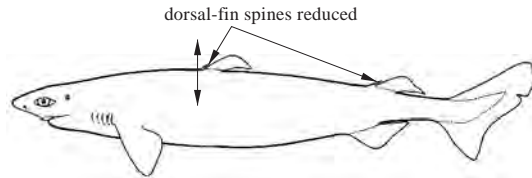
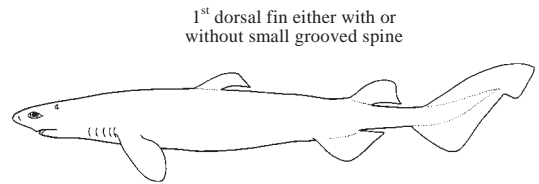
Squalidae: both upper and lower teeth blade-like, imbricated and without cusplets; precaudal keels and usually precaudal pits present on caudal peduncle; dorsal-fin spines without grooves; second dorsal fin falcate; no subterminal notches on caudal fin.

Centrophoridae: both upper and lower teeth blade-like, imbricated and without cusplets; dorsal fins larger; first dorsal-fin origin over or just behind pectoral-fin bases.

**Squalidae****Centrophoridae**

Somniosidae: upper teeth narrow and without cusplets; lateral keels present on abdomen; dorsal-fin spines greatly reduced or absent.

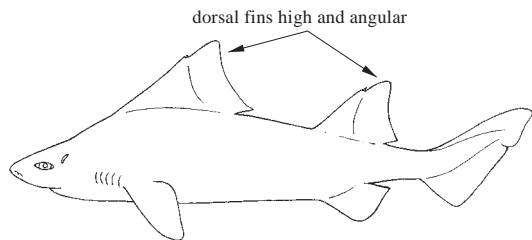
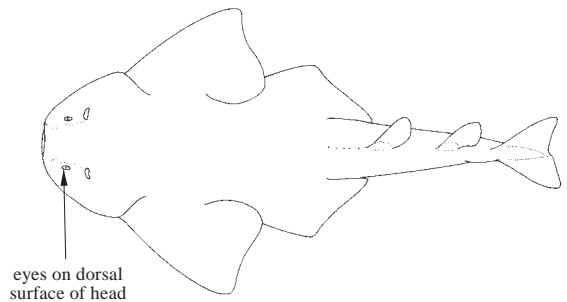
Dalatiidae: upper teeth narrow and without cusplets; dorsal-fin spines either present on first dorsal fin only (*Squaliolus*) or absent.

**Somniosidae****Dalatiidae**

Oxynotidae: upper teeth narrow and not imbricated; body high and compressed; conspicuous lateral keels on abdomen; dorsal fins very high and angular; dorsal-fin spines large but buried in the dorsal fins with only the tips exposed.

Squatinae: trunk much flattened dorsoventrally; eyes on upper side of head; anterior margins of pectoral fins extending forward past gill openings and partly concealing them; pelvic fins also very broad, wing-like.

All other shark families: anal fin present.

**Oxynotidae****Squatinae**

Key to species of etmopteridae occurring in the area

- 1a. Upper and lower teeth similar, with narrow cusps and cusplets, not blade-like (Fig. 1) ***Centroscyllium fabricii***
- 1b. Upper and lower teeth dissimilar, with a slender center cusp and one or more cusplets on each side in the upper jaw and compressed and blade-like in the lower jaw (Fig. 2) (***Etmopterus***) → 2



Fig. 1 *Centroscyllium fabricii*



Fig. 2 *Etmopterus*

- 2a. Dermal denticles on sides of body truncated, without cusps, body with a smooth texture → 3
- 2b. Dermal denticles on sides of body cuspidate, body with a rough or fuzzy texture → 4
- 3a. Upper tooth cusps stout and thick, lower tooth cusps become erect with growth; first dorsal more anterior, distance from pectoral insertion to first dorsal base three or more times in interdorsal space; first dorsal spine longer and stouter, equal or longer than first dorsal base length; 16 to 19 turns to the intestinal valve (Fig. 3). ***Etmopterus bigelowi***
- 3b. Upper tooth cusps slender, lower tooth cusps do not become erect with growth; first dorsal more posterior, distance from pectoral insertion to first dorsal base less than three times in interdorsal space; first dorsal spine shorter and slenderer, equal or less than first dorsal base length; 10 to 13 turns to the intestinal valve (Fig. 4) ***Etmopterus pusillus***

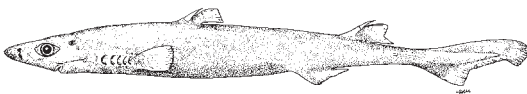


Fig. 3 *Etmopterus bigelowi*



Fig. 4 *Etmopterus pusillus*

- 4a. Denticles on dorsal surface of head arranged in conspicuous linear rows, which extend to the flanks, caudal peduncle and caudal base (Fig. 5). ***Etmopterus cf. brachyurus***
- 4b. Denticles on dorsal surface of head not arranged in linear rows; flanks without linear rows of denticles, caudal peduncle and caudal base with or without linear rows of denticles → 5
- 5a. First dorsal-fin base closer to pelvic bases than to pectoral bases; precaudal fins with broad bands of naked ceratotrichia; dorsal-fin spines slender (Fig. 6) ***Etmopterus gracilispinis***
- 5b. First dorsal-fin base closer to pectoral bases than to pelvic bases; precaudal fins without broad bands of naked ceratotrichia; dorsal-fin spines stout → 6



Fig. 5 *Etmopterus brachyurus*

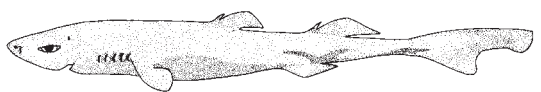


Fig. 6 *Etmopterus gracilispinis*

- 6a. Gill openings broad, much wider than spiracle widths; dermal denticles on sides low, conical to thorn-like; flank and tail without conspicuous black luminous markings, colour uniformly dark on dorsal and ventral surfaces → 7
- 6b. Gill openings narrower, subequal to spiracle widths; dermal denticles on sides high, conical to almost bristle-like; flank and tail with conspicuous black luminous markings, ventral surface conspicuously darker than dorsal surface → 8

- 7a. Centre of underside of snout, area around nostrils, and chin generally naked; linear rows of denticles inconspicuous, confined to caudal peduncle and base of caudal fin; second dorsal spine not strongly recurved, with its tip posterodorsally directed; distinct black marks with photophores absent, although photophores are scattered on the dorsal and ventral surfaces of the body (Fig. 7) ***Etmopterus princeps***
- 7b. Snout, nostrils and chin covered with denticles; linear rows of large denticles conspicuous on caudal peduncle, caudal base, and sometimes on flanks; second dorsal spine strongly recurved, with its tip posteriorly directed; back marks with photophores indistinct on flanks and caudal base but well-developed on terminal lobe of caudal fin (Fig. 8) ***Etmopterus baxteri***



Fig. 7 *Etmopterus princeps*

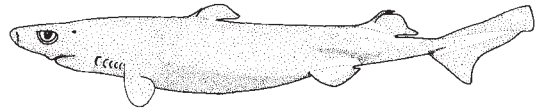


Fig. 8 *Etmopterus baxteri*

- 8a. Lateral trunk denticles slender and conical; denticles in longitudinal rows on caudal peduncle; underside of snout without denticles; first dorsal fin only slightly smaller than second dorsal fin; no conspicuous dark bands on the terminal caudal lobe, although terminal lobe is dusky; no dark blotch on ventral caudal lobe (Fig. 9) ***Etmopterus polli***
- 8b. Lateral trunk denticles very slender and bristle-like; denticles not in longitudinal rows on caudal peduncle; underside of snout mostly covered with denticles; first dorsal fin much smaller than second dorsal fin; a conspicuous or obscure dark band on the terminal caudal lobe and often a dark blotch on ventral caudal lobe (Fig. 10) ***Etmopterus spinax***

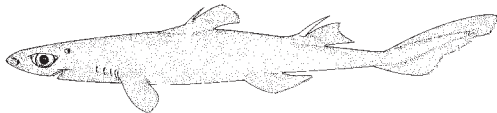


Fig. 9 *Etmopterus polli*



Fig. 10 *Etmopterus spinax*

List of species occurring in the area

The symbol is given when species accounts are included.^{1/}

- Centroscyllium fabricii* (Reinhardt, 1825).
- Etmopterus baxteri* Garrick, 1957.^{2/}
- Etmopterus bigelowi* Shirai and Tachikawa, 1993.
- Etmopterus* cf. *brachyurus* Smith and Radcliffe, 1912.

^{1/} In addition to *Etmopterus baxteri* and *E. princeps*, a third species of large-bodied lanternshark, the brown or bristly lanternshark, *E. unicolor* (Engelhardt, 1912), is common off the west coast of South Africa and are to be expected in the southern part of the eastern central Atlantic area.

^{2/} Junior synonym of *Etmopterus granulosus* (Günther, 1880).

- ✦ *Etmopterus gracilispinis* Krefft, 1968.^{3/}
- ✦ *Etmopterus polli* Bigelow, Schroeder, and Springer, 1953.
- ✦ *Etmopterus princeps* Collett, 1904.
- ✦ *Etmopterus pusillus* (Lowe, 1839).
- ✦ *Etmopterus spinax* (Linnaeus, 1758).

The arrangement of genera and species adopted here follows the forthcoming revision of the FAO shark catalog (Compagno, 2007 in preparation).

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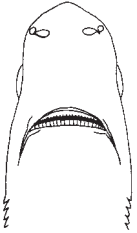
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^{3/} Nominal records of *Etmopterus gracilispinis* are recorded from the southern part of the area, which need confirmation. See account of this species below for known range of the species.

Etmopterus spinax (Linnaeus, 1758)

Frequent synonyms / misidentifications: None / *Etmopterus unicolor* (Engelhardt, 1912) off South Africa.

FAO names: En – Velvet belly; Fr – Sagre commun; Sp – Negrito.



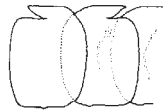
ventral view of head



dermal denticles



upper and lower teeth



Diagnostic characters: Body moderately stout, cylindrical in cross section; dermal denticles of back close-spaced, with slender, curved, bristle-like, pointed crowns, those of head, body and tail not in longitudinal rows and clumps of denticles separated by naked skin; snout moderately elongated, **denticles present on underside of snout**. Greatest head width about equal to length of snout; spiracles moderately large; labial furrows short, not forming a groove around mouth; lips smooth, thin, not papillose or suctorial; teeth in upper and lower jaws unlike, uppers not blade-like, with a narrow medial cusp and side cusplets, lowers larger, broad, compressed, blade-like, with a single oblique, low, smooth-edged cusp. Dorsal fins with strong, grooved spines, second spine much larger than the first; position of first dorsal fin between pectorals and pelvis, **its origin opposite or slightly behind free rear tips of pectoral fins and closer to pectoral bases than pelvic bases**; second dorsal fin much larger than the first; **distance from pelvic-fin insertions (rear end of fin base) to lower caudal-fin origin only about half that from pectoral insertions to pelvic origins, not more than two-thirds of upper caudal margin, and shorter than space between first and second dorsal bases**; caudal fin moderately long, narrow, and asymmetrical, with a subterminal notch but a hardly developed lower lobe; no keels or precaudal pits on caudal peduncle. Luminous organs present on sides and in black patches (photomarks). **Colour:** brown above, black on underside of head and abdomen; **an elongated, single black photomark (with luminous organs or photophores) above and behind pelvic fins**, and other elongated black marking at caudal-fin base and along caudal-fin axis; caudal fin terminal margin usually blackish, ventral caudal lobe often with a black spot.

Size: Maximum: to about 60 cm, maturing between 33 and 36 cm.

Habitat, biology, and fisheries: A common deepwater shark caught on or above the bottom at depths from 100 to 1 000 m. Ovoviviparous, litter size from 6 to 20, embryos born at about 12 to 14 cm length. Feeds on small fishes, squids, and crustaceans. Offshore waters. Separate statistics are not reported for this species. Caught with bottom and pelagic trawls. Utilized dried salted and processed to fishmeal.

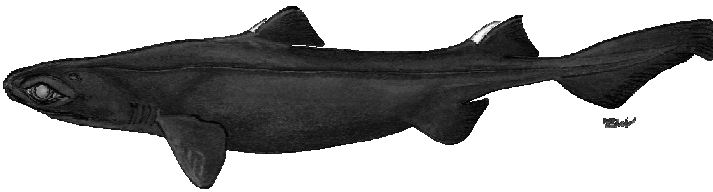
Distribution: Probably occurring through most of the area; specifically recorded from Morocco to Senegal, the Canary Islands, Sierra Leone, Côte d'Ivoire to Nigeria, and Cameroon to Gabon. Northward extending into the Mediterranean and the North Atlantic to Iceland and Norway. Reported from South Africa, but records there are apparently based on *Etmopterus unicolor* (Engelhardt, 1912), which is currently not recorded from the eastern central Atlantic area but may occur off Namibia, and possibly also on *E. gracilispinis*.



***Centroscyllium fabricii* (Reinhardt, 1825)**

En – Black dogfish; **Fr** – Aiguillat noir; **Sp** – Tollo negro merga.

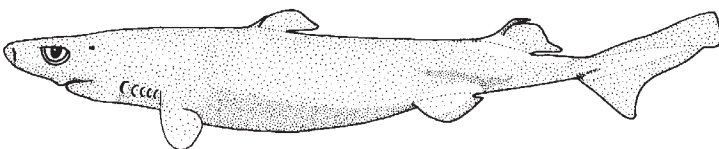
Maximum total length about 107 cm; size at birth 15 to 18 cm; adult males 46 to 79 cm, adult females 51 to at least 106 cm. A common demersal dogfish of the outermost continental shelves and upper continental and insular slopes from 180 to 2 250 m, moving to near the surface in high latitudes. Ovoviviparous with litters of 7 or 8 young; feeds on pelagic shrimp (including euphausiids) and crabs, cuttlefish, squid and octopuses, jellyfish, polychaete worms, small pelagic teleosts including lanternfish, argentines and barracudinas, benthic fish including cods, macrourids, and scorpionfish. Little utilized in the area and often a discarded bycatch of deepwater commercial fisheries. In the eastern central Atlantic area from Morocco to Liberia, and Namibia; in the eastern Atlantic northwards along the Atlantic slope to Norway, the Faeroes, and Iceland, and southwards to the west coast of South Africa. Elsewhere in the western Atlantic from Greenland and Canada south to the eastern Atlantic coast of the United States and the Gulf of Mexico, also Argentina (Beagle Channel).



***Etmopterus baxteri* Garrick, 1967**

En – Giant lanternshark.

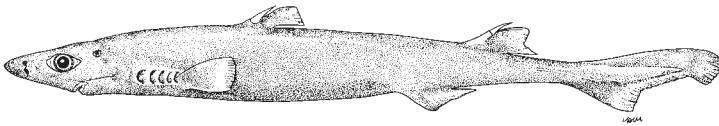
Maximum total length about 86 cm; size at birth 17 to possibly 30 cm; females mature from about 75 cm to at least 86 cm, males mature at 46 to 68 cm. Occurs on continental and insular slopes on or near bottom at depths of 250 to 1 500 m, mostly below 400 to 600 m. Ovoviviparous, litter size 6 to 15. Feeds on bony fishes including lanternfish, barracudina, synphobranchid eels, oreo dories, hake, rattails, bathylagids, idiacanthids, also squid (including histioteuthids and ommastrephids), octopuses, euphausiids, mysids, penaeid shrimp, salps, sponges, and ribbonworms (Nemertina). Interest to fisheries small, taken as bycatch of deepwater demersal fisheries. In the area from off Angola and possibly Namibia, nominally on the Sierra Leone Ridge, elsewhere from South Africa (Western Cape, Eastern Cape), possibly off Inaccessible Island (Tristan da Cunha group) and the Melville Ridge area (south of Madagascar), Australia (southern New South Wales, Victoria, Tasmania, and seamounts south of Tasmania), and New Zealand. Now considered a junior synonym of the southern lanternshark, *Etmopterus granulosus* (Günther, 1880).



***Etmopterus bigelowi* Shirai and Tachikawa, 1993**

En – Blurred smooth lanternshark.

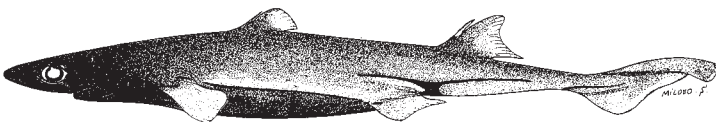
Maximum size to at least 67 cm; size at birth probably below 16 cm; males adult at 40 to 67 cm, females at 50 to 65 cm. Occurs on continental shelves and slopes, island slopes, and submarine ridges from 163 to 1 000+ m, also epipelagic in the open ocean at depths of 110 to 700 m. Biology little-known, ovoviviparous, eats small fish and squids. In the eastern central Atlantic area from Liberia, Congo, Namibia, and St Helena; southwards to off the west, south and east coasts of South Africa. Also, wide-ranging in the western Atlantic from the Gulf of Mexico and the Caribbean Sea to Brazil and Argentina; the western Pacific off Japan and Australia; on seamounts in the central North Pacific; and on submarine ridges in the eastern South Pacific off Peru. Often confused with *E. pusillus* (Lowe, 1839) which is partly sympatric with this species.



***Etmopterus cf. brachyurus* Smith and Radcliffe, 1912**

En – Sculpted lanternshark.

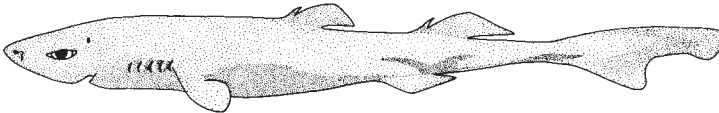
Maximum size to at least 53 cm; size at birth below 15 to 17 cm; adult females 50 to 53 cm, adult males 36 to 48 cm. Occurs on continental slopes from 275 to at least 1 023 m, mostly below 400 m. Biology little-known but relatively common on the hake fishing grounds, ovoviviparous with size of litters unknown, eats small mesopelagic fish including lanternfish and viperfish, penaeid shrimp, squids and brittle stars. In the area, off Namibia, extending south to the west and southeast coasts of South Africa and off southern Mozambique. This large rough lanternshark with prominent linear denticles from snout tip to tail has been termed *E. cf. brachyurus* but it is not conspecific with true *E. brachyurus* from the western Pacific. It may be an undescribed species but is apparently close to *E. bullisi* Bigelow and Schroeder, 1957 from the western North Atlantic.



***Etmopterus gracilispinis* Krefft, 1968**

En – Broadbanded lanternshark; **Fr** – Sagre rubané; **Sp** – Tollo lucero bandoneado.

Maximum size at least 33 cm, males mature at or above 26 cm, females at 33 cm. Occurs on outer continental shelves and upper to middle slopes at depths of 100 to 1 000 m, also epipelagic at depths of 70 to 480 m over water 2 240 m deep. Biology little known. Interest to fisheries none, catch uncertain. In the area, nominal records from Namibia need confirmation and may be based in part on the larger brown lanternshark *E. unicolor* (Engelhardt, 1912) which also has very slender-crowned bristly denticles and is common off the west and southeast coasts of South Africa. Vouchered records of true *E. gracilispinis* exist from the east and southeast coasts of South Africa and its occurrence on the west coast of southern Africa would not be surprising. Also western Atlantic from the Atlantic and Gulf of Mexico coasts of the United States, from Suriname, southern Brazil, Uruguay and Argentina.



***Etmopterus polli* Bigelow, Schroeder and Springer, 1953**

En – African lanternshark; **Fr** – Sagre à menton lisse; **Sp** – Tollo lucero africano.

Maximum total length about 24 cm; adult males to 23 cm, females to 24 cm; reports of this apparently dwarf species at total lengths from 30 to 80 cm are unverified and possibly based on other larger species of *Etmopterus*. Occurs on the upper and middle continental slopes at depths of 300 to 1 000 m. Biology little known. Interest to fisheries minor. In the eastern Atlantic this species and possibly others reported under its name are captured offshore in bottom trawls, fixed bottom nets and on hook-and-line gear, and utilized dried-salted for human consumption and for fishmeal. Eastern Atlantic from Mauritania, Guinea, Sierra Leone, and Liberia to Côte d'Ivoire, and Nigeria to Angola. Nominal from the western central Atlantic off Venezuela.



***Etmopterus princeps* Collett, 1904**

En – Great lanternshark; **Fr** – Sagre rude; **Sp** – Tollo lucero raspa.

Maximum total length about 89 cm, females mature from about 62 cm to at least 83 cm, males mature at 56 to 70 cm. Occurs on continental slopes and rises on or near bottom at depths of 350 to 2 213 m, also lower rises between 3 750 and 4 500 m in North Atlantic. Ovoviviparous, litter size 10. Feeds on bony fishes including lanternfish, notosudids, barracudinas, and codfish, also squid, euphausiids, and shrimp. Interest to fisheries small, taken as bycatch of deepwater demersal fisheries. In the area, from Gibraltar south to Mauritania, Canary Islands, and possibly Sierra Leone; northwards from Spain, Portugal, France and the Azores to the Denmark Strait between Greenland and Iceland, and Iceland. Also western Atlantic from the Canada and the United States. Nominal from the Kyushu-Palau Ridge, Japan, and New Caledonia.



***Etmopterus pusillus* (Lowe, 1839)**

En – Smooth lanternshark; **Fr** – Sagre nain; **Sp** – Tollo lucero liso.

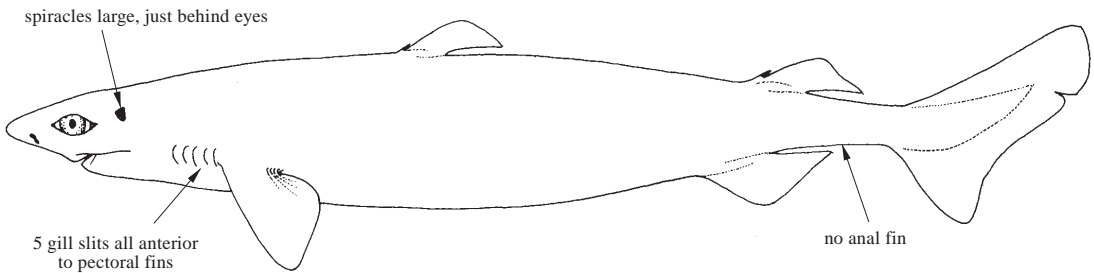
Maximum total length at least 47 cm; adult females 38 to 47 cm, adult males 31 to 39 cm. Occurs on continental slopes near the bottom at depths of 274 to 1 000 m or more, also epipelagic and mesopelagic in the central South Atlantic and probably elsewhere, at depths from the surface to 708 m over deep water. Biology little known, ovoviviparous, eats hake (Merluccidae), lanternfish (Myctophidae), small squaloid sharks, squid and fish eggs. Interest to fisheries limited. In the eastern Atlantic captured as bycatch in bottom trawls and in fixed bottom nets, also with line gear, and utilized dried-salted for human consumption and for fishmeal. In the area, Morocco to Namibia, including the Madeira, Canary, and Cape Verde Islands. Elsewhere in the western Atlantic from the Atlantic coast of the United States and the Gulf of Mexico to Suriname, Brazil, Uruguay and Argentina and in the south central Atlantic; southwestern Indian Ocean off South Africa, Mozambique and on seamounts south of Madagascar; western Pacific off Japan and Australia; central Pacific; and eastern Pacific on submarine ridges off Peru.



SOMNIOSIDAE

Sleeper sharks

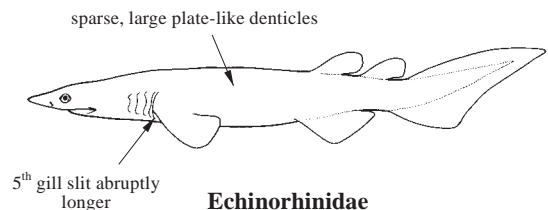
Diagnostic characters: Small to gigantic sharks (adults 38 cm to at least 730 cm), with cylindrical or slightly compressed bodies, with ridges between pectoral and pelvic fins and without precaudal pits and caudal keels. **Head with 5 gill slits, all anterior to pectoral fins**, the fifth not abruptly longer than the others; **spiracles always present, large and just behind eyes**; **eyes on sides of head, without nictitating eyelids**. Snout short to moderately elongated, broad, flattened, not formed as a rostral saw; no barbels on snout; nostrils wide-spaced, internarial width greater than nostril width; mouth short and nearly transverse, lips smooth; teeth dissimilar in both jaws, upper teeth narrow, needle-shaped, and without cusplets; lower teeth strong-cusped, blade-like, imbricated, and without cusplets. **Two dorsal fins with or without spines on their anterior margins, when present spines grooved, usually small, and on both dorsal fins**; dorsal fins large, angular, broad, and with convex to weakly concave posterior margins; first dorsal fin variably slightly larger, subequal to, or slightly smaller in area to second; origin of first dorsal far in front of pelvic-fin origins, anterior, over, or slightly posterior to pectoral free rear tips; pelvic fins subequal to or larger than second dorsal; **no anal fin**; caudal fin strongly asymmetrical, with subterminal notch present and with a lower lobe varying from virtually absent to strong. Dermal denticles close-set, not greatly enlarged and plate-like. **Colour:** body and fins greyish to blackish brown, without conspicuous black marks and luminescent organs.



Habitat, biology, and fisheries: Sleeper sharks mostly occur near the bottom on the continental and insular slopes between 200 and at least 3 675 m; some species are apparently oceanic. In high latitudes members of the genus *Somniosus* occur on the continental shelves to the intertidal. These dogfishes are circumglobal in most seas, and range from the tropics to high latitudes up to the Arctic and Antarctic oceans. Sleeper sharks feed on bony fishes, other chondrichthyan, cephalopods and other molluscs, crustaceans, seals, whale meat, carrion, sea birds, echinoderms and jellyfish; at least one species takes chunks of meat out of living marine mammals and bony fishes. Reproduction is ovoviviparous, with 4 to 59 young per litter. In the Far East and the present area these sharks are fished with line gear and bottom trawls for human consumption and for their livers, which are extremely large, oily, and have a high squalene content.

Similar families occurring in the area

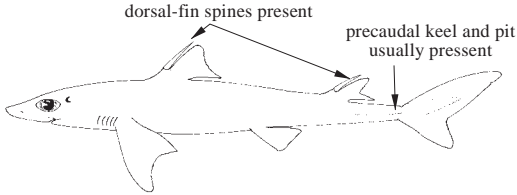
Echinorhinidae: body set with sparse, large, plate-like denticles; spiracles small and well behind eyes; fifth pair of gill slits abruptly longer than others; mouth broadly rounded; teeth not imbricated, upper teeth nearly as large as lowers, with cusplets present in large juveniles and adults; first dorsal-fin origin over or posterior to pelvic-fin origins; pelvic fins much larger than second dorsal fin.



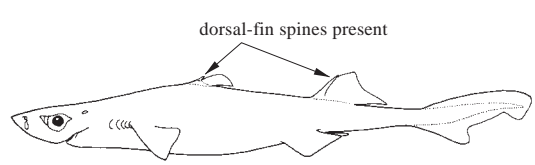
Echinorhinidae

Squalidae: upper teeth nearly as large as lowers; precaudal keels and usually precaudal pits present; dorsal-fin spines very strong and without grooves, second dorsal falcate; no subterminal notches on caudal fin.

Etmopteridae: cusplets present on upper teeth; second dorsal fin larger than first and more or less falcate; usually with conspicuous black markings and luminescent organs; species smaller, adults usually do not reach 70 cm.



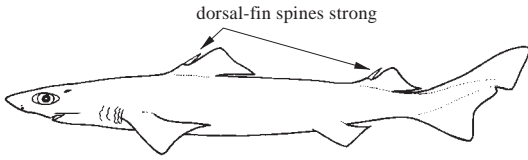
Squalidae



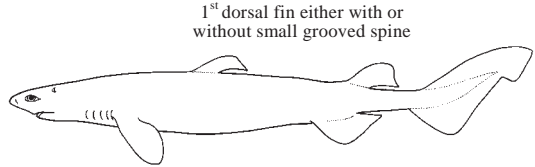
Etmopteridae

Centrophoridae: upper teeth broader and imbricated; no lateral keels on abdomen; origin of first dorsal fin in front of pectoral free rear tips; dorsal-fin spines strong.

Dalatiidae: head narrower, conical; nostrils close together; dorsal-fin spines absent or present on first dorsal fin only (*Squaliolus*).



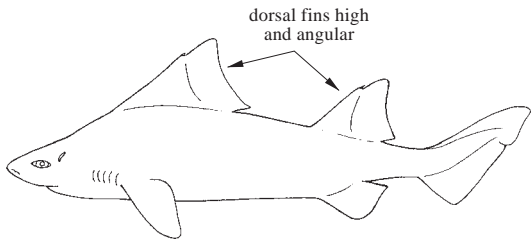
Centrophoridae



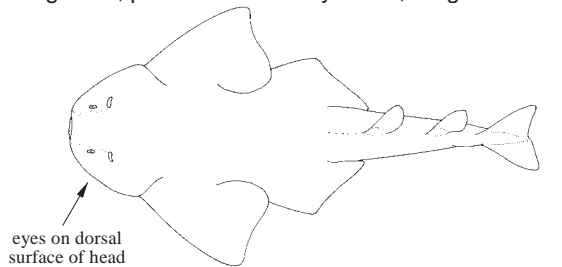
Dalatiidae

Oxynotidae: lips fringed; body high and compressed; dorsal fins very high and angular, dorsal spines large but buried in the dorsal fins with only the tips exposed.

Squatinae: trunk much flattened dorsoventrally eyes on upper side of head; anterior margins of pectoral fins extending forward past gill openings and partly concealing them; pelvic fins also very broad, wing-like.



Oxynotidae



Squatinae

Key to species of Somniosidae occurring in the area

- 1a. Dorsal fins without exposed spines; ventral lobe of caudal fin elongated (Fig. 1) ***Somniosus rostratus***
- 1b. Dorsal fins with spines more or less exposed, sometimes inconspicuous; ventral lobe of caudal fin short → 2



Fig. 1 *Somniosus rostratus*

- 2a. Snout greatly elongated, its length about equal to distance from mouth to pectoral-fin origins; upper labial grooves greatly elongated, their lengths (taken from front ends to mouth corners) greater than distance between their front ends (Fig. 2)



..... ***Centroselachus crepidater***

Fig. 2 *Centroselachus crepidater*

- 2b. Snout shorter, its length less than distance from mouth to pectoral-fin origins; upper labial grooves shorter, their lengths (taken from front ends to mouth corners) less than distance between their front ends → 3

- 3a. Lower teeth with high cusps (Fig. 3a); denticles on sides of body with a median ridge extending the length of the crown in adults (Fig. 3b) → 4

- 3b. Lower teeth with low to moderate cusps (Fig. 4a); denticles on sides of body without ridges or with a median ridge not extending the entire length of the crown, in adults (Fig. 4c) (***Centroscymnus***) → 5

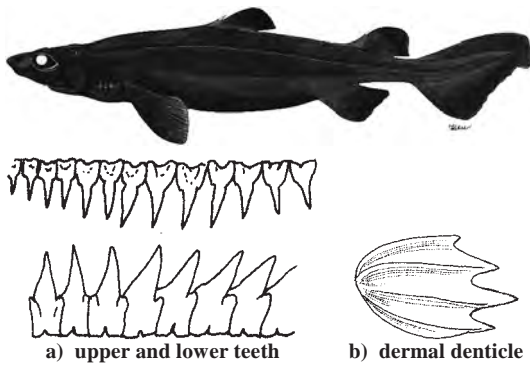


Fig. 3 *Scymnodon ringens*

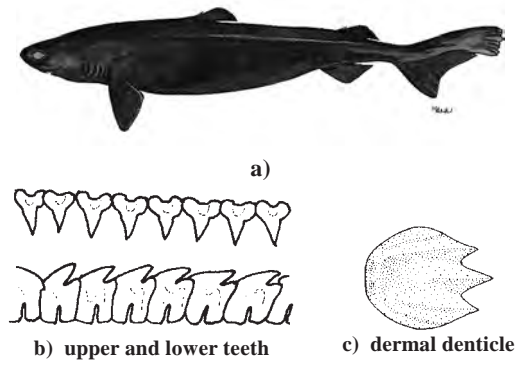


Fig. 4 *Centroscymnus coelolepis*

- 4a. Snout short, length in front of mouth less than mouth width; mouth very large and strongly arched; caudal fin with a faint subterminal notch; denticles on sides without transverse ridges, but only longitudinal ridges (Fig. 5) ***Scymnodon ringens***

- 4b. Snout moderately elongated, length in front of mouth much greater than mouth width; mouth smaller and weakly arched; caudal fin with a well-developed subterminal notch; denticles on sides with distinct transverse ridges in addition to the longitudinal ridges (Fig. 6) ***Zameus squamulosus***



Fig. 5 *Scymnodon ringens*



Fig. 6 *Zameus squamulosus*

- 5a. Snout shorter, length in front of mouth less than distance from mouth to first gill slit; distance from fin-spine to free rear tip about equal in both dorsal fins; denticles of adults without cusps and ridges (Fig. 7) ***Centroscymnus coelolepis***
- 5b. Snout longer, length in front of mouth greater than distance from mouth to first gill slit; distance from fin-spine to free rear tip greater in second dorsal fin than in first; denticles of adults with short posterior cusps and ridges (Fig. 8). ***Centroscymnus owstonii***

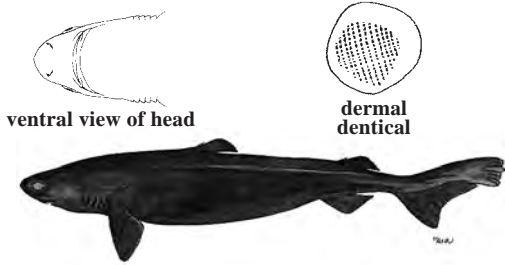


Fig. 7 *Centroscymnus coelolepis*

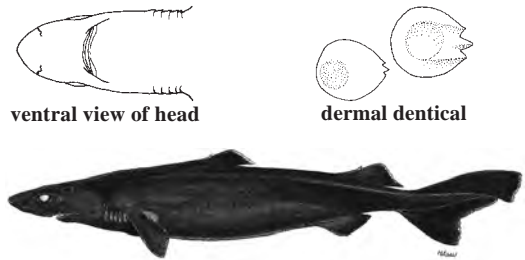


Fig. 8 *Centroscymnus owstonii*

List of species occurring in the area^{1/}

The shark symbol is given when species accounts are included.

- Centroscymnus coelolepis* Barbosa du Bocage and de Brito Capello, 1864.
- Centroscymnus owstonii* Garman, 1906.^{2/}
- Centroselachus crepidater* (Barbosa du Bocage and de Brito Capello, 1864).^{3/}
- Scymnodon ringens* Barbosa du Bocage and de Brito Capello, 1864.
- Somniosus rostratus* (Risso, 1827).^{4/}
- Zameus squamulosus* (Günther, 1877).^{5/}

The arrangement of genera and species adopted here follows the forthcoming revision of the FAO shark catalog (Compagno, 1984) by the present author (Compagno in preparation).

^{1/} The Azores dogfish, *Scymnodalatias garricki* Kukuev and Konovalenko, 1988, is a small (adult at 38 cm), possibly epipelagic shark that is known from a single record north of Area 34 from in the open ocean off the bottom over a seamount of the mid-Atlantic Ridge near the Azores. As with other members of *Scymnodalatias* it lacks dorsal-fin spines, but it differs from *Somniosus* in having high-cusped, *Scymnodon*-like lower teeth, more elongated eyes, a shorter ventral caudal lobe, and in being much smaller when adult. It should be watched for in the present area.

^{2/} Formerly termed *Centroscymnus cryptacanthus* Regan, 1906 (Compagno, 1981) in the eastern Atlantic, while similar dogfish in the western North Atlantic and western Pacific have been referred to *C. owstonii* (Compagno, 1984). Examination of western and eastern Atlantic, New Zealand, Australian and Japanese material referred to these species suggests that they comprise a single species, and that *C. cryptacanthus* is a junior synonym of *C. owstonii*.

^{3/} Formerly placed in the genus *Centroscymnus* Barbosa du Bocage and de Brito Capello, 1864 (Compagno, 1981, 1984), but placed in a separate genus, *Centroselachus* Garman, 1913 due to the distinctiveness of this species from other somniosids.

^{4/} The Greenland shark, *Somniosus microcephalus* (Bloch and Schneider, 1801) occurs at high latitudes in the North Atlantic and Arctic Ocean but in the eastern North Atlantic the species extends south to the North Sea, to France, and possibly as far south as Portugal. It could occur in very deep water (1 000 m or more), in the northern part of Area 34. The southern sleeper shark, *S. antarcticus* Whitley, 1939, occurs just south of the area on the Walvis Ridge and off the west coast of South Africa and should be expected in deep water in the southern part of the eastern central Atlantic Area. Deep-camera photographs recently taken off Angola picture a large *Somniosus*, possibly this species. It otherwise has a southern ocean range off South America, New Zealand, Australia, and in the southern Indian Ocean off islands and seamounts. *S. antarcticus* and *S. microcephalus* differ from *S. rostratus* in having more oblique, shorter cusps on the lower teeth, fewer upper tooth rows, more lower tooth rows, poorly calcified vertebrae with an expanded notochord, more intestinal valve turns, and a much greater size (adults reach 430 to 730 cm). An undescribed species of *Somniosus* from off Portugal with an elongated pointed snout and slender caudal peduncle has been confused with *S. rostratus*. It was known from a single specimen (unfortunately destroyed in a museum fire) but should be watched for in the area.

^{5/} Formerly placed by Compagno (1981, 1984) in the genus *Scymnodon* with eastern Atlantic representatives termed *S. obscurus* (Vaillant, 1888), but placed in the genus *Zameus* following Taniuchi and Garrick (1986) and synonymized with *Z. squamulosus* following Yano and Tanaka (1984).

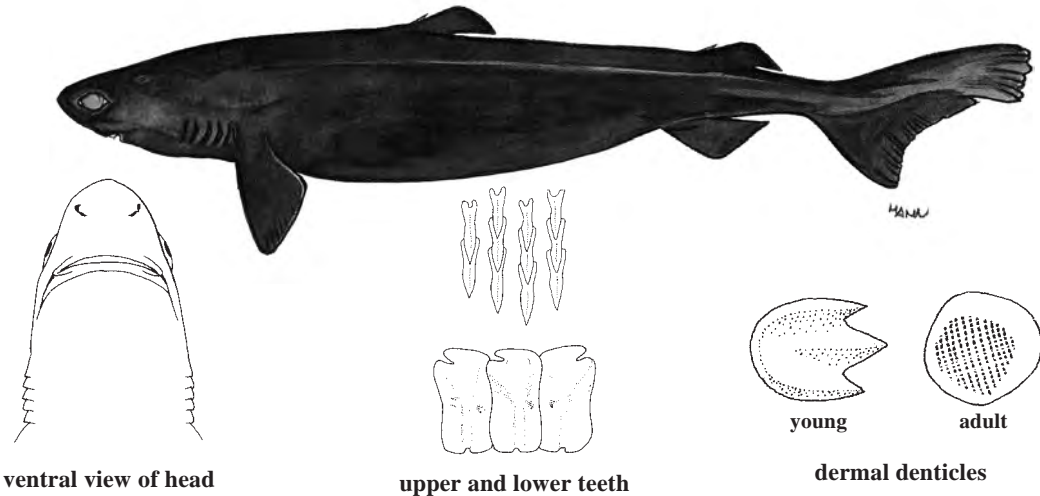
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***Centroscymnus coelolepis* Barbosa du Bocage and de Brito Capello, 1864**

Frequent synonyms / misidentifications: None / *Centroscymnus owstonii* Garman, 1906.

FAO names: En – Portuguese dogfish; Fr – Pailona commun; Sp – Pailona.



Diagnostic characters: Body moderately stout and slightly compressed; dermal denticles of back tricuspidate and ridged in young, but **very large, circular, smooth, and without cusps in adults**. **Snout broadly rounded, shorter than distance from mouth to first gill slit; upper labial grooves very short, the distance between their anterior ends greater than their lengths** (taken from their anterior ends to mouth angles). Teeth differing in upper and lower jaws, upper teeth much smaller than lower teeth, not blade-like, with slender erect cusps and no cusplets; lowers large, compressed, blade-like, with a single oblique cusp, no cusplets, a deeply notched outer edge and no serrations. A very small spine with lateral grooves on anterior edges of both dorsal fins; **first dorsal fin short and low, about as large as second dorsal, its origin well posterior to pectorals, distance from dorsal-fin spine to free rear tip shorter in first dorsal fin than in second dorsal fin**, the pectoral fins much shorter than upper caudal margin, their inner corners broadly rounded; caudal fin with a well-developed subterminal notch and short lower lobe. Caudal peduncle without dermal keels or precaudal pits. **Colour: uniformly brownish black.**

Size: Maximum: About 114 cm; size at birth below 34 cm, adults 90 to 114 cm.

Habitat, biology, and fisheries: A relatively common shark of the outer continental shelves, continental slopes, rises and seamounts in depths of 160 to 3 675 m, most common between 400 and 2 000 m in the area. Ovoviviparous, number of fetuses in a litter 13 to 16. Eats bony fishes including hake, epigonids and bramids, other sharks, benthic invertebrates including squid, octopuses, gastropods, and crab, and cetacean meat. Apparently will core flesh out of live cetaceans, deep-diving pinnipeds (southern elephant seals), and bony fishes, as with the dalatiid genus *Isistius*. Separate statistics are not reported to FAO for this species. Caught in bottom trawls, fixed deepwater bottom nets and with line gear. Utilized dried-salted and for fishmeal.

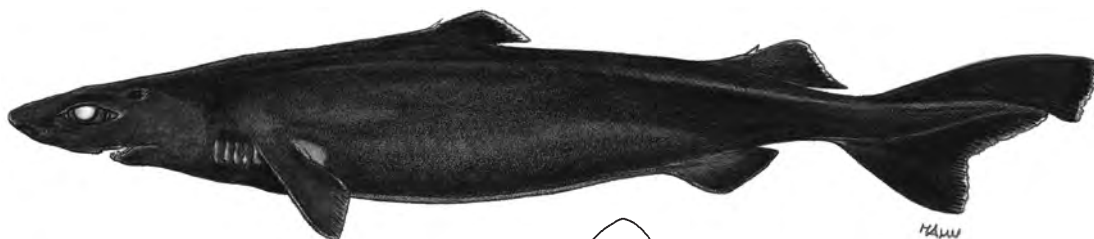
Distribution: In the area, found from off Morocco and the Canary Islands to Senegal, Guinea to Sierra Leone, and off Madeira; also Namibia. Elsewhere, western Mediterranean Sea and the eastern Atlantic off the Azores northward along the Atlantic slope to the Denmark Strait, Faeroe Banks, and Iceland and southwards off the west coast of South Africa. Elsewhere, this species is wide-ranging in the western Atlantic, Indian Ocean and western Pacific.



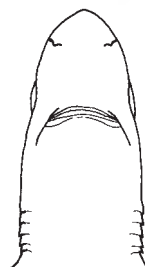
***Centroscymnus owstonii* Garman, 1906**

Frequent synonyms / misidentifications: *Centroscymnus cryptacanthus* Regan, 1906 / *Centroscymnus coelolepis* Barbosa du Bocage and de Brito Capello, 1864.

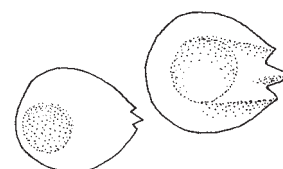
FAO names: En – Roughskin dogfish; Fr – Pailona rapeux; Sp – Sapata lija.



Diagnostic characters: Body moderately stout and somewhat compressed; dermal denticles of back tricuspidate and ridged in young, but large, circular, smooth, and with or without cusps in adults. Snout narrowly rounded, longer than distance from mouth to first gill slit; upper labial grooves very short, the distance between their anterior ends greater than their lengths (taken from their anterior ends to mouth angles). Teeth differing in upper and



ventral view of head



dermal denticles

lower jaws, upper teeth much smaller than lower teeth, not blade-like, with slender erect cusps and no cusplets; lower teeth large, compressed, blade-like, with a single oblique cusp, no cusplets, a deeply notched outer edge and no serrations. A very small spine with lateral grooves on anterior edges of both dorsal fins, sometimes covered with skin; first dorsal fin long and low, smaller than second dorsal, its origin extending to over inner margins or bases of pectorals, distance from dorsal-fin spine to free rear tip shorter in first dorsal fin than in second dorsal fin, the pectoral fins much shorter than upper caudal margin, their inner corners broadly rounded; caudal fin with a well-developed subterminal notch and short lower lobe. Caudal peduncle without dermal keels or precaudal pits. **Colour:** uniformly brownish black.

Size: Maximum total length about 120 cm; size at birth about 30 cm, adults 72 to 120 cm, mostly less than 110 cm.

Habitat, biology, and fisheries: A rare to common demersal or semipelagic shark of the outer continental and insular shelves and slopes and near seamounts in depths of 150 to 1 459 m, on or near bottom and commonest below 600 m. Ovoviviparous, number of fetuses in a litter uncertain but females may have up to 34 eggs maturing at once. Eats bony fishes and cephalopods. Separate statistics are not reported to FAO for this species. Caught in bottom trawls and with tuna longlines. Utilized dried-salted and for fishmeal.

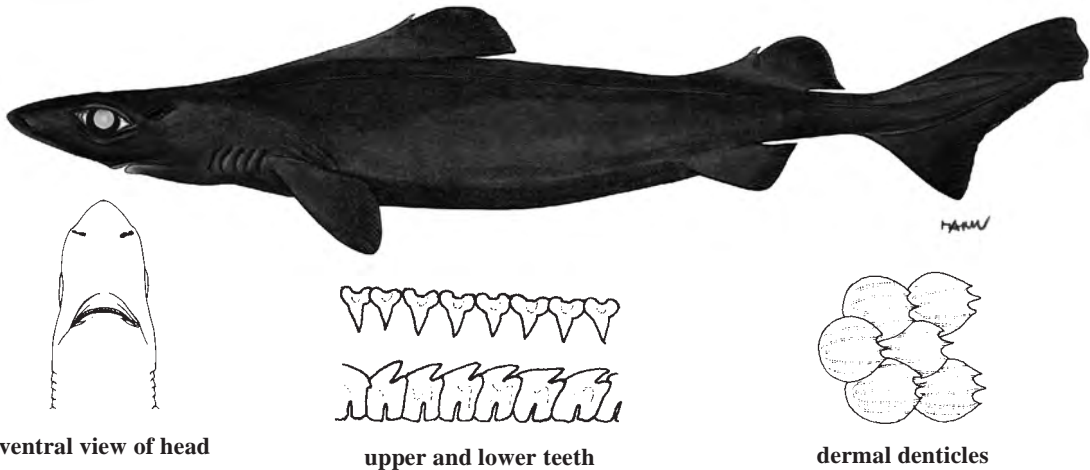
Distribution: In the area, off Madeira, Senegal, the Canary Islands, and northern Namibia, probably more wide-ranging; in the eastern Atlantic also in the Azores and off the west coast of South Africa. Elsewhere in the western Atlantic from the northern Gulf of Mexico off the United States, and Uruguay, in the western Pacific off Japan, New Zealand, and Australia, and in the eastern South Pacific. Wide-ranging in the eastern Atlantic, western Pacific, and eastern South Pacific on the Nazca and Sala y Gomez submarine ridges.



Centroselachus crepidater (Barbosa du Bocage and de Brito Capello, 1864)

Frequent synonyms / misidentifications: *Centroscymnus crepidater* (Barbosa du Bocage and de Brito Capello, 1864) / None.

FAO names: **En** – Longnose velvet dogfish; **Fr** – Pailona à long nez; **Sp** – Sapata negra.



ventral view of head

upper and lower teeth

dermal denticles

Diagnostic characters: Body moderately slender and compressed; **dermal denticles of back with cusps and ridges in young and adults, the medial ridge not extending the full length of the crown.** Snout narrowly rounded, very long, about equal to distance from mouth to origins of pectoral fins; **upper labial grooves extremely long, the distance between their anterior ends less than their lengths (taken from their anterior ends to mouth angles);** teeth differing in upper and lower jaws, **upper teeth much smaller than lower teeth**, with slender, erect cusps and no cusplets in the region of the symphysis, but broadening out near the mouth angles; **lowers larger, compressed, blade-like, unserrated**, with a single erect to oblique cusp, no cusplets and a deeply notched outer edge. **A very small spine with lateral grooves on anterior edges of both dorsal fins; first dorsal fin very long and low**, its base longer but its height less than second dorsal fin, **its origin about over the posterior ends of pectoral-fin bases;** pectoral fins shorter than upper margin of caudal fin, **their inner corners broadly rounded;** caudal fin with a well-developed subterminal notch and a weak lower lobe. Caudal peduncle without dermal keels or precaudal pits. **Colour: uniform brownish black.**

Size: Maximum total length of adults to about 105 cm, size at birth about 30 to 35 cm; females mature at 77 to 88 cm and males at 60 to 68 cm.

Habitat, biology, and fisheries: A little-known deepwater shark, found offshore on the upper continental and insular slopes from 200 to 1 500 m depth. Feeds on small bony fishes including lanternfishes (Myctophidae), and cephalopods. Ovoviparous, number of fetuses reported about 4. Separate statistics are not reported for this species. Caught in bottom trawls. Utilized for fishmeal.

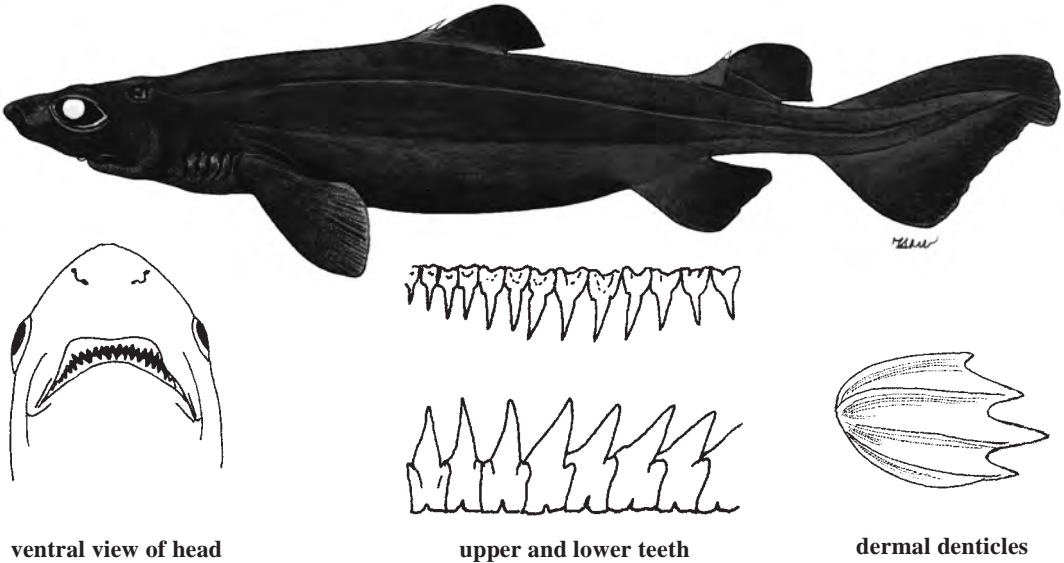
Distribution: In the area, off Morocco, Canary Islands, and Madeira south to Senegal and off Gabon to Democratic Republic of the Congo and Namibia; in the eastern Atlantic also northward along the Atlantic slope from Portugal and the Azores to the Faeroe Islands and Iceland, and off the west coast of South Africa. Elsewhere in the Indo-West Pacific off the Aldabra Islands, Madagascar range of seamounts south of Madagascar, India (Travancore Coast), and Japan, Australia, and New Zealand; and the eastern Pacific off Chile.



***Scymnodon ringens* Barbosa du Bocage and de Brito Capello, 1864**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Knifetooth dogfish; Fr – Squale-grogneur commun; Sp – Bruja.



ventral view of head

upper and lower teeth

dermal denticles

Diagnostic characters: Body moderately stout and slightly compressed; **dermal denticles of back with cusps and longitudinal ridges but no transverse ridges in young and adults. Snout broadly rounded, shorter than mouth width; mouth very large and strongly arched;** upper labial grooves (measured from their front ends to mouth angles) moderately long, shorter than distance between their front ends; teeth differing in upper and lower jaws, **upper teeth much smaller than lower teeth, not blade-like, with extremely long, slender, erect cusps and no cusplets, lowers very large, unserrated, compressed, blade-like, with a single very large, erect or semi-erect cusp, no cusplets** and a deeply notched outer edge. A very small spine with lateral grooves on anterior edges of both dorsal fins; first dorsal short and low, a little smaller than the second, its origin slightly posterior to pectoral inner corners; **pectoral fins with their inner corners rounded; pelvic fins very large**, much more so than second dorsal fin; **caudal fin with subterminal notch hardly indicated**, lower caudal lobe not differentiated. Caudal peduncle without dermal keels or precaudal pits. **Colour: uniformly brownish black.**

Size: Adults to 110 cm total length.

Habitat, biology, and fisheries: A deepwater shark of the continental slopes and outer shelves, ranging from 200 to 1 600 m depth; offshore in the northern part of the area. The large jaws and teeth of this shark suggest it is a formidable predator on fishes, other sharks, and benthic invertebrates. Probably ovoviviparous. Separate statistics are not reported for this species. Caught in bottom trawls, also fixed bottom nets and with line gear. Utilized dried-salted and for fishmeal.

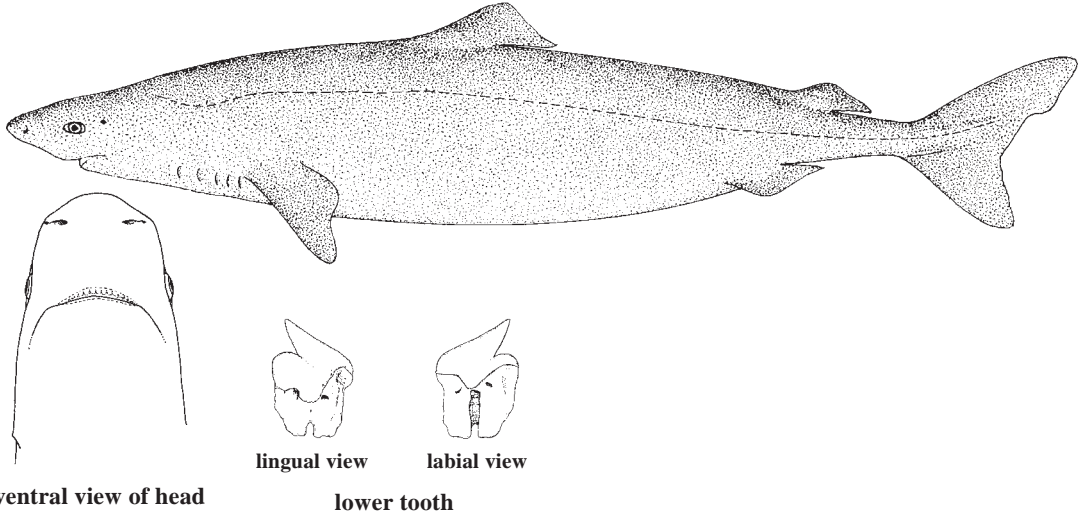
Distribution: In the area, recorded from off Morocco, Canary Islands and Mauritania to Senegal; in the eastern Atlantic also off Spain and Portugal and northward along the Atlantic slope to Scotland. Occurs in the western Pacific off New Zealand.



***Somniosus rostratus* (Risso, 1827)**

Frequent synonyms / misidentifications: *Somniosus bauchotae* Quero, 1976 / None.

FAO names: En – Little sleeper shark; Fr – Laimargue de Méditerranée; Sp – Tollo boreal.



Diagnostic characters: Body moderately stout and slightly compressed; **dermal denticles of back thorn-like, with pointed cusps and longitudinal ridges; eyes small;** snout broadly rounded, moderately elongated, slightly longer than mouth width; **lips smooth, not ridged or plicated;** teeth differing in upper and lower jaws, upper teeth much smaller than lower teeth, not blade-like, with short erect cusps and no cusplets; **lower teeth large, blade-like, unserrated, with a single, moderately long, semi-erect cusp, no cusplets and a deeply notched outer edge. No spines on dorsal fins; first dorsal short and low, about as large as second dorsal fin and as pelvic fins, its origin well posterior to inner corners of pectoral fins, its free rear tip far ahead of pelvic origins; pectoral fins considerably shorter than upper caudal margin; caudal fin with subterminal notch strongly developed, slightly asymmetrical, with a long, strongly differentiated lower lobe.** Caudal peduncle without dermal keels or precaudal pits; **a pair of low dermal keels present on lower base of caudal fin.** **Colour:** dark grey-brown above and below, without conspicuous markings.

Size: Maximum: 140 cm total length, adults at about 100 cm or less.

Habitat, biology, and fisheries: An uncommon deepwater shark, found on the continental and insular slopes at 220 to 2 220 m. Ovoviviparous, number of young not recorded. Incidental catches offshore, in the north of the area. Separate statistics are not reported for this species. Captured in bottom trawls. Possibly not utilized.

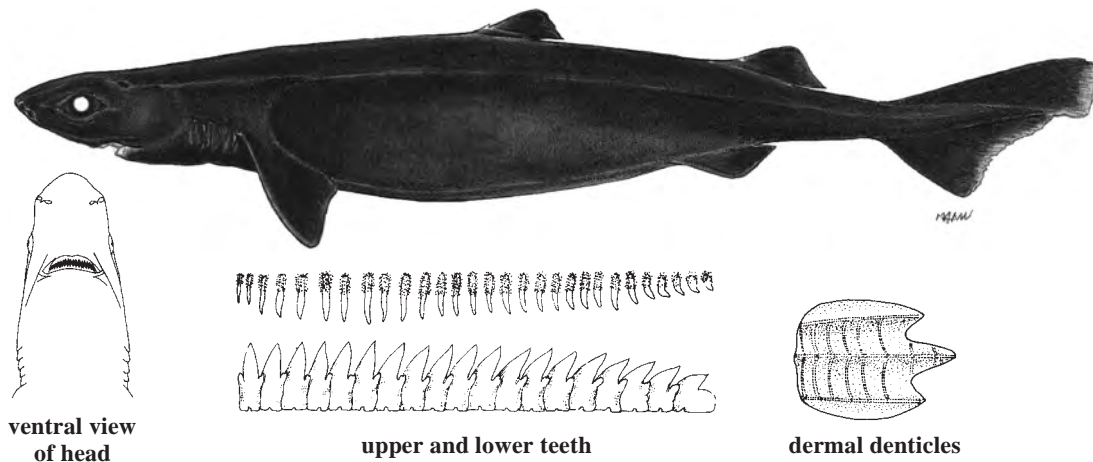
Distribution: In the area recorded only from off Madeira and the Canary Islands; in the eastern Atlantic also occurring off Portugal, France and in the Mediterranean Sea; elsewhere in the western North Atlantic off Cuba. Western Pacific records of small *Somniosus* off Japan and New Zealand were attributed to this species (Compagno, 1984) but now are reinstated as a separate species, *S. longus* (Tanaka, 1912), which may also occur off Chile in the eastern Pacific.



***Zameus squamulosus* (Günther, 1877)**

Frequent synonyms / misidentifications: *Scymnodon obscurus* (Vaillant, 1888); *S. squamulosus* (Günther, 1877) / None.

FAO names: **En** – Velvet dogfish; **Fr** – Squalé grogneur velouté; **Sp** – Bruja terciopelo.



Diagnostic characters: Body slender and slightly compressed; **dermal denticles of back with cusps, longitudinal ridges, and distinctive transverse ridges in young and adults. Snout pointed and somewhat elongated, much longer than mouth width; mouth moderate-sized and moderately arched;** upper labial grooves (measured from their front ends to mouth angles) moderately long, shorter than distance between their front ends; teeth differing in upper and lower jaws, **upper teeth much smaller, not blade-like, with extremely long, slender, erect cusps and no cusplets; lower teeth large, unserrated, compressed, blade-like, with a single very large, erect or semi-erect cusp, no cusplets and a deeply notched outer edge.** A very small fin spine with lateral grooves on anterior edges of both dorsal fins; first dorsal fin short and low, a little smaller than the second, its origin over or somewhat posterior to pectoral inner margins; **pectoral fins with their inner corners rounded; pelvic fins small, about as large or slightly larger than second dorsal fin; caudal fin with subterminal notch strongly indicated, lower caudal lobe short but well-differentiated in adults.** Caudal peduncle without dermal keels or precaudal pits. **Colour: uniformly brownish black.**

Size: Maximum total length at least 84 cm, adult males 49 to 51 cm, and adult females 59 to 69 cm long.

Habitat, biology, and fisheries: An uncommon deepwater shark, found on the continental and insular slopes at 550 to 1 450 m near the bottom, near seamounts, and epipelagic between the surface and 55 m well offshore in water 2 000 to 6 000 m deep. Probably ovoviviparous and a predator on bottom fishes and invertebrates. Separate statistics are not reported for this species. Captured in bottom trawls. Utilization not reported but probably used for fishmeal in the area.

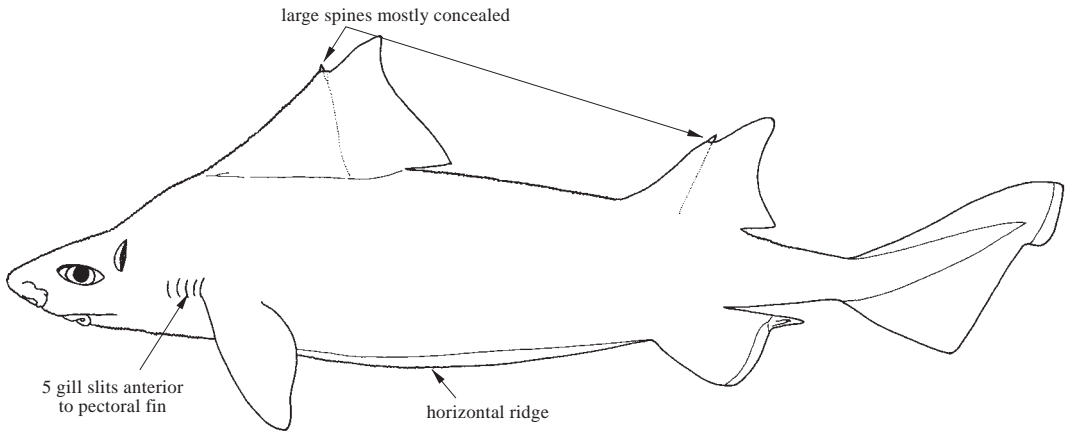
Distribution: In the area, this species occurs off Morocco, Madeira, the Canary Islands, and the Cape Verde Islands south to Mauritania and Senegal, and off northern Namibia; in the eastern North Atlantic northward from the Azores and Spain along the Atlantic slope and the Faeroe Ridge to Iceland; in the eastern South Atlantic off southern Namibia and the west coast of South Africa. Elsewhere this species occurs in the western Atlantic from the Gulf of Mexico and Caribbean south to Brazil, possibly the western Indian Ocean off South Africa and on seamounts and submarine ridges south of Madagascar, in the eastern Indian Ocean off Australia, in the western Pacific from off Japan, China, Taiwan Province of China, possibly Viet Nam, the Philippines, and in the central Pacific (Hawaiian Islands).



OXYNOTIDAE

Rough sharks

Diagnostic characters: Small to moderate-sized sharks (adults 49 to 150 cm total length, most less than 100 cm) with **strongly compressed, very deep bodies**, triangular in cross section, **with a horizontal ridge between pectoral and pelvic fins on each side**. Head with **5 gill slits, all anterior to the pectoral fins**, the fifth not abruptly larger than the others; spiracles present, moderately large; eyes on sides of head, above mouth, without nictitating eyelids; teeth unlike in upper and lower jaws, the uppers small, narrow, needle-like, with a single cusp, the lowers broader, blade-like, with a single triangular cusp and serrated edges. **Two broad-based, very large, triangular dorsal fins, each with a large spine mostly concealed, except for the very tip; origin of first dorsal fin extending forward to over gill slits;** pelvic fins smaller than the second dorsal; **anal fin absent;** pectoral fins very narrow; caudal fin strongly asymmetrical, with a poorly developed lower lobe and a distinct subterminal notch. Dermal denticles moderately large and close-set giving the body a prickly, extremely rough texture. **Colour:** blackish or dark grey to light brown above, sometimes lighter below in species occurring in the area; a pattern of blotches present in one local species (*Oxynotus centrina*).

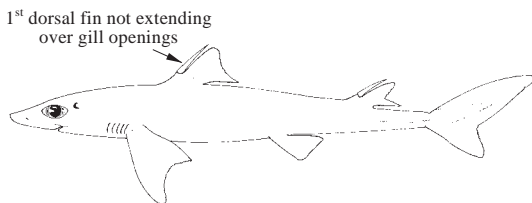


Habitat, biology, and fisheries: These are moderately common deepwater sharks occurring on the bottom along the edges of the continental shelf and on the upper slope, in depths between 40 and 720 m. Ovoviviparous, litters 7 to 23. These sharks feed on benthic crustaceans, polychaete worms, and small molluscs. Harmless, incidentally caught in trawl fisheries, used for human consumption smoked and dried-salted, also for oil and fishmeal.

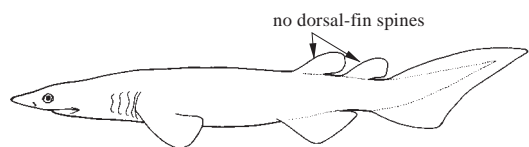
Similar families occurring in the area

Squalidae, Centrophoridae, Somniosidae, Etmopteridae and Dalatiidae: body more cylindrical, dorsal fins smaller, lower, and not sail-like, first dorsal fin not extending over gill openings, pectoral fins broader and more paddle-shaped.

Echinorhinidae: body set with sparse, large, plate-like denticles; spiracles small and well behind eyes; fifth pair of gill slits abruptly longer than others; mouth broadly rounded; teeth not imbricated, upper teeth nearly as large as lower teeth, with cusplets present in large juveniles and adults; no dorsal-fin spines; first dorsal-fin origin over or posterior to pelvic-fin origins; pelvic fins much larger than second dorsal fin.



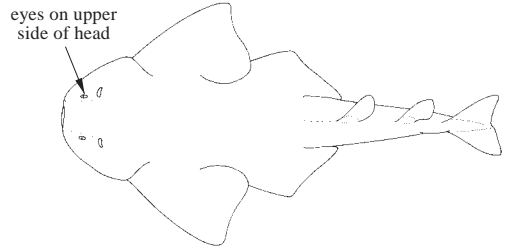
Squalidae



Echinorhinidae

Squatinae: trunk much flattened dorsoventrally; eyes on upper side of head; anterior margins of pectoral fins extending forward past gill openings and partly concealing them; pelvic fins also very broad, wing-like.

All other shark families: anal fin present.



Squatinae

Key to species of Oxynotidae occurring in the area

- 1a. Supraocular ridge strongly developed, with a knob-like posterior end studded with large denticles, extending over the eyes to just in front of spiracles; spiracles very large, vertically oval or crescentic; pectoral fins not falcate, with narrowly rounded apices; first dorsal-fin spine slanted forward from base to tip; apical part of first dorsal fin low, broad, and not strongly falcate, its height (from spine tip to fin apex) about equal to, or shorter than basal height (from spine tip to fin base); a colour pattern of dark blotches present (Fig. 1) *Oxynotus centrina*
- 1b. Supraocular ridge low, not formed as a heavy denticle-studded knob in front of spiracles; spiracles smaller, circular; pectoral fins falcate, with pointed apices; first dorsal-fin spine slanted backward from base to tip; apical part of first dorsal fin high, narrow, and strongly falcate, its height greater than basal height; colour uniform, sometimes slightly lighter below (Fig. 2) *Oxynotus paradoxus*

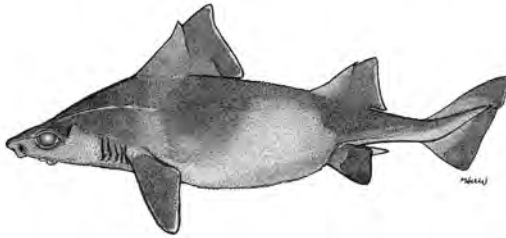


Fig. 1 *Oxynotus centrina*

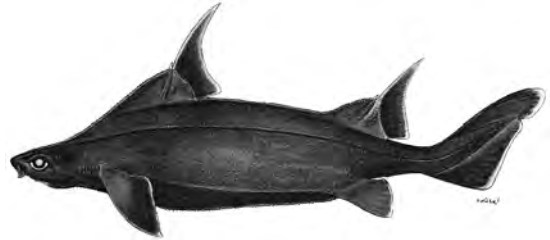



Fig. 2 *Oxynotus paradoxus*

List of species occurring in the area

The shark symbol  is given when species accounts are included.

 *Oxynotus centrina* (Linnaeus, 1758).^{1/}

 *Oxynotus paradoxus* Frade, 1929.

^{1/} The species of *Oxynotus* from off Angola, Namibia and South Africa, usually considered as *O. centrina*, was thought to be a separate species, *O. shubnikovi* Myagkov, 1986, but it proved to be indistinguishable from *O. centrina*.

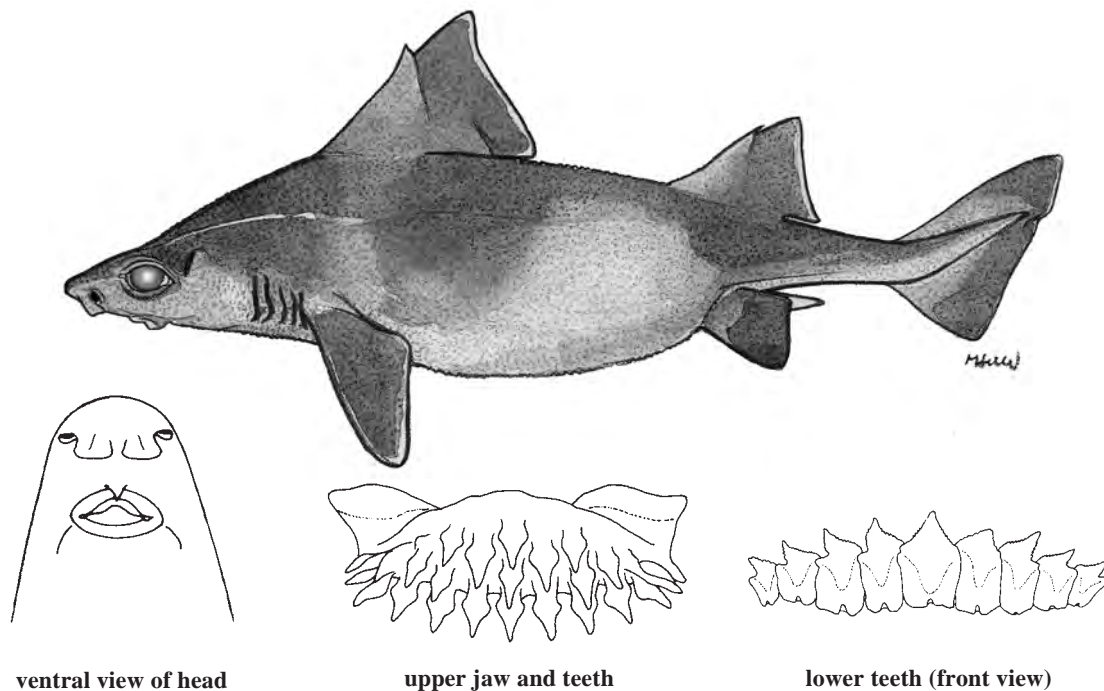
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***Oxynotus centrina* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: *Oxynotus shubnikovi* Myagkov, 1986 / None.

FAO names: En – Angular roughshark; Fr – Centrine commune; Sp – Cerdo marino.



Diagnostic characters: A small to medium-sized shark. Body stout, very deep, triangular in section; a strong longitudinal ridge on each side of abdomen between pectoral and pelvic-fin bases. Head with 5 small gill slits, all in front of pectoral-fin bases; nostrils very large, separated medially by a narrow gap much shorter than their width, anterior nasal flaps large, but not reaching mouth; no oronasal grooves; mouth small, situated below eyes; labial furrows formed as deep grooves around the thick, finely fringed (not suctional) lips; eyes horizontally elongated, without nictitating lower lids; **a heavy supraocular ridge, with a knob-like posterior end studded with large denticles, extending over the eyes on each side and ending just in front of spiracles; spiracles very large, vertically elongated, crescentic to oval**; snout short, evenly rounded or subangular; teeth unlike in upper and lower jaws, uppers very small and needle-like, with a single slender cusp and no cusplets; lowers broad, blade-like, with an erect, triangular, serrated cusp and no cusplets. Two dorsal fins both with long spines mostly buried leaving only the spine tips exposed; first dorsal fin very large, originating over the gill slits, **its apical part (from spine tip to fin apex) relatively low, not strongly falcate, broad, and about as high as, or lower than basal height (from spine tip to fin base); first dorsal fin spine slanted obliquely forward from base to tip**; second dorsal fin somewhat smaller than first; anal fin absent; **pectoral fins not falcate, with narrowly rounded apices**; caudal fin short, broad, asymmetrical, with a subterminal notch and a hardly developed lower lobe; no keels or precaudal pits on caudal peduncle. Dermal denticles moderately large and close-set, giving the body a prickly and extremely rough texture. **Colour:** grey or grey brown above and below, **with darker blotches on head and sides**; a light horizontal line separates dark areas on head and another crosses cheeks below eyes.

Size: Maximum: This species may reach 150 cm, but most individuals are smaller; becomes adult at above 50 cm total length.

Habitat, biology, and fisheries: An uncommon, bottom-dwelling shark, ranging in depth from 40 to 500 m. Eats polychaete worms, crustaceans and molluscs. Caught in offshore waters, as bycatch of industrial trawling fleets. Separate statistics are not reported for this species. Caught in bottom and pelagic trawls. Utilized dried-salted, smoked, and for fishmeal and oil.

Distribution: In the area, found in the eastern Atlantic from Morocco, Madeira, the Canary Islands, Mauritania, Western Sahara, Senegal, Liberia, Nigeria, Gulf of Guinea region and south to Gabon, Angola, and Namibia. Northward extending off Spain, Portugal, France, the British Isles, and Norway, as well as off the entire coast of the Mediterranean Sea (absent from the Black Sea); it also occurs off the Western Cape coast of South Africa and possibly off Mozambique.



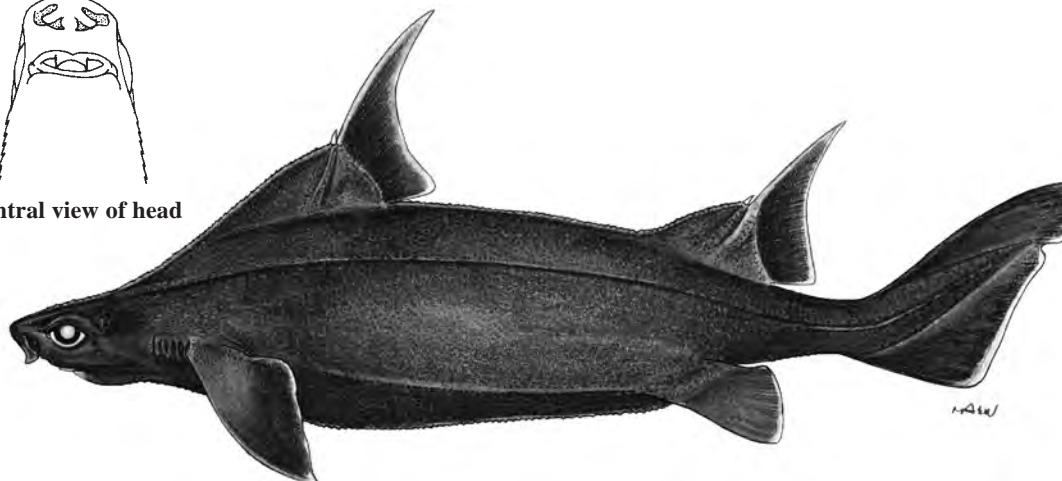
***Oxynotus paradoxus* Frade, 1929**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Sailfin roughshark; Fr – Humantin; Sp – Cerdo marino velero.



ventral view of head



Diagnostic characters: A small to medium-sized shark. Body stout, very deep, triangular in section; a strong longitudinal ridge on each side of abdomen between pectoral and pelvic-fin bases. Head with 5 small gill slits, all in front of pectoral-fin bases; nostrils very large, separated medially by a narrow gap much shorter than their width, anterior nasal flaps large, but not reaching mouth; no oronasal grooves; mouth small, situated below eyes; labial furrows formed as deep grooves around the thick, finely fringed (not suctional) lips; eyes horizontally elongated, without nictitating lower lids; **supraocular ridge weakly developed, without enlarged denticles or rear knobs; spiracles small and circular;** snout short, evenly rounded or subangular; teeth unlike in upper and lower jaws, uppers very small and needle-like, with a single slender cusp and no cusplets; lowers broad, blade-like, with an erect, triangular, serrated cusp and no cusplets. Two dorsal fins both with long spines mostly buried leaving only the spine tips exposed; first dorsal fin very large, originating over the gill slits, **its apical part (from spine tip to fin apex) relatively high and strongly falcate, narrow, and higher than basal height (from spine tip to fin base); first dorsal-fin spine slanted obliquely rearwards from base to tip;** second dorsal fin about as large as first; anal fin absent; **pectoral fins falcate, with angular apices;** caudal fin short, broad, asymmetrical, with a subterminal notch and a hardly developed lower lobe; no keels or precaudal pits on caudal peduncle. Dermal denticles moderately large and close-set, giving the body a prickly, extremely rough, texture. **Colour:** uniformly dark brown or dark grey on the back, sometimes lighter below, but with no blotches; no conspicuous black marks and apparently no luminescent organs.

Size: Maximum total length about 118 cm, an adult male was 75 cm long.

Habitat, biology, and fisheries: Bottom-living on the continental slopes in water 265 to 720 m deep. Biology poorly known, ovoviviparous, feeds near bottom. Caught as bycatch of offshore demersal fishing fleets, used for fishmeal.

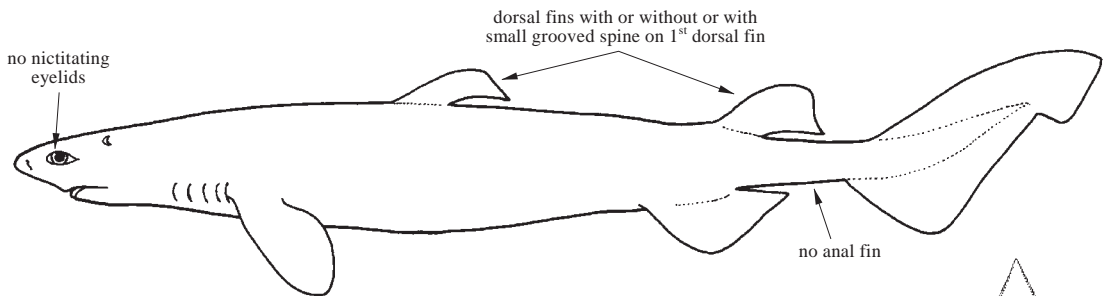
Distribution: Eastern North Atlantic, in the area off Madeira, the Canary Islands, the Azores, Morocco, Mauritania, Western Sahara, Senegal, and possibly southwards to the Gulf of Guinea region; also along the Atlantic Slope from Spain, Portugal, France, southern England, Ireland, and Scotland (including the northern North Sea).



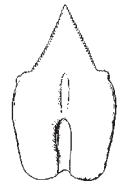
DALATIIDAE

Kitefin sharks

Diagnostic characters: Dwarf to moderately large sharks (adults 15 to possibly 182 cm total length) with cylindrical or slightly compressed bodies, with lateral ridges absent between pectoral and pelvic fins and without precaudal pits, caudal keels present or absent. **Head with 5 gill slits, all anterior to pectoral fins, the fifth not abruptly longer than the others; spiracles always present, large and just behind eyes; eyes on sides of head, without nictitating eyelids.** Snout short to moderately elongated, narrow, conical, not flattened and not formed as a rostral saw; no barbels on snout; nostrils fairly wide-spaced, internarial width greater than or subequal to nostril width; mouth short and nearly transverse, lips smooth or papillose; **teeth strong-cusped, dissimilar in both jaws, upper teeth narrow, and needle-like, without cusplets; lower teeth compressed, broad, blade-like and without cusplets, adjacent teeth imbricated, upper teeth much smaller than lowers.** **Two dorsal fins either without spines on their anterior margins or with a small grooved spine present on the first dorsal fin;** dorsal fins small, rounded, narrow, and with weakly concave posterior margins; first dorsal fin subequal in area to second or smaller; origin of first dorsal fin close to or well in front of pelvic fin origins, behind pectoral-fin insertions and opposite or (usually) behind pectoral fin free rear tips; pelvic fins variably smaller to larger than second dorsal; **no anal fin;** caudal fin strongly asymmetrical to nearly symmetrical, with subterminal notch present and with a lower lobe varying from virtually absent to very strong. Dermal denticles close-set, not greatly enlarged and plate-like. **Colour:** body greyish to blackish brown, fins either colour of body or with transparent webs, body without conspicuous black marks, luminescent organs present or absent.



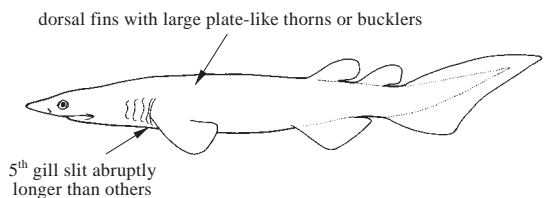
Habitat, biology, and fisheries: Kitefin sharks occur in deep water near the bottom on the continental and insular slopes between 200 and at least 1 800 m, but most species are dwarf oceanic sharks and occur in the epipelagic, mesopelagic, and probably bathypelagic zones. Occasional individuals occur in shallow water on the continental shelves, and may wash up on beaches. These dogfishes are circumglobal in temperate to tropical seas and may range into higher latitudes. Kitefin sharks feed on a wide variety of bony fishes, other elasmobranchs, cephalopods, crustaceans, worms and tunicates; some species (*Isistius*) are partially ectoparasitic and take chunks out of larger marine animals, including bony fishes, elasmobranchs, and cetaceans. Reproduction is ovoviparous, with 6 to 16 young per litter. In the eastern Atlantic and the Far East one kitefin shark, *Dalatias licha*, is commonly fished with line gear and bottom trawls, and fixed bottom nets for human consumption and for their livers, which are extremely large, oily, and have a high squalene content.



tooth

Similar families occurring in the area

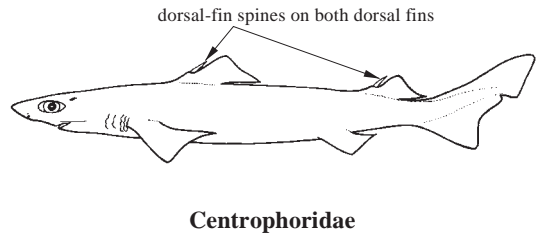
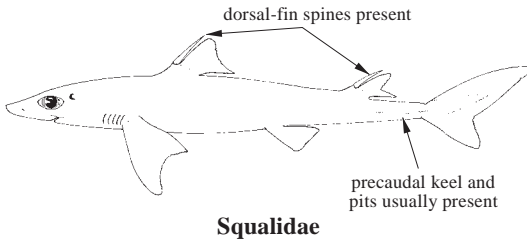
Echinorhinidae: body set with sparse, large, plate-like thorns or bucklers; spiracles small and well behind eyes; fifth pair of gill slits abruptly longer than others; mouth broadly rounded; teeth not imbricated, upper teeth nearly as large as lower teeth, with cusplets present in large juveniles and adults.



Echinorhinidae

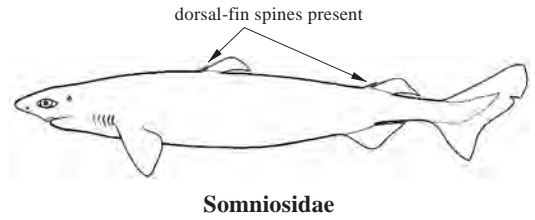
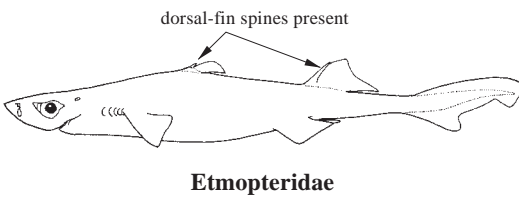
Squalidae: snout flattened; nostrils far apart; upper teeth nearly as large as lowers, both upper and lower teeth imbricated and blade-like; precaudal keels and usually upper precaudal pits present; fin spines present on both dorsal fins, second dorsal fin falcate; no subterminal notches on caudal fin.

Centrophoridae: snout flattened; nostrils far apart; both upper and lower teeth compressed, imbricated and blade-like; dorsal fins larger and with origin of first anterior to pectoral rear tips; strong fin spines present on both dorsal fins.



Etmopteridae: snout flattened; nostrils far apart; cusplets present on upper teeth; fin spines present on both dorsal fins; origin of first dorsal fin over or behind the pectoral fin free rear tips; second dorsal fin more or less falcate; body usually with conspicuous black markings and luminescent organs.

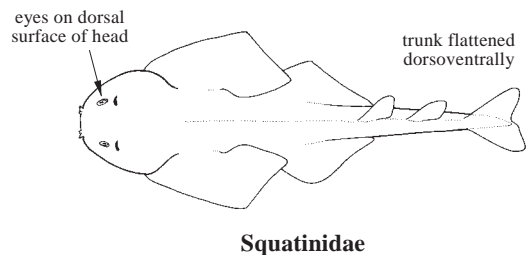
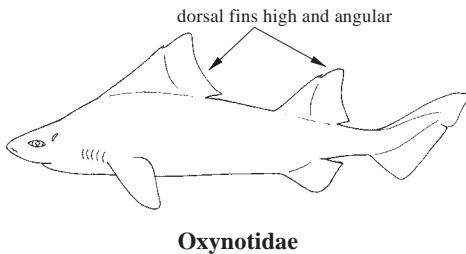
Somniosidae: snout broader and more flattened; nostrils far apart; species in the area with fin spines on both dorsal fins.



Oxynotidae: body high and compressed; conspicuous lateral keels present on abdomen; dorsal fins very high and angular, large dorsal-fin spines present but buried in the dorsal fins with only the tips exposed.

Squatinae: trunk much flattened dorsoventrally; eyes on dorsal surface of head; anterior margins of pectoral fins extending forward past gill openings and partly concealing them; pelvic fins also very broad, wing-like.

All other shark families: anal fin present.



Key to species of Dalatiidae occurring in the area

- 1a. First dorsal fin with a low spine, second dorsal fin spineless (Fig. 1) *Squaliolus laticaudus*
- 1b. Both dorsal fins without spines. → 2

- 2a. Lips fringed; edges of lower teeth serrated; caudal fin strongly asymmetrical, without a well-developed lower lobe (Fig. 2) *Dalatias licha*
- 2b. Lips not fringed; edges of lower teeth smooth; caudal fin slightly asymmetrical, with a strong lower lobe. → 3

1st dorsal-fin spine present

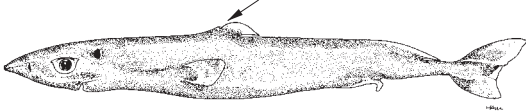


Fig. 1 *Squaliolus laticaudus*

dorsal fins spineless



Fig. 2 *Dalatias licha*

- 3a. Cusps of lower teeth oblique, edges notched; first dorsal fin much smaller than second, its base well in front of pelvic-fin origins (Fig. 3) *Euprotomicrus bispinatus*

1st dorsal fin much smaller than 2nd

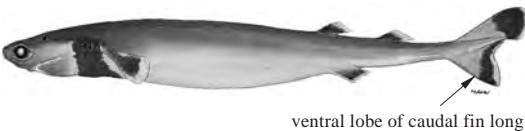


Fig. 3 *Euprotomicrus bispinatus*

- 3b. Cusps of lower teeth erect, edges not notched; first dorsal fin about as large as second, the rear end of its base about over pelvic-fin origins → 4

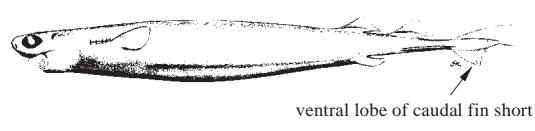
- 4a. Lower teeth in 25 to 32 rows; caudal large and with a long ventral lobe; a prominent dark collar marking around throat (Fig. 4) *Isistius brasiliensis*

- 4b. Lower teeth in 17 to 19 rows; caudal small and with a short ventral lobe; no collar marking on throat or irregular markings (Fig. 5) *Isistius plutodus*



ventral lobe of caudal fin long

Fig. 4 *Isistius brasiliensis*



ventral lobe of caudal fin short

Fig. 5 *Isistius plutodus*

List of species occurring in the area^{1/}

The symbol is given when species accounts are included.

- Dalatias licha* (Bonnaterre, 1788).
- Euprotomicrus bispinatus* (Quoy and Gaimard, 1824).
- Isistius brasiliensis* (Quoy and Gaimard, 1824).
- Isistius plutodus* Garrick and Springer, 1964.
- Squaliolus laticaudus* Smith and Radcliffe, 1912.

The arrangement of genera and species adopted here follows the forthcoming revision of the FAO shark catalog (Compagno, 2004 in prep.).

^{1/} The longnose pygmy shark, *Heteroscymnoides marleyi* Fowler, 1934, occurs in the open ocean somewhat to the south of the area off southern Namibia and the west coast of South Africa while the taillight shark, *Euprotomicroides zantedeschia* Hulley and Penrith, 1966 occurs off the west coast of South Africa. Both of these rare oceanic species may eventually be found within the area.

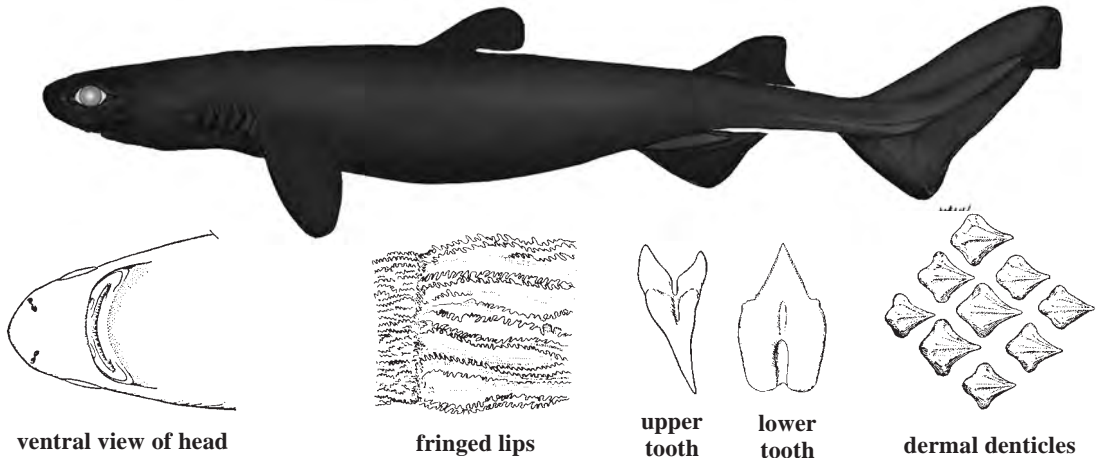
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***Dalatias licha* (Bonnaterre, 1788)**

Frequent synonyms / misidentifications: *Scymnorhinus licha* (Bonnaterre, 1788) / None.

FAO names: En – Kitefin shark; Fr – Squale liche; Sp – Carocho.



Diagnostic characters: A small to moderately large shark of cylindrical body; **dermal denticles of back low, sessile, with short, pointed cusps and longitudinal ridges**; eyes moderately large; snout rounded and conical, about as long as mouth width; **lips very thick and fringed with transverse pleats and grooves**; teeth differing in upper and lower jaws, **uppers much smaller, not blade-like, with slender, erect to semi-oblique, needle-like cusps and no cusplets**; **lowers very large, blade-like, with a single, very broad, high, erect or semi-erect triangular cusp**, no cusplets, a shallow to deep outer notch and serrations. **No spines on dorsal fins; first dorsal closer to pectorals than to pelvics**, its origin posterior to inner corners of pectorals; **second dorsal slightly larger than first**; pectoral fins considerably shorter than upper caudal margin; **caudal fin with subterminal notch strongly developed, its lower lobe very weak or undeveloped**. Caudal peduncle without dermal keels or precaudal pits. **Colour:** body a uniform dark grey or chocolate brown, rear edges of fins light.

Size: Maximum: at least 160 cm, possibly to 182 cm, most adults between 100 and 150 cm.

Habitat, biology, and fisheries: A common bottom and midwater shark of the outer continental shelves and upper slopes on the bottom and in midwater, depths from 40 to 1 800 m but mostly found below 200 m and down to 1 000 m, but sometimes in shallower water. Ovoviviparous, number of young 3 to 16, size at birth about 30 cm. Found in schools or groups usually of one sex. Feeds on a wide variety of small to moderately large bottom and midwater bony fishes including argentinid smelt, viperfishes, scaly dragonfishes, barracudinas, greeneyes, lanternfish, bristlemouths, cod, ling, whiting and other cod-like fishes, hake, grenadiers, deepwater scorpionfish, epigonids, bonito, snake mackerel, and deep-water anglers, on other sharks and skates, squid and octopuses, a variety of crustaceans including shrimps and lobsters, and polychaete worms and siphonophores. Offshore. Separate statistics are not reported for this species. Caught in bottom trawls. Utilized for meat, squalene-rich liveroil, fishmeal, and leather.

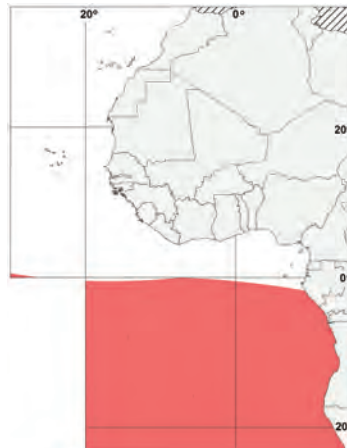
Distribution: In the area found from off Morocco to Senegal, including Madeira and Canary Islands, and from Côte d'Ivoire to Cameroon; also, in the eastern Atlantic off the Azores and northward to the North Sea and Scotland and in the western Mediterranean. Elsewhere, in the western Atlantic, western Indian Ocean and western and central Pacific.



Euprotomicrus bispinatus (Quoy and Gaimard, 1824)

En – Pygmy shark; **Fr** – Squalé pygmée; **Sp** – Tollo pigmeo.

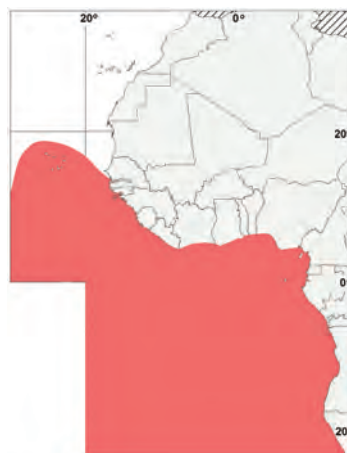
Maximum total length to about 27 cm, adults maturing at 17 to 22 cm. Epipelagic, mesopelagic, and possibly bathypelagic in the ocean basins, caught near the surface over depths of 1 829 to 9 938 m. Feeds on deepwater bony fishes, squids and crustaceans. Without interest to fisheries and mostly caught by research vessels. Oceanic and nearly circumtropical.



Isistius brasiliensis (Quoy and Gaimard, 1824)

En – Cookie cutter shark; **Fr** – Squalélet féroce; **Sp** – Tollo cigarro.

Maximum total length to about 50 cm, adults maturing at 31 to 44 cm. Epipelagic, mesopelagic, and bathypelagic at depths from the surface to 3 500 m, in the ocean basins and near islands and continents. Makes diurnal vertical migrations probably from below 1 000 m in the day to or near the surface at night. Feeds on freeliving deepwater prey including squid, bristlemouth fish, and crustaceans, but is also a facultative ectoparasite and cuts plugs of tissue out of larger marine organisms including bony fishes, other sharks, whales and dolphins, and hair seals. No importance to fisheries in the area, damages commercial bony fishes. A widespread oceanic shark in temperate and tropical seas, with numerous records within the area but mostly in lower latitudes.



***Isistius plutodus* Garrick and Springer, 1964**

En – Largetooth cookiecutter shark; **Fr** – Squalelet dentu; **Sp** – Tollo cigarro dentón.

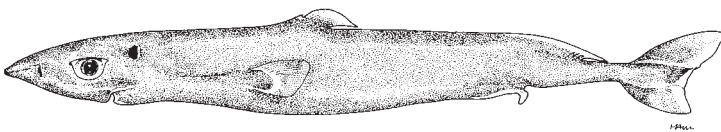
Maximum total length to at least 42 cm. Benthic on continental shelf at about 100 m; epipelagic above continental slopes and over submarine trenches near surface at depths of 60 to 200 m over water 815 to 6 440 m deep; so far the few specimens caught are near continents. Biology little known, probably ectoparasitic on bony fishes (plug of fish found in stomach). No importance to fisheries in the area. In the area a record off Western Sahara, elsewhere rare but wide-ranging in the Atlantic and western Pacific, including north of the area and possibly off South Africa.



***Squaliolus laticaudus* Smith and Radcliffe, 1912**

En – Spined pygmy shark; **Fr** – Squale nain; **Sp** – Tollo pigmeo espinudo.

Maximum total length to about 28 cm, maturing as small as 15 cm. Epipelagic and mesopelagic in the tropics near continental and island land masses, usually over the slopes at depths of 200 to 500 m, apparently not extending far into the ocean basins. Migratory with a diel cycle, descending deeper during the daytime and rising at night, but apparently avoiding the surface at night. Feeds on deepwater squids and bony fishes. Without interest to fisheries. Oceanic and nearly circumtropical, in the area from open ocean north of the Canary Islands and west of Morocco, and north of the Cape Verde Islands and west of Mauritania; also from Azores.

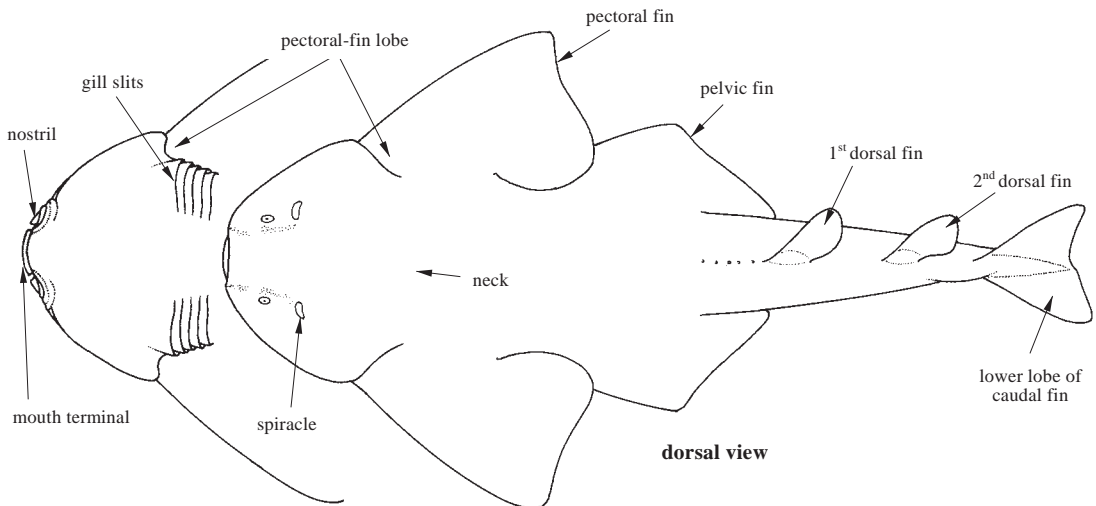


Order SQUATINIFORMES

SQUATINIDAE

Angel sharks or sand devils

Diagnostic characters: Moderately large, **flattened, ray-like sharks** (total length of adults 75 to possibly 244 cm but most below 170 cm). Head transversely oval or round, **with a distinct neck at the pectoral-fin bases**; 5 pairs of moderately long **gill slits situated ventrolaterally and not visible dorsally**; no gillrakers; nostrils at tip of snout, with anterior flaps shaped as elaborate barbels; eyes on dorsal surface of head, without nictitating eyelids; **mouth terminal**, short and angular, extending under front of eyes when jaws are not protruded; teeth small, similar in both jaws, with a single, strong, needle-sharp cusp and no cusplets. **Pectoral fins greatly enlarged, with a broad triangular lobe extending forward from their bases on either side of gill slits** (but not fused to sides of head as in rays); pelvic fins enlarged and wing-like; **2 equally small, spineless dorsal fins located far rearward on tail**, the first dorsal fin originating behind the pelvic-fin bases; **anal fin absent**; caudal fin very short, nearly symmetrical but not lunate, **its lower lobe slightly longer than the upper**. Caudal peduncle moderately depressed, with a short, low, longitudinal keel on each side, but without precaudal pits. Intestine with an auger- or corkscrew-like spiral valve. **Colour:** grey or brownish above, white below, often with irregular darker markings or light ocelli.

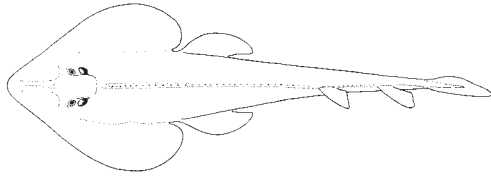


Habitat, biology, and fisheries: Angel sharks are widely distributed and often abundant in cool temperate to tropical regions, ranging in depth from shallow inshore waters down the continental slope from the intertidal zone to 1 290 m depth, but mostly less than 400 m. They are bottom-dwelling, often buried in sand or mud, and feed on small fishes and bottom invertebrates. Ordinarily harmless, but aggressive when provoked and capable of causing serious cuts with their small but sharp teeth and strong jaws. Angel sharks are commonly caught in trawls and utilized for human consumption and for fishmeal; their skin makes good leather and shagreen for sanding wood.

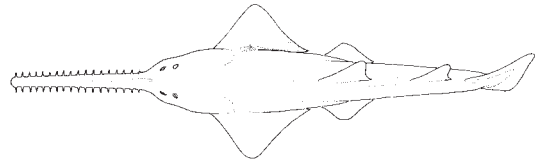
Similar families occurring in the area

The combination of characters such as terminal mouth, greatly flattened head and body, ventrolateral gill openings, free anterior lobes of the very large, triangular pectoral fins, dorsal fins posterior in position, absence of anal fin, and long lower caudal-fin lobe with vertebral axis bent into it, readily distinguishes these unmistakable sharks from all other sharks in the area.

Guitarfishes (Rhinobatidae) and sawfishes (Pristidae) are rays that are superficially similar to angel sharks, but have the pectoral fins fused to the head over the ventral gill openings, ventral mouths, small cusplless teeth, and a heterocercal caudal fin with the lower lobe of caudal fin, when present, shorter than the upper lobe and with the vertebral axis extending into the upper lobe.



Rhinobatidae



Pristidae

Key to species of Squatinidae (Genus *Squatina*) occurring in the area

- 1a. Head and trunk broad; pectoral fins shorter and higher, with acutely angular apices; no thorns on head; denticles of back with very narrow, sharp-cusped crowns; section of upper lip between nasal flaps expanded as a low, broad arch; barbel on each anterior nasal flap simple (Fig. 1) ***Squatina squatina***
- 1b. Head and trunk narrow; pectoral fins longer and lower, with broad apices; enlarged thorns present on head; denticles of back with very broad, blunt-cusped crowns; section of upper lip between nasal flaps usually expanded as a high and narrow arch; barbel on each anterior nasal flap complex, with weak to strong fringes → 2

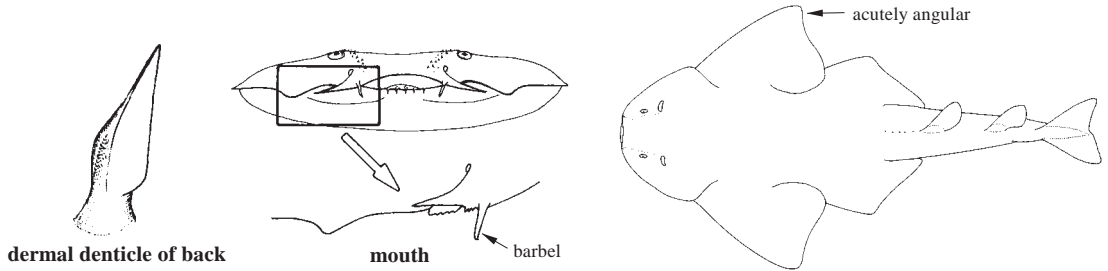


Fig. 1 *Squatina squatina*

- 2a. Thorn-like denticles on midline of back either small or absent; origin of first dorsal fin usually behind rear tips of pelvic fins; denticles of back with posteriorly hooked, wedge-shaped crowns; anterior nasal flaps and nasal barbels with weak, shallow fringes; large and conspicuous white spots present on back (Fig. 2) ***Squatina oculata***
- 2b. Thorn-like denticles on midline of back very large and conspicuous; origin of first dorsal fin about opposite or slightly anterior to rear tips of pelvic fins; denticles of back with erect, unhooked, pyramidal crowns; anterior nasal flaps and anterior nasal barbels with strong, deep, very prominent fringes; small inconspicuous or obscure white spots present on back (Fig. 3) ***Squatina aculeata***

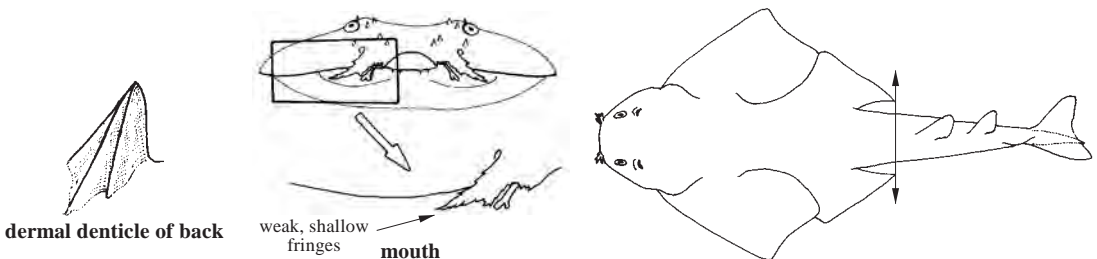


Fig. 2 *Squatina oculata*

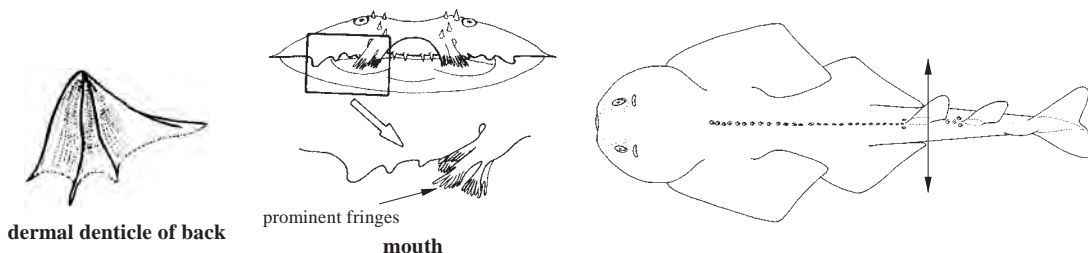





Fig. 3 *Squatina aculeata*

List of species occurring in the area

The shark symbol  is given when species accounts are included.

-  *Squatina aculeata* Duméril, in Cuvier, 1829.
-  *Squatina oculata* Bonaparte, 1840.
-  *Squatina squatina* (Linnaeus, 1758).

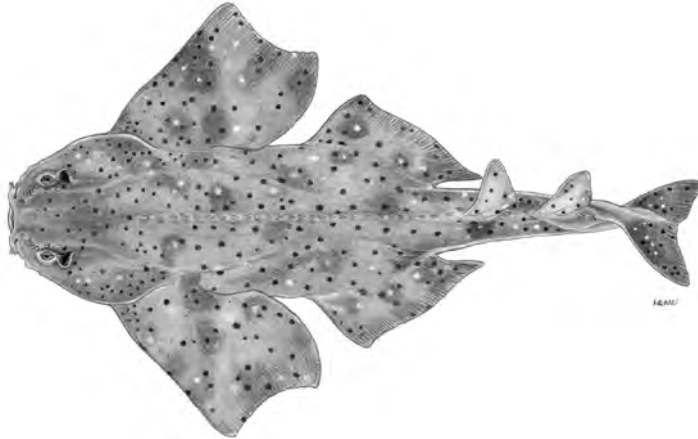
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***Squatina aculeata* Duméril, in Cuvier, 1829**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Sawback angelshark; Fr – Ange de mer épineux; Sp – Angelote espinudo.



Diagnostic characters: A moderately large, flattened, ray-like shark. Body greatly depressed and broad, the width across rear ends of pectoral-fin bases about 5.4 to 6.0 times in total length. Dermal denticles of back with very broad, erect, blunt-cusped pyramidal crowns; very large thorns present on snout and between eyes and spiracles; very large thorns on midline of back and tail, from base of head to behind second dorsal fin. Head greatly depressed, nearly circular, with a distinct “neck” at pectoral-fin origins; eyes relatively large, their diameter about 3.1 times in space between them and about 1.3 times in spiracle width; 5 moderately long gill slits, ventrolaterally situated and concealed by the anterior pectoral-fin lobes; spiracles very large; nostrils at tip of snout; anterior nasal flaps narrowly separated and deeply fringed, each with a strongly branched barbel; posterior nasal flaps large, strongly fringed; section of upper lip between anterior nasal flaps formed as a high and narrow arc; dermal folds on sides of head with 3 triangular lobes on each side; mouth terminal, short, extending below eyes; teeth in both jaws with a strong, short cusp and no cusplets; the enlarged pectoral fins relatively long, low and moderately pointed apically; pelvic fins broad; position of first dorsal-fin origin ranging from slightly anterior to slightly posterior to free rear tips of pelvic fins; anal fin absent; caudal fin short, nearly symmetrical, its lower lobe longer than the upper; caudal peduncle with a pair of short keels and a weak upper precaudal pit. **Colour:** brown or grey brown above, white below, with obscure darker markings and small, relatively obscure, symmetrical white spots.

Size: Maximum total length 188 cm; becoming adult at 124 cm.

Habitat, biology, and fisheries: A warm-temperate to tropical species of the continental shelves and uppermost continental slopes, ranging in depth from 30 to 300 m. Inshore and offshore waters in the area. Ovoviviparous. Eats small sharks, herrings, jacks, pickerels, soles and other flatfish, cuttlefish, shrimp, mantis shrimp, and crabs. Separate statistics are not reported for this species. This species is caught primarily in bottom trawls, but also with fixed bottom nets, on line gear, and even in pelagic trawls. Utilized dried-salted, fresh and for oil; hides are used for leather. A demersal fishery for this species and *Squatina oculata* recently occurred off Namibia.

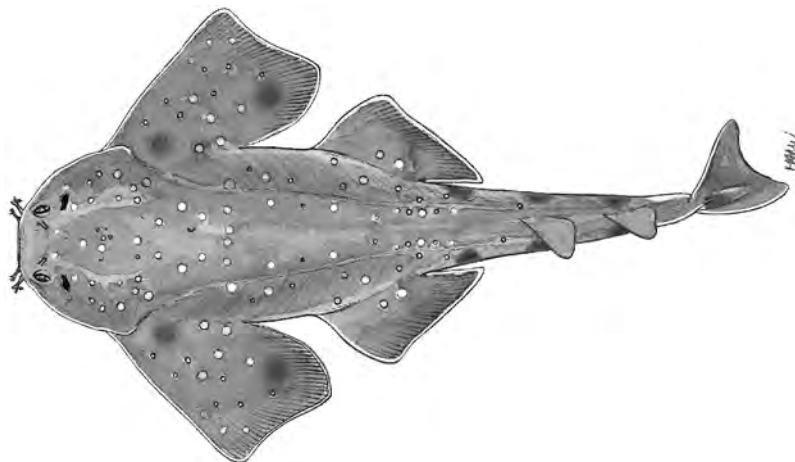
Distribution: In the area recorded from Morocco, Western Sahara, Mauritania, Senegal, and Guinea to Nigeria, and Gabon to southern Angola and Namibia, but possibly more widespread in the area; also extending into the western Mediterranean.



Squatina oculata Bonaparte, 1840

Frequent synonyms / misidentifications: None / None.

FAO names: **En** – Smoothback angelshark; **Fr** – Ange de mer ocellé; **Sp** – Pez ángel.



Diagnostic characters: A moderately large, **flattened, ray-like shark**. Body greatly depressed and broad, **the width across rear ends of pectoral-fin bases about 4.9 to 5.9 times in total length**. **Dermal denticles on back with broad, wedge-like crowns and blunt, posteriorly hooked cusps; large thorns present on snout and between eyes and spiracles**; large thorn-like denticles on midline of back either absent or, when present, small and extending from pelvic-fin bases to first dorsal-fin origin. Head greatly depressed, nearly circular, relatively elongated, with a distinct "neck" at pectoral-fin origins; **eyes relatively large, their diameter 2.8 to 3.4 times in space between them and 1.0 to 1.7 times the spiracle width**; 5 moderately long gill slits, ventrolaterally situated and concealed by the anterior pectoral-fin lobes; spiracles very large; nostrils at tip of snout; **anterior nasal flaps narrowly separated, large and weakly fringed, each with a slightly branched barbel; posterior nasal flaps small, 1 smooth or weakly fringed; section of upper lip between anterior nasal flaps formed as a high and narrow arc; dermal folds on sides of head without triangular lobes**; mouth terminal, short, extending below eyes; teeth in both jaws with a strong, short cusp and no cusplets; the enlarged pectoral fins relatively long, low and moderately pointed apically; pelvic fins broad; position of first dorsal-fin origin ranging from slightly behind to opposite to free rear tips of pelvic fins; anal fin absent; caudal fin short, nearly symmetrical, its lower lobe longer than the upper; caudal peduncle with a pair of short keels and a weak upper precaudal pit. **Colour:** light brown above, white below, with darker bars on tail, dark spots on pectoral fins and body, and **prominent, symmetrical, large white ocelli on pectoral fins, back and tail**; edges of pectoral and pelvic fins dusky.

Size: Maximum total length possibly to 160 cm; most adults between 30 and 95 cm.

Habitat, biology, and fisheries: A warm-temperate to tropical species of the continental shelves and upper continental slopes, ranging in depths from 20 to 500 m or more, but more common in deeper, cooler waters below 100 m. Oviviparous. Feeds on bony fishes, including argentinies, jacks, codlets, goatfishes, flatfish, squid, octopuses, mud shrimp, and crabs. This species occurs in both inshore and offshore waters in the area. Separate statistics are not reported for this species. This species is caught primarily in bottom trawls, but also in fixed bottom nets, on line gear, and even in pelagic trawls. Utilized fresh, dried-salted, and processed for oil and fishmeal. A demersal fishery for this species and *Squatina aculeata* recently occurred off Namibia.

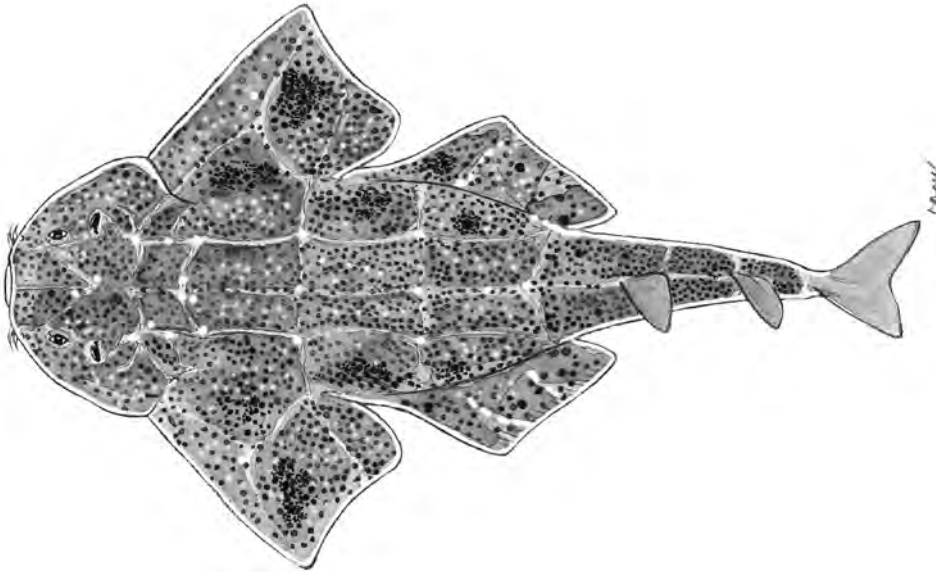
Distribution: In the area, from Morocco, Mauritania, Western Sahara, Canary Islands, Senegal, Guinea, Côte d'Ivoire, Nigeria, São Tomé, Gabon, Congo, Republic of Congo, Angola (including Cabinda), to Namibia; also in the Mediterranean and off southern Portugal and Spain in the eastern Atlantic.



Squatina squatina (Linnaeus, 1758)

Frequent synonyms / misidentifications: *Squatina vulgaris* Risso, 1810; *S. angelus* Blainville, 1816; *S. laevis* Cuvier, 1817 / None.

FAO names: **En** – Angelshark; **Fr** – Ange de mer commun; **Sp** – Angelote.



Diagnostic characters: A moderately large, flattened, ray-like shark. Body greatly depressed and **very broad, the width across rear ends of pectoral-fin bases about 3.6 to 4.0 times in total length**. **Dermal denticles of back with very narrow, sharp-cusped crowns**; clusters of moderately enlarged denticles present on snout and between eyes, but **no large thorns on head**; enlarged thorn-like denticles on midline of back either absent or, when present, small and extending from pelvic-fin bases to first dorsal fin. Head greatly depressed, transversely oval, very broad and short, with a distinct “neck” at pectoral-fin origins; **eyes relatively small, their diameter 3.5 to 5.5 times in space between them and 0.6 to 1.0 times in spiracle width**; 5 moderately long gill slits, ventrolaterally situated and concealed by the anterior pectoral-fin lobes; spiracles very large; nostrils at tip of snout; **anterior nasal flaps broadly separated, smooth or weakly fringed, each with a simple barbel**; **posterior nasal flaps small, smooth or weakly fringed**; **section of upper lip between anterior nasal flaps formed as a low and broad arc**; **dermal folds on sides of head with a single triangular lobe**; mouth terminal, short, extending below eyes; teeth in both jaws with a strong, short cusp and no cusplets; the enlarged pectoral fins relatively short, high, and pointed apically; pelvic fins broad; first dorsal fin originating opposite or somewhat posterior to free rear tips of pelvic fins; anal fin absent; caudal fin short, nearly symmetrical, its lower lobe longer than the upper; caudal peduncle with a pair of short keels and a weak upper precaudal pit. **Colour:** light to dark brown or grey-brown above, white below, with obscure dark mottling or bands and sometimes relatively inconspicuous, irregular or symmetrical white spots on pectoral fins, back and tail.

Size: Maximum: at least 180 cm (said to attain 244 cm), but common to 100 cm.

Habitat, biology, and fisheries: A temperate-water, bottom-dwelling inshore and offshore shark of the continental shelves, occurring from close inshore waters down to 150 m depth. Often buries itself in mud or sand, but can swim strongly well off the bottom; more active at night; seasonally migrates northward in the summer. Ovoviviparous, number of fetuses in a litter 9 to 20, length of young at birth about 24 cm total length.

Feeds especially on flatfishes and soles, but also other demersal bony fishes including hakes, sparids, and grunts, also skates, squid, cuttlefish, crabs and other crustaceans, and rarely eelgrass and seabirds. Separate statistics are not reported for this species. Caught in bottom trawls and on line gear. Utilized fresh, dried-salted, and possibly for oil and fishmeal.

Distribution: Found in the northern part of the area off Morocco, Western Sahara, Mauritania and especially the Canary Islands; nominally also off Senegal and Guiana (but these records may be based on *Squatina aculeata*). Northward it extends from Spain north to Norway, Sweden, Denmark and the Shetland Islands and into the Mediterranean and Black Seas.

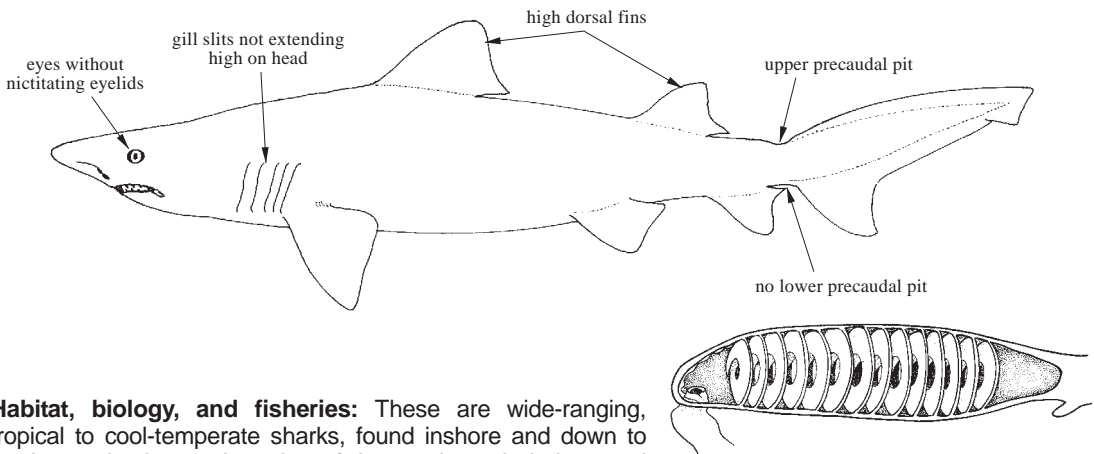


Order LAMNIFORMES

ODONTASPIDIDAE

Sand tiger sharks, ragged-tooth sharks

Diagnostic characters: Large stocky sharks with firm bodies and tough skin. Head with 5 medium-sized gill slits, all in front of pectoral-fin bases, **their upper ends not extending onto dorsal surface of head**; gill arches without rakers; spiracles present but very small; no nasal barbels or nasoral grooves; eyes small or moderately large, **without nictitating eyelids**; snout conical or moderately depressed, not blade-like; mouth very long and angular, extending well behind eyes when jaws are not protruded; **lower labial furrows present at mouth corners**; anterior teeth enlarged, with long, narrow, sharp-edged but unserrated cusps and small basal cusplets (absent in young of at least one species), the upper anterior teeth separated from the lateral teeth by a gap and rows of tiny intermediate teeth. **Pectoral fins small, broad, short and triangular.** Pelvic fins moderately large, about equal-sized or smaller than first dorsal fin and about equal-sized or larger than second dorsal fin. Two moderately large, **high dorsal fins, the first dorsal fin originating well in advance of the pelvic fins**, the second dorsal fin as large as the first dorsal fin or somewhat smaller; anal fin as large as second dorsal or slightly smaller, angular in shape; caudal fin short, asymmetrical, with a strong subterminal notch and a short but well marked ventral lobe. Caudal peduncle not depressed, **without keels**; **a deep upper precaudal pit present but no lower pit.** Intestinal valve of ring type, with turns closely packed like a stack of washers. **Colour:** grey or grey-brown to blackish above, blackish to light grey or white below, with round or oval dark spots and blotches variably present on two species.

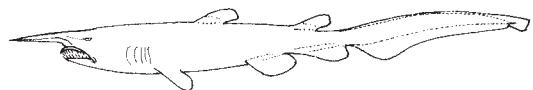


intestinal valve of ring type

Habitat, biology, and fisheries: These are wide-ranging, tropical to cool-temperate sharks, found inshore and down to moderate depths on the edge of the continental shelves and around some oceanic islands, and in the open ocean. Development is ovoviparous (aplacental viviparous) as far as known. They feed on bony fishes, other sharks, squids and occasionally bottom crustaceans. Normally inoffensive, occasionally biting people, two species are popular as subjects of ecotouristic diving and one as an aquarium exhibit. In the present area, *Carcharias taurus* was formerly caught for food, liver oil, and fishmeal but is possibly depleted. The two species of *Odontaspis* are rarely caught as bycatch in the area and are not utilized commercially.

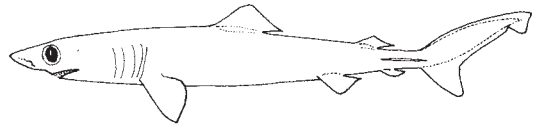
Similar families occurring in the area

Mitsukurinidae: body very soft and flabby and thin-skinned, whitish in colour, snout extremely elongated, flattened and blade-like, pectoral fins very short and rounded, anal fin broadly rounded, no lower lobe on caudal fin, no precaudal pits; may grow larger, about 6 m long.



Mitsukurinidae

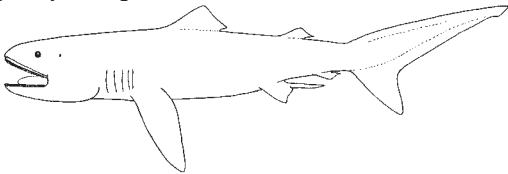
Pseudocarchariidae: body slimmer, gill slits higher and reaching onto dorsal sides of head, eyes larger, no true labial furrows, dorsal and anal fins lower, a weak lateral keel on caudal peduncle and both upper and lower precaudal pits present, maximum size less than 1.3 m long.



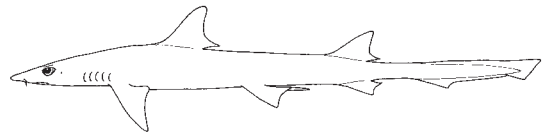
Pseudocarchariidae

Megachasmidae: snout very short and broadly rounded, mouth huge, terminal and with numerous small, hooked teeth in both jaws, head very long, gillraker papillae present on internal gill slits, pectoral fins narrow, leaf-shaped, and with origins under third gill slits, body very soft and flabby, size probably greater, adults 4.5 to 5.6 m long.

Leptochariidae, Triakidae, Hemigaleidae and Carcharhinidae: nictitating eyelids present, anterior teeth not greatly enlarged, no intermediate teeth between anteriors and laterals, intestinal valve of spiral or scroll type.



Megachasmidae



Leptochariidae

Key to genera and species occurring in the area

- 1a. Snout short and somewhat flattened (Fig. 1a); eyes very small; 3 rows of anterior teeth on either side of upper symphysis (Fig. 2a); first dorsal fin closer to pelvic bases than to pectoral bases; second dorsal fin about as large as first dorsal fin; anal fin about equal to dorsal fins in size (Fig. 3) **Carcharias taurus**
- 1b. Snout longer, bulbous and conical (Fig. 1b); eyes larger; 2 rows of large anterior teeth on either side of upper symphysis; first dorsal fin closer to pectoral bases than to pelvic bases; second dorsal fin smaller than first dorsal fin and larger than anal fin (**Odontaspis**) → 2



a) *Carcharias taurus* b) *Odontaspis ferox*
Fig. 1 ventral view of head

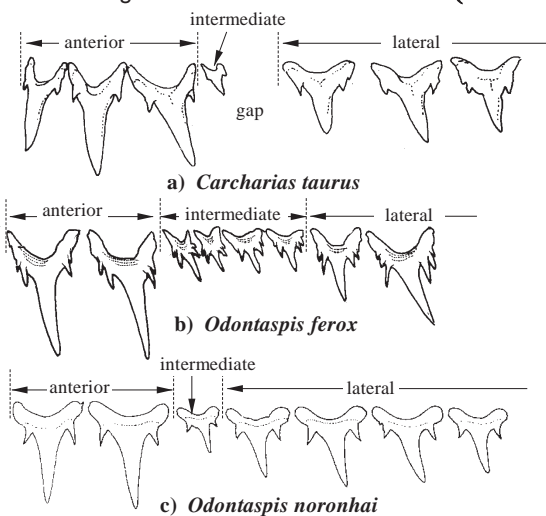


Fig. 2 upper teeth of left side



Fig. 3 *Carcharias taurus*

- 2a. Teeth with mostly 2 or 3 cusplets on each side; 3 to 5 pairs of intermediate teeth present (Fig. 2b); anal fin high; ventral caudal lobe short but strong; colour grey or grey-brown above, lighter below, often with darker spots on sides, no light patch on first dorsal fin (Fig. 4) ***Odontaspis ferox***
- 2b. Teeth usually with a single cusplet on each side; 1 to 3 pairs of intermediate teeth present (Fig. 2c); anal fin lower; ventral caudal lobe hardly developed; colour blackish or brownish black above and below, often with a light patch on the first dorsal fin (Fig. 5). . ***Odontaspis noronhai***

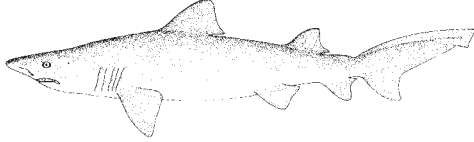


Fig. 4 *Odontaspis ferox*

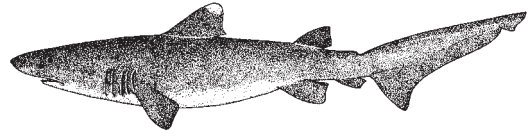


Fig. 5 *Odontaspis noronhai*

List of species occurring in the area

The shark symbol is given when species accounts are included.

- Carcharias taurus* Rafinesque, 1810.^{1/}
- Odontaspis ferox* (Risso, 1810).^{2/}
- Odontaspis noronhai* (Maul, 1955).^{3/}

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Compagno, L.J.V. 2001. *Sharks of the world. An annotated and illustrated catalogue of the shark species known to date. Volume 2. Bullhead, mackerel and carpet sharks (Heterodontiformes, Lamniformes and Orectolobiformes). FAO Species Catalogue for Fisheries Purposes. No. 1, Vol. 2. Rome, FAO, 269 p., figs 163.*

Fergusson, I.K., Graham, K. & Compagno, L.J.V. 2007 in press. Distribution, abundance and biology of the smalltooth sandtiger shark *Odontaspis ferox* (Risso, 1810) (Lamniformes: Odontaspididae). *Environmental Biology of Fishes*. 37 ms. pp., tabs 1–6, figs 1–9.

^{1/} This species is often placed in *Odontaspis*, but external and anatomical studies show that it is very distinct and rates generic separation.

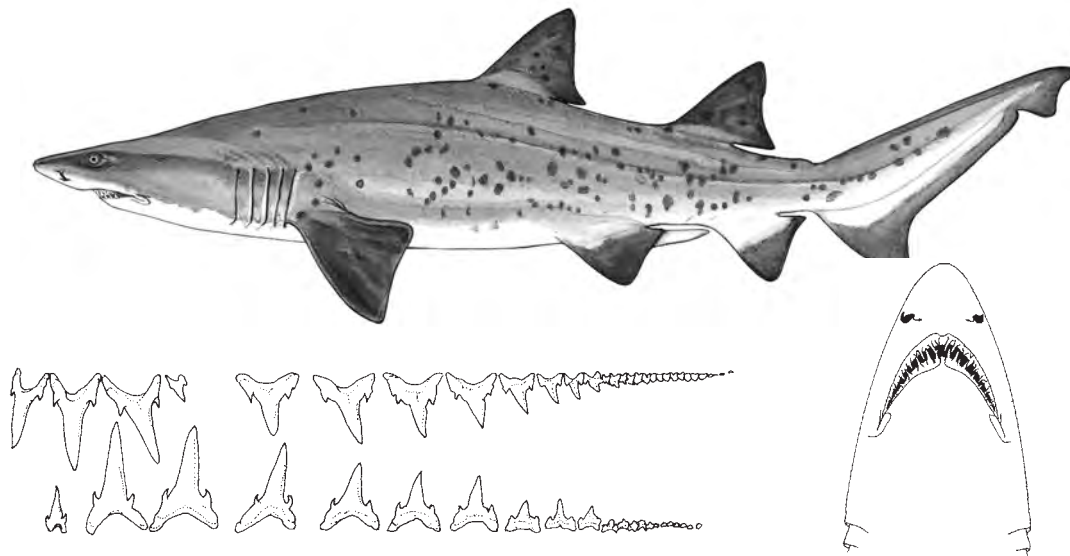
^{2/} Sometimes considered as 2 species. *Odontaspis herbsti* Whitley, 1950 from Australia and New Zealand, and *O. ferox* from elsewhere, but these are apparently not distinct.

^{3/} Compagno (1981) thought it possible that *Odontaspis noronhai* was a morphological extreme of *O. ferox* and not a valid species, but subsequent information proved it valid (see Compagno, 1984, 2001).

***Carcharias taurus* Rafinesque, 1810**

Frequent synonyms / misidentifications: *Odontaspis taurus* Rafinesque, 1810; *Eugomphodus taurus* (Rafinesque, 1810); *Odontaspis platensis* Labille, 1928 / None.

FAO names: En – Sand tiger shark; Fr – Requin taureau; Sp – Toro bacota.



upper and lower teeth of left side

ventral view of head

Diagnostic characters: A large shark. Head with 5 medium to large gill slits, all in front of pectoral-fin bases, no gillrakers; **snout very short, moderately flattened**; no nasal barbels or nasoral grooves; **eyes small, without nictitating eyelids**; mouth very long and angular, extending well behind eyes; **upper anterior teeth in 3 rows on either side of symphysis**, large, with long, narrow, hooked, sharp-edged but non-serrated cusps and usually one short cusplet on each side; upper anterior teeth separated from the smaller lateral teeth by **usually a single row of tiny intermediate teeth** (lacking in lower jaw); lower anterior teeth separated at front by 2 rows of small symphyseal teeth (**generally lacking in upper jaw**). Two dorsal fins, the base of first dorsal fin **just in front of pelvic-fin bases and well posterior to pectoral fins**; **second dorsal fin about as large as first dorsal and anal fins**; caudal fin short, strongly asymmetrical, with a pronounced subterminal notch and a short but strong ventral lobe. No keels on caudal peduncle, but with a strong upper precaudal pit and no lower pit. Intestinal valve of ring type. **Colour: light grey-brown above, white below, often with round or oval, yellow or yellow-brown spots and blotches.**

Size: Maximum total length to about 318 cm, possibly up to 430 cm; size at birth 95 to 120 cm; males maturing at about 190 to 195 cm, females at 220 cm or more.

Habitat, biology, and fisheries: A formerly common littoral shark found inshore from the surf zone and in shallow bays to at least 191 m on the outer continental shelves. It commonly lives near or on the bottom but occurs at midwater and at the surface. It is a slow but strong swimmer that can readily halt and hover motionless in midwater, and is the only known shark to gulp and store air in its stomach to maintain neutral buoyancy while swimming. It occurs singly, in pairs, or in large schools or aggregations and is migratory in higher latitudes. In the northern parts of its range it migrates south for the winter. Ovoviviparous (aplacental viviparous), with litters of two or occasionally one young recorded. Only one fetus survives out of several fertilized eggs deposited in each uterus; fetuses resorb their yolk sacs at a small size, with the largest killing smaller rivals and subsisting on additional, nutritive eggs for an 8 to 9 month gestation period. This shark feeds on a wide variety of bony fishes, small sharks, rays, squids, crabs and lobsters. The jaws can be protruded to a considerable distance from the mouth. It is apparently mostly inoffensive, but occasionally may bite divers without attempting to feed. It will readily steal fish from spearfishing divers. It may allow close approach underwater and is a favourite with ecotouristic divers as well as public aquaria. Separate statistics

are not reported for this species. Caught on handlines and longlines, in setnets, and pelagic and bottom trawls in the area, formerly the subject of targeted fisheries and utilized for its flesh smoked and dried-salted, its liver oil, and for fishmeal. The sand tiger shark is exceptionally vulnerable to overfishing because of its slow growth, very low fecundity, restricted coastal habitat, and ease of capture, and is protected in Australia and the United States due to declining numbers. It is ranked as Vulnerable worldwide on the IUCN Red List and Critically Endangered on the east coast of Australia but Near Threatened on the west coast of Australia. It may be severely depleted or essentially extirpated in the eastern Atlantic and Mediterranean as well as the western North Pacific and northern Indian Ocean, but is still moderately common off the east coast of South Africa.

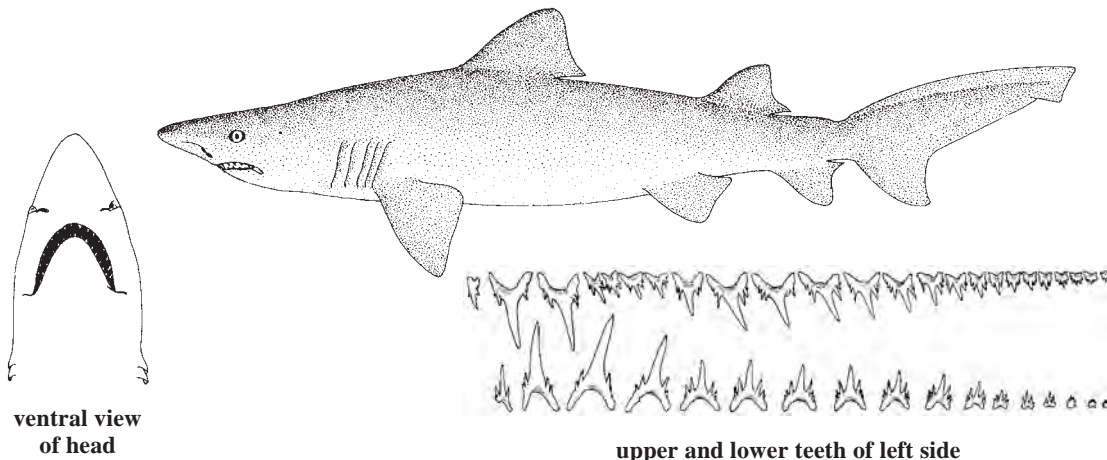
Distribution: A shark of temperate and tropical continental waters, found in all warm seas except perhaps the eastern Pacific. It is most abundant in warm-temperate waters but is relatively uncommon and sporadically distributed in the tropics. It is mostly absent from oceanic islands, and apparently does not readily cross ocean basins. In the area, known from off Morocco to Senegal, including the Canary and Cape Verde Islands, and from Ghana to Cameroon; possibly off northern Namibia, extending northwards to the Mediterranean Sea, and southwards to South Africa. It also occurs in the western Atlantic from New Brunswick and the east coast of the United States to the Bahamas and Gulf of Mexico, and off southern Brazil, Uruguay and Argentina; the western Indian Ocean from South Africa to Mozambique, the Red Sea, Pakistan and possibly India, and the eastern Indian Ocean and western Pacific from Japan, China, Taiwan Province of China, Viet Nam, Indonesia and Australia.



***Odontaspis ferox* (Risso, 1810)**

Frequent Synonyms / Misidentifications: *Carcharias ferox* (Risso, 1810); *Odontaspis herbsti* Whitley, 1950 / None.

FAO names: **En** – Smalltooth sand tiger (AFS: Ragged-tooth shark); **Fr** – Requin féroce; **Sp** – Solrayo.



Diagnostic characters: A large shark. Head with 5 medium to large gill slits, all in front of pectoral fin bases; no gillrakers; **snout moderately elongated, bulbously conical**; no nasal barbels or nasoral grooves; **eyes large, without nictitating eyelids**; mouth very long and angular, extending well behind eyes; anterior teeth moderate-sized with long, narrow, straight, sharp-edged, non-serrated cusps and **2 or 3 moderately long cusplets on each side**, separated in front by **2 rows of small symphyseal teeth in both jaws**; **upper anterior teeth set in 2 rows** on either side of symphysis and separated from the smaller laterals by **2 to 5 (usually 4) rows of tiny intermediate teeth**; lower anterior teeth set in 3 rows on either side of symphysis and not followed by small intermediate teeth. Two dorsal fins, **the first dorsal fin large and situated closer to the pectoral fins than to the pelvic fins**, its free rear tip **well ahead of pelvic fin origins**, **the second dorsal fin smaller than the first dorsal fin and larger than anal fin or about equally large**; caudal fin short, strongly asymmetrical, with a pronounced subterminal notch and a short but strong ventral lobe. No keels on caudal peduncle, but a strong upper precaudal pit. Intestinal valve of ring type. **Colour: medium grey or grey-brown on the upper surface, lighter below**, sometimes with darker dusky spots on side, fins dusky in adults but black-edged in young, **first dorsal fin without a light blotch at its apex**.

Size: Maximum total length to at least 410 cm and possibly larger, with diver claims of individuals over 5 m long; size at birth above 105 cm; males adult at 275 cm, females at 364 cm.

Habitat, biology, and fisheries: A rare to uncommon offshore and deepwater species on continental and insular shelves and slopes from 13 to 420 m, and possibly also the epipelagic zone in 140 to 180 m over the ocean floor close to land. Found on seamounts and underwater ridges. Biology sketchily known, presumably ovoviviparous (aplacental viviparous), feeds on bony fishes, squid and shrimp. An incidental bycatch of fisheries in the area, with separate statistics not reported. Caught with line gear and in bottom trawls. Mostly fished in the Mediterranean Sea and Japan. Recently the subject of ecotouristic diving in the Mediterranean Sea and the eastern Pacific (Malpelo Island), apparently docile but inquisitive around divers. This species is listed on the IUCN Red List as Data Deficient world-wide but Vulnerable off the east coast of Australia.

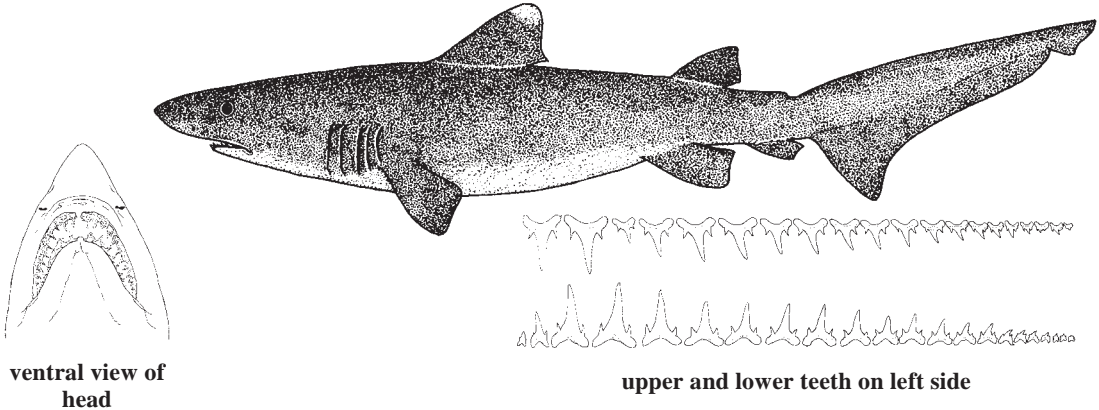
Distribution: A wide-ranging bottom-dwelling shark found in the area off Morocco, the Canary Islands, and Madeira; also off the Azores, in the Bay of Biscay and the Mediterranean. Possibly circumglobal in all warm seas but sporadically distributed in the western and eastern Atlantic, Mediterranean Sea, Indian Ocean, western Pacific, central Pacific and eastern Pacific.



***Odontaspis noronhai* (Maul, 1955)**

Frequent synonyms / misidentifications: *Carcharias noronhai* Maul, 1955 / None.

FAO names: En – Bigeye sand tiger; Fr – Requin noronhai; Sp – Solrayo ojgrande.



Diagnostic characters: A large shark. Head with 5 medium to large gill slits, all in front of pectoral-fin bases; no gillrakers; **snout moderately elongated, bulbously conical**; no nasal barbels or nasoral grooves; **eyes very large, without nictitating eyelids**; mouth very long and angular, extending well behind eyes; anterior teeth moderate-sized with long, narrow, straight, sharp-edged, non-serrated cusps and **a single moderately long cusplet on each side**, separated in front by **2 (sometimes one or none) rows of small symphyseal teeth in the upper jaw and 4 to 8 rows in the lower jaw**; **upper anterior teeth set in 2 rows on either side of symphysis and separated from the smaller laterals by 1 or 2 rows of tiny intermediate teeth**; lower anterior teeth set in 3 rows on either side of symphysis and not followed by small intermediate teeth. Two dorsal fins, the first dorsal fin large and situated **closer to the pectorals than to the pelvis**, its free rear tip **well ahead of pelvic fin origins, the second dorsal fin smaller than the first and noticeably larger than anal fin**; caudal fin short, strongly asymmetrical, with a pronounced subterminal notch and the **ventral caudal lobe hardly developed**. No keels on caudal peduncle, but a strong upper precaudal pit. Intestinal valve of ring type. **Colour: glossy black, brownish black or dark reddish black on entire body and fins, usually a grey or whitish patch on first dorsal fin, no spots on body.**

Size: Maximum total length to at least 360 cm; size at birth unknown; males maturing above 217 cm and females above 321 cm.

Habitat, biology, and fisheries: A rare deepwater and oceanic species that occurs on continental and insular slopes near the bottom at 600 to 1 000 m or more depth, well off the bottom at 100 m in water 640 m deep, and in the epipelagic and mesopelagic zone in water between 4 500 and 5 300 m deep. May migrate vertically during the day, rising to the surface at night; of seasonal occurrence as longline catches off southern Brazil, suggesting possible geographic migration. Biology poorly known, presumably ovoviviparous (aplacental viviparous). Feeds on cephalopods and fishes. An incidental and rare bycatch of oceanic and deep benthic fisheries using pelagic and vertical longlines but little-utilized; may live below the depths fished by fishing operations with horizontal pelagic longlines and purse seines at least during the day, and possibly too large to be a regular pelagic or benthic trawl catch. Conservation status of concern but poorly-known; currently listed as Data Deficient on the IUCN Red List.

Distribution: Possibly circumglobal in all warm seas but sporadically distributed and with very few records in the Atlantic and central Pacific currently known. Occurs off Madeira in the the eastern central Atlantic but probably more widespread in the area. Also occurs in the western Atlantic including the northern Gulf of Mexico off Texas and off Brazil, the central Atlantic near the equator, the Indian Ocean possibly off the Seychelles and definitely off Mauritius, and in the Pacific near the Hawaiian and Marshall islands and in the South China Sea.



MITSUKURINIDAE

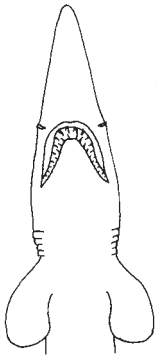
Goblin sharks

A single species in this family.

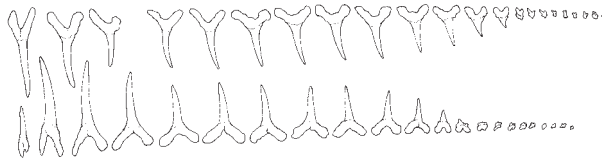
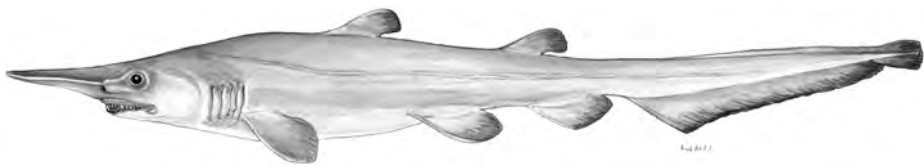
Mitsukurina owstoni Jordan, 1898

Frequent synonyms / misidentifications: *Scapanorhynchus owstoni* (Jordan, 1898); *Mitsukurina nasutus* or *Scapanorhynchus nasutus* (de Bragança, 1904) / None.

FAO names: En – Goblin shark; Fr – Requin lutin; Sp – Tiburón duende.



ventral view of head

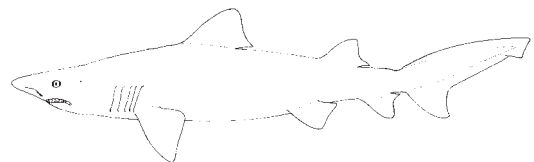


upper and lower teeth of left side

Diagnostic characters: A large, very **soft-bodied, flabby shark**. Head with 5 medium-sized gill slits, all in front of pectoral-fin bases, their upper ends not extending onto dorsal sides of head; no gillrakers; spiracles present but very small; no nasal barbels or oronasal valves; **eyes very small**, on sides of head, **without nictitating eyelids**; **snout very long and flat, formed as a narrow, pointed blade**; mouth long and angular, extending well behind eyes when jaws are not protruded, but mouth extends in front of eyes when jaws are thrust forward to level of snout tip; lower labial furrows present; **anterior teeth large, with long, extremely narrow, hooked, sharp-edged but unserrated cusps**, set in 3 rows on either side of symphysis in both jaws; upper anterior teeth separated from the smaller lateral teeth by a gap without small intermediate teeth; cusplets absent on most teeth. **Pectoral fins small, broad, short, and rounded-triangular in shape. Pelvic fins larger than both dorsal fins. Two low, equal-sized, small dorsal fins**, the first dorsal fin closer to the pectoral fins than the pelvic fins; first dorsal-fin base well in front of the pelvic fins and much shorter than caudal fin; **anal fin low, rounded, and much larger than dorsal fins**; **caudal fin long** but much less than half the total length, strongly asymmetrical, **without a well-developed ventral lobe. Caudal peduncle compressed and without keels or precaudal pits**. Intestinal valve of ring type, with the turns closely packed like a stack of washers. **Colour:** pinkish white to light grey on body in life, fin webs and gill region dusky; often brown in preservative.

Similar families occurring in the area

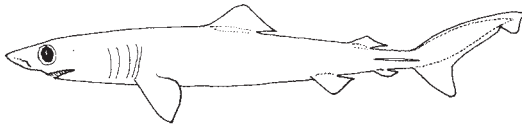
Odontaspidae: snout conical and short; small intermediate teeth present in upper jaw, teeth mostly with prominent cusplets; first dorsal fin larger, anal fin angular and about as large as the dorsal fins or smaller than them; caudal fin with short but strong ventral lobe; caudal peduncle not compressed and with well-developed upper precaudal pit; colour not pinkish white in life.



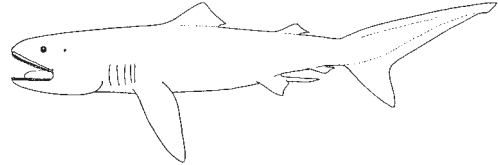
Odontaspidae

Pseudocarchariidae: body slimmer, gill slits higher and reaching onto dorsal sides of head, eyes much larger, no true labial furrows, anal fin smaller and lower, a weak lateral keel on caudal peduncle and both upper and lower precaudal pits present, colour not pinkish white in life; maximum size less than 1.3 m long.

Megachasmidae: snout very short and broadly rounded, mouth huge, terminal and with numerous small, hooked teeth in both jaws, head very long, gillraker papillae present on internal gill slits, pectoral fins narrow, leaf-shaped, and with origins under third gill slits, colour not pinkish white in life.



Pseudocarchariidae



Megachasmidae

Size: Maximum total length about 6 m, most individuals smaller.

Habitat, biology, and fisheries: An uncommon, deepwater bottom-dwelling and possibly semioceanic shark with a spotty but wide distribution on the outer continental shelves and upper slopes down to at least 1 300 m. Most records are between 270 and 960 m deep but rarely taken in shallow water. Biology little known, probably ovoviviparous, adults seldom taken. Preys on bony fishes, squids and crustaceans. Separate statistics are not reported for this species; it is rarely collected in most places other than Japan. It is caught as bycatch of other fisheries in fixed bottom nets, with hook-and-line, and possibly in purse seines. Utilized dried-salted in the area for human consumption; elsewhere, formerly discarded but jaws are prized by collectors who will pay high prices for them. Occasionally kept in aquaria in Japan. Conservation status uncertain but currently listed by the IUCN Red List as of Least Concern.

Distribution: Wide-ranging but sporadically distributed in all temperate and tropical seas, in the area off Madeira, Senegal and the Gulf of Guinea, north off France and Portugal, and south off South Africa in the eastern Atlantic. Elsewhere recorded in the western North Atlantic (in the Gulf of Mexico off the USA, and off French Guiana and Suriname), in the western Indian Ocean (South Africa), in the western Pacific (off Japan and Australia), and in the eastern North Pacific (off California).



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PSEUDOCARCHARIIDAE

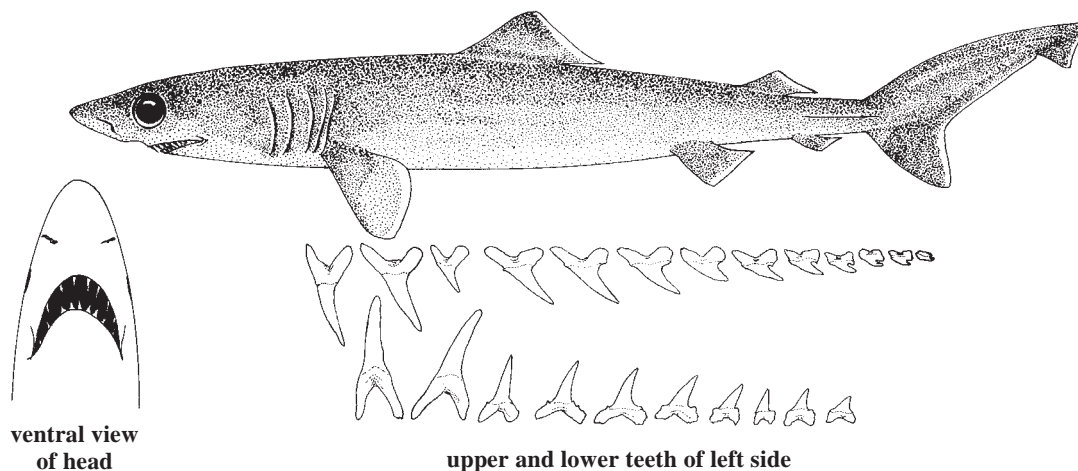
Crocodile sharks

A single species in this family.

Pseudocarcharias kamoharai (Matsubara, 1936)

Frequent synonyms / misidentifications: *Carcharias kamoharai* Matsubara, 1936; *Odontaspis kamoharai* (Matsubara, 1936)/ None.

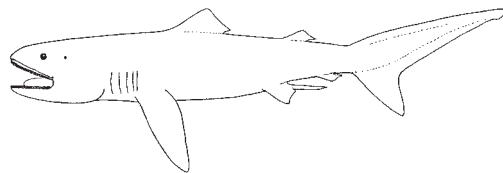
FAO names: En – Crocodile shark; Fr – Requin crocodile; Sp – Tiburón cocodrilo.



Diagnostic characters: A small relatively slender, spindle-shaped, firm-bodied shark. Head with 5 large gill slits, all in front of pectoral-fin bases, their upper ends extending onto dorsal surface of head. No gillrakers; spiracles usually present but very small; no nasal barbels or nasoral grooves; **eyes very large, without nictitating eyelids**; **snout conical**, not greatly elongated, flattened and blade-like; **mouth very long and angular, extending well behind eyes**; no true labial furrows; **anterior teeth very large**, with long, narrow, hooked, sharp and smooth-edged cusps and no cusplets or serrations, set in 2 rows on either side of symphysis in both jaws, and not separated in front by small symphyseal teeth; upper anterior teeth separated from the smaller lateral teeth by a gap and a row of **tiny intermediate teeth**. **Pectoral fins small, broad, short, and rounded-triangular in shape**. Pelvic fins moderate-sized, smaller than first dorsal fin but larger than second dorsal fin. Two low dorsal fins, the first about midway between the pectorals and the pelvics, and well in front of pelvic-fin bases, **the second dorsal fin somewhat smaller than the first**, but larger than anal fin; caudal fin short, strongly asymmetrical, with a pronounced subterminal notch and a short ventral lobe. **Caudal peduncle slightly depressed, with a low keel on each side and upper as well as lower precaudal pits**. Intestinal valve of ring type, with close-set turns resembling a stack of washers. **Colour:** light or dark grey or grey-brown above, lighter below, fins white-edged, sometimes small white spots on body and a white blotch between the mouth and gill slits.

Similar families occurring in the area

Megachasmidae: a huge (adults 4.5 to 5.6 m) epipelagic filter-feeding shark with a very short, flattened, broadly rounded snout, huge terminal mouth with numerous small, hooked teeth in both jaws, very long head, gillraker papillae on its internal gill slits, narrow leaf-shaped pectoral fins with origins under third gill slits, and a soft, flabby body.



Megachasmidae

Mitsukurinidae: body very soft and flabby and thin-skinned, whitish in colour, snout extremely elongated, flattened and blade-like, anal fin broadly rounded, no lower lobe on caudal fin, no precaudal pits; size huge, up to about 6 m although most individuals smaller.

Odontaspidae: body stocky and not spindle-shaped, gill slits shorter, not reaching upper surface of head, eyes smaller, caudal peduncle not depressed, without a keel, and with well-developed upper precaudal pit only, size larger, to 3 m or more.



Mitsukurinidae



Odontaspidae

Size: Maximum total length to about 110 cm; commonly between 75 and 100 cm.

Habitat, biology, and fisheries: A rare to locally abundant oceanic, epipelagic and possibly mesopelagic shark, usually found offshore at depths from the surface to at least 300 m. Its habits are little known. Ovoviviparous (aplacental viviparous), with litters of 4 young recorded; size at birth between 41 and 59 cm. Feeds on oceanic bony fishes, cephalopods and crustaceans. The crocodile shark can protrude its jaws well forward from its mouth. Most frequently caught by pelagic longline fisheries as bycatch, but usually discarded because of its relatively small size; utilized for its large, squalene-rich liver. Separate statistics are not reported for this species. Conservation status uncertain, listed as Lower Risk/Near Threatened by the IUCN Red List, but this may be optimistic in the writer's opinion.

Distribution: An oceanic shark that is possibly circumtropical in distribution, but with sporadic records within its vast range. In the area, eastern Atlantic off Guinea and Angola, but probably more wide-ranging; caught off the west coast of South Africa. Also present in the southwestern Atlantic, the southwestern and possibly north-eastern Indian Ocean, and the western, central, and eastern Pacific.



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MEGACHASMIDAE

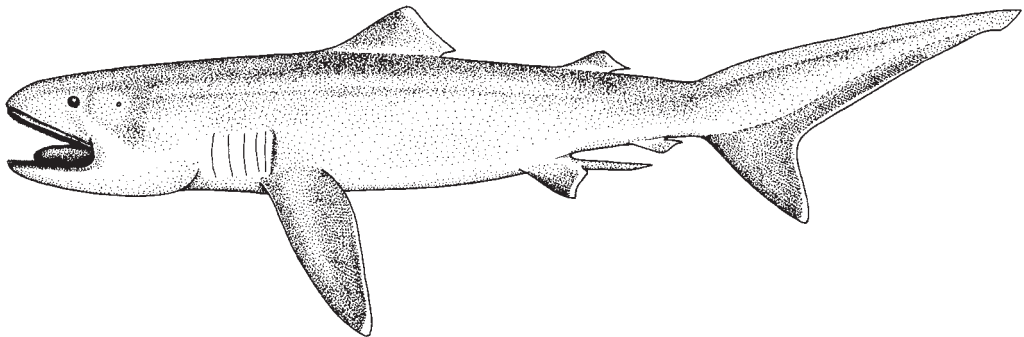
Megamouth sharks

A single species in this family.

Megachasma pelagios Taylor, Compagno and Struhsaker, 1983

Frequent synonyms / misidentifications: None/ None.

FAO names: **En** – Megamouth shark; **Fr** – Requin grande gueule; **Sp** – Tiburón bocudo.



Diagnostic characters: A large, soft-bodied, flabby, filter-feeding shark. Head with 5 medium-sized gill slits, **last two over pectoral-fin bases**, their upper ends not extending onto dorsal sides of head; dense-set papillose gillrakers present on internal gill arches, covered with small denticles; spiracles present but very small; no nasal barbels or oronasal valves; eyes small, on sides of head, without nictitating eyelids; **snout extremely short, flattened and broadly rounded, not bladelike or conical; mouth very long, wide, arcuate, and terminal on head;** extending well behind eyes when jaws are not protruded; mouth extends far in front of eyes when jaws are thrust forward of level of snout tip; labial furrows absent; **no differentiation between anterior, intermediate, lateral and posterior tooth rows. Teeth small, continuously variable and more or less awl-shaped, with a strongly hooked cusp but without cusplets. Pectoral fins large, narrow, long and leaf-shaped. Pelvic fins large, smaller than first dorsal fin but larger than second dorsal fin. First dorsal fin moderately large, semierect and angular; second dorsal fin less than half size of first dorsal fin, anal fin smaller than second dorsal fin;** caudal fin long but much less than half the total length, strongly asymmetrical, but with a well-developed ventral lobe. Caudal peduncle compressed and without keels but with a small upper precaudal pit. Intestinal valve of ring type, with the turns closely packed like a stack of washers. **Colour:** dark grey or bluish grey to blackish above, abruptly white on flanks and underside of body except for dark spots and mottling around mouth, dorsal, pectoral, pelvic and caudal fins dark with white posterior margins.

Similar families occurring in the area

Mitsukurinidae: body whitish in colour, snout extremely elongated, flattened and blade-like, mouth subterminal, teeth less numerous and with symphyseal, anterior, lateral, and posterior rows well-differentiated, anterior and lateral teeth greatly enlarged, a toothless gap present in upper jaw between anterior and lateral teeth, dorsal fins small and equal sized, smaller than anal fin, anal fin broadly rounded, no lower lobe on caudal fin, no precaudal pits.



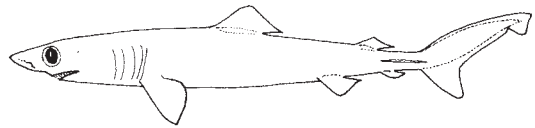
Mitsukurinidae

Odontaspidae: snout bulbously conical or flattened-conical and moderately long, mouth subterminal, teeth less numerous and with symphyisial, anterior, intermediate, lateral, and posterior rows well-differentiated, anterior and lateral teeth greatly enlarged, small intermediate teeth present in upper jaw, teeth mostly with prominent cusplets, no gillraker papillae on internal gill openings, broader, triangular pectoral fins with origins in front of gill slits, and a firmer body.

Pseudocarchariidae: snout conical and moderately long, eyes much larger, mouth subterminal, anterior and lateral teeth greatly enlarged, intermediate teeth present, no gillrakers, gill slits higher and reaching onto dorsal sides of head, body slim and spindle-shaped, a weak lateral keel on caudal peduncle, both upper and lower precaudal pits present, second dorsal and anal fins much lower, and in reaching a size of less than 1.3 m.



Odontaspidae



Pseudocarchariidae

Size: Maximum total length of adults 4.5 to 5.6 m long.

Habitat, biology, and fisheries: A rare to uncommon oceanic, epipelagic and possibly mesopelagic and littoral shark, usually found offshore at depths from the surface to at least 166 m but also in coastal waters. Its habits are little known. Probably ovoviviparous, with young eating nutritive eggs (oophagous), but pregnant females unrecorded, size at birth unknown. The megamouth shark is a filter feeder that eats epipelagic invertebrates, including crustaceans (euphausiid shrimp and copepods) and jellyfish. The jaws can be protruded to a considerable distance forward from mouth. Sometimes strands on beaches, but also found as bycatch in pelagic gillnets, purse seines, pelagic longlines, and fixed shore nets. Utilization little-known, occasionally taken for human consumption but otherwise for museum and display specimens. Separate statistics are not reported for this species. Conservation status little-known.

Distribution: In the area, collected off Senegal, but probably more wide-ranging. This species may be circumtropical in distribution but is currently known from spotty records in the western Atlantic (off southern Brazil), the western Indian Ocean (South Africa), the eastern Indian Ocean (Western Australia), the western central Pacific (Japan, Taiwan Province of China, Indonesia, the Philippines, and Hawaiian Islands), and the eastern Pacific (California, off Peru and Ecuador).



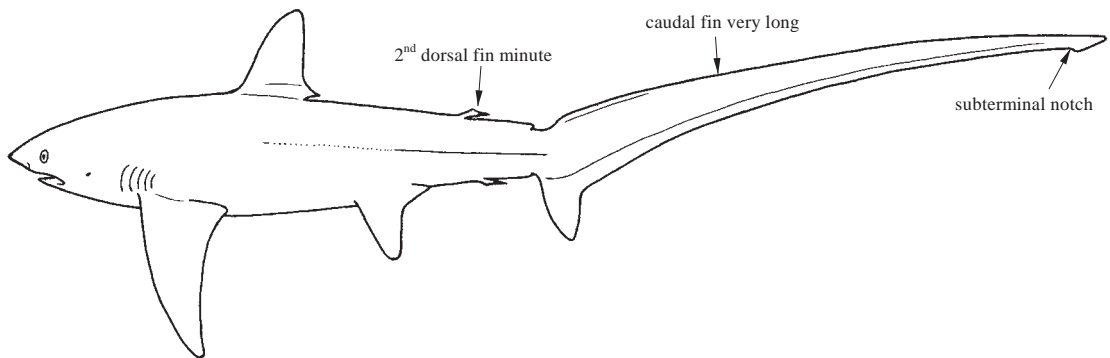
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ALOPIIDAE

Thresher sharks

Diagnostic characters: Large sharks (adults 264 to at least 573 cm total length and possibly reaching 610 cm). Trunk and precaudal tail cylindrical, not depressed and without lateral ridges; **precaudal tail much shorter than trunk**. Head not expanded laterally, not depressed; 5 small to medium-sized gill slits present, **the last 2 behind pectoral fin origins**, their upper ends not expanded onto upper surface of head; no gillrakers on internal gill slits; spiracles present and minute; nostrils without barbels, nasoral grooves, or circumnarial grooves, well separated from mouth; eyes on sides of head, without nictitating lower eyelids; snout moderately long, bluntly conical, not flattened and without lateral teeth or barbels; mouth small but arched and elongated, extending well behind eyes; labial furrows present on lower jaw only or absent, when present not reaching front of mouth; teeth small, blade-like and compressed, with erect to oblique cusps and cusplets very small or absent; anterior teeth in upper jaw slightly larger than lateral teeth and sometimes separated from them by a row of smaller intermediate teeth on each side. **Pectoral fins narrow, very large and long, falcate or broad-tipped. Pelvic fins large, about size of first dorsal fin.** Two dorsal fins, without spines, the first moderately large, high and angular, much shorter than the caudal fin, and with its base located over the interspace between pelvic and pectoral-fin bases; second dorsal fin low, minute, and less than one-tenth the size of the first dorsal; anal fin present, very small, with its origin under or behind the second dorsal-fin insertion; caudal fin strongly asymmetrical, **the upper lobe enormously enlarged, about half the total length and with a subterminal notch**, and an undulated or rippled dorsal margin, the lower lobe short but strong; vertebral axis of caudal fin raised above body axis. **Caudal peduncle not depressed, without keels; upper and lower precaudal pits present.** Intestinal valve of ring type. **Colour:** bluish, blackish, grey or brown above, shading to white or grey below.



Habitat, biology, and fisheries: These are active, strong-swimming, pelagic, coastal and deepwater sharks, with the young of one species occurring close inshore and inside bays. They feed mainly on small to moderately large schooling fishes and squids, which may be herded and stunned by the long, strap-like tail. Threshers are circumtemperate and tropical in all warm oceans. This monogeneric family comprises three species worldwide, two of which occur in Area 34. The two species in Fishing Area 34 occur sporadically in the area from Morocco to Côte d'Ivoire, but are probably wide-ranging. Thresher sharks form an important component of the world oceanic shark fishery, particularly because of their high-quality meat which is utilized fresh, frozen, smoked and dried-salted. Their fins are used for sharkfin soup, livers for vitamin extraction, and hides for leather. In the area they are fished for meat (fresh, dried-salted and smoked). Threshers are primarily captured by offshore longline fisheries worldwide but also offshore and near shore with line gear (including rod-and-reel) and fixed bottom gillnets.

Similar families occurring in the area

No other families in the area have a long curving asymmetrical caudal fin with dorsal lobe nearly or not quite as long as rest of shark and ventral lobe short but well-developed combined with large to huge eyes, a somewhat compressed spindle-shaped body without caudal keels, long narrow pectoral fins, large angular pelvic fins, large first dorsal fins, and tiny second dorsal and anal fins.

Key to species occurring in the area

- 1a.** Head nearly flat between eyes; a deep horizontal groove on nape of each side above gills; eyes very large, with orbits expanded onto dorsal surface of head; labial furrows rudimentary; teeth larger, less than 25 rows in each jaw; first dorsal-fin base closer to pelvic bases than pectoral bases; pectoral fins broad-tipped; sides above pectoral bases dark, without an extension of the white abdominal area (Fig. 1) . . . *Alopias superciliosus*
- 1b.** Head strongly arched between eyes; no horizontal groove or an inconspicuous one on nape of each side; eyes smaller, with orbits not expanded onto dorsal surface of head; lower labial furrows well developed; teeth smaller, usually more than 29 rows in each jaw; first dorsal-fin base about equidistant between pectoral and pelvic-fin bases or closer to pectoral bases; pectoral fins falcate and narrow-tipped; sides above pectoral bases marked with a white patch extending forward from the abdominal area (Fig. 2) . . . *Alopias vulpinus*

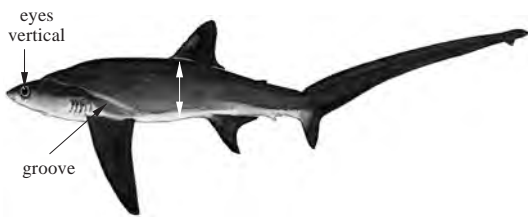



Fig. 1 *Alopias superciliosus*



Fig. 2 *Alopias vulpinus*

List of species occurring in the area

The shark symbol  is given when species accounts are included.

 *Alopias superciliosus* Lowe, 1841.

 *Alopias vulpinus* (Bonnaterre, 1788).

Note: The pelagic thresher, *Alopias pelagicus* Nakamura, 1935, is an oceanic species presently known from southeast Africa, Madagascar, northwestern Indian Ocean, Taiwan Province of China, the central Pacific and the tropical and warm-temperate eastern Pacific. It has not been taken in the Atlantic but should be watched for, as it has been mistaken for *A. vulpinus* elsewhere. It differs in having the eyes placed more ventrally, the forehead less convex, the snout more elongated, the head narrower, no labial furrows, teeth more oblique, pectoral fin less falcate and broad-tipped, and white colour from belly not expanding over pectoral-fin base.

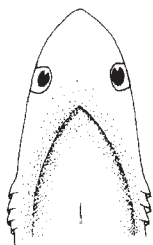
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***Alopias superciliosus* Lowe, 1841**

Frequent synonyms / misidentifications: *Alopias profundus* Nakamura, 1935 / *Alopias pelagicus* Nakamura, 1935; *Alopias vulpinus* (Bonnaterre, 1788).

FAO names: **En** – Bigeye thresher; **Fr** – Renard à gros yeux; **Sp** – Zorro oñon.



dorsal view of head



Diagnostic characters: A large shark. Head with 5 medium-sized gill slits, the last 2 above pectoral-fin bases; **a deep horizontal groove on nape on each side** from the level of mouth to pectoral fins; no nasal barbels or nasoral grooves on nostrils; **snout moderately long and conical; profile of forehead distinctly indented over eyes; interorbital space nearly flat;** no nictitating eyelids; **eyes very large, expanding onto dorsal surface of head,** permitting upward vision; mouth moderately long and semicircular, placed below the eyes, with rudimentary labial furrows; teeth moderately large, **less than 25 rows in upper or lower jaws,** sharp-edged, with a single, broad, straight or posteriorly curved cusp and no cusplets; anterior teeth not greatly enlarged, uppers not separated from the large laterals by smaller intermediate teeth. **Pectoral fins very narrow, long and falcate, broad-tipped.** Two dorsal fins, the first moderately large and **located just in front of the pelvic-fin origins,** closer to the pelvics than to the pectorals; second dorsal fin minute and positioned well ahead of the small anal fin. Upper lobe of caudal fin very long and strap-like, almost or not quite equal to the length of rest of shark; lower lobe short but well developed. Precaudal pits present but caudal keels absent. Intestinal valve of ring type. **Colour:** purplish grey above, cream below, posterior edges of pectorals, pelvics and sometimes first dorsal fin dusky; light colour of abdomen not expanded over pectoral-fin bases.

Size: Maximum total length to about 4.6 m, said to reach 5.5 m but possibly erroneous; commonly between 3 and 4 m. Size at birth between 100 and 140 cm; size at maturity between 2.8 and 3.5 m.

Habitat, biology, and fisheries: An oceanic and littoral species found in coastal waters over the continental shelves, sometimes close inshore in shallow waters, and on the high seas far from land, in deep water down to at least 500 m. Apparently strong-swimming. Ovoviviparous (aplacental viviparous), with uterine cannibalism, number of young usually 2 per litter, but sometimes up to 4. Feeds on pelagic fishes (lancetfishes, clupeoids, scombroids, and small billfishes) and bottom fishes (hakes); also squids. Apparently stuns its prey with its long caudal fin, as individuals are often tail-hooked on longlines. Apparently harmless to people. Generally caught in oceanic longline fisheries worldwide, but also taken in fixed bottom and pelagic gillnets, in trawls, and with sportsfishing gear (rod-and-reel). Its meat is utilized fresh, smoked and dried-salted for human consumption, its liver oil is processed for vitamins, its skin for leather, and fins for sharkfin soup; utilized smoked and dried-salted in the area. Separate statistics are not reported for this species. Conservation status of concern because of extensive catches by oceanic fisheries.

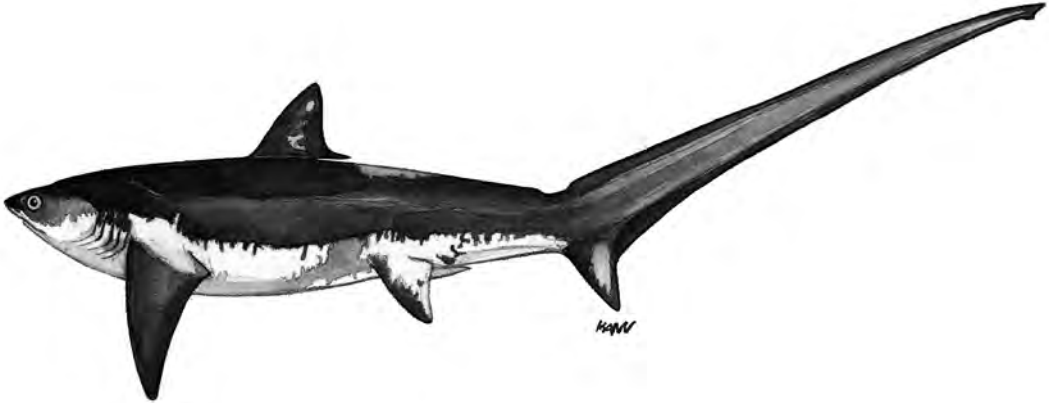
Distribution: Virtually circumglobal in tropical and warm temperate seas. Found in the area off Morocco, Madeira, Canary Islands, Senegal, Guinea to Sierra Leone, Ghana and Angola, and northward to Portugal, the Azores, and the Mediterranean Sea; western Cape coast of South Africa, in the western Atlantic (Bahamas and Cuba and the Gulf of Mexico south to Venezuela and Brazil), and the Indo-Pacific.



***Alopias vulpinus* (Bonnaterre, 1788)**

Frequent Synonyms / misidentifications: None / *Alopias pelagicus* Nakamura, 1935; *A. superciliosus* Lowe, 1841.

FAO names: En – Thresher (AFS: Common thresher shark); Fr – Renard; Sp – Zorro.



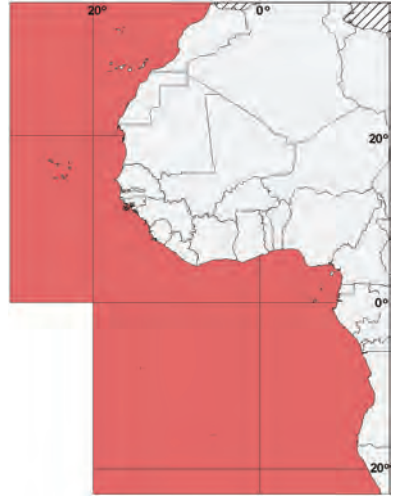
Diagnostic characters: A large shark. Head with 5 medium-sized gill slits, the last two above pectoral-fin bases; **no grooves on nape**; no gillrakers; no nasal barbels or nasoral grooves on nostrils; **snout short and conical**; forehead broadly convex in lateral view, not indented at nape; no nictitating eyelids; **eyes moderately large, not expanded onto the dorsal surface of head**; mouth short and semicircular, below eyes, with short lower labial furrows; teeth small, **usually over 29 rows in upper and lower jaws**, sharp-edged, with a single, broad, straight or posteriorly curved cusp and usually no cusplets; anterior teeth not greatly enlarged, **upper anterior teeth usually separated from the lateral teeth by a small intermediate tooth**. Pectoral fins very long and falcate, with narrowly rounded (small juveniles) to acutely pointed, narrow tips. Two dorsal fins, the first moderately large, **with its base well ahead of the pelvic-fin bases and farther from them than from the pectoral-fin bases**; second dorsal fin minute and positioned just in front of the small anal fin; upper lobe of caudal fin very long and strap-like, about as long as, or longer than, rest of shark; lower lobe short but well-developed. Precaudal pits present but caudal keels absent. Intestinal valve of ring type. **Colour:** brown, grey, blue-grey or blackish on back and underside of snout, lighter on sides, and abruptly white below; **a white area extends from the abdomen over the pectoral-fin bases**; pectoral, pelvic and dorsal fins blackish, white dots sometimes present on pectoral, pelvic and caudal-fin tips.

Size: Maximum total length between 5 and 6.1 m; commonly between 4.3 and 4.9 m; apparently reaches a somewhat larger size than *A. superciliosus*. Size at birth between about 114 and 160 cm; size at maturity between 288 and 400 cm.

Habitat, biology, and fisheries: Coastal over the continental and insular shelves and epipelagic far from land in cold-temperate to tropical waters; young often close inshore and in shallow bays, from the surface to 370 m. An active, strong-swimming shark, sometimes leaping out of the water. Ovoviviparous (aplacental viviparous) and apparently a uterine cannibal, number of young 2 to 4 per litter (usually 2). Feeds mostly on small schooling fishes, including mackerels, bluefishes, clupeids, needlefishes, lancetfishes, and lanternfishes; also squids, octopuses and pelagic crustaceans, and rarely seabirds. Herds and stuns its prey with its long, whip-like caudal fin, and is often caught on longlines by being tail-hooked. Worldwide it is caught on oceanic longlines, anchored bottom and surface gillnets, floating gillnets and sportfishing gear (rod-and-reel); captured with line gear, and with anchored and floating nets in the area. The meat is highly prized fresh for human consumption but is also eaten smoked and dried-salted; the fins are valuable for sharkfin soup; the hide is usable for leather and the liver oil can be processed for vitamins. Utilized smoked

and dried-salted in the area. Apparently harmless to people, including divers, though the size of adults of this species should invite respect; a few incidents involving biting or hitting of boats are attributed to this species, but whether they were provoked or not is uncertain. Separate statistics are not reported for this species. Conservation status of concern because of extensive catches by oceanic fisheries.

Distribution: Virtually circumglobal in temperate to tropical waters. In the area, from Morocco southward at least to Ghana and Côte d'Ivoire, Angola; also Azores and northward to Norway and the British Isles and in the Mediterranean Sea, and off Namibia and the west coast of South Africa. Wide-ranging in the western Atlantic and the Indo-Pacific. Some Indo-West Pacific records of this species may be based on *Alopias pelagicus*.



CETORHINIDAE

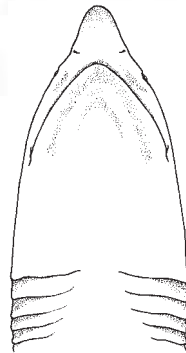
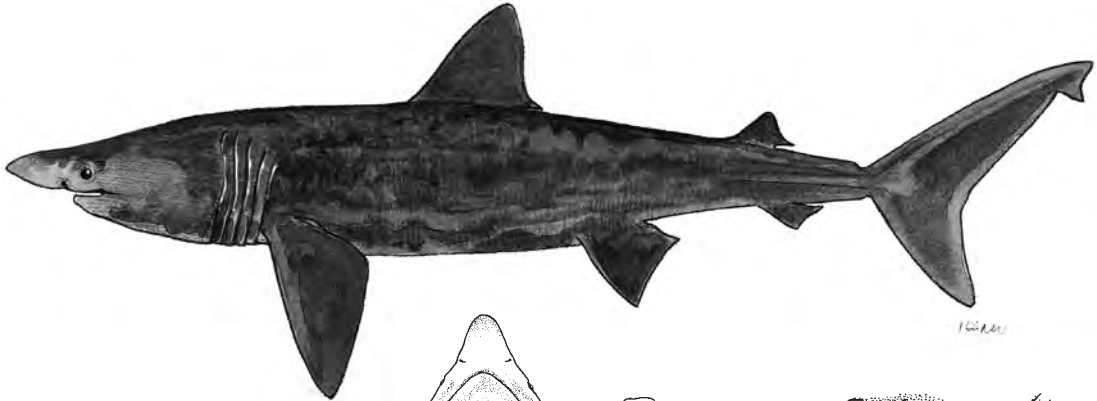
Basking sharks

A single species in this family.

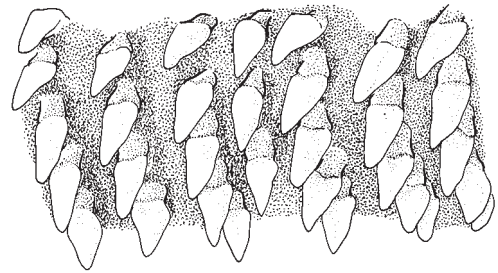
Cetorhinus maximus (Gunnerus, 1765)

Frequent synonyms / misidentifications: None / None.

FAO names: En – Basking shark; Fr – Pélerin; Sp – Peregrino.



ventral view of head



upper teeth

Diagnostic characters: A very large shark (adults 7 to 9.8 m). Head with **5 extremely long gill slits, almost meeting at the midline above and below**, the last in front of pectoral fins; **unique, long, bristle-like gillrakers, formed from modified dermal denticles, in rows along the internal gill openings** and serving

as plankton strainers (occasionally absent in individuals in which they have been shed and new rakers have not yet developed); nostrils without barbels or nasoral grooves; no nictitating lower eyelid; snout long, conical or hooked (in young); teeth very small, extremely numerous, not blade-like, and with a single cusp. **Pectoral fins large, broad, long, and rounded-triangular in shape.** Pelvic fins large, smaller than first dorsal fin but larger than second dorsal fin. Two dorsal fins, the first on the back above the space between pectoral and pelvic fins, the second less than a third the size of first; anal fin present; **caudal fin much less than half the total length, nearly symmetrical and crescentic, with a strong lower lobe. Caudal peduncle strongly depressed, with strong keels on sides;** precaudal pits present. Intestinal valve of ring type. **Colour:** blackish, slate grey, blue-grey or greyish brown above, similar below or slightly lighter, often with white patches and bands on snout and belly but without regular small light spots or stripes.

Similar families occurring in the area

No other sharks in the area have the combination of conical head with large subterminal mouth, gigantic gill slits, denticle gillrakers, very small numerous hooked teeth, simple colour pattern without numerous light spots and stripes, strong caudal keels and nearly symmetrical caudal fin.

Size: Maximum total length at least 9.8 m, reported exceptionally to 12 to 15 m but this is not confirmed with contemporary data.

Habitat, biology, and fisheries: A temperate-boreal, harmless species that usually is seen at or near the surface, singly or in groups up to one hundred or more. A plankton-feeding, slow but strong swimming migratory shark occurring well offshore and close inshore, sometimes in large bays and right off beaches but also in the epipelagic zone near continental waters. Reproduction ovoviviparous (aplacental viviparous), probably with uterine cannibalism (oophagy). Litter size six, size at birth about 150 cm. So far, caught only incidentally in Fishing Area 34, but this species has been subject to intensive targeted fisheries in the North Atlantic and the North Pacific. Separate statistics are not reported for this species. Generally caught with harpoon gear, including harpoon guns mounted on small specialized vessels similar to whale killer ships; occasionally captured in nets, including bottom gillnets and even bottom and pelagic trawls. Utilized fresh, dried salted, as fishmeal and for liver oil and fins for the Oriental sharkfin trade. Conservation status of concern because of slow growth rate, ready capture from small boats, rapid declines of populations when targeted, and extremely high values of basking shark fins and other products. The basking shark is listed as Vulnerable worldwide on the IUCN Red List and Endangered in the Eastern North Atlantic and North Pacific; and listed on Appendix II of CITES and protected by national laws and regional agreements limiting catches.

Distribution: The basking shark enters Fishing Area 34 from the north, and ranges southward to Madeira, the Canary Islands and Senegal; also recorded off Namibia (Swakopmond) and ranging southwards to the west coast of South Africa. Found in the North Atlantic and Mediterranean, the South Atlantic coasts of America and Africa, the eastern Pacific, the southwestern Indian Ocean (South Africa), and the Western Pacific.



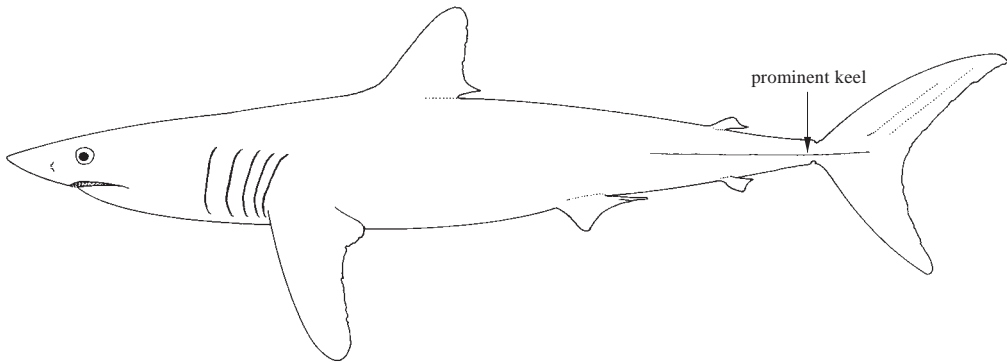
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LAMNIDAE

Mackerel sharks, makos, white sharks, porbeagles

Diagnostic characters: Large-sized sharks (adults 150 to about 600 cm) with a fusiform body. Head with 5 gill slits, **all in front of pectoral fin origins**; gill arches without rakers; no nictitating eyelids; **teeth long and few in number**, awl- or blade-like, with a single cusp. **Pectoral fins large, narrow, long, and falcate or leaf-shaped**. Pelvic fins smaller than first dorsal fin but larger than second dorsal fin. **Two dorsal fins, the first dorsal fin much shorter at base than caudal fin and far in advance of pelvic fins; second dorsal fin and anal fin much smaller than first dorsal fin, with narrow, pivoting bases; caudal fin lunate**, less than one-third of total length. **Caudal peduncle strongly depressed dorsoventrally** and expanded laterally, **with a prominent keel on each side, extending well out on caudal fin**. **Colour:** back pale grey, greyish blue, purplish blue, brownish, blackish grey or black; underside white to lighter grey.

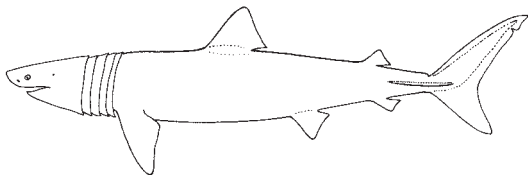


Habitat, biology, and fisheries: Mackerel sharks inhabit temperate and tropical waters (oceanic as well as coastal) throughout the world. They are very fast swimmers and voracious predators, feeding mainly on bony fishes and cephalopods, but also on other sharks, batoids, chimaeras, marine mammals, sea birds, turtles, crustaceans, and carrion. Reproduction ovoviviparous (aplacental vivipary), with uterine cannibalism in the form of egg-eating (oophagy); number of young 1 to 25 or 30 per litter. Some species, particularly the white shark, infrequently bite and rarely feed on people, but are also of great interest for ecotouristic diving and film-making. Most species are important for commercial fisheries and for sports angling. Mackerel sharks are often used for food or for production of liver oil, fishmeal, fins, jaws, teeth and other shark products.

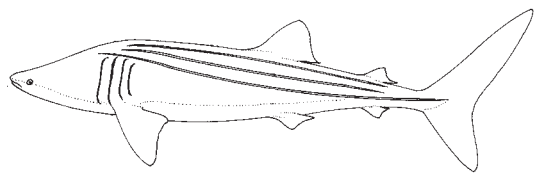
Similar families occurring in the area

Cetorhinidae: much longer gill openings, extending from upper surface of head to throat; gillrakers well developed on internal gill openings; teeth minute and hooked, not blade-like; anal and second dorsal fin larger; and size of adults larger, 7 to 10 m or more.

Rhincodontidae: body with several prominent dermal ridges on either side; last gill slit well behind pectoral-fin origin; snout squared off anteriorly; mouth nearly terminal; at least half of first dorsal-fin base posterior to pelvic-fin origins; gill arches connected by masses of spongy tissue; a spotted and striped colour pattern; and size of adults larger, 7 to 18 m or more.

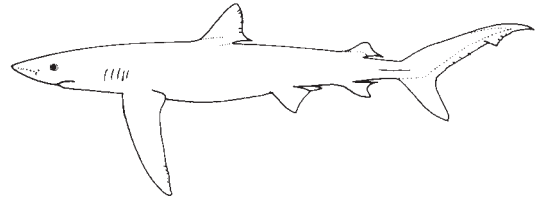


Cetorhinidae



Rhincodontidae

All other shark families: caudal fin strongly asymmetrical and not lunate, the upper lobe extending far beyond lower lobe; caudal peduncle not greatly flattened dorsoventrally. Also, fifth gill opening somewhat behind pectoral-fin origin in Alopiidae, Triakidae, Carcharhinidae, Scyliorhinidae and Ginglymostomatidae (in front of pectoral-fin origin in Lamnidae).



other families (e.g. Carcharhinidae)

Key to species occurring in the area

- 1a. Teeth with small side cusplets (except in specimens less than 1 m long) (Fig. 1a); origin of second dorsal fin above that of anal fin; caudal fin with a small, but strong, secondary keel below the rear end of the primary keel; free rear tip of first dorsal fin abruptly white (Fig. 2) **Lamna nasus**
- 1b. Teeth without side cusplets (except in *Carcharodon* less than 2 to 3 m long which always have serrations on some of their teeth); origin of second dorsal fin in advance of anal-fin origin; caudal fin without a secondary keel (Figs 3 and 4); free rear tip of first dorsal fin not abruptly white → 2

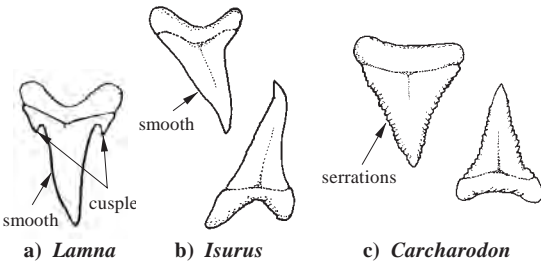


Fig. 1 teeth



Fig. 2 Lamna nasus

- 2a. Upper teeth triangular with serrated edges (Fig. 1c); origin of first dorsal fin opposite or slightly anterior to inner corners of pectoral fins when the latter are laid back; anal-fin origin posterior to second dorsal-fin base (Fig. 3) **Carcharodon carcharias**
- 2b. Upper teeth with smooth-edged cusps (Fig. 1b); origin of first dorsal fin posterior to inner corners of pectoral fins when the latter are laid back; anal-fin origin below midbase or insertion of second dorsal-fin base (Figs 4, 5 and 6) (**Isurus**) → 3

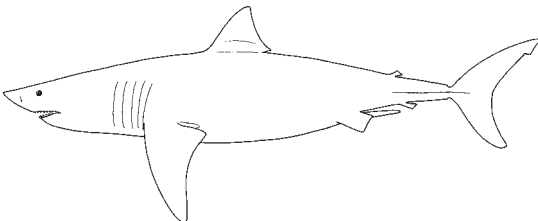


Fig. 3 Carcharodon carcharias

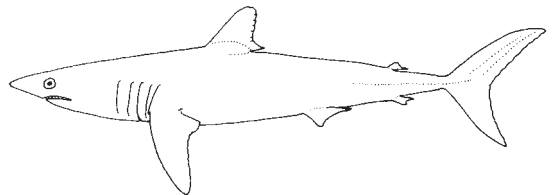


Fig. 4 Isurus oxyrinchus

- 3a. Snout usually acutely pointed (Fig. 5a); cusps of upper and lower anterior teeth curved at bases but with tips reversed and curving outward; pectoral fins considerably shorter than head, relatively narrow-tipped in young, acutely pointed in adults; origin of anal fin about under midbase of second dorsal fin; underside of snout and mouth usually white in adults and subadults in the area except for those caught off the Azores (Fig. 4) ***Isurus oxyrinchus***
- 3b. Snout narrowly to bluntly (usually not acutely) pointed (Fig. 5b); cusps of upper and lower anterior teeth straighter, with tips not reversed; pectoral fins about as long as head, relatively broad-tipped in young and adults; origin of anal fin about under insertion of second dorsal fin; underside of snout and mouth dusky in adults and subadults ***Isurus paucus***

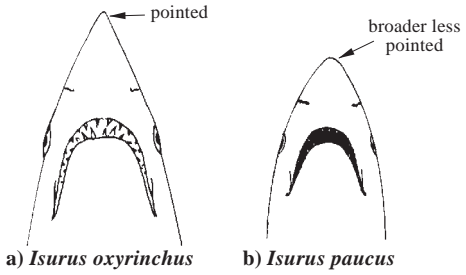


Fig. 5 ventral view of head

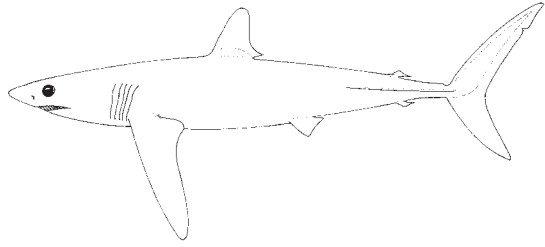


Fig. 6 *Isurus paucus*

List of species occurring in the area

The shark symbol is given when species accounts are included.

- Carcharodon carcharias* (Linnaeus, 1758).
- Isurus oxyrinchus* Rafinesque, 1810.
- Isurus paucus* Guitart Manday, 1966.
- Lamna nasus* (Bonnaterre, 1788).

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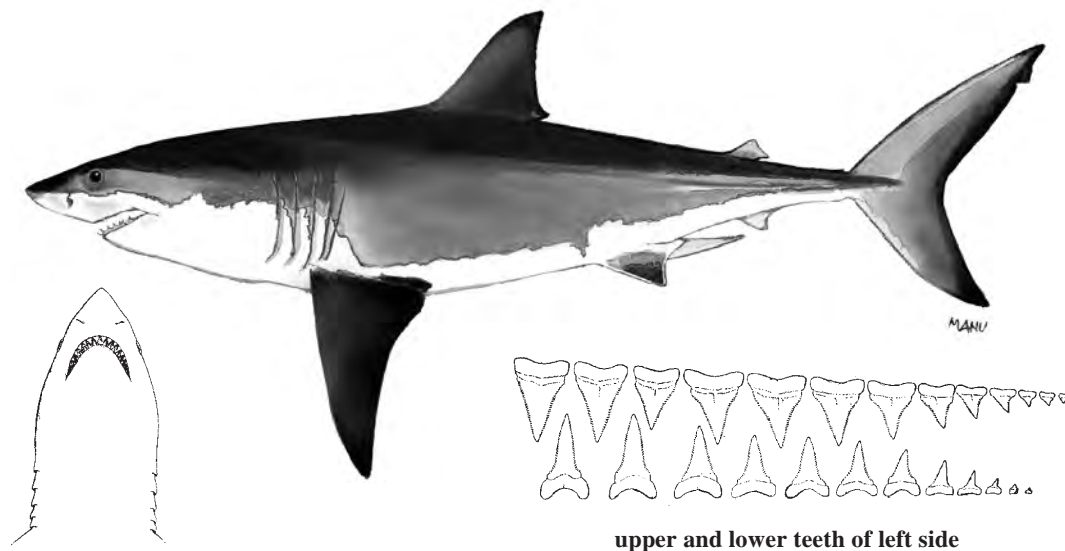
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***Carcharodon carcharias* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Great white shark; Fr – Grand requin blanc; Sp – Jaquetón blanco.



ventral view of head

upper and lower teeth of left side

Diagnostic characters: A very large shark with a fusiform, usually heavy body and a moderately long, bluntly pointed snout. Head with 5 very long gill slits, all in front of pectoral-fin origins; gill arches without rakers; spiracles very small; mouth long and broadly rounded. **Teeth very large** and relatively few, narrower in the lower than in the upper jaw, pointed backwards, with a **single broad cusp and with strong serrations** at most sizes (serrations irregular in newborn individuals below 1.5 m length); cusplets present on teeth of sharks up to about 2 to 3 m length, but lost in larger individuals; anterior teeth greatly enlarged in both jaws, in two rows on either side of symphysis, **broadly triangular and compressed (especially in the upper jaw), not recurved; single intermediate tooth and first few lateral teeth a little smaller than anterior teeth, the intermediate tooth larger and less differentiated from the anterior and lateral teeth than in other members of the family, cusp of intermediate tooth directed ventromedially.** Two dorsal fins, the first dorsal fin large, originating over inner margins of pectorals, the second dorsal fin very small; pectoral fins shorter than head and falcate; anal-fin origin posterior to rear end of second dorsal-fin base; caudal fin **lunate**, its lower lobe strongly developed. Caudal peduncle very much flattened dorsoventrally, expanded laterally, **with a prominent keel on either side extending well out on caudal fin** but with no secondary keel on the fin. **Colour:** grey-brown, dark grey, blue-grey, blackish, light grey or grey-white above, white below, fins with dusky margins below, usually with black tips on underside of pectoral fins and a conspicuous black spot present at pectoral-fin axils.

Size: Maximum total length to almost 6 m and possibly 6.4 m; adults commonly to between 5 and 6 m; size at birth between 100 and 165 cm; males maturing between 350 and 410 cm, females between 400 and 500 cm.

Habitat, biology, and fisheries: A littoral and epipelagic species, often occurring close inshore off beaches and in the intertidal of shallow bays and salty estuaries but also found in the open ocean far from land and off oceanic islands; not found in fresh water. Recorded from the surface and intertidal down to 1 280 m on the continental slopes. A strong swimmer, often jumping entirely out of the water and capable of chasing and catching very fast and agile prey. Ovoviviparous (aplacental viviparous), litter size 2 to possibly 14. A powerful predator, feeding on a wide variety of marine animals, including other sharks, rays, chimaeras, bony fishes, seals and sea lions, dolphins and porpoises, sea birds, turtles, crabs and squid as well as carrion. A bold inquisitive social shark, often visiting boats and seen individually or in small groups. Uncommonly bites

swimmers, divers, surfers and boats; very rarely eating people. Of limited interest to commercial fisheries, mostly taken as bycatch with longlines, hook-and-line, fixed bottom gillnets, fish traps, herring weirs, purse seines, trammel nets, harpoons, and even bottom and pelagic trawls. Prized by sports anglers but also by ecotouristic shark divers, for whom it is an ultimate experience in shark viewing. Much photographed by documentary film-makers. This shark is vulnerable to overfishing because of its low abundance, slow growth, notoriety from the *Jaws* movie image which encourages people to injure and kill it, tendency to investigate human activities including fishing operations, and ease of capture despite its size and strength. It is protected in several countries at present but not in the area. The white shark is ranked as Vulnerable world-wide and possibly Endangered locally (including the North Atlantic and the Mediterranean Sea) by the IUCN Red List, is listed on Appendices I and II of the Convention on Migratory Species (CMS or Bonn Convention), and listed on Appendix II of CITES. Utilized fresh, dried-salted, and smoked for human consumption; the liver oil is extracted for vitamins; the carcass is used for fishmeal; the skin used for leather; the fins are highly valued for sharkfin soup; and the teeth and jaws are prized for decorations, with jaws and teeth and fins currently bringing an extremely high price. Occasionally exhibited alive in aquaria, but usually does not survive for more than a week due to capture trauma.

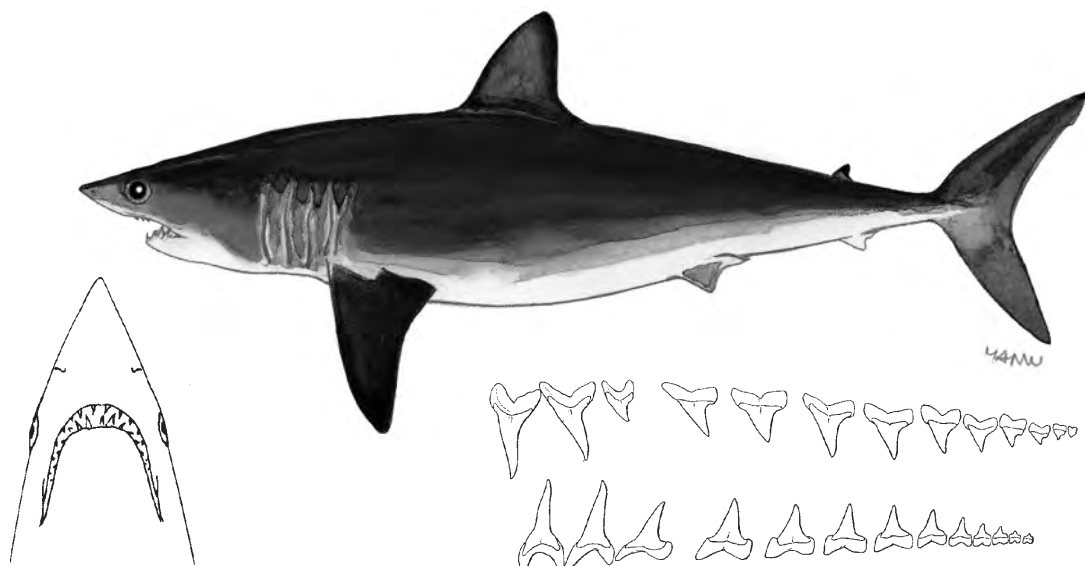
Distribution: Cosmopolitan in boreal and austral to tropical seas, but most commonly recorded in cool to warm-temperate waters. In the area it is known to occur from Morocco to Senegal (including Madeira and the Canary Islands) and off Ghana, possibly the Democratic Republic of the Congo (ex-Zaire), southern Angola and Namibia. Also present in the Mediterranean Sea and northward to France; but a recent United Kingdom record could not be verified and may be based on a basking shark or a porbeagle. Probably more wide-ranging in the area than currently known and could occur anywhere within it, but apparently sporadic in the tropics with moderate-sized to large individuals prevalent in tropical records.



***Isurus oxyrinchus* Rafinesque, 1810**

Frequent synonyms / misidentifications: *Isurus glaucus* (Müller and Henle, 1839) / *Isurus paucus* Guitart Manday, 1966.

FAO names: **En** – Shortfin mako; **Fr** – Taupe bleu; **Sp** – Marrajo dientuso.



ventral view of head

upper and lower teeth of left side

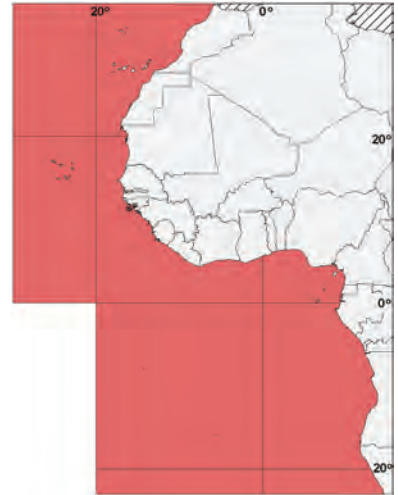
Diagnostic characters: A large shark with a fusiform and rather slender body and a long and **acutely pointed snout**. Head with 5 long gill slits, all in front of pectoral-fin origins; gill arches without rakers; spiracles very small; mouth broadly rounded and notably long. **Teeth large and relatively few**, alike in both jaws, backward-pointing, **anterior teeth flexed in outline, smooth-edged, with a single cusp**; **the first 2 anterior teeth in each jaw the largest, recurved at base but with the curve reversed at tips**; a small intermediate tooth between the upper anterior and lateral teeth, this with a ventrolaterally directed cusp. **Two unequal-sized dorsal fins, the first dorsal fin large and with its origin posterior to inner corners of pectoral fins when latter are laid back**, its apex bluntly rounded (young) to acutely pointed (adults); **pectoral fins moderately long (shorter than head) and falcate**; **anal-fin origin below about middle of second dorsal-fin base**; **caudal fin lunate**, its lower lobe strongly developed. **Caudal peduncle very flattened dorsoventrally, but expanded laterally, with a prominent keel on each side extending well out on caudal fin**. **Colour:** back grey-blue to purplish or deep blue; belly white; shortfin makos caught off the Azores have dusky undersides as in *Isurus paucus*.

Size: Maximum total length to about 4 m; commonly to 2.7 m; size at birth about 60 to 70 cm; males maturing between 203 and 215 cm, females between 275 and 293 cm.

Habitat, biology, and fisheries: An oceanic and coastal species, usually in surface waters, approaching close inshore, but also in deeper water to at least 500 m. Perhaps the most active and strong-swimming of sharks, renowned for leaping out of the water, especially when hooked. Ovoviviparous (aplacental viviparous), number of young in a litter 4 to 25 and possibly 30. Feeds heavily on schooling fishes (mackerels, jacks, herrings, etc.), also eats small sharks, larger bony fishes such as tunas and swordfishes, and rarely dolphins. A bold shark, occasionally but rarely biting swimmers and boats; hooked individuals fight very hard and may leap into the boats of anglers attempting to subdue them. An important species for targeted longline fisheries, because of its high-quality meat. Famed as one of the finest game fishes, highly prized by sport

anglers. Viewed by ecotouristic divers off California and in the western Indian Ocean. Caught commercially mostly with pelagic longlines, also gillnets and hook-and-line. The meat is utilized fresh, frozen, smoked and dried-salted for human consumption; the oil is extracted for vitamins; the fins used for sharkfin soup; the hides processed into leather and the jaws and teeth used for ornaments. The flesh is good eating and well esteemed in some localities. This species is an important fisheries species in the eastern Atlantic, with Namibia, Portugal, South Africa, and Spain reporting small catches (33 to 1 700 tonnes, total 2 868 tonnes) to FAO from the area in 2004 and many other countries probably catching this species but not reporting it. The conservation status of this shark is of concern because of declines due to overfishing and it is currently listed as Vulnerable worldwide on the IUCN Red List.

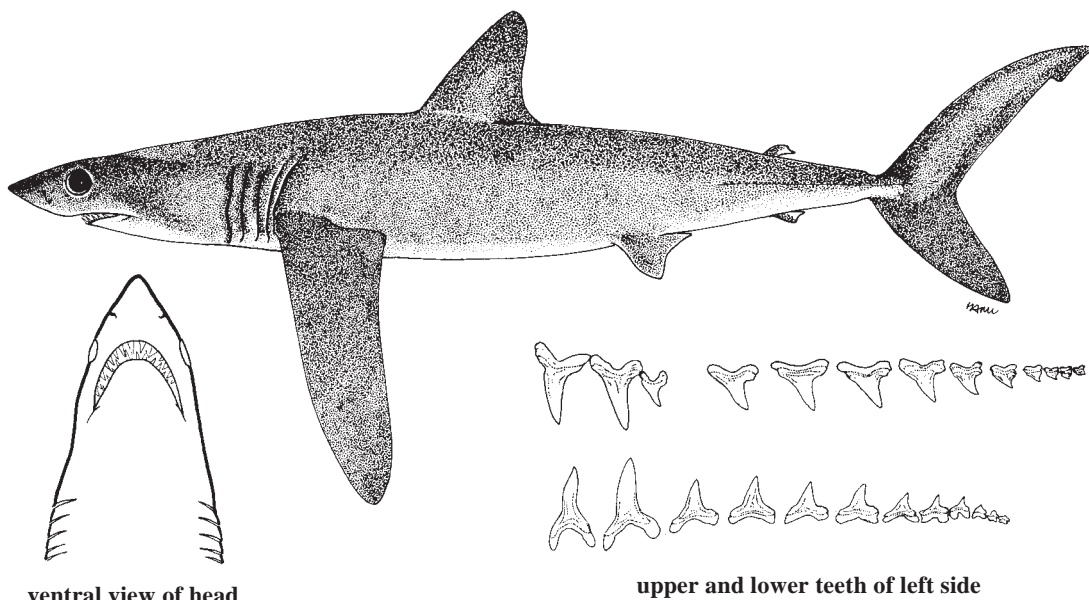
Distribution: Cosmopolitan in warm-temperate and tropical seas. Probably widespread in the area, from Morocco to Côte d'Ivoire and Ghana south; also, northward to Norway and the British Isles and southward to Namibia and South Africa.



Isurus paucus Guitart Mandy, 1966

Frequent synonyms / misidentifications: *Isurus alatus* Garrick, 1966 / *Isurus oxyrinchus* Rafinesque, 1810.

FAO names: En – Longfin mako; Fr – Petit taupe; Sp – Marrajo carite.



ventral view of head

upper and lower teeth of left side

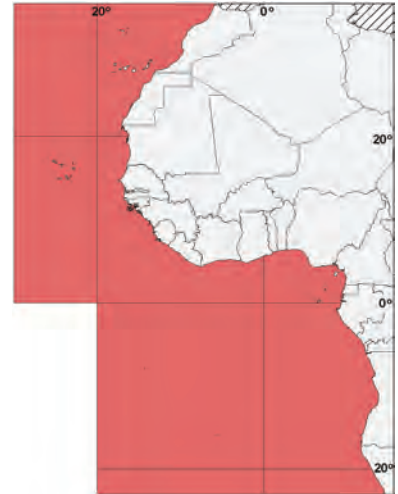
Diagnostic characters: A large shark with a fusiform and rather slender body and a long, pointed snout. Head with 5 long gill slits, all in front of pectoral-fin origins; gill arches without rakers; spiracles very small; mouth long and broadly rounded. Teeth large and relatively few, alike in both jaws, pointed backward, not greatly flexed, with a single cusp, but without cusplets or serrations; anterior teeth greatly enlarged in both jaws, in 2 rows on each side, cusps recurved at bases but not reversed at tips; a small intermediate tooth between the upper anterior and lateral teeth, with a ventrolaterally directed cusp. Two unequal-sized dorsal fins, the first large, originating posterior to free rear tips of pectoral fins, with a bluntly rounded apex, the second dorsal fin very small; anal fin very small, originating about under rear end of second dorsal-fin base; pectoral fins about as long or longer than head, straight to falcate, and broad-tipped; caudal fin lunate, with a very long lower lobe. Caudal peduncle strongly flattened dorsoventrally and expanded laterally, with a prominent keel on each side extending well onto caudal fin. **Colour:** back and sides darker slaty blue or grey-black, undersides white in young but partly to entirely dusky in adults and subadults.

Size: Maximum total length at least 4.17 m, common at 2.8 to 3.0 m; size at birth between 97 and 120 cm; adults 245 cm or larger.

Habitat, biology, and fisheries: A little-known oceanic and occasionally littoral shark, possibly approaching land to give birth. Often near surface, down to 220 m, over slopes and ocean basins 1 300 to 6 000 m deep. Ovoviviparous (aplacental viviparous), number of young 2 to 8 per litter. Probably feeds on oceanic schooling fishes and other pelagic animals as does *Isurus oxyrinchus*, but its large broad fins and slender body suggest that it is a slower, less active shark than that species. It is not known to have bitten people or boats. Separate statistics are mostly not reported for this species, which essentially is caught as an uncommon bycatch of pelagic longline and other oceanic fisheries targeting shortfin makos, pelagic sharks, or bony fishes. Taken with longlines, hook-and-line, and anchored gillnets. It is utilized fresh, frozen and dried-salted for human consumption. Conservation status is of concern because of its low abundance in most areas and

presence as bycatch of shark fisheries that may have caused declines in catches of the far more abundant and more fecund *I. oxyrinchus*. The IUCN Red List currently lists the longfin mako as Vulnerable worldwide.

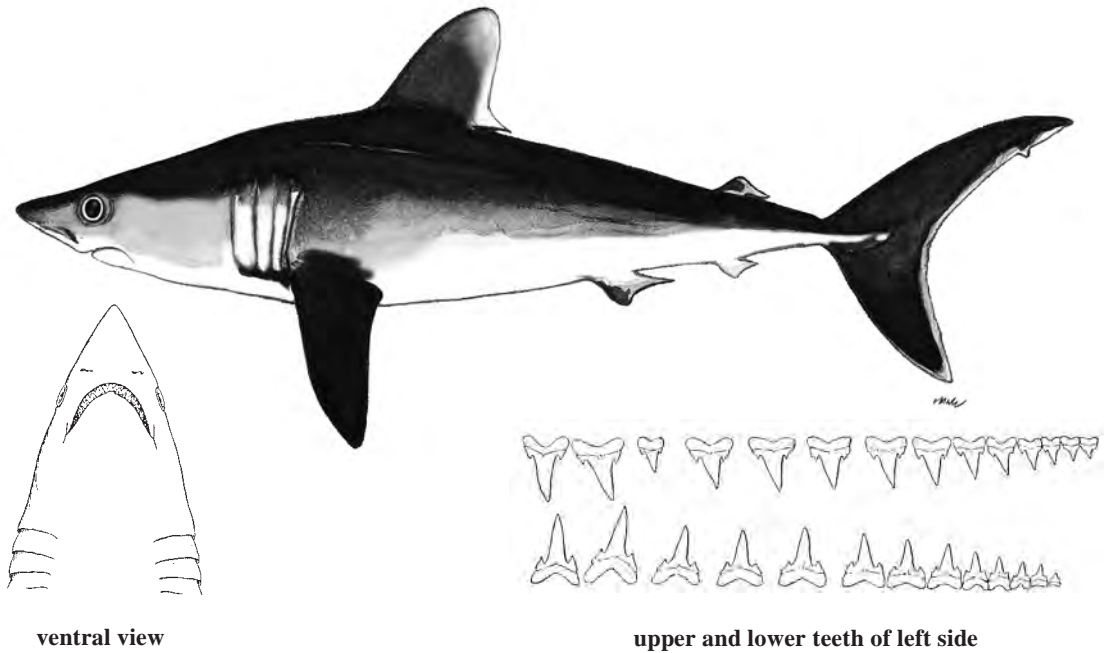
Distribution: In the area it is known from off Morocco, Western Sahara, Canary Islands, Mauritania, Guinea, Guinea-Bissau, Liberia, Ghana and possibly the Cape Verde Islands, but may be more widely distributed in the tropical Atlantic away from land. A warm-water species that extends northwards in the eastern Atlantic to off Spain and Portugal and probably occurs in the Mediterranean Sea, but distribution around southern Africa is poorly known with an observer record and specimens from the western Cape, South Africa; also found in the western North Atlantic, the Indian Ocean and the western central Pacific.



Lamna nasus (Bonnaterre, 1788)

Frequent synonyms / misidentifications: None / None.

FAO names: En – Porbeagle; Fr – Requin-taupe commun; Sp – Marrajo sardinero.



ventral view

upper and lower teeth of left side

Diagnostic characters: A moderately large shark with a fusiform and very stout, tuna-like body and a moderately long pointed snout. Head with 5 long gill slits, all in front of pectoral-fin origin; gill arches without rakers; spiracles very small; mouth broadly rounded in front and moderately long. **Teeth moderately large and relatively few in number, alike in both jaws, erect, smooth-edged, with a single cusp and side-cusplets; the first 2 anterior teeth in each jaw moderately large and straight-cusped; a small intermediate tooth between the upper anterior and lateral teeth, this with a ventrolaterally directed cusp.** Two unequal-sized dorsal fins, the first dorsal fin large, its origin anterior to inner corner of pectoral fin when latter is laid back, its apex bluntly or narrowly rounded, the second dorsal fin very small; pectoral fin moderately long, much shorter than head and not strongly falcate; anal-fin origin below origin of second dorsal fin; caudal fin lunate, its lower lobe strongly developed. **Caudal peduncle very much flattened dorsoventrally, but expanded laterally, with a prominent keel on each side extending well out on caudal fin and a secondary keel below its posterior end on the caudal base.** **Colour:** back, dorsal fins and caudal fins bluish grey, free rear tip of first dorsal abruptly white, underside of head white or dusky, abdomen white. At least some individuals in the Southern Hemisphere have dark faces and undersides, and have been confused with the North Pacific *Lamna ditropis*.

Size: Maximum total length to possibly 3.7 m but most adults smaller and below 3 m; size at birth between 60 and 75 cm; males maturing at about 150 to 200 cm, females at 200 to 250 cm.

Habitat, biology, and fisheries: Coastal and oceanic, amphitemperate; common or formerly common in cold seas north of the area but marginal in the area. Most common on continental offshore fishing banks but coming close inshore and found on the high seas far from land. It ranges from the surface to at least 700 m depth. This is an active, strong-swimming shark, often in schools and feeding aggregations. It seldom if ever bites people or boats. Ovoviviparous (aplacental viviparous), number of young 1 to 5 per litter but mostly four young, gestation period possibly about eight months. Feeds on small to moderate-sized pelagic schooling fishes, including mackerel (Scombridae), pilchards and herring (Clupeidae); also on demersal bony fishes such as cod, haddock, cusk and whiting (Gadidae), hake (Merluccidae), flatfish, and dories, also small to moderately large sharks, squids, and scavenged fishes from longlines. Offshore only in the northern part of the area, where it is rare or accidental and possibly caught primarily as bycatch. Separate statistics are not reported for this species in the area. Caught or formerly caught on longlines, and in pelagic and bottom trawls. Utilized fresh and dried-salted, and for oil and fishmeal. Heavily fished in the cold-temperate North Atlantic, with populations severely depleted; the porbeagle is listed by the IUCN Red List as Vulnerable worldwide, Critically Endangered in the eastern North Atlantic and the Mediterranean Sea, and Endangered in the western North Atlantic. This species was listed in 2013 on Appendix II of CITES.

Distribution: This species has centres of distribution in the North Atlantic and in a circumtemperate band of the southern Atlantic, southern Indian Ocean, southern Pacific and Antarctic Ocean. The porbeagle enters the area from the north, off Morocco and Madeira, the Azores, and rarely southward to Senegal and possibly the Gulf of Guinea. Northward it extends into the Mediterranean and to Iceland and the western Barents Sea; southwards it occurs off the west coast of South Africa but currently is not known from Namibian waters where it should be expected.



Order ORECTOLOBIFORMES

GINGLYMOSTOMATIDAE

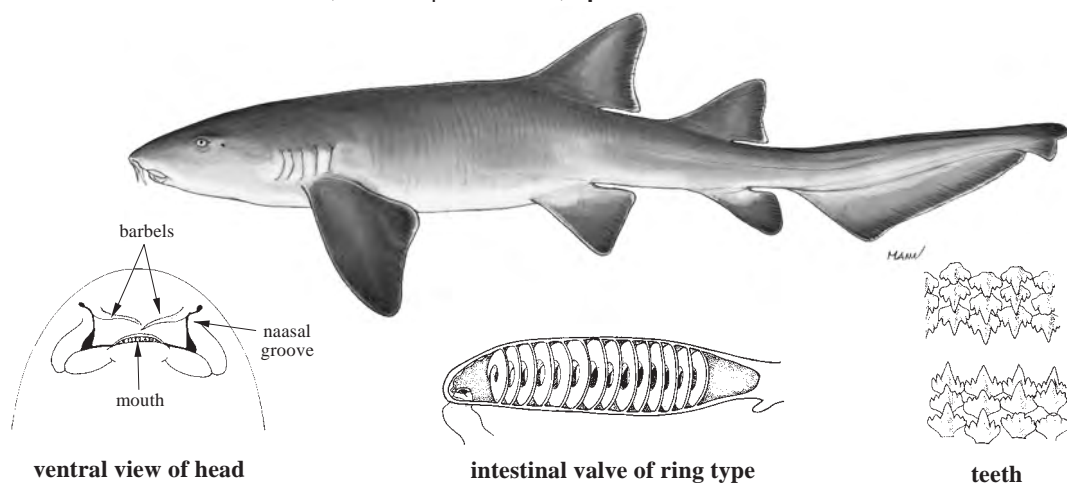
Nurse and tawny sharks

A single species occurring in the area.

Ginglymostoma cirratum (Bonnaterre, 1788)

Frequent synonyms / misidentifications: None / None.

FAO names: **En** – Nurse shark; **Fr** – Requin-nourrice; **Sp** – Gata nodriza.



Diagnostic characters: A large shark (adults 152 to at least 304 cm). Head with 5 small gill slits, the last 2 behind pectoral-fin origins and **very close to each other**; no gillrakers; nostrils close to front of snout, **with long barbels and nasoral grooves connecting them with mouth**; no nictitating lower eyelid; **snout very short, broad and bluntly rounded**; **mouth short, nearly transverse, and far forward on head, well in front of eyes**; teeth small, poorly differentiated in different regions of the mouth, with short medial cusps and large cusplets on sides of teeth. Two dorsal fins, the base of the first dorsal fin over pelvic-fin bases, the second dorsal fin about half to two-thirds the size of first dorsal fin; anal fin present; caudal fin much less than half the total length, strongly asymmetrical, with a pronounced subterminal notch but with ventral lobe hardly developed. Caudal peduncle not strongly depressed, **without keels**; **no precaudal pits**. Intestinal valve of ring type. **Colour:** back yellow, yellow-green, or reddish brown, underside yellowish, dark spots and dorsal saddles present in young.

Similar families occurring in the area

The combination of characters including nasoral grooves, barbels, anterior mouth, posterior portion of first dorsal fin, absence of caudal keels and precaudal pits, and asymmetrical caudal fin readily distinguishes this shark from all others in Fishing Area 34.

Size: Maximum total length said to be 430 cm but most adults less than 300 cm; size at birth about 27 to 29 cm; males maturing at about 210 cm and females maturing mostly between 230 and 240 cm.

Habitat, biology, and fisheries: Occurs in waters from the intertidal down to 130 m depth. Found around mangrove keys, on rocky and coral reefs, and on sand flats. Abundance in the present area is uncertain, but known to be common or formerly common in parts of the western Atlantic. This is a sluggish, social, nocturnal bottom-dwelling shark that is sometimes seen mating in shallow water. This shark rests in favoured caves and crevices during the day and returns to these shelters repeatedly after feeding during the night. The nurse shark is ovoviviparous (aplacental viviparous), with litters of 20 to 30 young. Feeds mostly on bottom invertebrates, including shrimps, crabs, lobsters, squid, octopuses, sea urchins, marine snails and bivalves, but also a variety of small bottom and pelagic bony fishes and occasionally stingrays. It is probably fished in

inshore waters throughout most of its range including the present area. This shark is readily caught on rod-and-reel, on handlines, on longline gear, in gillnets, in fixed bottom nets, in bottom trawls, and also with spears. Its meat is marketed fresh or salted; the extremely thick and tough hides are used for leather and the livers are processed for oil. Normally inoffensive and usually permits divers to approach it closely, but it may bite if provoked and can sometimes bite without provocation. A popular shark for ecotouristic viewing by divers in the western Atlantic. It is important for the commercial aquarium trade because of its hardiness in captivity and is kept for display in many public aquaria and by private aquarists worldwide. The nurse shark is vulnerable to overexploitation because of its habitat, ready access to fisheries, demand by the aquarium trade, and slow maturation (matures at 10 to 20 years old). The conservation status of the nurse shark in the area needs urgent investigation, as it is found off countries with intensive inshore fisheries and no fisheries statistics have been reported to FAO for the species in the area. It may be declining in the western central Atlantic due to overfishing and is currently listed on the IUCN Red List as Data Deficient worldwide, Near-Threatened overall in the western Atlantic, and Vulnerable off South America. It needs protection particularly in breeding areas. The nurse shark is a potential candidate for captive breeding, although to the writer's knowledge this has not happened and would presumably require ample space in large habitat tanks.

Distribution: In the area, from Canary Islands (rare, Las Palmas Island), Cape Verde Islands, Senegal, and Cameroon to Gabon, but probably more widespread; also exceptionally occurring in the Bay of Biscay, France (released from an aquarium?). Elsewhere, it occurs in the western Atlantic (Rhode Island, USA, Bermuda and Bahamas south to southern Brazil), and the eastern Pacific from Mexico (Gulf of California) south to Peru.



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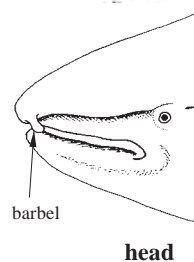
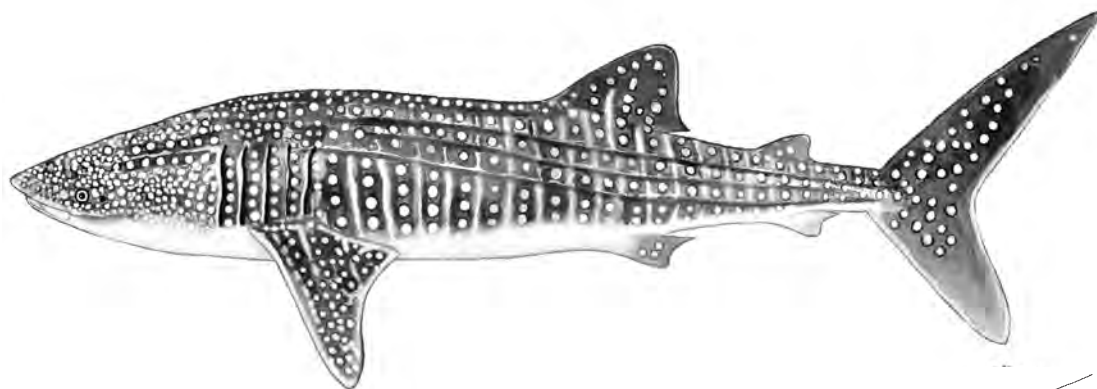
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RHINCODONTIDAE

[= RHINIODONTIDAE]

Whale sharks

A single species in this family.

Rhincodon typus Smith, 1828**Frequent synonyms / misidentifications:** *Rhiniodon typus* (Smith, 1828) / None.**FAO names:** En – Whale shark; Fr – Requin-baleine; Sp – Tiburón ballena.

Diagnostic characters: A gigantic shark (adults 7 to perhaps over 20 m total length) with body depressed anteriorly, fusiform posteriorly. **Head very broad and flattened**, with an **extremely short and truncated snout**. **Five large gill slits present, the posterior 3 over the pectoral-fin bases**. Internal gill arches with unique **filter grids of transverse bars and lobes across the internal gill slits**, but without discreet dermal denticle gillrakers or papillose gillrakers. Spiracles much smaller than eyes. **Nostrils with short, quadrate anterior nasal flaps, minute barbels, and shallow nasoral grooves**. Eyes without nictitating eyelids.

Mouth very large, wide, and short, nearly terminal and transverse on front of head; mouth not extending backward to eyes. **Teeth very small and extremely numerous**, similar in both jaws, not blade-like and **with hooked cusps**. Two dorsal fins, **the first dorsal fin with rear third of base over pelvic-fin bases, the second less than half the size of first**; anal fin present; **caudal fin asymmetrical, crescentic, and with a strong lower lobe but with only a vestigial subterminal notch and terminal lobe**; caudal fin much less than half the total length. **Caudal peduncle depressed, with a strong keel on each side continuing forward onto the back and over the gill slits as a low ridge and flanked by 2 additional ridges above it**; upper precaudal pit present. Supraorbital crests present on cranium, these laterally expanded. Intestine with a ring-type valve. **Colour:** dark grey or blackish grey, reddish, or greenish grey above (may appear bluish underwater), **with white or yellow spots and transverse stripes; white or yellowish below**.

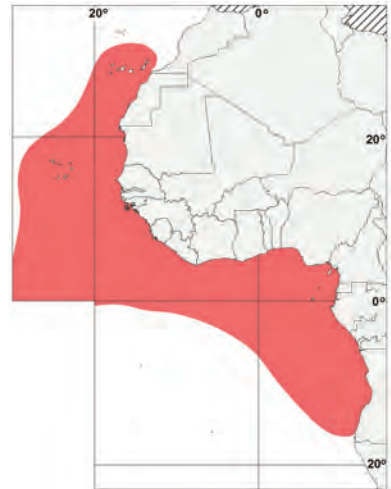
Similar families occurring in the area

The combination of characters such as the truncated snout, the transverse mouth in front of eyes, the numerous small teeth, the lateral ridges, the precaudal keels and the unique colour pattern distinguishes the whale shark from all other sharks in the area.

Size: This is the largest living shark, cartilaginous fish, and fish-like vertebrate; adult at 7 to 11 m or more, maximum total length at least 17 to 18 m from recent records and possibly to about 21 m.

Habitat, biology, and fisheries: This huge epipelagic and littoral filter-feeding shark occurs singly or in schools, often at or near the surface. It approaches beaches and reefs close inshore but is found far from land on the open sea. The species is ovoviviparous (aplacental viviparous) or oviparous (egg-laying), a pregnant female whale was caught in Taiwan Province of China with about 300 young inside but a youngster in a large, football-sized egg case was collected on the bottom in the Gulf of Mexico. Feeds on small pelagic crustaceans, squids, and schooling fishes including anchovies, sardines, and even albacore. These sharks feed horizontally and in a feeding position with head at or near the surface of the water but with body vertical. Harmless and permitting close approach by boats and divers; rarely butting small angling boats, possibly when excited by fish being hooked from the boats, but more commonly struck by ships while basking at the surface. Fishing methods uncertain in the area, but captured elsewhere as bycatch in floating gillnets, in fixed fish-traps, and sometimes in trawls, and often fished by harpoon and sometimes by snagging with big hooks. The flesh has been utilized dried-salted and fresh for human consumption (particularly in Taiwan Province of China, where the flesh is a luxury food that commands high prices); liver processed for oil; fins for the oriental fin trade; other parts including gillrakers used for human consumption and for fish-meal. Taken incidentally in Fishing Area 34, but has been of growing interest worldwide for targeted fisheries because of the high-value Oriental market. It may not be able to withstand even modest pressure from fisheries targeting it because of exceptionally slow growth, maturation at a large size, and low numbers of adults. This shark is currently listed on the IUCN Red List as Vulnerable worldwide and was placed on the CITES Appendix II list to limit international trade after drastic declines from targeted fisheries in the Indian Ocean (India) and western Pacific (Philippines). It is protected in several countries including former fishing countries (India and Philippines), but not in the present area, but in some regions is protected under national shark management plans and by international conventions. This shark is an increasingly popular subject of ecotouristic shark diving worldwide because it migrates close inshore, concentrates off reefs to feed during part of the year, is spectacular, and is readily accessible to divers and relatively tolerant of their presences. Whale shark ecotourism has been used to substitute for fisheries in the Philippines to employ former whale shark fishers as dive tour guides. The public image of the whale shark is of a benign and 'gentle giant', more like that of large whales than of large macropredatory sharks, supports the conservation and protection of this species from targeted fisheries. Whale shark conservation is also supported by the high economic benefits of whale shark ecotourism, which may be greater than whale shark fisheries products. Whale sharks have been kept in captivity for many years in Okinawa, Japan, and are now being kept in at least one other Japanese aquarium and in Taiwan Province of China and the United States.

Distribution: Circumglobal in all tropical and warm temperate seas, oceanic and coastal. In the area, known from the Canary Islands, Mauritania, Senegal and the Cape Verde Islands southward to the Gulf of Guinea, but probably more widespread; also from the Azores and the western Cape coast of South Africa in the eastern Atlantic.



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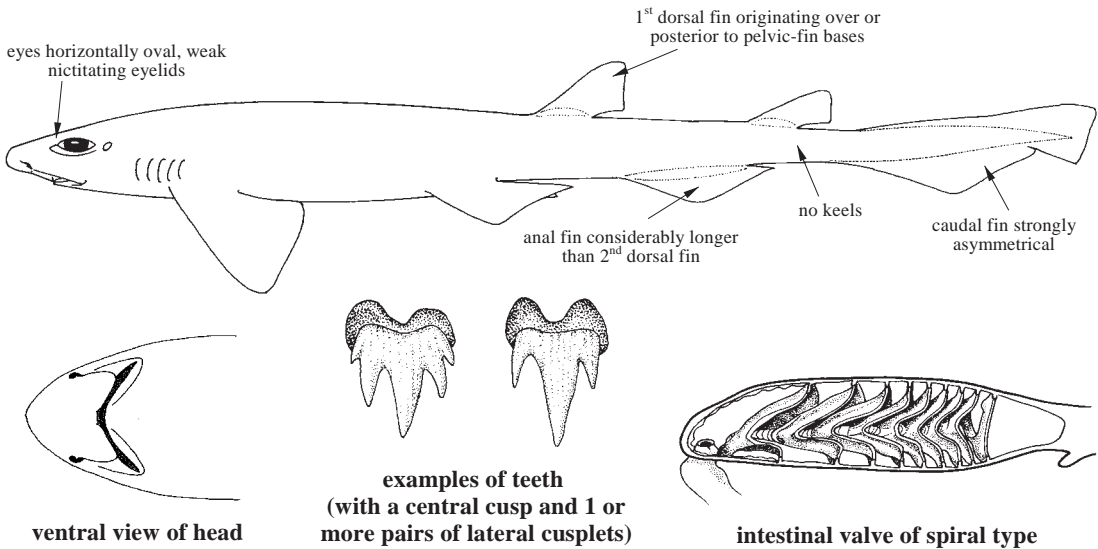
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Order CARCHARHINIFORMES

SCYLIORHINIDAE

Catsharks, nursehounds

Diagnostic characters: Small to moderate-sized sharks (adults of most species between 19 and 100 cm long but some to 162 cm) rarely with slender and elongated to moderately stout bodies. Head with 5 gill slits, **the last two posterior to pectoral-fin origins**; gill arches with or without small papillose rakers; nostrils with or without barbels (absent in species from the area) and lacking deep nasoral or circumnarial grooves; eyes horizontally oval, elongated, **with weakly differentiated nictitating lower eyelids** delimited below by a variably developed subocular pouch; mouth moderately large, with rear corners behind front margins of eyes; labial furrows present or absent (present in species from the area); **teeth very small, numerous, teeth near the centre of the mouth with a single medial cusp and usually one or more cusplets on each side**, the rear teeth often comb-like. Two dorsal fins, **the first dorsal fin originating over or posterior to pelvic-fin bases**, the second dorsal fin smaller, as large, or larger than the first dorsal fin, but never greatly reduced; **anal fin considerably longer than second dorsal fin, and originating in advance of the second dorsal fin origin**; caudal fin strongly asymmetrical, with a subterminal notch, **its lower lobe absent or only weakly indicated, its upper edge not rippled, sometimes with a denticulated crest**; ventral caudal lobe usually weak or absent. **Caudal peduncle** not flattened dorsoventrally, **without lateral keels or precaudal pits**. Intestine with a corkscrew-shaped spiral valve, with 5 to 22 turns. **Colour:** grey, brown, yellowish or black, often with light or dark spots and dark blotches, bars and saddles.



Habitat, biology, and fisheries: This is by far the largest family of sharks, with numerous small to moderate-sized species (rarely reaching 1.5 m total length) from tropical and temperate latitudes. Catsharks range from the intertidal to depths greater than 2 000 m on continental or insular slopes, but in the eastern central Atlantic area they are mostly found on the continental slopes between 200 and 1 600 m. They are generally not strong, sustained swimmers and do not migrate over great distances. Most species live on or near the bottom. Reproduction is usually oviparous (egg-laying), but ovoviviparous in a few species. These sharks feed chiefly on invertebrates and small fishes. Some are rather common and regularly taken as bycatch in the trawl fisheries. Species from shallower waters are also taken in fixed bottom nets, in lobster traps, on hook-and-line and in gillnets. Most of the bycatch from trawl fisheries is reduced to fishmeal, while the catch from artisanal fisheries is marketed chiefly dried-salted; they are also used for oil. Separate statistics are not reported for this family. Some catsharks are caught by sport anglers or viewed by ecotouristic divers, but not in the present area. Some species of catsharks including *Scyliorhinus canicula* and *S. stellaris* are hardy and are kept in public and private aquaria. Conservation status of catsharks sketchily known in the area.

Similar families occurring in the area

The catsharks are easily distinguished from superficially similar families of sharks by the combination of characters such as their small size, the location of the last two gill slits behind the pectoral-fin origins, their nictitating eyelids, the posterior position of the first dorsal fin, the comparatively large anal fin, the strongly asymmetrical caudal fin, the absence of keels or precaudal pits on the caudal peduncle and the presence of a spiral or spiral-ring intestinal valve.

Key to species occurring in the area

- 1a. Labial furrows present on lower jaw only (Fig. 1a); second dorsal fin considerably smaller than first dorsal; supraorbital crests present on cranium above eyes. (***Scyliorhinus***) → 2
- 1b. Labial furrows present on both upper and lower jaws (Fig. 1b); second dorsal fin as large as first; supraorbital crest absent from cranium above eyes → 4

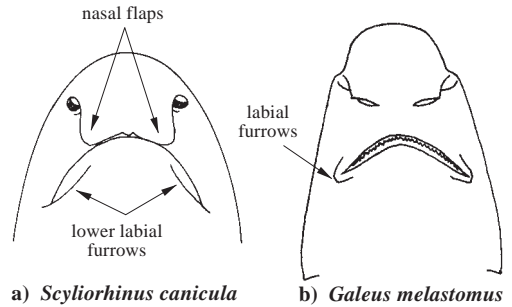


Fig. 1 ventral view of head

- 2a. Anterior nasal flaps greatly enlarged, meeting each other at midline of snout and overlapping mouth posteriorly (Fig. 1a); shallow oronasal grooves present between nostrils and mouth; first dorsal-fin origin behind pelvic-fin insertions; second dorsal-fin origin over anal-fin insertion (Fig. 2) ***Scyliorhinus canicula***
- 2b. Anterior nasal flaps smaller, well-separated from each other medially and ending anteriorly to mouth or just reaching it (Fig. 3); first dorsal-fin origin over pelvic-fin insertions; second dorsal-fin origin over rear half of anal-fin base → 3

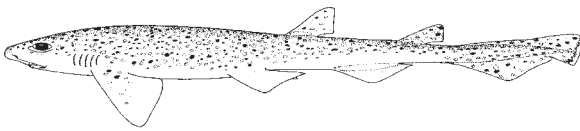


Fig. 2 *Scyliorhinus canicula*

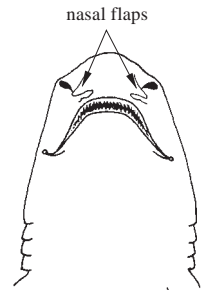


Fig. 3 ventral view of head

- 3a. Body relatively stout and tapering strongly to tail; anterior nasal flaps reaching mouth; saddle blotches present on back, dark spots large and few, no white spots (Fig. 4) ***Scyliorhinus cervigoni***
- 3b. Body slenderer and tapering slightly to tail; anterior nasal flaps ending just in front of mouth; no saddle blotches, large and small dark spots more numerous, often white spots on sides (Fig. 5) ***Scyliorhinus stellaris***



Fig. 4 *Scyliorhinus cervigoni*



Fig. 5 *Scyliorhinus stellaris*

4a. Snout short, blunt and broadly rounded; anterior nasal flaps enlarged and fused across snout to form a broad nasal curtain that reaches mouth; shallow and broad nasoral grooves connecting excurrent apertures of nostrils and mouth; colour pattern with dark saddles with light spots on back and tail (Fig. 6) ***Haploblepharus pictus***

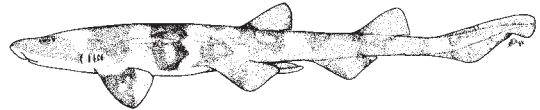


Fig. 6 *Haploblepharus pictus*

4b. Snout longer, more or less pointed and narrowly rounded or angular, blunt and broadly rounded; anterior nasal flaps smaller, not fused across snout to form a broad nasal curtain, and ending in front of mouth; nostrils without nasoral grooves; colour pattern plain or with dark saddles without light spots and dark spots on back and tail → 5

5a. Labial furrows shorter, upper ones ending well behind upper symphysis of mouth; head narrower; eyes nearly lateral in position, extending laterally to head rim in dorsal view (Fig. 7a); dorsal margin of caudal fin with a well-developed crest of enlarged denticles; colour pattern consisting of dark spots and blotches on a light background, dorsal surface dark, underside light (***Galeus***) → 6

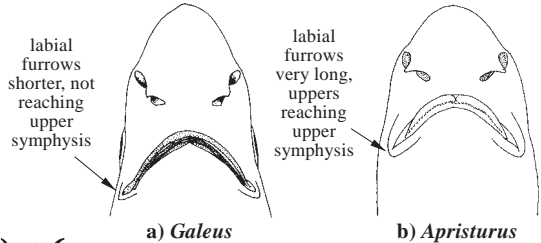


Fig. 7 ventral view of head

5b. Labial furrows longer, upper ones reaching upper symphysis of mouth (Fig. 7b); head broader, eyes dorsolateral in position, well medial to head rim in dorsal view; dorsal margin of caudal fin without a crest of enlarged denticles in species known from the area; colour uniform, without prominent markings, usually black or brown on upper and lower surfaces (***Apristurus* spp.**) → 8

6a. Snout broadly parabolic in shape; mouth short and very broadly arched, with upper labial furrows reaching anteriorly to level of lower symphysis; 15 to 18 dorsal saddle blotches on back; a large species, adults 48 cm or more and may reach 90 to 100 cm total length (Fig. 8) ***Galeus melastomus***



Fig. 8 *Galeus melastomus*

6b. Snout narrowly parabolic in shape; mouth longer and more narrowly arched, with upper labial furrows ending far behind level of lower symphysis; saddle blotches, when present, usually 9 to 11 or less; smaller species, adults to 45 cm total length or less → 7

7a. Internarial space narrower, much less than nostril width but about equal to distance between the pectoral-fin insertions; head shorter, less than 20% of total length; pectoral fins over 20% of total length; first dorsal inner margin less than first dorsal height; caudal peduncle strongly compressed; black edging on dorsal fins and postventral caudal margin (Fig. 9) ***Galeus atlanticus***

7b. Internarial space broader, subequal to nostril width but less than half of distance between the pectoral-fin insertions; head longer, over 20% of total length; pectoral fins less than 20% of total length; first dorsal inner margin usually greater than first dorsal height; caudal peduncle moderately compressed; no black marks on dorsal fins, no black edging on caudal fin (Fig. 10) ***Galeus polli***

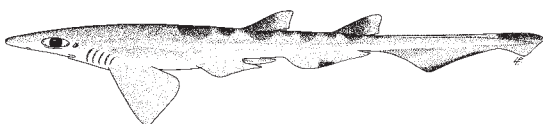


Fig. 9 *Galeus atlanticus*



Fig. 10 *Galeus polli*

- 8a. Colour dark brown to blackish; size possibly smaller, to at least 68 cm (Fig. 11)
 *Apristurus laurussonii*
- 8b. Colour slate grey to grey-brown, not blackish; size possibly larger, to at least 88 cm
 (Fig. 12) *Apristurus saldanha*



Fig. 11 *Apristurus laurussonii*

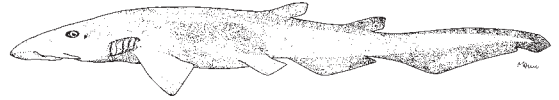












Fig. 12 *Apristurus saldanha*

List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Apristurus laurussonii* (Saemundsson, 1922).^{1/}
-  *Apristurus saldanha* (Barnard, 1925).
-  *Galeus atlanticus* (Vaillant, 1888).^{2/}
-  *Galeus melastomus* Rafinesque, 1810.
-  *Galeus polli* Cadenat, 1959.
-  *Haploblepharus pictus* (Müller and Henle, 1838).
-  *Scyliorhinus canicula* (Linnaeus, 1758).
-  *Scyliorhinus cervigoni* Maurin and Bonnet, 1970.
-  *Scyliorhinus stellaris* (Linnaeus, 1758).

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^{1/} *Apristurus* is a large sketchily known deepwater genus with 32 described species plus approximately 10 undescribed species (2006 count). Apart from *A. laurussonii* (including *A. atlanticus* and *A. maderensis* as synonyms) from the area north of the equator and the closely similar *A. saldanha* from southern Africa, two additional species were nominally recorded from the area: *Apristurus nasutus* de Buen, 1959, an eastern Pacific South American species reported from Morocco, and *Apristurus profundorum* (Goode and Bean, 1896), described from the western North Atlantic and reported off Mauritania. These records could not be confirmed, and it is possible that other species are involved. *Apristurus microps* (Gilchrist, 1922) and *A. manis* (Springer, 1979) are both known from the eastern Atlantic from off the United Kingdom and off South Africa, and could occur in deep water within the area.

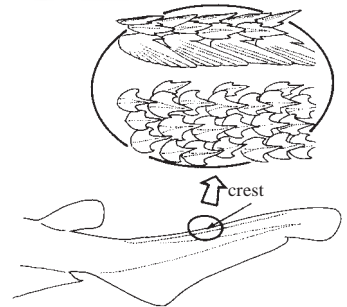
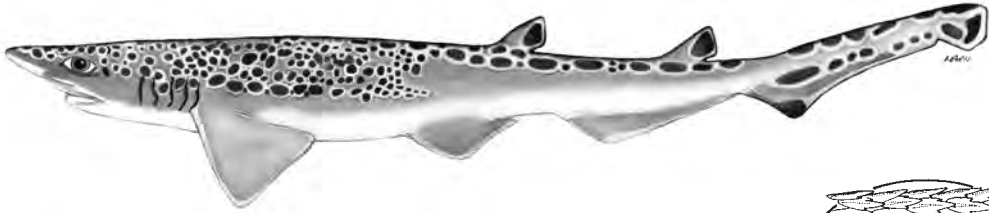
^{2/} *Galeus* species have been placed in the genus *Pristiurus* Bonaparte, 1834 by some writers, but *Galeus* Rafinesque, 1810 is currently considered the valid genus name.

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***Galeus melastomus* Rafinesque, 1810**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Blackmouth catshark; Fr – Chien espagnol; Sp – Pintarroja bocanegra.



Diagnostic characters: A small shark; head with 5 small gill slits, the last two above the pectoral-fin bases; nostrils without barbels and with the anterior nasal flaps very short, not meeting each other at midline and ending well anterior to mouth; distance between nostrils about equal to space between pectoral-fin insertions; no oronasal grooves; labial furrows present on both jaws, short, not extending to front of mouth; eyes horizontally elongated, nearly lateral in position reaching rim of head when viewed from above; nictitating eyelids present, weakly differentiated externally and delimited below the eye by shallow subocular pouches; **snout long**, narrowly parabolic; teeth very small and numerous, similar in both jaws and not blade-like, with a slender primary cusp and side cusplets, comb-like towards rear of mouth; anterior teeth of upper jaw not greatly enlarged and not separated from the laterals by minute intermediate teeth. **First dorsal fin about as large as second dorsal**, its origin about over or slightly behind pelvic-fin insertions; second dorsal fin originating over rear half of anal-fin base; anal fin larger than second dorsal, its rear tip reaching beyond lower caudal-fin origin; caudal fin moderately long, asymmetrical, with a subterminal notch but with a hardly developed lower lobe, its lower origin just behind anal-fin insertion; **a crest of enlarged, pointed denticles along dorsal margin of caudal fin**; caudal peduncle without keels or precaudal pits. **Colour:** brown above, cream brownish below, with 15 to 18 large, dark brown blotches and spots on sides; **mouth black inside**.

caudal fin

Size: Maximum: 90 cm total length, possibly to 100 cm; most adults below 70 cm with smallest about 48 cm.

Habitat, biology, and fisheries: A common, deepwater, bottom dwelling shark found on the upper continental slope, mainly between 200 and 500 m depth but occasionally up to 55 m and down to 1 000 m. Oviparous, depositing eggs in small rounded-elongated capsules with a pair of tendrils on each end that anchor the capsule to the bottom. Feeds mainly on bottom invertebrates, including shrimp and cephalopods, but also on small midwater fishes. Mainly fished in the Canary Islands. Separate statistics are not reported for this species. Caught in bottom trawls. Utilized fresh and dried-salted for food, and the hides used for leather. Assessed globally as Least Concern on the IUCN Red List.

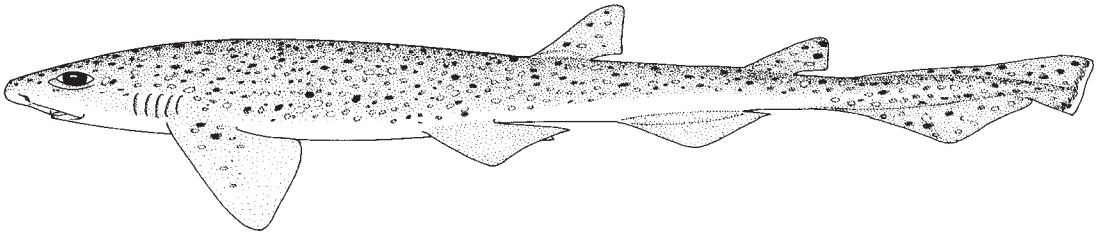
Distribution: In the area, from Morocco, Mauritania, Western Sahara, and Madeira to Senegal and the Canary Islands. Northward extending to the Azores and Norway and into the Mediterranean Sea.



***Scyliorhinus canicula* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Smallspotted catshark; Fr – Petite roussette; Sp – Pintarroja.



Diagnostic characters: A small, slender shark. Head with 5 small gill slits, the last two above the pectoral-fin bases; nostrils without barbels but **with the anterior nasal flaps greatly enlarged, meeting each other at the midline, and posteriorly overlapping the mouth; broad and shallow oronasal grooves** between mouth and nostrils; mouth extending behind front margins of eyes; **labial furrows present only on lower jaw**; eyes horizontally elongated, in dorsolateral position, with nictitating lower eyelids that are weakly differentiated externally and delimited below the eye by shallow subocular pouches; **snout short and narrowly rounded**; teeth very small and numerous, similar in both jaws, not blade-like, with a slender primary cusp and usually a cusplet on each side, not comb-like at rear of mouth; anterior teeth of upper jaw smaller than lateral teeth and not gradually increasing toward the sides, not separated from the laterals by minute intermediate teeth. First dorsal fin somewhat larger than second and **originating behind the pelvic-fin insertions; second dorsal fin originating over anal-fin insertion; anal fin longer than second dorsal**; caudal fin short, asymmetrical, with a subterminal notch but with a hardly developed lower lobe and its lower origin well separated from anal fin. Caudal peduncle without keels or precaudal pits. **Colour:** light brown above, cream below, **with numerous small to large dark brown and often white spots on back, sides and upper surfaces of fins.**

Size: Maximum: to about 100 cm (60 cm in the Mediterranean Sea), mostly from 39 to 60 or 70 cm total length.

Habitat, biology, and fisheries: Found mostly in waters of the continental shelf, close inshore, on sand, fine gravel, or mud bottoms from the intertidal commonly down to 110 m and exceptionally to about 400 m depth. Oviparous, depositing eggs in small, rounded capsules with a pair of tendrils on each end that anchor the capsule to the bottom; the eggs hatch in 5 to 11 months and yield young of 10 cm length. Feeds mainly on bottom invertebrates, including crabs shrimps, worms, and molluscs, but also small fishes. Separate statistics are not reported for this species in the area. Caught mostly in bottom trawls, but also fixed bottom nets and pelagic trawls. Utilized fresh, dried-salted, or processed for oil or fishmeal. Assessed globally as Least Concern on the IUCN Red List.

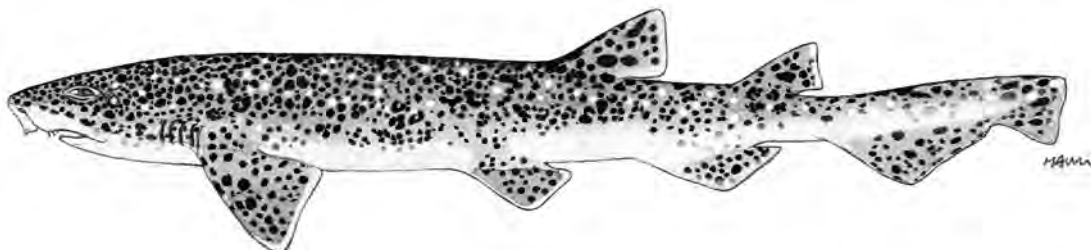
Distribution: In the area, found from Morocco, Western Sahara, Mauritania, Madeira, the Canary Islands, and to Senegal, possibly Côte d'Ivoire and Benin; northward extending to the Azores, Norway and the British Isles, and into the Mediterranean.



***Scyliorhinus stellaris* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Nursehound; Fr – Grande roussette; Sp – Alitán.



Diagnostic characters: A moderately large, relatively slender shark. Head with 5 small gill slits, the last two above the pectoral-fin bases; nostrils without barbels, **with moderately large anterior nasal flaps, separated from each other at the midline by a short space and not overlapping the mouth posteriorly; no oronasal grooves** between mouth and nostrils; mouth extending posteriorly behind front margins of eyes; **labial furrows present only on lower jaw**; eyes horizontally elongated, **in dorsolateral position**, with nictitating lower eyelids that are weakly differentiated externally and delimited below the eye by shallow subocular pouches; **snout short and narrowly rounded**; teeth very small and numerous, similar in both jaws and not blade-like, with a slender primary cusp and usually a cusplet on each side, not comb-like at rear of mouth; anterior teeth of upper jaw smaller than lateral teeth and gradually increasing in size toward the sides, not separated from the laterals by minute intermediate teeth. First dorsal fin somewhat larger than the second, **originating about over pectoral-fin insertions**; **second dorsal fin originating about over middle of anal-fin base**; **anal fin longer than second dorsal**; caudal fin short; asymmetrical, with a subterminal notch but a hardly developed lower lobe, and its lower origin well separated from anal fin. Caudal peduncle without keels or precaudal pits. **Colour:** light brown or grey-brown above, creamy white below; **back and upper surfaces of fins with numerous small to large rounded dark brown and often white spots**; caudal and anal fins with dusky edges.

Size: Maximum total length about 162 cm; common to about 125 cm.

Habitat, biology, and fisheries: A common shark on rough bottom, in inshore waters of the continental shelf from 1 or 2 m to at least 125 m, but commonest in depths of 20 to 63 m. Oviparous, depositing eggs in small, rounded capsules with a pair of tendrils on each end which anchor them to the substrate, hatching in about 9 months and yielding young of 16 cm length. Feeds mainly on benthic crustaceans including crabs, shrimps, and hermit crabs, squids, octopuses and other molluscs, also a wide variety of demersal and pelagic bony fishes, and other small sharks. Separate statistics are not reported for this species. Caught primarily in bottom trawls, but also fixed bottom nets and pelagic trawls. Utilized dried salted or processed for fishmeal and oil. Assessed globally as Near Threatened on the IUCN Red List due to evidence of declines in the Mediterranean Sea and patchy distribution elsewhere.

Distribution: In the area, found from Morocco, Western Sahara, Mauritania and the Canary Islands to Senegal. Nominal records of this species from Gambia to Guinea, Liberia and from Côte d'Ivoire to Zaire may be based in whole or part on *Scyliorhinus cervigoni*. Northward this species extends to the British Isles, the North Sea, southern Scandinavia, and the Mediterranean Sea.



***Apristurus laurussonii* (Saemundsson, 1922)**

En – Iceland catshark.; **Fr** – Roussette d'Islande; **Sp** – Pejegata islándico.

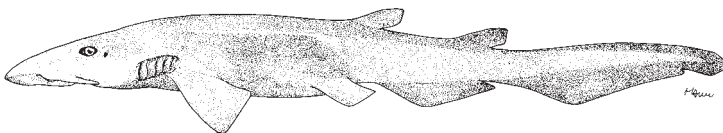
Maximum total length to at least 68 cm, adult male 68 cm, adult female 67 cm. Occurs on the upper and middle continental slopes on or near the bottom at 560 to 2 060 m. Biology poorly known, relatively common. In the eastern central Atlantic area off the Canary Islands, Madeira, and Western Sahara; ranging northwards in the eastern North Atlantic to southwestern Ireland and Iceland; elsewhere from the western Atlantic from the Atlantic and Gulf of Mexico coasts of the United States to Honduras and Venezuela. Nominal records of this species exist from Indian Ocean seamounts south of Madagascar and west of Australia. Two other species described from the area, *Apristurus atlanticus* Koefoed, 1932 from the Canary Islands and *A. maderensis* Cadenat and Maul, 1966 from Madeira, are junior synonyms of this wide-ranging (for a scyliorhinid) species. Ranked as Data Deficient on the IUCN Red List.



***Apristurus saldanha* (Barnard, 1925)**

En – Saldanha catshark; **Fr** – Holbiche gatussau; **Sp** – Pejegato saldaña.

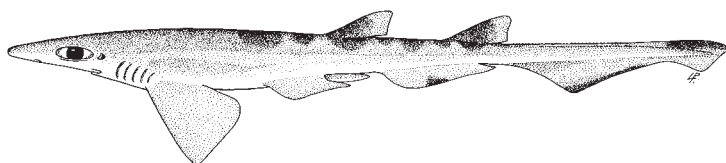
Maximum total length to at least 89 cm, adult females 72 to 77 cm, adult males 74 to 89 cm. Occurs on the continental slopes on or near the bottom at 344 to 1 009 m. Biology poorly known, possibly oviparous. Eats lanternfishes (two species) and unidentified cephalopods. Interest to fisheries none at present, possibly caught as bycatch in demersal trawl fisheries. In the eastern Atlantic off northern Namibia, and southwards to the west and southeast coasts of South Africa. Ranked as Least Concern on the IUCN Red List.



Galeus atlanticus (Vaillant, 1888)

En – Atlantic sawtail catshark; **Fr** – Chien d'Alboran; **Sp** – Pejegato Alborán.

Maximum total length about 45 cm, adult females 40 to 45 cm, adult males 38 to 42 cm. A little-known small deepwater shark, until recently confused with *Galeus melastomus*. Occurs on the upper continental slopes on or near the bottom at 400 to 600 m. Reproduction oviparous, but with nine cased eggs in the oviducts suggesting multiple oviparity (egg-laying) and extended retention of eggs. Feeds on shrimps. No known fisheries at present, discarded bycatch of deepwater demersal fisheries. Eastern North Atlantic, in the area from the Straits of Gibraltar off Morocco, possibly off Mauritania, and north to Spain (Alboran Sea); also found in the Mediterranean Sea. Assessed as Near Threatened on the IUCN Red List due to levels of capture as bycatch.

***Galeus polli*** (Cadenat, 1959)

En – African sawtail catshark; **Fr** – Chien râpe; **Sp** – Pintarroja africana.

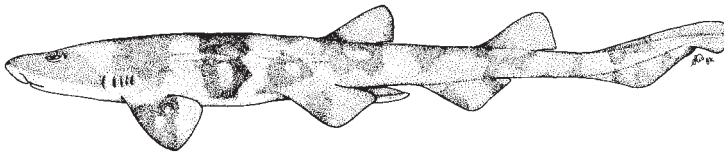
Maximum total length about 42 cm; size at birth about 11 to 12 cm; adult males 35 to 39 cm, adult females 41 to 42 cm. A common to abundant small deepwater shark in tropical to cold-temperate waters. Occurs offshore on the outer continental shelves and upper slopes on or near bottom at depths of 115 to 720 m, mostly between 200 and 500 m in southern part of its range. Reproduction ovoviviparous (aplacental viviparous), 5 to 12 young per litter; eats small crustaceans including mysid and euphausiid shrimps, lanternfishes, lightfishes, and small squids. Interest to fisheries limited, caught in bottom trawls and utilized fresh for human consumption and for fishmeal, or discarded as unwanted bycatch. In the eastern Atlantic virtually confined to the eastern Central Atlantic area, from off southern Morocco, Western Sahara, Mauritania, Senegal, Guinea, Angola, Namibia and extending to the west coast of South Africa (Northern Province). Ranked as of Least Concern on the IUCN Red List.



***Haploblepharus pictus* (Müller and Henle, 1838)**

En – Dark shyshark; **Fr** – Roussette sombre; **Sp** – Alitán oscuro.

Maximum total length about 56 cm; size at hatching about 11 cm, adult males to 56 cm, adult females to 53 cm. A common small inshore shark that occurs on sandy and rocky bottom at depths from the intertidal to 59 m. Reproduction oviparous, with one egg laid per oviduct; eggs take about 3.5 months to hatch in captivity. Eats benthic invertebrates. No known fisheries at present, discarded bycatch of lobster trap fisheries. This species occurs in the area off Namibia and ranges south to the west and southeast coasts of South Africa. Ranked as of Least Concern on the IUCN Red List.



***Scyliorhinus cervigoni* Maurin and Bonnet, 1970**

En – West African catshark; **Fr** – Roussette thalassa; **Sp** – Alitán africano.

Maximum total length about 76 cm, adult male 67 cm, adult females to at least 76 cm. A little-known tropical demersal shark of the continental shelf and upper slope on rocky and mud bottom at depths of 45 to 500 m. Reproduction probably oviparous (egg-laying), eats bony fishes. No known fisheries at present, probably discarded bycatch of deepwater demersal trawl fisheries off West Africa, but uncertain because of past confusion with *Scyliorhinus stellaris*. As currently known endemic to the eastern central Atlantic area, with scattered records off Mauritania, Senegal, possibly Gambia to Guinea and Liberia, possibly Gabon to Democratic Republic of Congo, and Angola, but may be wider ranging in the area. Ranked as Data Deficient on the IUCN Red List.



PSEUDOTRIAKIIDAE

False catsharks and gollumsharks

A single species occurring in the area.

Pseudotriakis microdon de Brito Capello, 1868

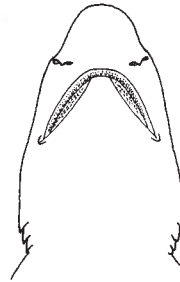
Frequent synonyms / misidentifications: None / None.

FAO names: **En** – False catshark; **Fr** – Requin à longue dorsale; **Sp** – Musolón aleta larga.

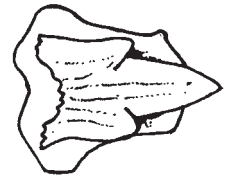


Diagnostic characters: A large, soft-bodied shark. Head with 5 small gill slits, the last two over the pectoral-fin bases; no dermal gillrakers; **spiracles very large, about as long as eyes**; nostrils without barbels or oronasal grooves; eyes above sides of head, horizontally elongated, with weakly differentiated but prominent nictitating lower eyelid; snout moderately long, narrowly rounded, bell-shaped in vertical view; **mouth very wide and long, extending behind front of eyes, angular in shape; labial furrows present but short, not extending forward to front of mouth; teeth extremely small and numerous, in over 200**

rows, and similar in both jaws; teeth not blade-like, with a small primary cusp and one or more cusplets, becoming comb-like in the rear of mouth; upper anterior teeth small and grading into the laterals, not separated from these by small intermediate teeth. **Two dorsal fins, the first greatly elongated, low, keel-like, and broadly rounded above**, its base just ahead of pelvic-fin origins and about **as long as caudal fin; second dorsal fin short but higher than the first dorsal fin and larger than the anal fin**; anal-fin base under second dorsal base; caudal fin asymmetrical, its ventral lobe hardly developed, its upper edge not rippled and with a subterminal notch present. Caudal peduncle not depressed, without lateral keels or precaudal pits. Intestine with spiral valve of 17 turns. **Colour:** dark brownish grey to blackish above and below, often darker on posterior edges of pelvic, dorsal, anal and caudal fins.



ventral view of head



dermal denticle

Similar families occurring in the area

No other sharks in the area combine the presence of a low, keel-like first dorsal fin about equal in length to the caudal fin, nictitating eyelids, an anal fin, and no dorsal-fin spines. Other genera and species in the family Pseudotriakidae that are found in the Indian Ocean and western Pacific have shorter dorsal fins, fewer tooth rows, fewer intestinal valve turns and are much smaller than *Pseudotriakis microdon*.

Size: Maximum total length 295 cm; size at birth between 70 and 85 cm, adults 200 to 210 cm and larger.

Habitat, biology, and fisheries: A deepwater shark, normally occurring on the upper continental slopes at depths between 200 and 1 900 m, seldom occurring in shallower water. Ovoviviparous (aplacental viviparous), with litters of two to possibly four young; fetuses resorb yolk-sacs and feed on nutritive eggs before birth (oophagy). Little known in habits, eats bony fish and prawns, and probably other bottom prey. No separate statistics are reported for this species. Taken incidentally as bycatch on deep-set longlines, more rarely caught in bottom trawls. Utilization not recorded. Ranked as Data Deficient on the IUCN Red List.

Distribution: In the area known to occur off the Canary Islands, Cape Verde Islands, Madeira, and Senegal, but not found in the subequatorial part of the area and not known from South Africa; also found off Portugal, the Azores, France and Iceland in the eastern North Atlantic. Elsewhere in the western Atlantic, western Indian Ocean (Aldabra and Melville Ridge area south of Madagascar) and the western and central Pacific, but not recorded in the eastern Pacific.



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LEPTOCHARIIDAE

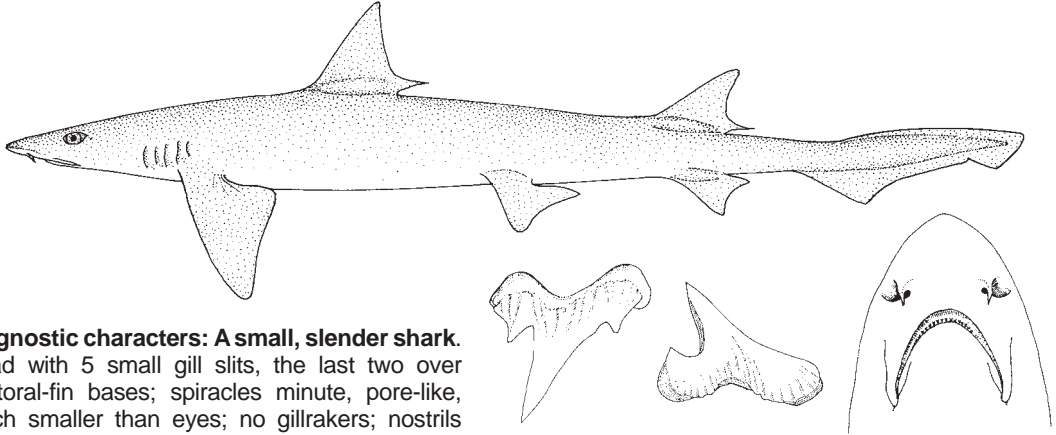
Barbeled houndsharks

A single species occurring in the area.

Leptocharias smithii (Müller and Henle, 1839)

Frequent synonyms / misidentifications: None / None.

FAO names: **En** – Barbeled houndshark; **Fr** – Emissole barbué; **Sp** – Tiburón barbudo.



Diagnostic characters: A small, slender shark.

Head with 5 small gill slits, the last two over pectoral-fin bases; spiracles minute, pore-like, much smaller than eyes; no gillrakers; nostrils with **anterior nasal flaps formed as slender, prominent barbels**, but without oronasal

grooves; eyes horizontally oval, **on sides of head**, with strongly differentiated nictitating lower eyelids that are entirely within the eye openings; snout moderately long and narrowly rounded; mouth moderately wide and long, extending behind front of eyes; **labial furrows very long**; teeth very small and numerous, **not in form of pavement**, most **with a slender primary cusp** and side cusplets, except for moderately enlarged hook-like anterior teeth in adult males; no small intermediate teeth separating the anteriors from the laterals. Two dorsal fins, the first angular, not keel-like, high and short, its base well in front of pelvics, but posterior to pectorals and much shorter than caudal fin; **second dorsal fin slightly smaller than the first but larger than anal fin**; origin slightly posterior to that of second dorsal, its base almost entirely below second dorsal base; **caudal fin much less than half the total length, strongly asymmetrical, with lower lobe weakly developed**, subterminal notch present, and **upper edge not rippled**. Caudal peduncle not depressed, **without keels or precaudal pits**. Intestine with an auger or corkscrew like spiral valve of 14 to 16 turns. **Colour:** grey or grey-brown above, white below, no spots or other markings.

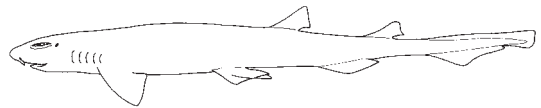
upper and lower teeth

ventral view of head

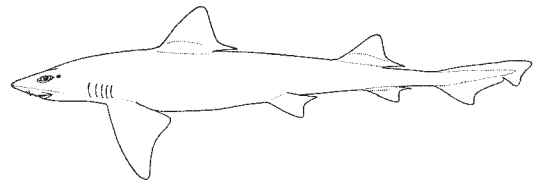
Similar families occurring in the area

Scyliorhinidae: first dorsal fin over or behind pelvic-fin bases.

Triakidae: anterior nasal flap broad, not formed as slender barbels (species in the area), labial furrows shorter, intestinal spiral valve of 5 to 10 turns.



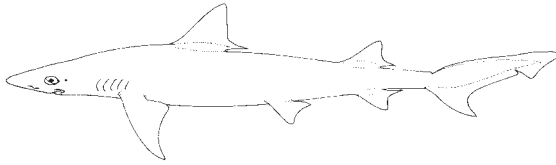
Scyliorhinidae



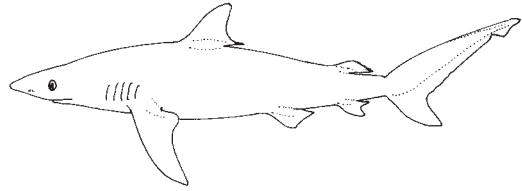
Triakidae

Hemigaleidae and Carcharhinidae: usually stouter-bodied, anterior nasal flaps not in form of barbels, teeth larger and blade-like at least in upper jaw, caudal fin with a strong lower lobe and a rippled upper edge, precaudal pits present, intestinal valve of scroll type (Carcharhinidae) or of spiral type, with 4 to 6 turns (Hemigaleidae).

Other shark families: no nictitating lower eyelids.



Hemigaleidae



Carcharhinidae

Size: Maximum total lengths to about 80 cm, adults commonly between 55 and 80 cm, females slightly larger than males.

Habitat, biology, and fisheries: A common or formerly common inshore, tropical shark, reported to be especially abundant around river mouths, ranging from 5 to 75 m depth but mostly inshore in water less than 50 m depth. Viviparous, with yolk-sac placenta, litters of up to 7 young. Feeds primarily on crustaceans, but also on small cephalopods and fishes. Separate statistics are not reported for this species. Caught in bottom trawls, on hooks, and in fixed bottom nets. Utilized fresh, smoked, and dried-salted; skins also used for leather. Taken as utilized bycatch throughout its restricted habitat, conservation status needs further study. Listed on IUCN Red List for 2007 as Lower Risk/Near Threatened but this may be optimistic given the inshore habitat limits of this species and heavy inshore fisheries and possibly habitat destruction through development and pollution.

Distribution: Virtually endemic to the area, ranging from Mauritania to Angola and possibly northward to Morocco and the Mediterranean and south to Namibia and South Africa, but these records require confirmation.



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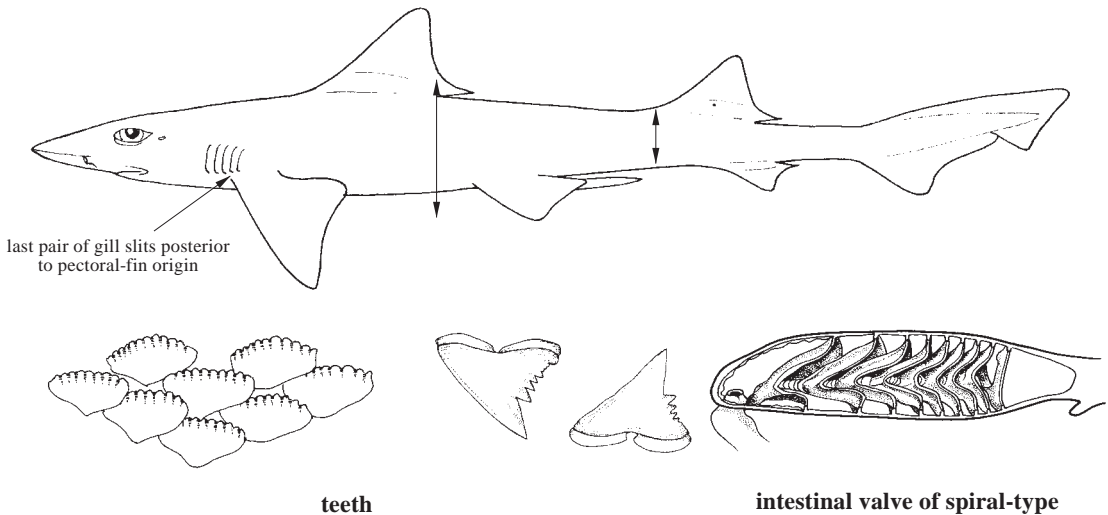
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TRIAKIDAE

Houndsharks, smoothhounds, topes

Diagnostic characters: Small to medium-sized sharks (adults 30 to 195 cm total length and possibly to 240 cm). Body elongate and slender to moderately stout. Head with 5 gill slits, **the last two posterior to pectoral-fin origins**; small spiracles present; gill arches without rakers; eyes horizontally oval, situated on or above sides of head, **with a nictitating eyelid partly or entirely within the eye opening**; anterior nasal flaps of nostrils either broadly to narrowly expanded or greatly reduced, **but not in the form of slender barbels** in species in the area; teeth either numerous, cusplless or strong-cusped but not blade-like and arranged in a pavement or semi-pavement (*Mustelus* and *Triakis*) or larger, blade-like, with a strong cusp and small cusplets but no serrations (*Galeorhinus*); mouth ending below or posterior to eyes; labial furrows moderately long. Two dorsal fins, the first dorsal fin much shorter than caudal fin in species in the area, **its base entirely anterior to pelvic fins; second dorsal fin somewhat smaller than the first dorsal fin, originating ahead of anal fin; anal fin as large as or smaller than the second dorsal**; caudal fin asymmetrical, its lower lobe varying from virtually absent to strong, **its upper edge not rippled**. Caudal peduncle not flattened dorsoventrally or expanded laterally, **without keels or precaudal pits**. **Intestine with a corkscrew or auger-like spiral valve**, with 6 to 10 turns. **Colour:** back usually greyish brown, belly white, some species with small dark or white spots. Some species are capable of undergoing slow colour changes.

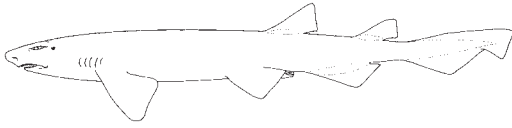


Habitat, biology, and fisheries: Houndsharks are widely distributed in tropical- and warm-temperate waters ranging from the intertidal to the upper continental slopes (to depths of 300 m or more). Houndsharks are variably ovoviparous (aplacental viviparous) or viviparous (placental viviparous) with a yolk sac placenta. They feed on a wide variety of small to medium-sized bony fishes (both demersal and pelagic) and fish eggs, small sharks and batoids, chimaeroids, crustaceans (including brachyurid crabs, hermit crabs, lobsters, slipper lobsters, mantis shrimp, ghost shrimp, shrimp and prawns, and isopods), king crabs, gastropods, bivalves (whole bivalves and their siphons), cephalopods (squids and octopuses), tunicates, cephalochordates, polychaete worms, echiuroid worms, sipunculoid worms, holothurians, coelenterates, and rarely garbage. None of the species are injurious to people. Many species are used for human consumption (fresh, frozen, smoked or dried-salted) as well as in the preparation of various subproducts such as shark fins, liver oil, fishmeal, and shark skins for leather. Houndsharks include important fisheries species, particularly smoothhounds (*Mustelus*) and tope sharks (*Galeorhinus*), because of their abundance in inshore areas and because they are readily captured with light line and net gear. Several species of houndsharks are caught by sports fishers and by spearfishing divers, but are seldom the subject of ecotouristic shark viewing. Some species, including most if not all found in the area, are displayed in public aquaria and are often hardy and attractive, active animals that do well in captivity.

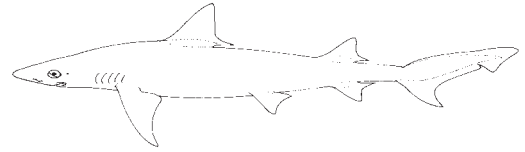
Similar families occurring in the area

Scyliorhinidae: origin of first dorsal fin over or behind pelvic-fin bases.

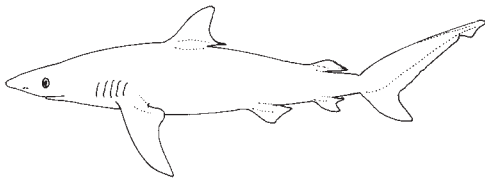
Hemigaleidae, Carcharhinidae and Sphyrnidae: upper edge of caudal fin with a rippled or undulating margin; precaudal pits present; teeth more or less unlike in upper and lower jaws (for the species in the area). Furthermore, Carcharhinidae and Sphyrnidae with an intestinal valve of scroll type and Sphyrnidae with hammer-like lateral projections of its head.



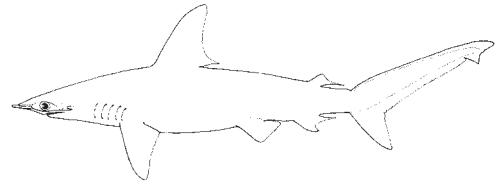
Scyliorhinidae



Hemigaleidae

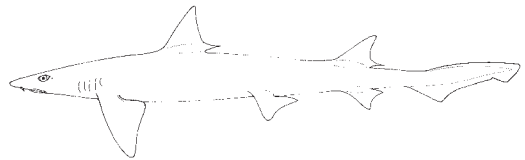


Carcharhinidae



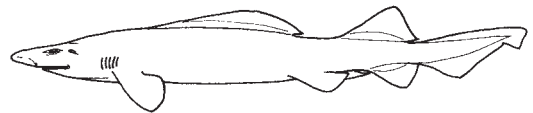
Sphyrnidae

Leptochariidae: anterior nasal flaps formed as slender barbels; teeth not blade-like, with long cusps and cusplets; upper labial furrows longer, nearly reaching front of mouth; intestinal valve with 14 to 16 turns.



Leptochariidae

Pseudotriakidae: first dorsal fin low, keel-like, and about as long as caudal fin; teeth more numerous and in more than 200 rows in either jaw.

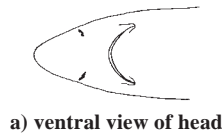


Pseudotriakidae

Other shark families: eyes without nictitating lower eyelids.

Key to species of Triakidae occurring in the area

1a. Eyes on sides of head (Fig. 1a); teeth compressed, blade-like, and not in a pavement, with a strong cusp and cusplets; second dorsal fin about as large as anal fin; caudal fin with a strong ventral lobe and a long terminal lobe about half of total dorsal caudal margin length (Fig. 1b)



..... ***Galeorhinus galeus***

1b. Eyes above sides of head (Fig. 2a); teeth not blade-like and forming a pavement or semipavement, with no cusps, low cusps, or strong cusps, cusplets low or absent; second dorsal fin much larger than anal fin; caudal fin with ventral lobe low to absent and with a shorter terminal lobe less than half of total dorsal caudal margin length → 2

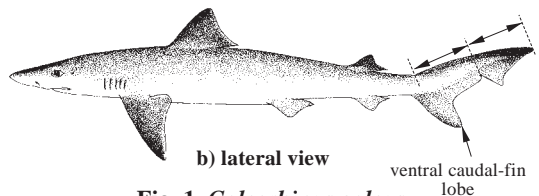


Fig. 1 *Galeorhinus galeus*

- 2a. Snout broad and bluntly rounded in dorsoventral view; mouth arcuate, lower jaw with convex edges; teeth with strong erect cusps in middle of jaws; body stocky; dorsal, pectoral, pelvic and anal fins large (Fig. 2b) ***Triakis megalopterus***
- 2b. Snout parabolic to subangular in dorsoventral view; mouth angular, lower jaw with straight or nearly straight edges; teeth with low cusps or no cusps; body slender; dorsal, pectoral, pelvic and anal fins smaller (***Mustelus***) → 3

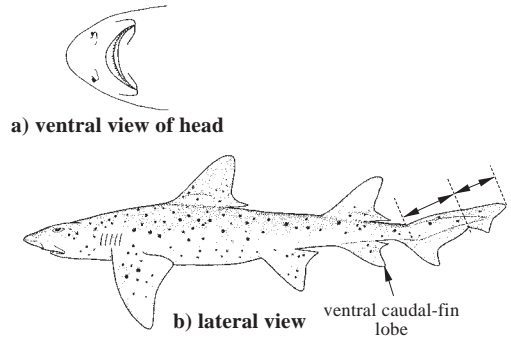


Fig. 2 *Triakis megalopterus*

- 3a. Sides of body with numerous small white spots; upper labial furrows noticeably longer than lower furrows (Fig. 3a); buccopharyngeal denticles covering almost entire palate and floor of mouth → 4
- 3b. Sides of body without white spots; upper labial furrows about as long as lower furrows (Fig. 3b); buccopharyngeal denticles confined to tongue and anterior end of palate. → 5

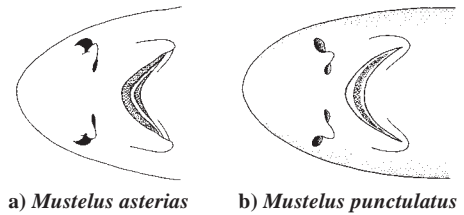


Fig. 3 ventral view of head

- 4a. Internarial space averaging narrower, 2 to 2.6% of total length; pectoral fins smaller, posterior margin 7.5 to 14% of total length (Fig. 4) ***Mustelus asterias*** (confined to North Africa and European seas)
- 4b. Internarial space averaging broader, 2.4 to 3.0% of total length; pectoral fins larger, posterior margin 12 to 16% of total length (Fig. 5) ***Mustelus palumbes*** (confined to southern Africa)



Fig. 4 *Mustelus asterias*

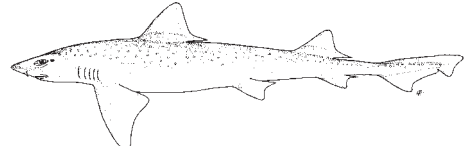


Fig. 5 *Mustelus palumbes*

- 5a. Posterior edges of dorsal fins with a narrow dark, frayed band of bare ceratotrichia (horn-like fin rays) free of denticles and skin; black spots usually present on back; denticles of back with ridges extending only along anterior halves of crowns . . . ***Mustelus punctulatus***
- 5b. Posterior edges of dorsal fins without a frayed band of ceratotrichia; usually no black spots on back but sometimes present; denticles of back with ridges extending the entire lengths of crowns ***Mustelus mustelus***

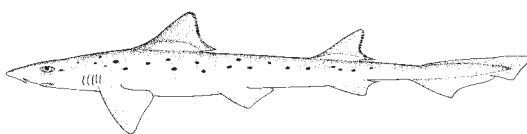


Fig. 6 *Mustelus punctulatus*

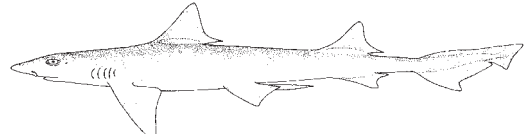


Fig. 7 *Mustelus mustelus*

List of species occurring in the area^{1/}

The symbol  is given when species accounts are included.

 *Galeorhinus galeus* (Linnaeus, 1758)

 *Mustelus asterias* Cloquet, 1819

 *Mustelus mustelus* (Linnaeus, 1758)

 *Mustelus palumbes* Smith, 1957

 *Mustelus punctulatus* Risso, 1827

 *Triakis megalopterus* (Smith, 1839)^{2/}

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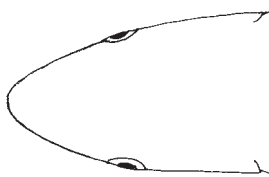
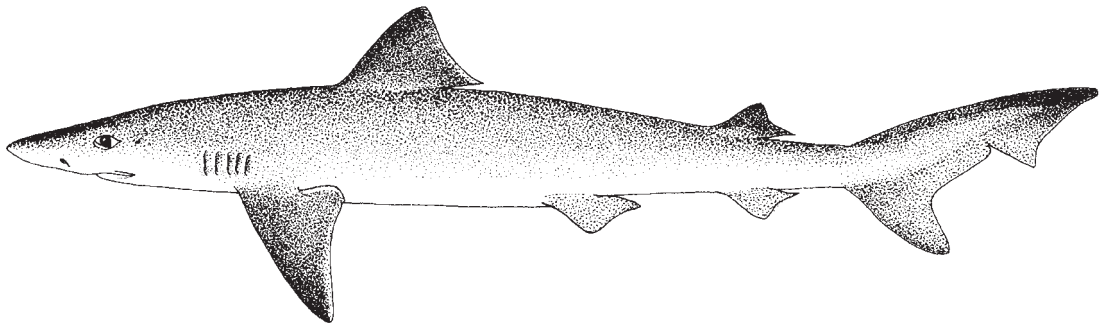
^{1/} The arrangement of the genus *Mustelus* follows Dr. Phillip C. Heemstra's (1973) revision of the genus in an unpublished Ph.D. thesis (see also Compagno, 1984). *Mustelus* species are very similar in external morphology and can be difficult to separate in the field. In the area the placental viviparous dark-spotted (or plain) group is represented by the sympatric *M. mustelus* and *M. punctulatus*, while the aplacental white-spotted group includes the entirely allopatric *M. asterias* and *M. palumbes*. The two white-spotted species have subtle and not absolutely definitive morphometric characters separating them (snout width, fin size), which along with vertebral counts are difficult to utilize in the field.

^{2/} This stocky, big-finned, blunt-headed shark is sometimes confused with *Mustelus mustelus* (Linnaeus, 1758) in South Africa but the latter is small-finned and comparatively slender.

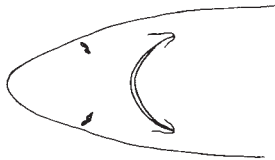
***Galeorhinus galeus* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Tope shark; Fr – Requin-hâ; Sp – Cazón.



dorsal view of head



ventral view of head



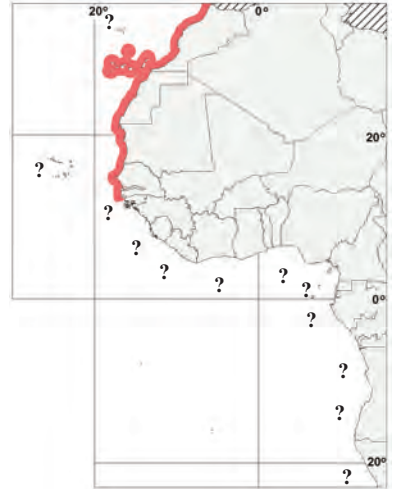
upper and lower teeth

Diagnostic characters: A small to medium-sized shark with a moderately elongate body. Head flattened above and below, snout relatively long and narrowly rounded; nostrils with very small nasal flaps, not formed as barbels; 5 gill slits, the last two above pectoral-fin bases; **eyes horizontally oval on sides of head**, with well-differentiated nictitating lower eyelids entirely, or almost entirely, inside the eye openings; spiracles very small; mouth broadly rounded, with moderately long labial furrows that do not reach front of mouth; teeth small, alike in both jaws, **compressed blade-like; lateral teeth with short, oblique cusps and outer cusplets only; anterior teeth, in the area of symphyses, more symmetrical**, smaller, with both inner and outer cusplets. First dorsal fin on back between pectoral and pelvic fin bases much larger than the second; **second dorsal fin about as large as anal fin**, its origin slightly anterior to anal fin origin; **caudal fin with a strong lower lobe and a very long terminal lobe about half as long as upper edge of fin. No interdorsal ridge**; caudal peduncle without keels or precaudal pits. Denticles on sides broad, strongly cuspidate and ridged, with strong side cusps in adults. 79 to 92 precaudal vertebral centra. **Colour:** dark grey or grey-brown above, white below, pectoral fins with light rear margins.

Size: Maximum total length 174 to 195 cm; size at birth about 40cm; adults 120 to 195 cm, most adults below 180 cm.

Habitat, biology, and fisheries: An active, strong-swimming, schooling shark found in continental temperate waters, near as well as off the bottom, from inshore waters down to 900 m depth. Strongly migratory in higher latitudes. Ovoviviparous (aplacental viviparous) number of young in a litter 20 to 40, gestation period about 10 months. Feeds heavily on small schooling fishes, especially gadoids, other bottom fishes, crustaceans, and echinoderms. Inshore and offshore waters in the northern part of the area. Fished wherever it occurs, and often the subject of targeted fisheries. Small catches of this species (216 tonnes in 2004) have been reported by Portugal, Spain and South Africa in the area. Caught with bottom trawls, on longlines, and in pelagic trawls. Utilized fresh and dried-salted for human consumption and processed for oil (Vitamin A), fins for the Oriental sharkfin trade, and fishmeal. Overfishing has caused declines in numbers in regions outside the area. Ranked as Vulnerable worldwide on the IUCN Red List because of its slow growth rate, but its status in the present area is uncertain.

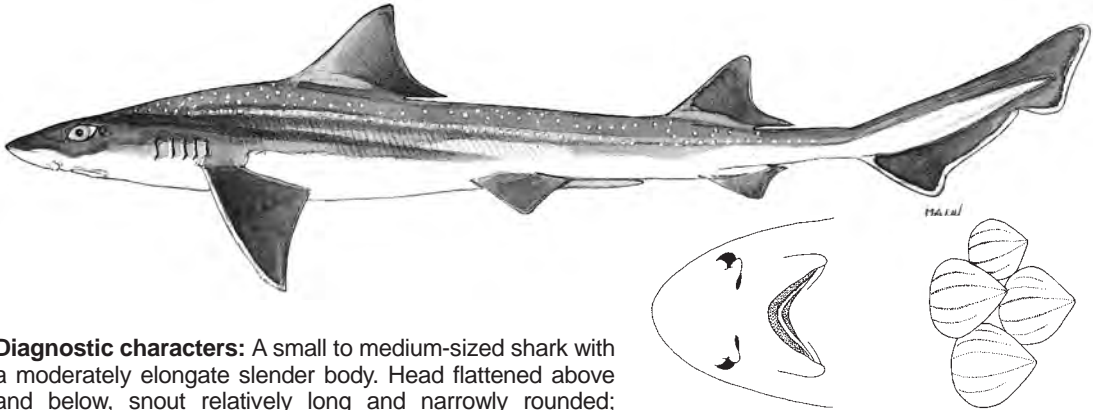
Distribution: A wide-ranging species found from Morocco to Senegal and off the Canary Islands; also northward extending into the Mediterranean and to Iceland and Norway; southward to off southern Namibia and South Africa; furthermore, unconfirmed tropical records of this species are from Côte d'Ivoire, Nigeria, and Gabon to off Republic of the Congo. Elsewhere, found in the western South Atlantic, western Indian Ocean off South Africa, eastern Indian Ocean, the western South Pacific and the eastern Pacific.



***Mustelus asterias* Cloquet, 1819**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Starry smoothhound; Fr – Émissole tachetée; Sp – Musola dentuda.



Diagnostic characters: A small to medium-sized shark with a moderately elongate slender body. Head flattened above and below, snout relatively long and narrowly rounded; nostrils with long, broad nasal flaps, not formed as barbels, **the distance between them about 2 to 2.6% of total length**; 5 gill slits, the last two over pectoral-fin base; eyes horizontally oval, above sides of head, with well-developed nictitating lower eyelids partly inside the eye openings; spiracles moderately large; mouth broadly angular, with moderately long labial furrows that do not reach front of mouth; upper labial furrows much longer than lower labial furrows; denticles of mouth (buccopharyngeal denticles) covering almost entire palate and floor of mouth; teeth small, alike in both jaws, blunt-crowned, not blade-like, without cusplets and with low cusps only in young. Pectoral fin posterior margin 7.5 to 14% of total length; first dorsal fin on back between pectoral and pelvic-fin bases, **its origin just posterior to pectoral insertions and usually well anterior to midlengths of pectoral inner margins**; second dorsal fin almost as large as first dorsal, and much larger than anal fin, its origin well in front of anal fin origin; **rear edge of dorsal fins without frayed margins**; **caudal fin with lower lobe hardly developed in adults**, and absent in young, the terminal lobe less than half the length of upper edge of fin. **An interdorsal ridge present**; caudal peduncle without keels or precaudal pits. Denticles on sides relatively broad-crowned, with strong medial cusps, lateral cusps weak or absent; **ridges on denticles restricted to anterior halves of crowns**. **Precaudal vertebral centra 90 to 100**. **Colour:** grey above and cream white below, upper surface spotted with white dots.

ventral view of head

dermal denticles

Size: Maximum total length about 140 cm with size at birth about 30 cm and with adults maturing at 78 to 85 cm.

Habitat, biology, and fisheries: A small, common to abundant, inshore continental species with a more temperate-water distribution than *Mustelus mustelus*, found near the bottom in the intertidal and down to at least 350 m depth on the upper slopes. Ovoviviparous (aplacental viviparous), number of fetuses between 7 and 15, gestation period about 12 months. This shark feeds almost entirely on crustaceans, especially crabs and small lobsters. Probably utilized for human consumption in the area. Separate statistics are not reported for this species in the area. Ranked as Low Risk/Least Concern by the IUCN Red List.

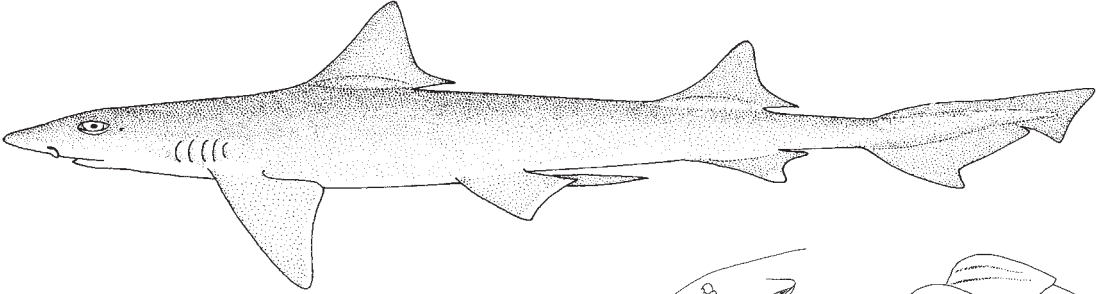
Distribution: In the area, from Morocco to Western Sahara, and the Canary Islands. Northward extending into the Mediterranean, possibly the Azores, and to the British Isles and North Sea.



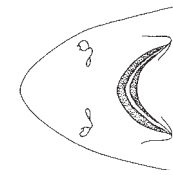
Mustelus mustelus (Linnaeus, 1758)

Frequent synonyms / misidentifications: *Mustelus canis* (not of Mitchill, 1815) / None.

FAO names: En – Smooth-hound; Fr – Émissole lisse; Sp – Musola.



Diagnostic characters: A small to medium-sized shark with a moderately elongated slender body. Head flattened above and below, snout relatively long and narrowly rounded; nostrils with long, broad nasal flaps, not formed as barbels, **the distance between them about 2.4 to 3.0% of total length**. Five gill slits, the last two over pectoral-fin bases; eyes horizontally oval, above sides of head, with well-developed nictitating lower eyelids partly inside the eye openings; spiracles moderately large; mouth broadly angular, with moderately long labial furrows that do not reach front of mouth; upper labial furrows usually slightly longer than lower labial furrows; denticles of mouth (buccopharyngeal denticles) confined to tongue tip and extreme anterior end of palate; teeth small, alike in both jaws, blunt-crowned, not blade-like, without cusplets and with low cusps only in young. Pectoral fin posterior margins 8.2 to 14% of total length; first dorsal fin on back between pectoral and pelvic fin bases, **its origin about over midlengths or rear halves of pectoral inner margins**; second dorsal fin almost as large as first dorsal, and much larger than anal fin, its origin well in front of anal fin; **rear edges of dorsal fins without frayed margins**; **caudal fin with lower lobe short in adults** and hardly developed in young, the terminal lobe less than half the length of upper edge of fin. **An interdorsal ridge present**; caudal peduncle without keels or precaudal pits. Denticles on sides narrow-crowned, with strong medial cusps, lateral cusps weak or absent; **ridges of denticles extending over entire length of crowns**. Precaudal vertebral centra 70 to 93. **Colour:** back and sides plain grey, underside cream white; no small white spots on sides, usually no black spots.



ventral view of head



dermal denticles

Size: Maximum total length 164 cm, size at birth about 39 cm, adult at 70 to 80 cm, mostly between 100 and 120 cm.

Habitat, biology, and fisheries: A small bottom-living shark found in continental waters from the surfline and intertidal down to at least 350 m depth on the uppermost slope, but most common in inshore waters from 5 to 50 m off open coast and in shallow enclosed bays. Viviparous, with a yolk-sac placenta, number of young 4 to 15. Primarily a crustacean feeder, eating mainly crabs, lobsters, shrimp, and mantis shrimp, but also eats cephalopods and bony fishes. Primarily inshore, but also taken offshore. Probably one of the most important of the small fisheries sharks in the area (along with other *Mustelus* species), in inshore as well as offshore fisheries. Separate statistics are not reported for this species. Caught in bottom trawls, fixed bottom nets, on line gear including longlines and rod-and-reel, and occasionally even in pelagic trawls. Utilized fresh, dried-salted, smoked, and processed for oil and fishmeal. Greece, Senegal, and Portugal have recently reported moderate catches (2 284 tonnes) of *Mustelus* from the area in 2004 which may largely consist of this species; while South Africa reported a small catch of this species (24 tonnes) during the same year. Ranked as Low Risk/Least Concern by the IUCN Red List.

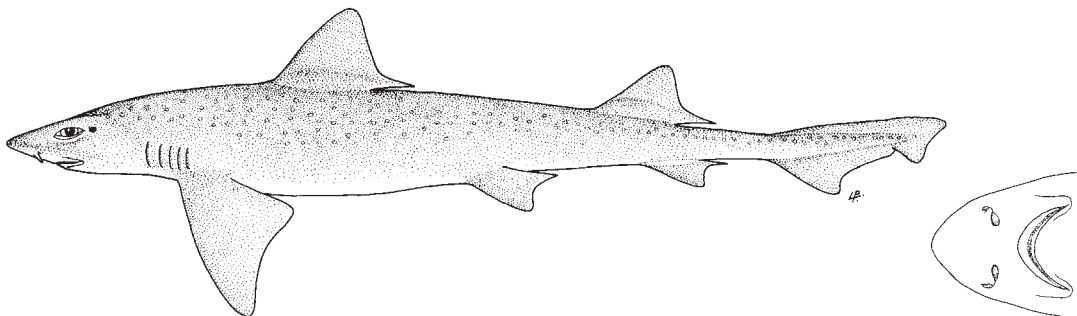
Distribution: Widespread in the area, from Morocco, the Canary Islands and Madeira to Angola. Northward extending into the Mediterranean and along the Atlantic coast of Europe, to France and the British Isles, southward to the east coast of South Africa. This species needs to be critically assessed across its broad geographic and habitat range to determine if it represents a single species.



***Mustelus palumbes* Smith, 1957**

Frequent synonyms / misidentifications: None / *Mustelus mustelus* (Linnaeus, 1758).

FAO names: En – Whitespotted smooth-hound; Fr – Émissole palombe; Sp – Musola paloma.



Diagnostic characters: A small to medium-sized shark with a moderately elongate slender body. Head flattened above and below, snout relatively long and narrowly rounded; nostrils with long, broad nasal flaps, not formed as barbels, **the distance between them about 2.4 to 3.0% of total length**; 5 gill slits, the last two over pectoral-fin base; eyes horizontally oval, above sides of head, with well-developed nictitating lower eyelids partly inside the eye openings; spiracles moderately large; mouth broadly angular, with moderately long labial furrows that do not reach front of mouth; upper labial furrows much longer than lower labial furrows; denticles of mouth (buccopharyngeal denticles) covering almost entire palate and floor of mouth; teeth small, alike in both jaws, blunt-crowned, not blade-like, without cusplets and with low blunt cusps highest in young. Pectoral fins larger, posterior margin 12 to 16% of total length; first dorsal fin on back between pectoral and pelvic-fin bases, its origin just posterior to pectoral insertions and usually well anterior to midlengths of pectoral inner margins; second dorsal fin almost as large as first dorsal, and much larger than anal fin, its origin well in front of anal fin; **rear edge of dorsal fins without frayed margins**; **caudal fin with lower lobe hardly developed in adults**, and absent in young, the terminal lobe less than half the length of upper edge of fin. **An interdorsal ridge present**; caudal peduncle without keels or precaudal pits. Denticles on sides relatively broad-crowned, with strong medial cusps, lateral cusps weak or absent; **ridges on denticles restricted to anterior halves of crowns or running their entire lengths**. Precaudal vertebral centra 74 to 88. **Colour:** uniform grey or grey-brown above and whitish below, upper surface usually spotted with conspicuous small white dots but without dark spots.

Size: Maximum about 120 cm; size at birth between 30 and 34 cm; adult females 79 to 102 cm, adult males 76 to 88 cm.

Habitat, biology, and fisheries: A common inshore and offshore temperate-water shark of the continental shelf and upper slope, on or near bottom at depths from the intertidal and surfline down to at least 443 m, mostly between 100 and 300 m depth. Prefers sandy and gravelly bottom. Migratory, a specimen tagged offshore in the western Cape was caught by an angler on a beach in the eastern Cape. An ovoviparous (aplacental viviparous) species; number of young 3 to 8 per litter. Eats mostly crabs, lobsters, shrimps, mud shrimps, mantis shrimps, hermit crabs, mysids, and other crustaceans but also octopuses, bony fishes, and fish offal. Fisheries interest limited, often taken by sports anglers and as bycatch of commercial bottom trawlers, but in the past has been usually discarded although excellent eating. Some may be utilized in a South African fishery that processes sharks for 'biltong', dried shark meat or jerky, for human consumption, and some may be exported fresh for the European and Australian markets for shark meat. No separate fisheries statistics reported for this species. Ranked as Data Deficient by the IUCN Red List although Lower Risk/Near Threatened may be more realistic due to continuing fisheries pressure and international markets for shark products.

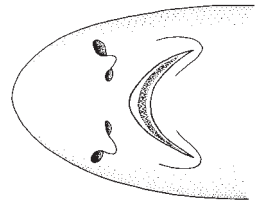
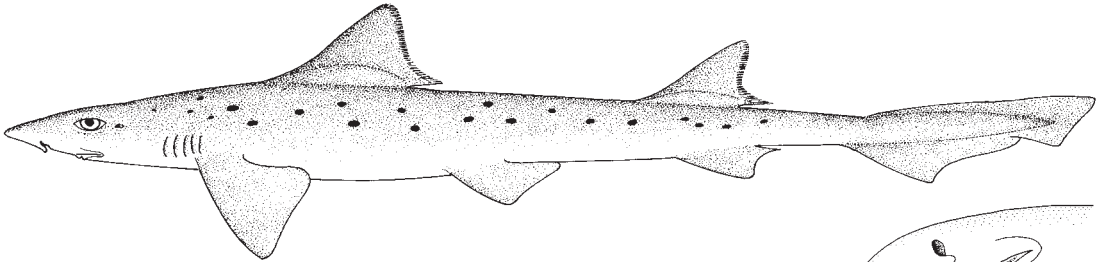
Distribution: In the area, off Namibia, elsewhere from off South Africa and extreme southern Mozambique.



***Mustelus punctulatus* Risso, 1827**

Frequent synonyms / misidentifications: *Mustelus mediterraneus* Quignard and Capapé, 1972 / *Mustelus mustelus* (Linnaeus, 1758).

FAO names: En – Blackspotted smooth-hound; Fr – Émissole pointillée; Sp – Musola pimienta.



ventral view of head

Diagnostic characters: A small to medium-sized shark with a moderately elongated body. Head flattened above and below, snout relatively long and narrowly rounded; nostrils with long, broad nasal flaps, not formed as barbels, **the distance between them about 1.9 to 2.3% of total length**; 5 gill slits, the last two over pectoral-fin bases; eyes horizontally oval, above sides of head, with well-developed nictitating lower eyelids partly inside the eye openings; spiracles moderately large; mouth broadly angular, with moderately long labial furrows that do not reach front of mouth; upper labial furrows slightly longer than lower labial furrows; denticles of mouth (buccopharyngeal denticles) confined to tongue and anterior third of palate; teeth small, alike in both jaws, blunt-crowned, not blade-like, without cusplets and with low cusps only in young. Pectoral fin posterior margin 7.2 to 11% of total length; first dorsal fin on back between pectoral and pelvic-fin bases, **its origin about over midlengths or rear halves of pectoral inner margins**; second dorsal fin almost as large as the first, and much larger than anal fin, its origin well in front of anal fin; **rear edges of dorsal fins with broad, dark margins formed of denticles and skin-free, frayed ceratotrichia** (horny rays); caudal fin probably with lower lobe short in adults, but hardly developed in young, the terminal lobe less than half the length of upper edge of fin. **An interdorsal ridge present**; caudal peduncle without keels or precaudal pits. Denticles on sides with strong medial cusps, lateral cusps weak or absent; **ridges on denticles restricted to anterior halves of crowns**. Precaudal vertebral centra 78 to 84. **Colour:** back and sides plain grey, underside cream-white, small black spots present on sides.

Size: Maximum total length to at least 95 cm; size at birth about 30 cm, adult at 50 to 60 cm.

Habitat, biology, and fisheries: No information is available on abundance and utilization of this species in the area, possibly because of its confusion with *Mustelus mustelus*. Separate statistics are not reported for this species. Littoral in habitat, possibly less than 50 m. Probably viviparous and a crustacean-feeder, but biology little known. Ranked on the IUCN Red List as Data Deficient.

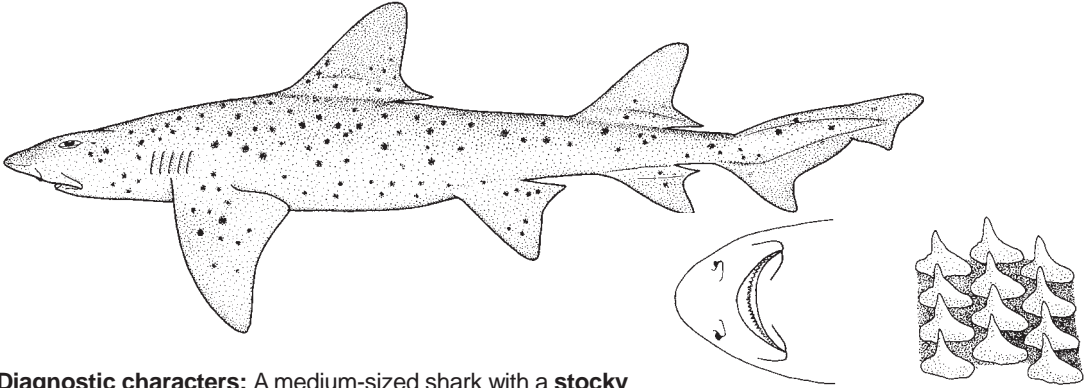
Distribution: In the area, known from the Mediterranean to Western Sahara, but possibly more widespread but unidentified because of confusion with *Mustelus mustelus*. This species extends northward into the Mediterranean Sea.



Triakis megalopterus (Smith, 1839)

Frequent synonyms / misidentifications: *Mustelus natalensis* Steindachner, 1866; *M. nigropunctatus* Smith, 1952 / *Mustelus mustelus* (Linnaeus, 1758).

FAO names: En – Sharptooth houndshark; Fr – Virli dentu; Sp – Tollo dentudo.



Diagnostic characters: A medium-sized shark with a **stocky body and large precaudal fins**. Head flattened above and below, **snout short and broadly rounded**; nostrils with long, broad nasal flaps, not formed as barbels, **the distance between them about 4% of total length**. Five gill slits, the last two over pectoral-fin bases; eyes horizontally oval, above sides of head, with well-developed nictitating lower eyelids partly inside the eye openings; spiracles moderately large; **mouth large and broadly arched**, with **long upper labial furrows that reach front of mouth**; upper labial furrows about as long as lower labial furrows; teeth small, alike in both jaws, blunt-crowned at the sides of the mouth **but with strong, high cusps near the symphysis**, not blade-like, with cusplets little-developed. Pectoral fin posterior margins about 10 to 14% of total length; first dorsal fin on back between pectoral and pelvic-fin bases, **its origin about over midlengths of pectoral inner margins**; second dorsal fin almost as large as first dorsal, and much larger than anal fin, its origin well in front of anal fin; **rear edges of dorsal fins without frayed margins**; **caudal fin with lower lobe short and strong in adults** and weak in young, the terminal lobe less than half the length of upper edge of fin. **A high interdorsal ridge present**; caudal peduncle without keels or precaudal pits. Denticles on sides of back narrow-crowned, with strong medial cusps, lateral cusps absent to short and strong, **medial ridge of denticles extending over entire length of crowns**. Precaudal vertebral centra 101 to 107. **Colour:** back and sides grey or bronzy above, white below, usually with numerous small black spots on sides and back (absent or sparse in newborn young and some adults) but no white spots.

Size: Maximum total length possibly to 170 cm; size at birth about 30 to 32 cm; adult at 140 to 150 cm.

Habitat, biology, and fisheries: A moderately common or formerly common bottom-living shark found in coastal continental waters from the intertidal and surfline to less than 50 m depth. Prefers cool-temperate waters off sandy and rocky shores and in shallow bays. Congregates in schools in summer, apparently to mate. Oviviparous (aplacental viviparous), number of young 6 to 10. Feeds on crabs, lobsters, bony fishes and small sharks. Of limited interest to fisheries, more commonly caught on rod-and-reel by anglers close inshore; also caught on bottom longlines and probably in beach seines. Utilized fresh and dried-salted for human consumption; use for fins uncertain; has been included in export fisheries to Europe and Australia for meat. In South Africa its conservation status is of concern because of its inshore habitat, slow growth rate, ready access to fisheries including commercial operators and anglers, and possible decline in abundance. Ranked as Lower Risk/Near Threatened by the IUCN Red List, which may be optimistic for this spatially and biologically restricted species.

Distribution: In the area, from Southern Angola and Namibia, extending southwards to the west and east coasts of South Africa.



HEMIGALEIDAE

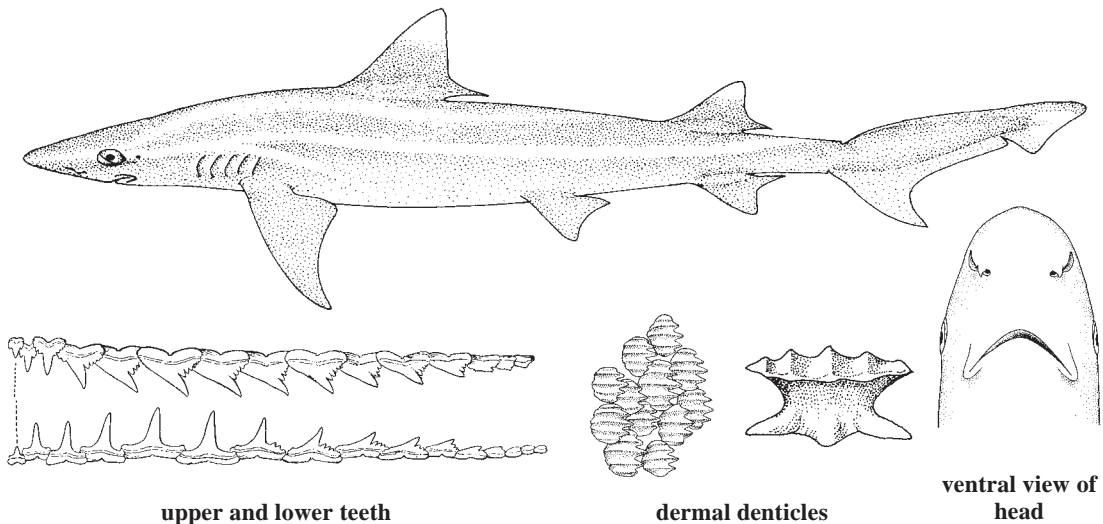
Weasel sharks

A single species occurring in the area.

Paragaleus pectoralis (Garman, 1906)

Frequent synonyms / misidentifications: *Paragaleus gruevi* Budker, 1935; *Hemigaleus pectoralis* Garman, 1906 / None.

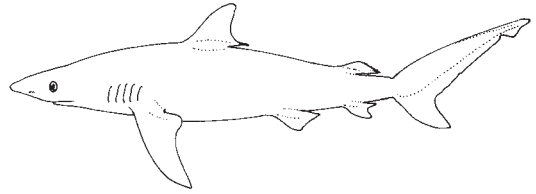
FAO names: En – Atlantic weasel shark; Fr – Milandre jaune; Sp – Tiburón comadiza.



Diagnostic characters: A small, moderately slender shark. Head with 5 small gill slits, the last two over the pectoral-fin bases; **spiracles minute, pore-like, much smaller than eyes**; no gillrakers; nostrils with anterior nasal flaps formed as short pointed lobes, not as slender barbels; no oronasal grooves; **eyes horizontally oval**, on sides of head, **with strongly developed nictitating eyelids**; snout long and narrowly rounded; mouth moderately wide and short, but extending backward beyond the eyes; **labial furrows moderately long reaching a transverse line through front of mouth**; **teeth small, not forming a pavement, different in upper and lower jaws; upper lateral teeth broader, blade-like, smooth-edged, with oblique cusps and several small cusplets on their outer edges; lower lateral teeth with narrow, erect to oblique cusps and a few or no cusplets**; no small intermediate teeth between upper anterior and lateral teeth. Two dorsal fins, the first high, triangular, much shorter than caudal fin, its base well in front of pelvics and its origin over rear corners of pectorals; **second dorsal fin about half the area of first dorsal fin and slightly larger than anal fin**; origin of anal fin posterior to that of second dorsal; **caudal fin with a strong lower lobe, a rippled upper edge, and a subterminal notch**. Caudal, peduncle not compressed, without keels; **precaudal pits present. Intestinal valve of spiral type, with 4 to 6 turns to the auger or corkscrew-shaped valve.** **Colour:** grey-brown above, white below, **with horizontal stripes of yellow on flanks** (fading and disappearing after death); **underside of snout tip with a short longitudinal black stripe on either side of midline.**

Similar families occurring in the area

Carcharhinidae: intestine with a bib-like scroll valve; teeth usually serrated; no black stripes on underside of snout or yellow stripes on flanks; eyes usually round or vertically oval (except in *Negaprion brevirostris*, which also has horizontally oval eyes).

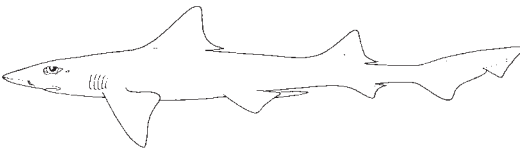


Carcharhinidae

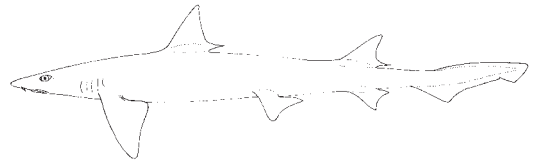
Triakidae: teeth alike in both jaws; mouth generally larger and longer, labial furrows not reaching a transverse line through front of mouth; no precaudal pits or rippled upper edge to caudal fin; no black stripes on underside of snout or yellow stripes on flanks.

Leptochariidae: body slimmer, nostrils with barbels; mouth longer; teeth not blade-like, alike in upper and lower jaws; lower lobe of caudal fin weak or absent, its upper edge not rippled; no precaudal pits; intestinal valve with 14 to 16 turns; no black stripes on underside of snout or yellow stripes on sides.

Other shark families: no nictitating lower eyelids.



Triakidae



Leptochariidae

Size: Maximum total length about 138 cm, adults 75 to 86 cm and larger.

Habitat, biology, and fisheries: Common or formerly common in coastal waters from about 12 m to slightly below 100 m. Primarily inshore, some offshore. Viviparous, with a yolk-sac placenta, number of young 2 to 4 but mostly 2. Feeds mostly on cephalopods, including squid and octopuses, but also small bony fishes (including soles and sardines). Separate statistics are not reported for this species. Taken as utilized bycatch throughout its restricted habitat, caught in bottom trawls, on hooks, and in fixed bottom nets. Utilized fresh, smoked, and dried-salted; skins also used for leather. Ranked as Data Deficient on the IUCN Red List; conservation status needs further study as species may be at risk due to its habitat limits.

Distribution: A tropical species essentially confined to the present area, ranging from Mauritania and the Cape Verde Islands southward to Angola and Namibia; it may also occur further north to Morocco and possibly the Mediterranean. A western North Atlantic record based on a specimen from New England is questionable, and a Madagascar record is possibly based on another species, *Paragaleus leucomatus*, which is also known from KwaZulu-Natal, South Africa.



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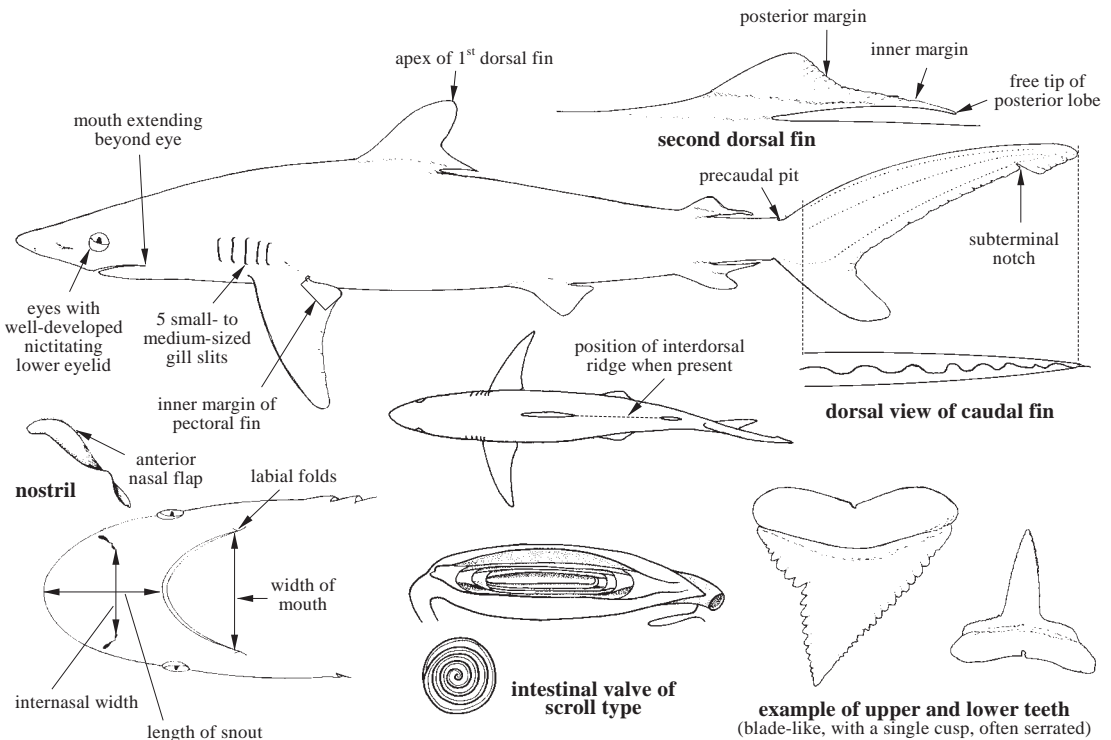
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CARCHARHINIDAE

Requiem sharks

(also, ground sharks, blue sharks, sharpnose sharks)

Diagnostic characters: Small to very large sharks (adults 24 cm to over 550 cm total length). Body cylindrical or slightly compressed, not depressed and without lateral ridges: precaudal tail much shorter than trunk. Head not expanded laterally, conical to moderately depressed; 5 small- to medium-sized gill slits present, **the last 1 to 3 over or behind pectoral-fin origins**, their upper ends not expanded onto dorsal surface of head; no gill sieves and **usually no gillrakers on internal gill slits** (short dermal gillrakers present in *Prionace*); spiracles usually absent (but always present in *Galeocerdo*); nostrils well separated from mouth, nostrils without barbels, nasoral grooves, or circumnarial grooves; **eyes on sides of head, with a well-developed nictitating lower eyelid within eye opening**; snout short to moderately long, conical and slightly pointed to depressed and broadly rounded, not blade-like in genera in the area, and without lateral teeth and barbels; mouth usually large, arched and elongated, and **extending well behind eyes**; labial furrows usually present on both jaws but generally greatly reduced, confined to mouth corners, and barely visible when mouth is closed (*Galeocerdo* and *Rhizoprionodon* species have well-developed labial furrows that are visible when mouth is closed); upper labial furrows usually not reaching front of mouth (except in *Galeocerdo*); **teeth small to large, blade-like**, with a single cusp and with cusplets variably developed; **anterior teeth in upper jaw smaller than lateral teeth; upper anterior and lateral teeth not separated by a gap with smaller intermediate teeth on each side. Two dorsal fins, without spines**, the first dorsal fin moderately large, high and angular or subangular, its base much shorter than the caudal fin and **located over the interspace between the pectoral and pelvic-fin bases and entirely anterior to origins of pelvic fins** (free rear tip of first dorsal fin may reach or extend posterior to pelvic origins in *Negaprion* and *Rhizoprionodon*); second dorsal fin varying from less than 20% of the height of the first dorsal fin to almost as high as it (*Negaprion*); anal fin present and moderately large, with its origin varying from somewhat anterior to the second dorsal-fin origin to about under its insertion; **caudal fin strongly asymmetrical**, much less than half of total length, **with a rippled or undulated dorsal margin**, a well-marked subterminal notch, and a **short but well-defined ventral caudal lobe**; vertebral axis of caudal fin raised above body axis. Caudal peduncle not strongly depressed dorsoventrally or widely expanded laterally, usually without longitudinal



keels but with weak keels present in two genera (*Prionace* and *Galeocerdo*); **precaudal pits present and well developed. Intestine with a scroll valve. Colour:** brown, grey, yellowish or bluish above, white to cream or yellowish below, some species with prominent dark or light markings on fins and a dark line on flanks; body usually without a prominent colour pattern (except for *Galeocerdo*).

Habitat, biology, and fisheries: The Carcharhinidae or requiem sharks are one of the largest families of non-batoid sharks and are the dominant sharks on the continental and insular shelves in warm-temperate and tropical waters (littoral zone); they generally have high diversity and abundance as well as high biomass in these waters. Small to very large requiem sharks are littoral and often occur close inshore in waters less than 100 m deep. Most large requiem sharks are more abundant well offshore on the outer shelves, but still occur near or over the continental and insular shelves; some are also semi-oceanic, and extend their range into the epipelagic or sunlit zone of the sea. Several very large littoral species, including bull sharks (*Carcharhinus leucas*), lemon sharks (*Negaprion brevirostris*) and tiger sharks (*Galeocerdo cuvier*), are found close inshore in bays, off beaches, and on rocky and coral reefs. Several inshore requiem sharks enter partially enclosed estuaries or river mouths and may occur in brackish or fresh water. The bull shark readily travels up rivers in the area and can reach the fall lines or the nearest dams blocking rivers; it occurs in freshwater lakes elsewhere and may do so in the area. The littoral bull shark can also make long transits to oceanic islands. The bignose shark (*C. altimus*) is unusual in extending its range to near the bottom on the upper continental and insular slopes between 200 and 440 m and at the surface in the epipelagic zone. The night shark (*C. signatus*) is a semioceanic species in deep water (183 to 366 m) off the continental slopes while the blue shark (*Prionace glauca*), silky shark (*C. falciformis*) and oceanic whitetip shark (*C. longimanus*) are primarily oceanic species in the epipelagic zone but approach land where the continental or insular shelves are narrow.

Requiem sharks are active, strong swimmers, occurring singly or in small to large schools or aggregations. Some species may be more or less continually active, while others can rest motionless on the bottom for extended periods. Many are more active at night or at dawn and dusk than the daytime. Except for the possibly ovoviviparous (aplacental viviparous) or semiplacental tiger shark (*Galeocerdo cuvier*), all species are viviparous (placental viviparous) with a yolk-sac placenta, and have litters of young from 1 or 2 to 135. All are capable predators, feeding on a wide variety of bony fishes, other sharks, batoids, squids, octopuses, cuttlefishes, crabs, lobsters, and shrimps but also birds, turtles, sea snakes, marine mammals, gastropods, bivalves, and carrion.

The Carcharhinidae are by far the most important shark family for fisheries in the tropics and in warm-temperate waters, and probably in the area; various species figure prominently in catches within the area. Requiem sharks are utilized primarily for human food, and marketed fresh, dried-salted, and frozen; but requiem sharks are also utilized for the preparation of various subproducts, including oil and Vitamin A from the liver, gelatine, fishmeal, cartilage for medicinals, leather and sandpaper from the skin, and fins for the Oriental soupfin market. Several species are the subjects of recreational or sports fisheries including international big-game angling. Separate statistics by species are mostly not available for the area and several of the eastern central Atlantic carcharhinids are often misidentified. The catch of carcharhinid sharks reported by FAO from Fishing Areas 34 and 47 totalled 11 232 tonnes in 2004. This included data from Benin, Liberia, Portugal, Republic of Congo, and Spain, and almost entirely consisted of 2 oceanic species, *Carcharhinus falciformis* and *Prionace glauca*. The actual catch and species diversity of the carcharhinid catch in the area is probably much higher as most species are probably reported as 'Elasmobranchii' for the area though Republic of Congo reported a 528-tonne catch of 'Carcharhinidae'.

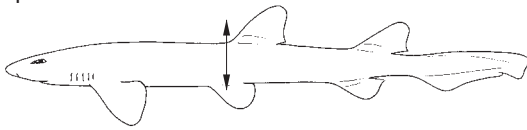
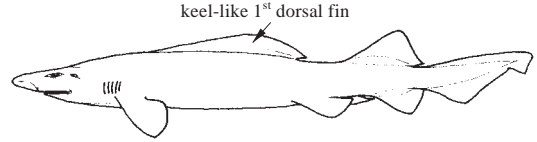
Many carcharhinids are negatively affected by fisheries and habitat degradation in the area and worldwide. Larger species generally have long maturation times and relatively low fecundity, and are particularly vulnerable to overfishing at all growth stages from newborn to adults through targeted and bycatch fisheries. They are also threatened by degradation of inshore nursery areas and freshwater habitats through development and pollution. Many species of requiem sharks have been placed on the IUCN Red List to date (2015) but many of their rankings for large wide-ranging species are unduly conservative worldwide and do not reflect the realities of threats, exploitation and marketing in tropical areas with unregulated 'land-everything' fisheries including the eastern central Atlantic.

The larger carcharhinids make up an important fraction of the shark species known to have bitten people, although shark incidents are relatively few each year despite media exaggeration of their significance. Requiem sharks are also the most important family for ecotouristic shark diving worldwide although this is apparently little-developed in the area. The commercial value of requiem sharks alive in ecotouristic shark dive centres such as the Bahamas or the Maldives is far greater than their value dead as fisheries products. Several species of requiem sharks are displayed worldwide in large public aquaria and at least one species has been bred in captivity.

Similar families occurring in the area

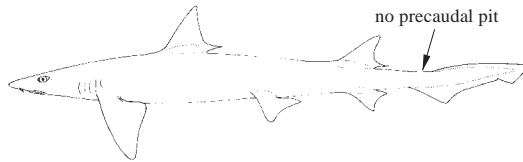
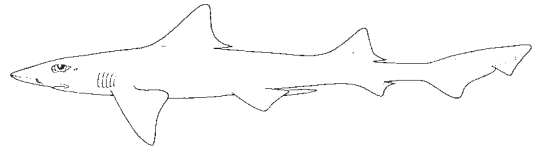
Scyliorhinidae: first dorsal-fin base over or posterior to pelvic-fin bases; teeth usually comb-like at mouth angles; precaudal pits absent; dorsal caudal margin not undulated; intestine with a spiral or spiral-ring valve.

Pseudotriakidae: species in the area with a keel-like first dorsal fin equal to caudal fin in length, tiny numerous cuspidate teeth, a large angular mouth, no precaudal pits, dorsal caudal margin not undulated, intestine with a spiral valve.

**Scyliorhinidae****Pseudotriakidae**

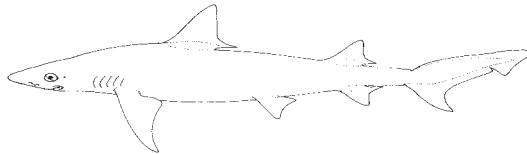
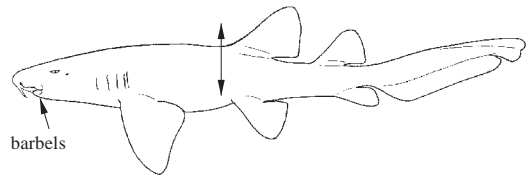
Leptochariidae: anterior nasal flaps formed as slender barbels; teeth small, with cusps and cusplets in both jaws; caudal fin with a straight upper margin (rippled in Carcharhinidae) and with lower lobe hardly developed; no precaudal pits; intestinal valve of spiral type.

Triakidae: species in the area with either blunt teeth in a pavement (*Mustelus*), pointed but not blade-like teeth (*Triakis*) or blade-like teeth with cusps and cusplets (*Galeorhinus*) but no serrations; caudal fin with a straight upper margin; precaudal pits absent; intestinal valve of spiral type.

**Leptochariidae****Triakidae**

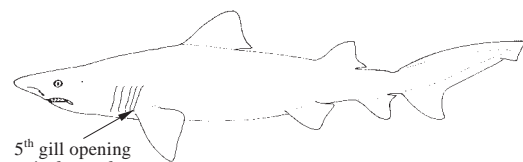
Hemigaleidae: species in the area with upper teeth lacking serrations but having cusplets (cusplets present along with serrations, or cusplets absent and serrations present or absent in Carcharhinidae); intestinal valve of spiral type.

Ginglymostomatidae: origin of first dorsal-fin base over or partly posterior to pelvic-fin bases; nostrils connected with mouth by deep nasoral grooves; anterior margins of nostrils with long, cylindrical barbels; eyes well behind mouth, without nictitating eyelids.

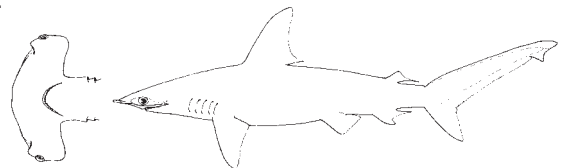
**Hemigaleidae****Ginglymostomatidae**

Odontaspidae: fifth gill opening in front of pectoral-fin origin; eyes without nictitating eyelids; largest teeth in front part of jaw on either side of symphysis; large upper anterior teeth separated from smaller lateral teeth at sides by a gap and 1 to 5 rows of intermediate teeth.

Sphyrnidae: head with hammer-like lateral projections.



5th gill opening
in front of
pectoral-fin

Odontaspidae**Sphyrnidae**

Other shark families: no nictitating eyelids; also either caudal fin very long (Alopiidae), or caudal fin lunate and with a strong caudal keel (Cetorhinidae, Lamnidae, Rhincodontidae), or a gigantic terminal mouth and papillose gillrakers (Megachasmidae), or very large eyes, large anterior teeth, and high gill slits (Pseudocarchariidae), or a single dorsal fin and 6 or 7 gill slits (Chlamydoselachidae, Hexanchidae), or anal fin absent (Echinorhinidae, Squalidae, Centrophoridae, Etmopteridae, Somniosidae, Oxynotidae, Dalatiidae, Pristiophoridae, and Squatinidae).

Key to species of Carcharhinidae occurring in the area

- 1a. Upper labial furrows very long, extending to level in front of eyes; spiracles present and relatively large; low but conspicuous lateral keels present on caudal peduncle; narrow vertical dark bars present on back, bold in young but obscure or absent in adults (Fig. 1) ***Galeocerdo cuvier***
- 1b. Upper labial furrows long to very short, ending behind level of eyes; spiracles usually absent; lateral keels usually absent (except for weak keels in *Prionace glauca*) (Fig. 2) → 2

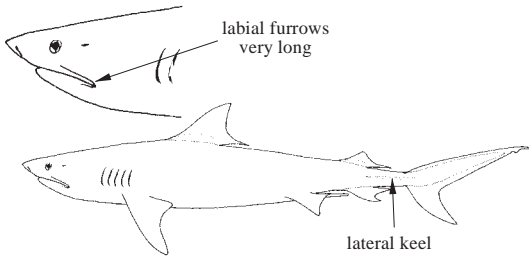


Fig. 1 *Galeocerdo cuvier*

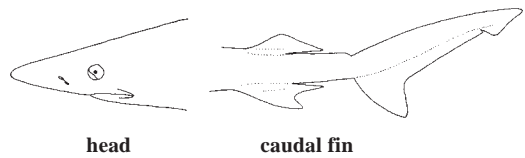


Fig. 2 other species

- 2a. Second dorsal fin nearly as large as first dorsal fin, second dorsal fin height 80 to 100% of first dorsal height (Fig. 3) ***Negaprion brevirostris***
- 2b. Second dorsal fin considerably smaller than first, height 20 to 50% of first dorsal-fin height → 3
- 3a. Midlength of first dorsal-fin base considerably closer to pelvic-fin origins than to pectoral-fin insertions; inner gill openings with short gillrakers; back dark blue, fading to purple-black after death (Fig. 4) ***Prionace glauca***
- 3b. Midlength of first dorsal-fin base usually closer to pectoral-fin insertions than to pelvic-fin origins, sometimes equidistant between pectoral and pelvic-fin bases; no gillrakers; back grey, blue-grey, or brownish → 4

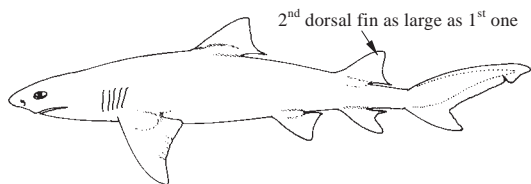


Fig. 3 *Negaprion brevirostris*



Fig. 4 *Prionace glauca*

- 4a. Upper labial folds long and prominent, horizontal on upper lip; anal-fin base expanded anteriorly by a very long pair of preanal ridges (Fig. 5) ***Rhizoprionodon acutus***
- 4b. Upper labial folds short to rudimentary, almost vertical at mouth corners; preanal ridges very short or absent (Fig. 6) **(*Carcharhinus*) → 5**

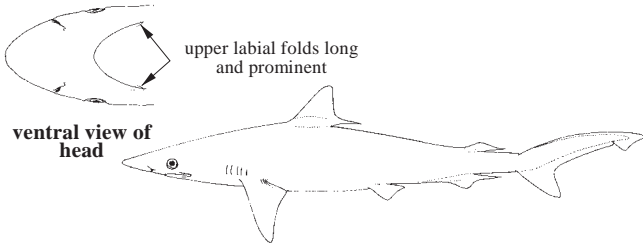


Fig. 5 *Rhizoprionodon acutus*

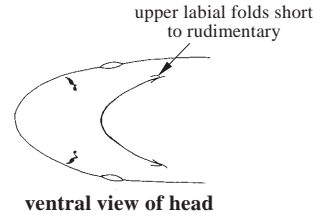


Fig. 6 *Carcharhinus*

- 5a. Pectoral and first dorsal fins very broad distally and broadly rounded apically, only slightly tapering toward their apices; most fin tips mottled white in adults, also black-tipped and with black dorsal saddle-marks on the caudal peduncle in juveniles (Fig. 7) ***Carcharhinus longimanus***
- 5b. Pectoral and first dorsal fins tapering distally and usually pointed or narrowly rounded; fins not mottled white, often black tipped but without black saddles on the caudal peduncle → 6

- 6a. Upper anterolateral teeth with bent, hooked, narrow cusps (Fig. 8) . . . ***Carcharhinus brachyurus***
- 6b. Upper anterolateral teeth variably shaped, and broad or narrow, but with cusps nearly straight → 7

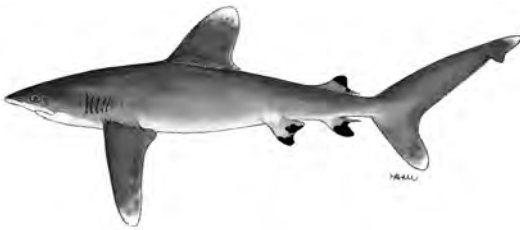


Fig. 7 *Carcharhinus longimanus*

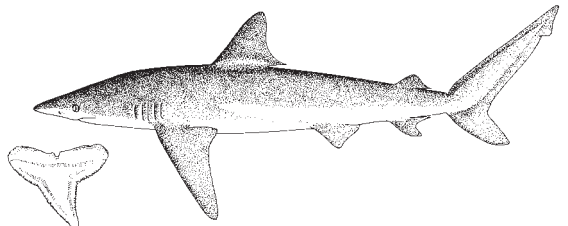


Fig. 8 *Carcharhinus brachyurus*

- 7a. Interdorsal ridge present → 8
- 7b. Interdorsal ridge absent → 13

- 8a. Snout very long, narrow and pointed, preoral length 170 to 190% of internarial width; cusps of upper anterolateral teeth smooth-edged or weakly serrated (Fig. 9) . ***Carcharhinus signatus***
- 8b. Snout shorter, narrowly to broadly rounded, preoral length less than 160% of internarial width; cusps of upper anterolateral teeth regularly serrated → 9

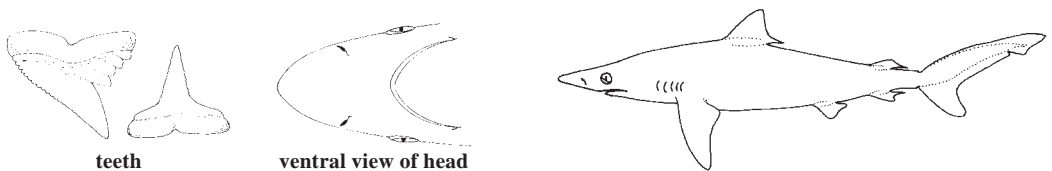


Fig. 9 *Carcharhinus signatus*

- 9a. Very coarse serrations or small cusplets on bases (crown feet) of upper anterolateral teeth; first dorsal-fin origin well behind free rear tips of pectoral fins; inner margin of second dorsal fin very long, usually over 200% of fin height but occasionally down to 160% of fin height (Fig. 10) ***Carcharhinus falciformis***
- 9b. Serrations on bases of upper anterolateral teeth small and fine; first dorsal-fin origin over or anterior to free rear tips of pectoral fins; inner margin of second dorsal fin shorter and generally less than 200% of fin height, but up to 210% in *Carcharhinus obscurus* → 10

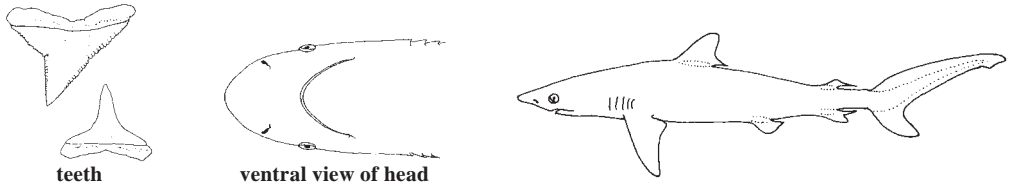


Fig. 10 *Carcharhinus falciformis*

- 10a. First dorsal-fin origin in front of or over pectoral-fin insertions or at least nearer to the pectoral insertions than to pectoral free rear tips 11
- 10b. First dorsal-fin origin opposite or somewhat in front of pectoral fin rear tips but closer to them than pectoral-fin insertions → 12

- 11a. Anterior nasal flaps usually low and inconspicuous; mouth width more than 240% of distance from nostrils to mouth; upper anterolateral teeth moderately high and broad; upper anterolateral teeth in 13 to 15 rows on each side but usually in 14 rows; first dorsal fin very high, with height about 50% of predorsal space from snout tip to first dorsal origin in adults; interdorsal ridge low (Fig. 11) ***Carcharhinus plumbeus***
- 11b. Anterior nasal flaps usually high and triangular; mouth width less than 240% of distance from nostrils to mouth; upper anterolateral teeth very high and narrow; upper anterolateral teeth in 14 to 16 rows on each side but usually in 15 rows; first dorsal fin lower, with height much less than 50% of predorsal space in adults; interdorsal ridge high (Fig. 12) ***Carcharhinus altimus***

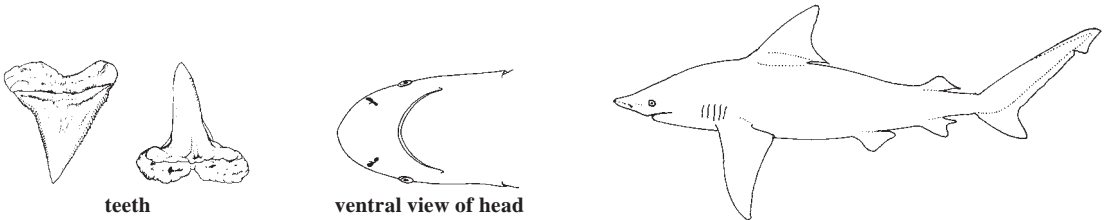


Fig. 11 *Carcharhinus plumbeus*

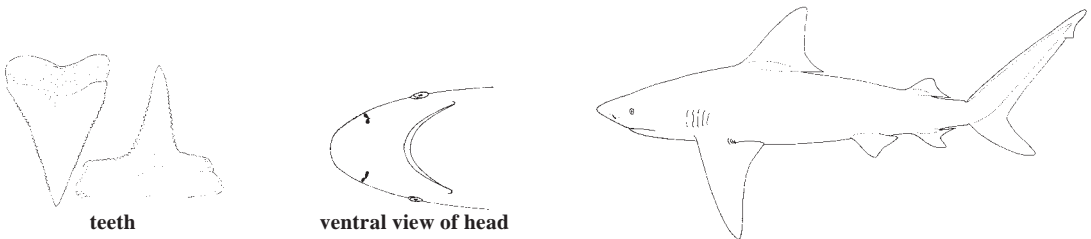
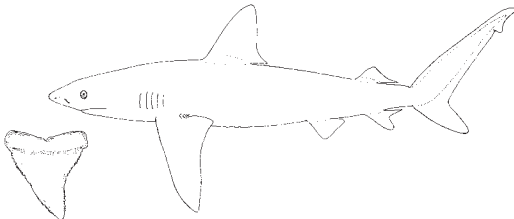
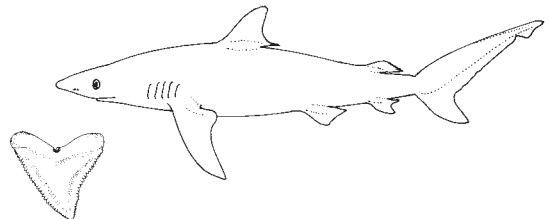


Fig. 12 *Carcharhinus altimus*

- 12a. Upper anterolateral teeth relatively high and narrow; pectoral fins nearly straight; first dorsal fin higher and with a nearly straight anterior margin, height 8.3 to 11.9% of total length; second dorsal fin higher and less elongated, with height 2.1 to 3.3% of total length and inner margin length 130 to 170% of fin height; precaudal vertebral centra 103 to 109 (Fig. 13) ***Carcharhinus galapagensis***
- 12b. Upper anterolateral teeth relatively low and broad; pectoral fins more falcate; first dorsal fin lower and with a more rounded anterior margin, height 6.0 to 9.1% of total length; second dorsal fin lower and more attenuated, with height 1.5 to 2.3% of total length and inner margin length 160 to 210% of fin height; precaudal vertebral centra 89 to 95 (Fig. 14) ***Carcharhinus obscurus***

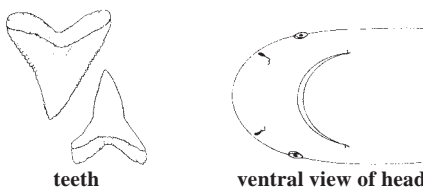


upper tooth Fig. 13 *Carcharhinus galapagensis*

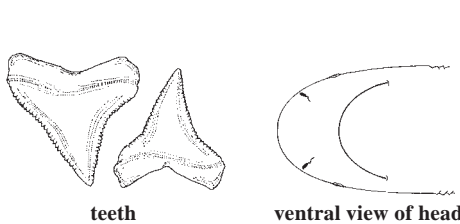
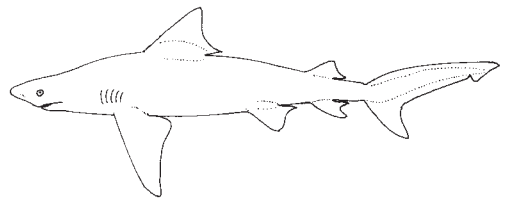


upper tooth Fig. 14 *Carcharhinus obscurus*

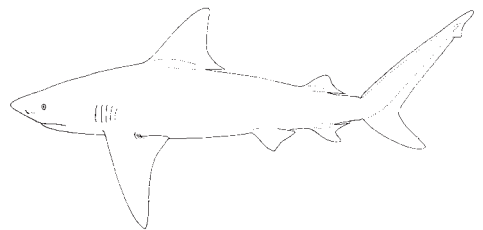
- 13a. Snout very short and broadly rounded, preoral length 70 to 100% of internarial width; upper anterolateral teeth with very broad, triangular cusps and straight to concave distal margins; lower anterolateral teeth with strongly arched roots → 14
- 13b. Snout longer and parabolic or wedge-shaped to pointed, preoral length 110 to 180% of internarial width; upper anterolateral teeth with narrow cusps and strongly notched distal margins; lower anterolateral teeth with nearly transverse roots. → 15
- 14a. First dorsal fin relatively lower and second dorsal fin higher, first dorsal fin less than 302% of height of second dorsal fin (Fig. 15) ***Carcharhinus leucas***
- 14b. First dorsal fin relatively higher and second dorsal fin lower, first dorsal fin 320% or more of the height of second dorsal fin (Fig. 16) ***Carcharhinus amboinensis***



teeth ventral view of head Fig. 15 *Carcharhinus leucas*



teeth ventral view of head Fig. 16 *Carcharhinus amboinensis*



15a. Upper labial furrows noticeably elongated and prominent; 15 to 18 rows of upper anteroposterior teeth on each side, usually at least 16 rows; first dorsal fin lower, its height about 6.0 to 8.8% of total length and less than 45% of the interdorsal space; first dorsal-fin origin over or just behind pectoral fin free rear tips (Fig. 17) ***Carcharhinus brevipinna***

15b. Upper labial furrows shorter and less noticeable; 14 to 16 rows of anteroposterior teeth on each side, usually 15 or fewer; first dorsal fin higher, its height 8.2 to 12.4% of total length and at least 45% of the interdorsal space; first dorsal-fin origin over or just behind pectoral-fin insertions (Fig. 18) ***Carcharhinus limbatus***

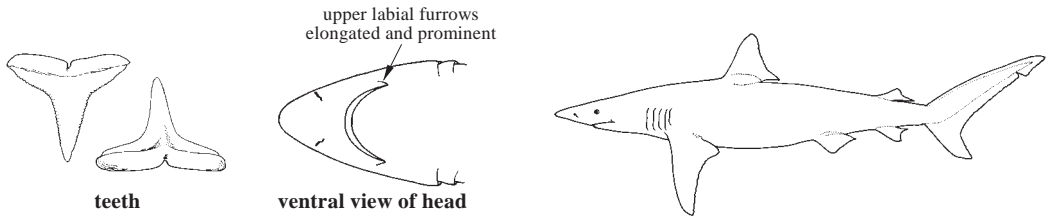


Fig. 17 *Carcharhinus brevipinna*

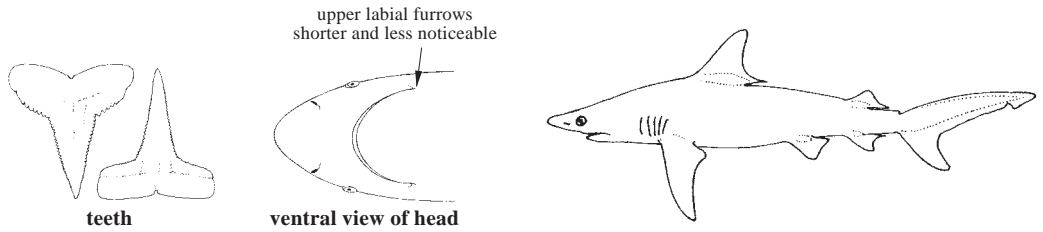



















Fig. 18 *Carcharhinus limbatus*

List of species occurring in the area

The symbol  is given when species accounts are included.^{1/}

-  *Carcharhinus altimus* (Springer, 1950).
-  *Carcharhinus amboinensis* (Müller and Henle, 1839).
-  *Carcharhinus brachyurus* (Günther, 1870).
-  *Carcharhinus brevipinna* (Müller and Henle, 1839).
-  *Carcharhinus falciformis* (Bibron, in Müller and Henle, 1839).
-  *Carcharhinus galapagensis* (Snodgrass and Heller, 1905).
-  *Carcharhinus leucas* (Valenciennes, in Müller and Henle, 1839).
-  *Carcharhinus limbatus* (Valenciennes, in Müller and Henle, 1839).
-  *Carcharhinus longimanus* (Poey, 1861).^{2/}
-  *Carcharhinus obscurus* (Lesueur, 1818).
-  *Carcharhinus plumbeus* (Nardo, 1827).
-  *Carcharhinus signatus* (Poey, 1868).
-  *Galeocerdo cuvier* (Péron and Lesueur, in Lesueur, 1822).
-  *Negaprion brevirostris* (Poey, 1868).^{3/}
-  *Prionace glauca* (Linnaeus, 1758).
-  *Rhizoprionodon acutus* (Rüppell, 1837).

^{1/} *Carcharhinus isodon* (Valenciennes, in Müller and Henle, 1839) was included in a species account in Compagno (1981) but is omitted here because old records of this species from tropical West Africa off Senegal and Guinea-Bissau have not been confirmed, and it is possible that these were based on some other species, particularly *Carcharhinus brevipinna* but possibly also *C. limbatus*. See Garrick (1982) and Compagno (1984, 2002) for accounts of this species.

^{2/} The earliest undoubted species name for this shark is *Carcharhinus maou* (Lesson, 1838), but modern authors generally use *C. longimanus* following Bigelow and Schroeder (1948) and Garrick (1982).

^{3/} The writer follows Cadenat and Blache (1981) and previous authors in using the name *Negaprion brevirostris* for this species.

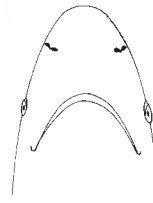
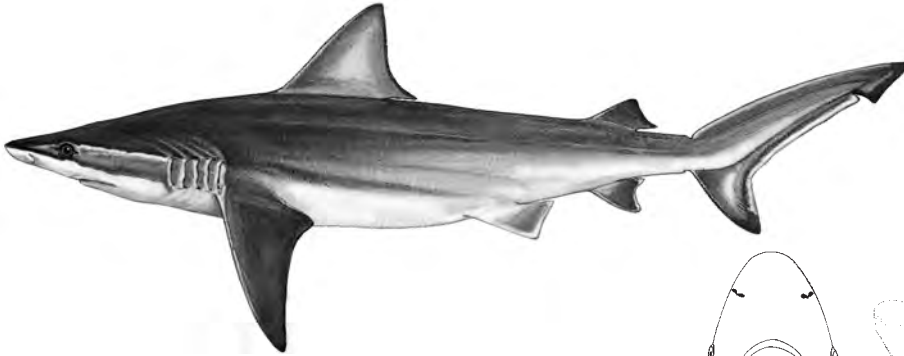
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***Carcharhinus altimus* (Springer, 1950)**

Frequent synonyms / misidentifications: *Eulamia altima* Springer, 1950 / *Carcharhinus galapagensis* (Snodgrass and Heller, 1905); *C. obscurus* (Lesueur, 1818); *C. plumbeus* (Nardo, 1827).

FAO names: **En** – Bignose shark; **Fr** – Requin babosse; **Sp** – Tiburón baboso.



ventral view
of head



upper and lower
teeth

Diagnostic characters: Body slender. **Snout rounded and rather long, preoral length 130 to 140% of internarial width; anterior nasal flaps expanded as low, broadly triangular lobes;** upper labial furrows very short; eyes moderately large, internal nictitating lower eyelids present; spiracles absent; gill slits long, height of third gill slits about 3.1 to 3.9% of total length; gill arches without papillae. Teeth with serrated edges, **upper teeth broadly triangular and erect in front of mouth, with very high cusps,** progressively oblique posteriorly; teeth in lower jaw erect and narrow-cusped; anteroposterior tooth row counts 14 to 16/14 to 16 on each side, total tooth row counts 31 to 34/29 to 31. **First dorsal fin moderately high, height 8.3 to 11.9% of total length; first dorsal fin with a nearly straight anterior margin, a narrowly rounded apex, an origin over inner margins of pectoral fins,** and the midlength of its base closer to the pectoral-fin insertions than to the pelvic-fin origins; second dorsal fin much smaller than first dorsal but relatively high, height 2.8 to 3.4% of total length; second dorsal fin with a slightly concave posterior margin, an origin about opposite that of anal fin, a slightly attenuated free rear tip, and an inner margin less than 150% of fin-height; anal fin with a deeply notched posterior margin and without long preanal ridges; **pectoral fins long and not strongly falcate,** broad-tipped but with angular apices. **A high interdorsal ridge present between dorsal fins;** no keels on caudal peduncle. Precaudal vertebral centra 101 to 110, total vertebral centra 194 to 206. **Colour:** back greyish; belly whitish; inner corners of pectoral fins blackish.

Size: Maximum total length to about 3 m; common to 2.4 m; size at birth between 70 and 90 cm; adults 216 to about 300 cm.

Habitat, biology, and fisheries: Usually found in the deeper areas of the continental shelves and uppermost slopes near the bottom, ranging from the surface to 430 m depth, but commonly between 80 and 220 m; rare in shallow waters and at the surface. Number of young 3 to 15 per litter. Bottom-dwelling; feeds primarily on bony fishes, small sharks and rays and cephalopods. Possibly taken incidentally as bycatch of demersal fisheries in the area, caught on deep-set and pelagic longlines, probably handlines and bottom trawls, gillnets, and rod and reel elsewhere. Separate statistics are not reported for the species. Utilization in the area unrecorded, flesh eaten and made into fishmeal for chicken feed, liver is processed for oil and the skin made into shagreen for sanding wood elsewhere. The conservation status of the bignose shark is poorly known, and it is currently ranked as Data Deficient on the IUCN Red List.

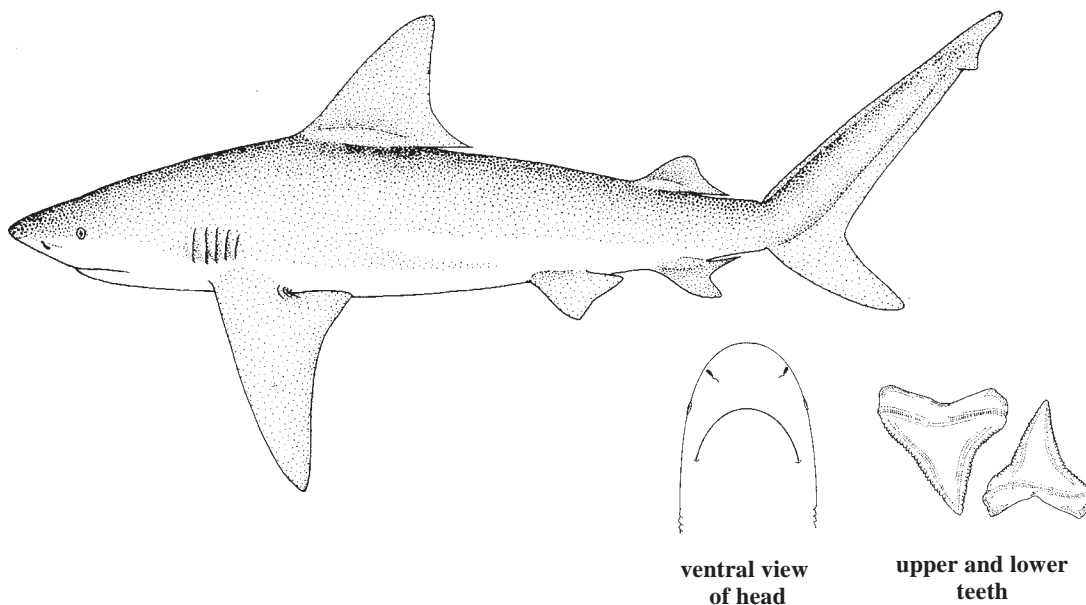
Distribution: In the area, off Senegal, Gambia, Sierra Leone, Côte d'Ivoire, and Ghana. Widespread in the Atlantic, Pacific, and Indian Oceans and the Mediterranean Sea but sporadically recorded, probably because it has a deeper habitat than most other *Carcharhinus* species.



***Carcharhinus amboinensis* (Müller and Henle, 1839)**

Frequent synonyms / misidentifications: None / *Carcharhinus leucas* (Valenciennes in Müller and Henle, 1839).

FAO names: En – Pigeye shark; Fr – Requin balestrine; Sp – Tiburón baleta.



Diagnostic characters: A large, stout to very heavy-bodied shark. **Snout very broadly rounded and very short, preoral length 100 to 110% of internarial width;** nostrils with a low, broadly triangular anterior nasal flap; labial furrows very short; eyes small, internal nictitating lower eyelids present; spiracles absent; gill slits moderately long, height of third gill slit about 2.9 to 3.8% of total length; gill arches without papillae. **Teeth in upper jaw triangular, with broad, heavy, serrated cusps,** their outer edges nearly straight in anterior teeth, but becoming increasingly concave to the sides; lower teeth with erect to slightly oblique, very heavy cusps with serrated edges and strongly arched bases; anteroposterior tooth row counts 11 to 13/10 to 12 on each side, total tooth row counts 23 to 27/21 to 25. **First dorsal fin very high and broad, height 11.1 to 12.0% of total length and 320% or more of second dorsal height, with a narrowly convex or nearly straight anterior margin and a pointed or slightly rounded apex, its origin a little in advance of insertion of pectoral fins,** and the midlength of its base close to the pectoral-fin insertions and distant from the pelvic-fin origins; **second dorsal fin high although much smaller than the first dorsal fin, height 2.8 to 3.6% of total length; second dorsal fin with a nearly straight inner margin, an origin slightly in front of that of anal fin, a free rear tip that is hardly attenuated,** and an inner margin about as high as the fin height; anal fin with a deeply notched posterior margin and without long preanal ridges; **pectoral fins large, broad, with narrow pointed tips. No interdorsal ridge between dorsal fins;** no keels on caudal peduncle. Precaudal vertebral centra 89 to 95, total vertebral centra 185 to 195. **Colour:** back greyish, belly white; tips of fins dark in juveniles, fading in adults.

Size: Maximum total length 280 cm; size at birth about 71 to 75 cm; males maturing at about 195 cm; females maturing at about 198 to 223 cm.

Habitat, biology, and fisheries: An inshore as well as offshore continental species occurring from the surfline and intertidal to 311 m depth near the bottom. Apparently not ascending rivers and entering lakes like *Carcharhinus leucas*. Young 3 to 13 in a litter. A bottom-feeding shark that preys on bony fishes including croakers, flatfishes and hairtails (Trichiuridae), small sharks and skates, shrimps, cuttlefishes, sea snails, and whale (probably as carrion). Potentially injurious to people but interactions not reported. In the area, both

inshore and offshore, rarely caught in fisheries, only 2 specimens collected but more common in the Indo-West Pacific. Separate statistics are not reported for this species. Caught on longlines, utilized fresh for human consumption. Conservation status sketchily known, listed as Data Deficient worldwide on the IUCN Red List and Lower Risk/Near Threatened on the east coast of southern Africa.

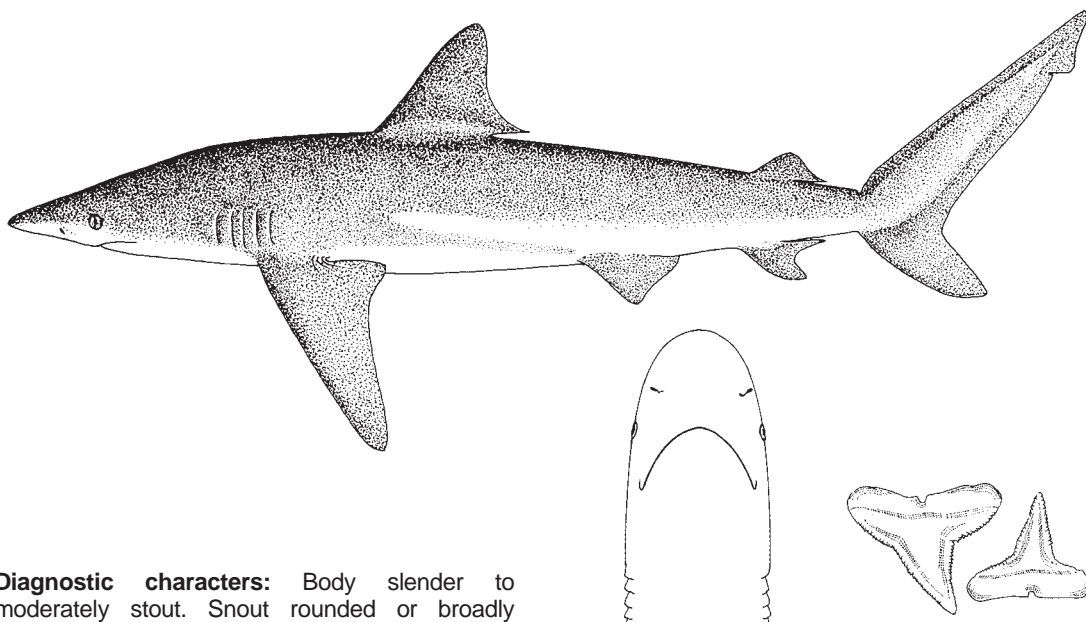
Distribution: Within the area, known from off Guinea-Bissau and Nigeria, but probably more widespread. Elsewhere from the Mediterranean Sea (Italy), western Indian Ocean and western South Pacific from the east coast of South Africa to Australia.



***Carcharhinus brachyurus* (Günther, 1870)**

Frequent synonyms / misidentifications: None / *Carcharhinus obscurus* (Lesueur, 1818).

FAO names: En – Copper shark; Fr – Requin cuivre; Sp – Tiburón cobrizo.



ventral view of head

upper and lower teeth

Diagnostic characters: Body slender to moderately stout. Snout rounded or broadly angular, preoral length **110 to 140% of internarial width**; anterior nasal flaps very short to rudimentary; labial furrows short; eyes small to moderately large, internal nictitating lower eyelids present; spiracles absent; **gill slits short to moderately long**, height of third gill slits about 2.5 to 4.1% of total length. **Upper teeth with narrow, mostly oblique and somewhat flexed cusps, well-delimited from the tooth bases and finely serrated**; lower teeth with moderately high, narrow, erect to semioblique, weakly serrated cusps; anteroposterior tooth row counts 14 to 16/14 to 15 on each side, total tooth row counts 29 to 36/29 to 35. First dorsal fin moderately high, height 6.8 to 9.7% of total length; first dorsal fin with a broadly convex anterior margin, a narrowly rounded or angular apex, an origin over inner margins of pectoral fins, and the midlength of its base closer to the pectoral-fin insertions than to the pelvic-fin origins; **second dorsal fin much smaller than first dorsal fin but moderately high**, height 2.0 to 2.5% of total length; second dorsal fin with a slightly concave posterior margin, an origin over that of anal fin, and an inner margin much shorter than half the fin height; anal fin with a deeply notched posterior margin and without long preanal ridges; pectoral fins large, narrow, and not strongly falcate, apically pointed. **Usually no interdorsal ridge** (occasionally a weak ridge present); no keels on caudal peduncle. Precaudal vertebral centra 96 to 110, total vertebral centra 179 to 203. **Colour:** dark brownish grey to bronzy grey above, white below; fins mostly plain, except for dusky tips on pelvic fins, as well as dusky to black tips and rear edges on pectoral fins.

Size: Maximum total length to about 290 cm; size at birth about 59 to 70 cm; males maturing at about 200 to 229 cm, females maturing below 240 cm; females somewhat larger than males.

Habitat, biology, and fisheries: A coastal and offshore, littoral and semi-oceanic shark, preferring temperate and subtropical waters to tropical seas. Found on the continental and insular shelves, from the intertidal to the surface and 200 m on the bottom and at the surface or well below it over water 900 to 1 100 m deep. Number of young 13 to 20 per litter. Feeds on bottom-dwelling bony fishes, including gurnards, flatfishes, hakes, puffers, sea catfishes, jacks and mullets; also on rays, small sharks, squids and cuttlefishes. The copper shark occasionally acts aggressively when confronted by divers but rarely bites people and is sought in places

outside the area for ecotouristic shark diving. It is not a regular aquarium exhibit as far as the writer knows but has potential as such. Flesh and possibly liver oil utilized for human consumption but details little-known in the area; Commonly caught off Spain, North Africa and Namibia but rare off tropical West Africa (Mauritania, Senegal and Guinea). No statistics are reported from the area but fished by Namibia, Spain, South Africa and probably other countries. Taken in bottom trawls, in gillnets, in beach seines, by longline, and by rod-and-reel (sports anglers). Ranked as Near Threatened worldwide and Vulnerable in the western North Pacific by the IUCN Red List because of its low fecundity, long maturation time, and collapse of shark fisheries in the western North Pacific.

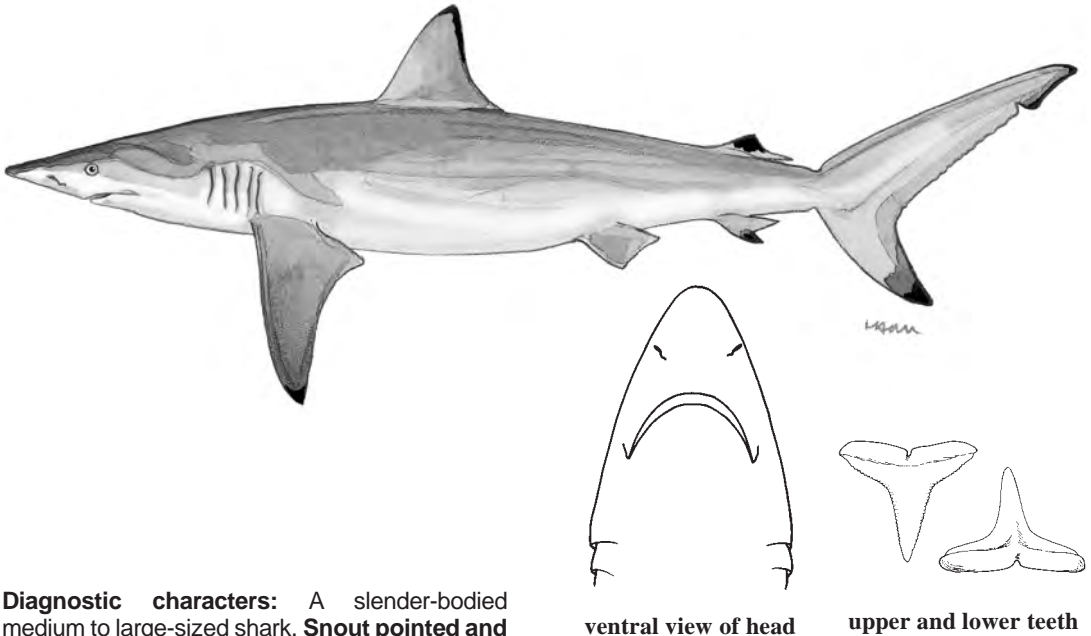
Distribution: Nearly circumglobal in temperate, subtropical and some tropical seas, but with a patchy distribution reflecting its apparent preference for temperate seas. In the area off Morocco to Western Sahara and Canary Islands, Mauritania, Senegal, probably off Guinea, also Namibia; northwards to Spain and the western Mediterranean Sea, and south to both coasts of South Africa. Wide-ranging in the western Atlantic and the Indo-Pacific.



***Carcharhinus brevipinna* (Müller and Henle, 1839)**

Frequent synonyms / misidentifications: *Carcharhinus maculipinnis* (Poey, 1865); *Aprionodon caparti* Poll, 1951 / *Carcharhinus limbatus* (Valenciennes in Müller and Henle, 1839); possibly *Carcharhinus isodon* (Valenciennes, in Müller and Henle, 1839).

FAO names: En – Spinner shark; Fr – Requin tisserand; Sp – Tiburón aleta negra.



Diagnostic characters: A slender-bodied medium to large-sized shark. **Snout pointed and long, preoral length 150 to 180% of internarial space;** anterior nasal flaps rudimentary, very low; labial folds short, but usually the **upper labial furrows longer and more prominent** than in other *Carcharhinus* species from the area; eyes small, internal nictitating lower eyelids present; spiracles absent; **gill slits relatively long, height of third gill slit about 3.6 to 5.5% of total length;** **gill arches without papillae.** **Upper and lower teeth nearly symmetrical and very similar,** with mostly erect, very narrow cusps, upper teeth with entirely or partly serrated edges, **lower teeth smooth;** **anteroposterior tooth row counts 15 to 18/14 to 17 on each side,** total tooth row counts 32 to 37/29 to 35. **First dorsal fin moderately high, height 6.0 to 8.8% of total length and less than 45% of the interdorsal space;** first dorsal fin with a broadly convex anterior margin, a narrowly rounded apex, **an origin above or slightly behind free rear tips of pectoral fins,** and the midlength of its base closer to the pectoral-fin insertions than to the pelvic-fin origins; second dorsal fin much smaller than first dorsal fin but relatively high, height 1.8 to 2.5% of total length; second dorsal fin with a nearly straight posterior margin, an origin about over that of anal fin, a somewhat attenuated free rear tip, and its inner margin less than twice the height of fin; anal fin with a deeply notched posterior margin and without long preanal ridges; pectoral fins moderate, narrow, falcate and with pointed tips. **No interdorsal ridge between dorsal fins;** no keels on caudal peduncle. Precaudal vertebral centra 84 to 96, total vertebral centra 155 to 185. **Colour:** grey on back, white below, with a conspicuous white band on sides. Second dorsal, anal, undersides of pectorals and lower caudal-fin lobe black or dark grey-tipped in subadults and adults, but fins unmarked or nearly so in small individuals (below 1 m).

Size: Maximum total length to about 2.8 m, common to 2.5 m; size at birth about 60 to 75 cm; males maturing at 159 to 203 cm, females at 170 to 200 cm.

Habitat, biology, and fisheries: Close inshore and offshore; common in shallow water at a depth less than 30 m but ranging down to at least 75 m. An active, fast-swimming shark, often making vertical spinning leaps out of the water, as a feeding technique in which the shark spins through a school of small fishes with open mouth and then breaks the surface. Abundance uncertain in the area. Number of young 6 to 15 per litter. Feeds mostly on small schooling teleosts including herring (Clupeidae), mackerel (Scombridae), jacks (Scombridae) bottom teleosts (including lizardfish, Synodontidae, hake, Merlucciidae, goatfish, Mullidae, and flatfish, Citharidae); also small sharks and rays and squids, cuttlefish, octopods, and crustaceans. The spinner shark very rarely bites swimmers. Its status in ecotouristic diving is uncertain in the area and elsewhere, but it is likely to be viewed as a 'blacktip' without necessarily distinguishing it from *Carcharhinus limbatus*. Important in inshore and offshore tropical fisheries wherever it occurs but details of utilization unclear in the area. Separate statistics are not reported for this species in the area. Caught with pelagic trawls, probably also gillnets, longlines, and hook-and-line. Utilized fresh and dried-salted for human consumption worldwide, also hides used for leather, fins used in the Oriental sharkfin trade, and livers for vitamin oil production. The conservation status of this shark is sketchily known, but the spinner shark is thought to be threatened by overfishing because of its low reproductive potential, coastal habitat and ready availability to fisheries. It is ranked on the IUCN Red List as Lower Risk/Near Threatened worldwide (which is under-ranked for the present area with its intensive long-duration inshore fisheries) but Vulnerable in the western North Atlantic.

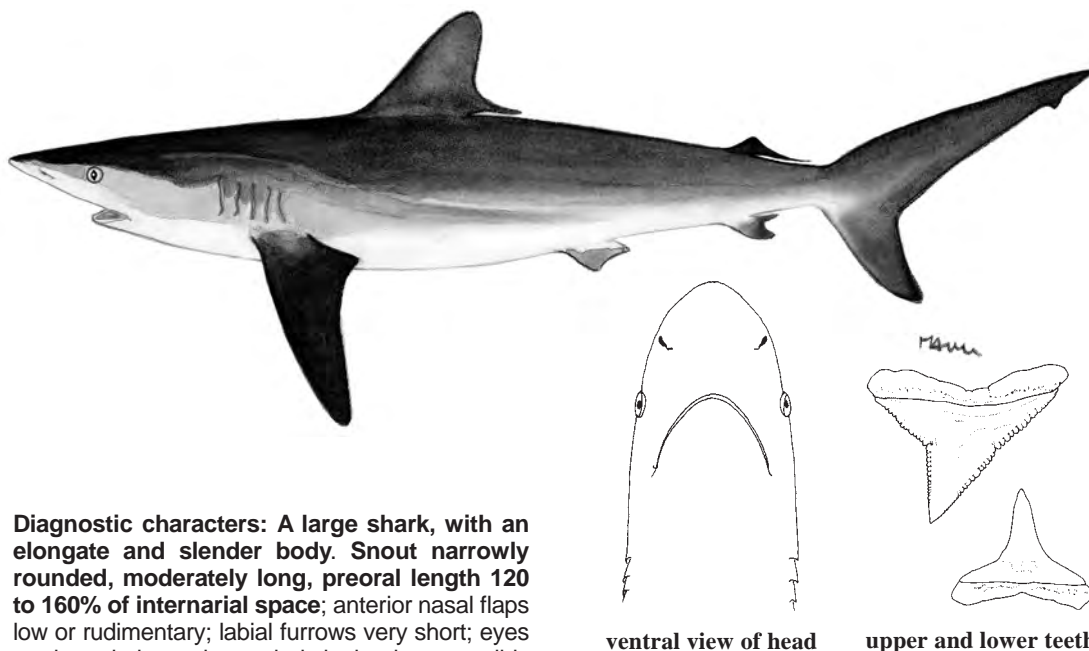
Distribution: Widespread in the area, but records are spotty in part due to confusion with *C. limbatus* and lack of information from many coastal countries. Within the area, known from Mauritania, Senegal, the Cape Verde Islands, Guinea and Sierra Leone, Côte d'Ivoire, Togo, Nigeria, Congo and Angola. A wide-ranging, nearly circumtropical species found in the western and eastern Atlantic and the Mediterranean Sea, Indian Ocean, and western Pacific, but apparently absent from the eastern Pacific.



***Carcharhinus falciformis* (Bibron in Müller and Henle, 1839)**

Frequent synonyms / misidentifications: *Carcharhinus floridanus* (Bigelow, Schroeder and Springer, 1943) / *Carcharhinus obscurus* (Lesueur, 1818).

FAO names: **En** – Silky shark; **Fr** – Requin soyeux; **Sp** – Tiburón jaquetón.



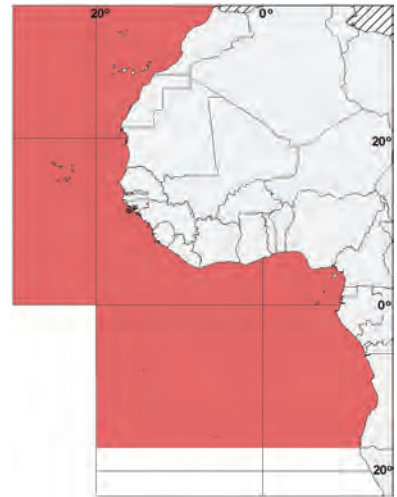
Diagnostic characters: A large shark, with an elongate and slender body. Snout narrowly rounded, moderately long, preoral length 120 to 160% of internarial space; anterior nasal flaps low or rudimentary; labial furrows very short; eyes moderately large, internal nictitating lower eyelids present; spiracles absent; gill slits moderately long, height of third gill slit about 2.9 to 3.6% of total length; gill arches without papillae. **Upper teeth with relatively narrow cusps well delimited from the heavy, serrated bases, their outer edges notched;** teeth in lower jaw erect, their edges only slightly serrated; anteroposterior tooth row counts 14 to 16/14 to 17 on each side, total tooth row counts 31 to 37/30 to 37. First dorsal fin moderately high, height 5.2 to 8.1% of total length; **first dorsal fin with a broadly convex anterior margin, a broadly rounded apex, an origin behind the free rear tips of the pectoral fins,** and the midlength of its base somewhat closer to the pectoral-fin insertions than the pelvic-fin origins or almost equidistant between them; **second dorsal fin very low** and much smaller than the first dorsal fin, height 1.4 to 2.1% of total length; second dorsal fin with a shallowly concave posterior margin, an origin about opposite that of anal fin, **an elongated, slender free rear tip, and an inner margin usually 200% of the the height of the fin or more;** anal fin with a deeply notched posterior margin and without long preanal ridges; **pectoral fins long and falcate,** more so in adults than in young. **Interdorsal ridge present between dorsal fins;** no keels on caudal peduncle. Precaudal vertebral centra 98 to 106, total vertebral centra 199 to 205. **Colour:** back dark grey, greyish brown or bluish black (in life); belly greyish or white.

Size: Maximum total length about 350 cm total length, common to 250 cm; size at birth 70 to 87 cm; males maturing at about 187 to 217 cm and females at 213 to 230 cm.

Habitat, biology, and fisheries: This shark inhabits subtropical and tropical oceanic waters near and beyond the continental slopes, but it is also found in coastal waters on the continental and insular shelves in waters as little as 18 m deep. Silky sharks usually live near the surface, but occur sometimes at considerable depths down to at least 500 m. Pupping and nursery grounds are found on the edges of the shelves; as they grow young move into oceanic waters and may follow tuna schools, but adults may return to the edge of the shelves and over the slopes. Number of young 2 to 14 per litter. Feeds chiefly on fishes, including tunas, also squids

and pelagic octopods. The silky shark is very quick and graceful in its movements and can be quite inquisitive. This shark very rarely bites divers while investigating them, but is currently sought as the subject of ecotouristic shark dives and underwater photography in the western Atlantic, Red Sea, and Indo-Pacific. It is an impressive and generally docile subject for viewing and photography. Caught mainly in offshore waters near the continental slopes, but less commonly in coastal waters. The silky shark caused damage to the catch and gear in tuna purse-seine fisheries. In the area Liberia and Spain reported a catch of 56 tonnes of silky sharks to FAO for 2004, but this is likely a small fraction of what is caught in the area. Worldwide only 3 512 tonnes of silky sharks were reported to FAO by only five countries in 2004 (Brazil, Costa Rica, Liberia, Spain, and Sri Lanka). Caught mainly with pelagic and bottom longlines, purse seines, gillnets, and hook-and-line. The silky shark is a major complementary bycatch of oceanic longline, purse seine and gillnet fisheries for large scombroids worldwide, and commonly is discarded after its fins are removed ('finning'). Its meat is used fresh or dried-salted for human consumption, its hide for leather, its fins for sharkfin soup, and its liver is extracted for oil, which has a high Vitamin A content. It is thought to be threatened by overexploitation because of slow growth, low fecundity, and long maturation time, despite its enormous range and offshore abundance or former abundance. The silky shark is ranked as Vulnerable in the eastern central and southeast Pacific and the northwest and western central Atlantic, and as Near Threatened worldwide by the IUCN Red List, which may still not be entirely reflective of the massive fishing pressure impinging on this species worldwide; Vulnerable may be as appropriate for this species as for *Carcharhinus longimanus* and other large pelagic sharks that are caught in the same fisheries.

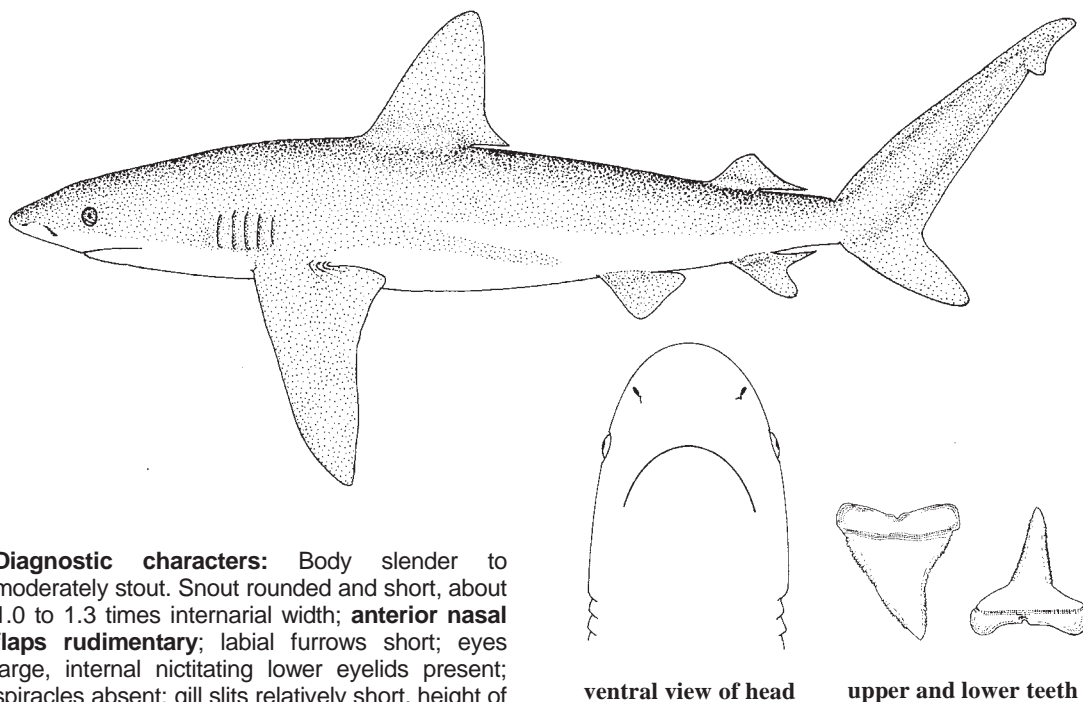
Distribution: Circumglobal in all warm seas. In the area from Madeira, Canary Islands, Mauritania, Senegal, Guinea, Cape Verde Islands, Côte d'Ivoire and Guinea southward to Congo and Angola, also northwards to Spain. Abundant or formerly abundant in the Gulf of Guinea, and historically one of the most common tropical oceanic sharks in Fishing Area 34. Elsewhere it occurs in the western Atlantic from Delaware Bay and Bermuda (rare) to southern Brazil; also, probably Mediterranean Sea, and widespread in the tropical Indo-Pacific.



***Carcharhinus galapagensis* (Snodgrass and Heller, 1905)**

Frequent synonyms / misidentifications: None / *Carcharhinus obscurus* (Lesueur, 1818).

FAO names: En – Galapagos shark; Fr – Requin des Galapagos; Sp – Tiburón de Galápagos.



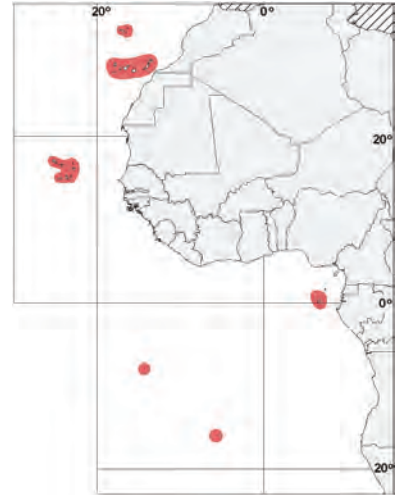
Diagnostic characters: Body slender to moderately stout. Snout rounded and short, about 1.0 to 1.3 times internarial width; **anterior nasal flaps rudimentary**; labial furrows short; eyes large, internal nictitating lower eyelids present; spiracles absent; gill slits relatively short, height of third gill slit about 2.8 to 3.5% of total length; gill arches without papillae. **Upper teeth broadly triangular**, erect to moderately oblique, **the anterior ones strongly serrated and with higher, broad cusps not delimited from the bases**; lower teeth with high, narrow cusps and serrations; anteroposterior tooth row counts 13 to 15/13 to 15 on each side, total tooth row counts 27 to 31/27 to 31. First dorsal fin high, height 9.5 to 11.2% of total length; **first dorsal fin with a convex or nearly straight anterior margin**, a narrowly rounded or pointed apex, **an origin over inner margins of pectoral fins** and the midlength of its base somewhat closer to the pectoral-fin insertions than the pelvic-fin origins; **second dorsal fin moderately high although much smaller than the first dorsal fin, height 2.6 to 2.8% of total length**; **second dorsal fin with a broadly concave posterior margin**, an origin over or slightly anterior to that of anal fin, a slightly elongated free rear tip, and an inner margin less than twice the fin height; anal fin with a deeply notched posterior margin and without long preanal ridges; **pectoral fins nearly straight** and apically pointed, not falcate. **A low interdorsal ridge present**; no keels on caudal peduncle. Precaudal vertebral centra 103 to 109, total vertebral centra 200 to 215. **Colour:** dark grey above, light below, fins plain except for slightly dusky tips in some individuals.

Size: Maximum size about 370 cm total length, common to 300 cm; size at birth about 57 to 80 cm; males maturing between 170 and 236 cm, females at about 235 cm.

Habitat, biology, and fisheries: A wide-ranging, inshore and offshore shark often preferring the coastal waters around islands to those of the continental shelf. Depths 0 to at least 180 m, subtidal or intertidal to well offshore. Number of young 4 to 16 per litter. Feeds on bottom fishes, including basses, flatheads, eels and flatfishes; also on cephalopods and bivalves. A bold and inquisitive species, sometimes pestering divers but rarely biting people; currently the subject of ecotouristic diving in the eastern Pacific but not kept in aquaria to the writer's knowledge. Separate statistics are not reported for this species in the area or worldwide. No information on utilization or fishing methods are available for the area or elsewhere, but it is likely to figure in

shark fisheries because of its abundance or former abundance in the insular habitats it prefers, its large size and its meat, fins, jaws and cartilage. Its insular habitat makes it subject to being decimated by relatively small oceanic longline or even gillnet fishing operations as well as insular artesional fisheries that target large island sharks for their increasingly valuable fins. Conservation status little-known; ranked as Near Threatened worldwide on the IUCN Red List.

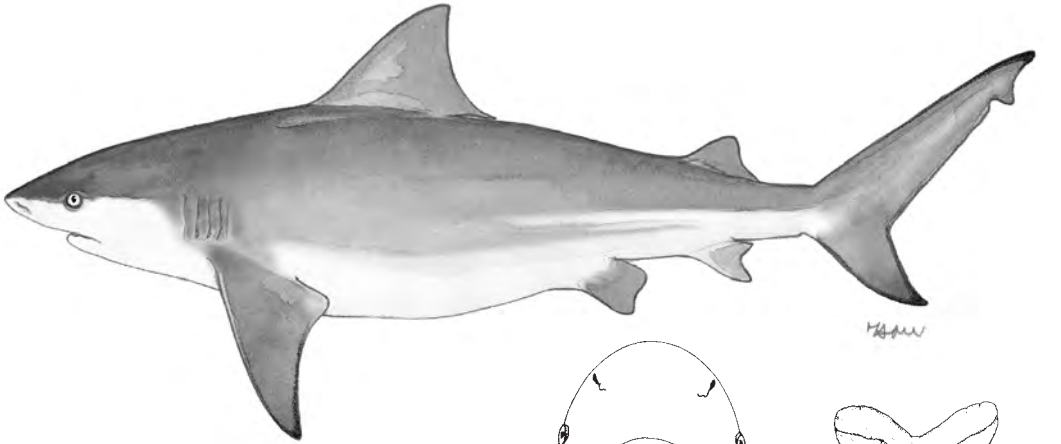
Distribution: Widely distributed in tropical and subtropical seas, but of spotty occurrence primarily off islands but offshore in continental waters in the eastern Pacific and possibly in the area. In the area reported from Madeira, the Canary Islands, Cape Verde, Ascension, St Helena and São Tomé Islands. Elsewhere, eastern Atlantic, possibly off the Azores and off the coasts of Spain or Portugal, in the western North Atlantic, the southwestern Indian Ocean and the southwestern, central and eastern Pacific.



Carcharhinus leucas (Valenciennes in Müller and Henle, 1839)

Frequent synonyms / misidentifications: *Carcharhinus nicaraguensis* (Gill and Bransford, 1877); *C. zambezensis* (Peters, 1852) / *Carcharhinus amboinensis* (Müller and Henle, 1839); *Carcharodon carcharias* (Linnaeus, 1758).

FAO names: **En** – Bull shark; **Fr** – Requin bouledogue; **Sp** – Tiburón sarda.



Diagnostic characters: A large, stout shark. **Snout very broadly rounded and very short**, preoral length 70 to 100% of internarial width; nostrils with a low, broadly triangular anterior nasal flap; labial furrows very short; eyes small, internal nictitating lower eyelids present; spiracles absent; gill slits moderately long, height of third gill slit about 3.1 to 4.5% of total length; gill arches without papillae. **Teeth in upper jaw triangular, with broad, heavy, serrated cusps**, their outer edges nearly straight in anterior teeth, but becoming increasingly concave to the sides; lower teeth with erect to slightly oblique, heavy cusps with serrated edges and strongly arched bases; anteroposterior tooth row counts 12 to 14/12 to 13 on each side, total tooth row counts 25 to 29/25 to 27. **First dorsal fin moderately high and broad, height 7.0 to 10.8% of total length but less than 320% of second dorsal height, with a broadly convex anterior margin and a pointed or slightly rounded apex, its origin a little in advance of insertion of pectoral fins**, and the midlength of its base close to the pectoral-fin insertions and distant from the pelvic-fin origins; **second dorsal fin high although much smaller than the first dorsal fin, height 3.2 to 4.5% of total length; second dorsal fin with a strongly concave inner margin, an origin slightly in front of that of anal fin, a free rear tip that is hardly attenuated**, and an inner margin shorter than the fin height; anal fin with a deeply notched posterior margin and without long preanal ridges; **pectoral fins large, broad, with narrow pointed tips. No interdorsal ridge between dorsal fins**; no keels on caudal peduncle. Precaudal vertebral centra 101 to 103, total vertebral centra 198 to 227. **Colour:** back greyish, belly white; tips of fins dusky to black, especially in young individuals.

ventral view of head

upper and lower teeth

Size: Maximum total length to about 340 cm; common to 260 cm; size at birth between 56 and 81 cm; males maturing at 157 to 226 cm and females maturing between 180 and 230 cm.

Habitat, biology, and fisheries: Predominantly a coastal and freshwater species inhabiting shallow continental waters from 0 to 30 m, especially in bays and river estuaries, and up rivers and in freshwater lakes. On the shelf it can range to the shelf edge down to at least 152 m depth; and can make oceanic excursions to islands far from continental landmasses. It tolerates a wide range of salinities, readily penetrates far up rivers

and into hypersaline bays. An active, bottom-dwelling shark, usually slow-swimming while cruising but can develop great speed when chasing its prey. Number of young 1 to 13 per litter. The young readily tolerate low salinities and are common in brackish water; some are born in fresh water. Pupping grounds and nursery areas are close inshore in lagoons, estuaries and rivers. An opportunistic predator with a very wide food spectrum that includes many species of bony fishes, sharks, rays, invertebrates (crabs, shrimps, hermit crabs, mantis shrimps, sea snails, squids, and sea urchins), marine and freshwater turtles, birds, marine and terrestrial mammals, and carrion. It has large strong jaws and large and stout teeth for its size, which enable it to dismember and eat relatively large, tough prey. The bull shark occasionally bites people, and possibly is one of the sharks most prone to do so because of its inshore and freshwater habitat where people often enter the water, large size, powerful jaws, omnivorous habits, and wide range. However, in the eastern Pacific, the Bahamas, South Africa and Mozambique it is a popular subject of ecotouristic divers who can approach it underwater and usually view it without mishap. It is kept in several large public aquaria worldwide, and makes a spectacular shark for exhibit albeit one which is hard on its fellow tank-mates in a community tank and may inspire divers to use a shark cage when cleaning its tank. Caught mainly with longlines and gillnets and used for its meat, hide, fins, liver oil (which is very rich in Vitamin A), and for fishmeal. It is also caught by sports anglers. It is fished in coastal waters (estuaries, bays, straits between islands) and in rivers and lakes throughout its range. Separate statistics are not reported for this species in the area or elsewhere. The bull shark is considered highly vulnerable to overexploitation and other human-induced problems because of its slow growth, low fecundity, inshore and freshwater habitat and particularly its pupping and nursery areas (which subject it to overfishing, pollution, and habitat destruction) and high value for fins, jaws, and other parts. It is protected off the east coast of the United States and ranked as Lower Risk/Near Threatened worldwide by the IUCN Red List. This species is definitely under-ranked for some areas where it has been extirpated or is under threat, as in the present area, and where Vulnerable or a higher ranking might be more appropriate.

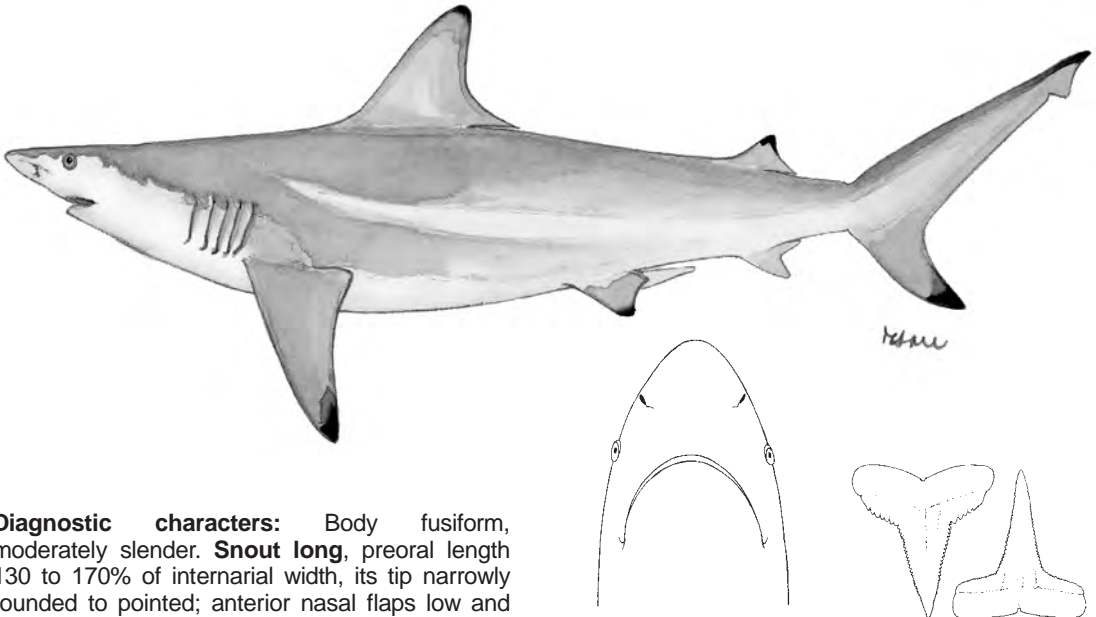
Distribution: Widespread along the continental coasts of all tropical and subtropical seas; also, it is the most wide-ranging cartilaginous fish in fresh water and is frequently found in warm-water rivers and lakes. In the eastern Atlantic there are records from off Morocco, Senegal, Gambia, Guinea, Sierra Leone, Côte d'Ivoire, Benin, Gabon, Congo and Angola but it is probably more widespread; it is found in the Gambia River (Gambia) and the Ogoué River (Gabon). In the eastern Atlantic it may occur off the Azores (although a record there may be based on *Carcharhinus obscurus* or *C. galapagensis*) and in the western Cape Province of South Africa. Otherwise wide-ranging in the Atlantic and Indo-Pacific; Mediterranean records not confirmed.



Carcharhinus limbatus (Valenciennes in Müller and Henle, 1839)

Frequent synonyms / misidentifications: None / *Carcharhinus brevipinna* (Müller and Henle, 1839).

FAO names: En – Blacktip shark; Fr – Requin bordé; Sp – Tiburón macuira.



Diagnostic characters: Body fusiform, moderately slender. **Snout long**, preoral length 130 to 170% of internarial width, its tip narrowly rounded to pointed; anterior nasal flaps low and broadly triangular; labial furrows short; eyes small, internal nictitating lower eyelids present; spiracles absent; gill slits relatively long, height of third gill slit about 3.8 to 4.9% of total length; gill arches without papillae. **Upper and lower teeth nearly symmetrical and similar, with erect, narrow cusps and serrated edges;** anteroposterior tooth row counts 14 to 16/13 to 15 on each side, total tooth row counts 29 to 35/27 to 33. **First dorsal fin high and broad, height 8.2 to 12.4% of total length and at least 45% of the interdorsal space; first dorsal fin with a convex or nearly straight anterior margin, a pointed or very narrowly rounded apex, an origin above, or slightly posterior to insertions of pectoral fins,** and the midlength of its base close to the pectoral-fin insertions and far from the pelvic-fin origins; **second dorsal fin high** although much smaller than the first dorsal fin, height 2.5 to 3.6% of total length; second dorsal fin with a shallowly concave posterior margin, an origin over or slightly in front of that of anal fin, a slightly attenuated free rear tip, and an inner margin less than 200% of the fin height; anal fin with a deeply notched posterior margin and without long preanal ridges; pectoral fins long, falcate, narrow and with narrow pointed tips. **No interdorsal ridge between dorsal fins;** no keels on caudal peduncle. Precaudal vertebral centra 88 to 102, total vertebral centra 174 to 203. **Colour:** back dark grey, ashy blue or dusky bronze; belly white or yellowish white. **A dark band extending rearward along each side to about over origin of pelvic fin; tips of pelvic fins with a persistent black spot;** tips of dorsals, anal, pectorals and the lower lobe of caudal fin usually black or dusky in young individuals, but these markings fade with growth.

ventral view of head

upper and lower teeth

Size: Maximum total length to about 250 cm; common to 150 cm; size at birth about 55 to 72 cm; males maturing at about 135 to 180 cm and females 120 to 190 cm.

Habitat, biology, and fisheries: Inhabits coastal as well as offshore surface waters, 0-130 m depth and mostly less than 30 m. A fast-moving migratory shark that sometimes leaps out of the water, usually found in aggregations or schools of 6 or more individuals. Occasionally enters brackish waters, but not fresh water. Number of young 1 to 10 per litter. Pupping and nursery grounds are in coastal lagoons and possibly other inshore habitats. Feeds mainly on small schooling bony fishes; also on small sharks, rays, squids,

cuttlefishes, octopuses, crabs and lobsters. Apparently of little hazard to people, but can be aggressive around divers when they are spearing fish. Sought for ecotouristic diving in the Bahamas and South Africa, and kept in a few aquaria worldwide for public viewing. Separate statistics are not reported for this species in the area. Taken with pelagic longlines, gillnets, demersal trawls (especially shrimp trawls), and on hook-and-line (usually by sports anglers). Its meat is excellent and is marketed fresh and dried-salted for human consumption, also caught for its fins and used to produce fishmeal. The skin is used in the manufacture of various subproducts and the liver in the production of oil (high in Vitamin A). Thought to be declining as offshore longline and sports angling catches in some areas during the past decade. Highly susceptible to overexploitation because of low fecundity, extensive fisheries that catch it, inshore pupping and nursery areas that are affected by small-scale fisheries and habitat destruction, and its habit of migrating in large schools close inshore which makes it highly accessible to gillnet fisheries. Ranked by the IUCN Red List as Lower Risk/Near Threatened worldwide (which is under-ranked for various fisheries-intensive areas including the present one) but Vulnerable in the western North Atlantic.

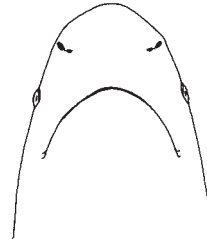
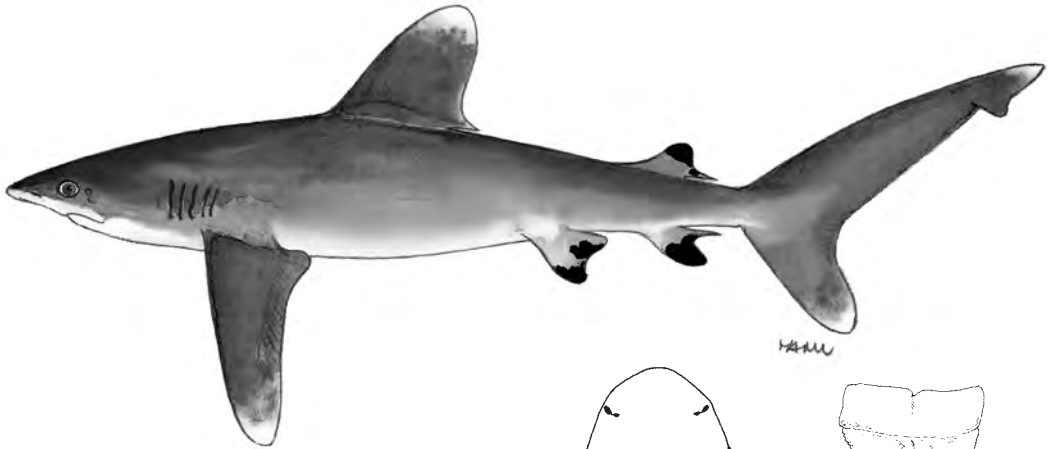
Distribution: Widespread in all tropical and subtropical continental waters. In the area, reported from the Canary Islands, Madeira, Cape Verde Islands and from Senegal to Republic of the Congo and including Guinea, Côte d'Ivoire, and Benin; possibly more wide-ranging in the area. A circumtropical and subtropical species found also in the Mediterranean Sea, the western Atlantic and the Indo-West Pacific.



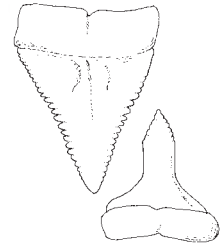
***Carcharhinus longimanus* (Poey, 1861)**

Frequent synonyms / misidentifications: *Carcharhinus maou* (Lesson, 1830) / None.

FAO names: En – Oceanic whitetip shark; Fr – Requin océanique; Sp – Tiburón oceánico.



ventral view of head



upper and lower teeth

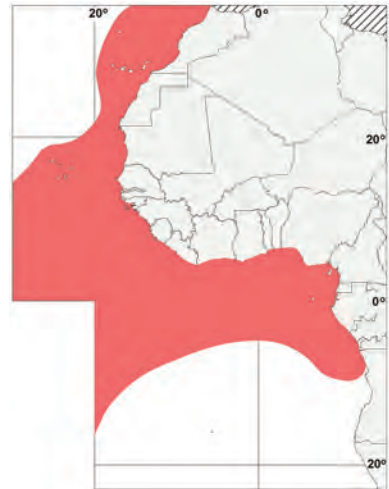
Diagnostic characters: A large, moderately stout oceanic shark. **Snout short and broadly rounded**, preoral length 100 to 110% of internarial width; anterior nasal flaps very low, rudimentary; labial furrows very short; eyes small, internal nictitating lower eyelids present; spiracles absent; gill slits relatively long, height of third gill slit about 3.0 to 4.1% of total length; gill arches without papillae. **Teeth with serrated edges, upper anterolateral teeth triangular, with broad, heavy, mostly erect cusps** nearly symmetrical anteriorly but becoming increasingly oblique at sides; lower teeth with erect, heavy cusps and serrated edges; anteroposterior tooth row counts 13 to 14/13 to 15 on each side, total tooth row counts 28 to 32/27 to 31. **First dorsal fin very high, height 9.2 to 15.2% of total length; first dorsal fin with a convex anterior margin, a broadly rounded apex**, an origin slightly behind insertions of pectoral fins, and the midlength of its base close to the pectoral-fin insertions and far from the pelvic-fin origins; second dorsal fin high, although much smaller than the first dorsal fin, height 2.7 to 4.2% of total length; second dorsal fin usually with a deeply concave posterior margin, an origin over or slightly in front of that of anal fin, an attenuated free rear tip, and an inner margin less than 200% of the fin height; anal fin with a deeply notched posterior margin and without long preanal ridges; **pectoral fins very long** (as long as or even longer than head from snout tip to fifth gill slits), not falcate, **with broadly rounded, wide tips. An interdorsal ridge present between dorsal fins**; no keels on caudal peduncle. Precaudal vertebral centra 123 to 131, total vertebral centra 228 to 244. **Colour:** back usually dark grey with a bronze tinge, but sometimes brown or bluish; underside whitish, sometimes with a yellow tinge; **tips of first dorsal fin, pectoral fins and lower lobe of caudal fin often white or with white spots** (sometimes absent); ventral surface of pelvic fins, apices of anal and second dorsal fins, and ventral lobe of caudal fin often with black spots; also black or dusky saddle-marks in front of second dorsal fin, upper margin of caudal fin and between dorsal fins (especially in young).

Size: Maximum total length possibly to 350 or even 395 cm, but common to 270 cm or less; size at birth 60 to 65 cm; males maturing at 175 to 198 cm and females at 180 to 200 cm.

Habitat, biology, and fisheries: Along with the silky shark (*Carcharhinus falciformis*), this is (or formerly was) one of the most abundant sharks in warm oceanic waters. It occasionally enters coastal waters, but is more typically found from the edges of continental or insular shelves to far beyond land, at the surface to at

least 152 m depth. This is a slow-swimming species while cruising, but it can be fast in pursuit of prey. It is often accompanied by pilot fishes (*Naucrates ductor*), remoras (*Remora remora*) and sometimes dolphinfishes (*Coryphaena* species). The females tend to form aggregations in several areas around the Antilles and in the Gulf of Mexico. Number of young 6 to 9 per litter. Feeds mainly on oceanic bony fishes (especially scombrids and carangids) and squids; also, on crustaceans (especially portunid crabs), pelagic stingrays, sea birds, turtles, marine snails, carrion, and garbage. This species causes or formerly caused much damage to the catch and gear in tuna purse-seine fisheries; it also used to eat and damage dead whales that were inflated and buoyed after harpooning by whaling ships. Reported to occasionally bite humans and may closely investigate divers and swimmers that venture into its offshore habitat. It is a spectacular species that is sought by ecotouristic divers and photographers in the eastern Pacific, the Bahamas, the western Indian Ocean, the Red Sea, the western central Pacific, but perhaps not in the area. Not kept in aquaria as far as the writer knows. Caught mostly with floating longlines and primarily as bycatch of fisheries targeting scombroids. Fished in oceanic waters throughout its range. Separate statistics are not reported to FAO for this species in the area but the International Commission for Conservation of Atlantic Tuna (ICCAT) reported 81 tonnes of oceanic whitetip sharks as bycatch of Atlantic tuna fisheries in 2005. Meat utilized fresh and salted for human consumption, also processed for fins and probably liver oil. It is considered susceptible to overexploitation because of its low fecundity, depletion in the western Atlantic and extirpation in the Gulf of Mexico, and vast, largely unmonitored pelagic catches worldwide. The IUCN Red List gives this species a Vulnerable ranking worldwide, which may be realistic compared to rankings for certain coastal carcharhinids. This species is also ranked as Critically Endangered in other regions.

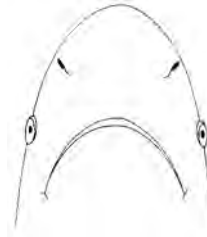
Distribution: Circumglobal in all tropical and subtropical offshore waters. Probably occurs throughout the area but records are sporadic. In the area near Straits of Gibraltar south to the Gulf of Guinea and Angola and including Morocco, Madeira, the Canary and Cape Verde Islands, Senegal, Guinea, Côte d'Ivoire, Nigeria, Cameroon, and Congo; in the eastern Atlantic northwards to Portugal and the Azores and south to the west coast of South Africa; also the Mediterranean Sea. Otherwise wide ranging in the Atlantic and Indo-Pacific.



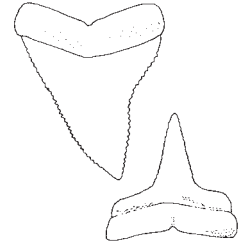
Carcharhinus obscurus (Lesueur, 1818)

Frequent synonyms / misidentifications: None / *Carcharhinus falciformis* (Valenciennes in Müller and Henle, 1839); *C. galapagensis* (Snodgrass and Heller, 1905).

FAO names: En – Dusky shark; Fr – Requin de sable; Sp – Tiburón arenero.



ventral view of head



upper and lower teeth

Diagnostic characters: Body slender to moderately stout. Snout moderately long to short and broad (adults), preoral length 100 to 140% of internarial width; **anterior nasal flaps rudimentary**; labial furrows short; eyes small, internal nictitating lower eyelids present; gill slits relatively short, height of third gill slit about 2.7 to 4.0% of total length; gill arches without papillae. **Upper teeth broadly triangular**, erect to moderately oblique, anterior teeth with strongly serrated broad cusps not delimited from the bases; lower teeth with low, narrow, serrated cusps; anteroposterior tooth row counts 14 to 15/13 to 15 on each side, total tooth row counts 29 to 33/29 to 33. **First dorsal fin relatively low, height 6.0 to 9.1% of total length; first dorsal fin with a broadly arched anterior margin**, a narrowly rounded or pointed apex, **an origin over or slightly behind free rear tips of pectoral fins**, and the midlength of its base much closer to the pectoral-fin insertions than the pelvic-fin origins; **second dorsal fin low and much smaller than the first dorsal fin, height 1.8 to 2.3% of total length; second dorsal fin with a nearly straight posterior margin, an origin about over that of anal fin, an elongated free rear tip, and an inner margin about 200% of the fin height**; anal fin with a deeply notched posterior margin and without long preanal ridges; pectoral fins long, falcate and apically pointed. **A low interdorsal ridge present between the dorsal fins**; no keels on caudal peduncle. Precaudal vertebral centra 86 to 97, total vertebral centra 173 to 194. **Colour:** blue-grey or lead grey above, white below. Tips of pectorals, pelvics, lower lobe of caudal and dorsal fins often dusky in young, plain in adults.

Size: Maximum total length possibly over 400 cm but largest adults recently measured were 340 to 365 cm; size at birth about 69 to 102 cm; males maturing at about 280 cm, females between 257 and 300 cm.

Habitat, biology, and fisheries: An active littoral and pelagic shark occurring from close inshore in the intertidal to the outer continental shelf, and semi-oceanic in the epipelagic zone off the continental slopes, depths 0 to 400 m. Number of young 6 to 14 per litter, gestation period possibly 16 months. Feeds chiefly on bony fishes, including scombrids, clupeids, serranids, trichiurids, bluefish, wrasses, anchovies, grunts, barracudas, other sharks, and rays; also eats squids, octopuses, gastropods, shrimps, crabs and carrion. Reported to bite people in the water, but there are no reports of such incidents in the area. Occasionally kept in aquaria, and a subject of ecotouristic diving in the eastern Pacific. Separate statistics are not reported for this species in the area. Mainly caught with longlines, gillnets, and in pelagic and bottom trawls; also caught by

anglers on rod-and-reel. Its meat is utilized fresh, dried-salted, frozen and smoked for human consumption; its hides are used for leather; fins are used for sharkfin soup; and its liver oil is processed for vitamins. It has declined greatly in numbers in the western North Atlantic over the last 2 decades but trends in the eastern central Atlantic area are unknown although one suspects major declines due to human-induced problems. It is highly vulnerable to overfishing because of its long maturation period, size, low fecundity and longevity. It is protected off the east coast of the United States and the subject of a regulated fishery off southern Australia. Ranked as Vulnerable worldwide on the IUCN Red List but Endangered in the northwest and western central North Atlantic.

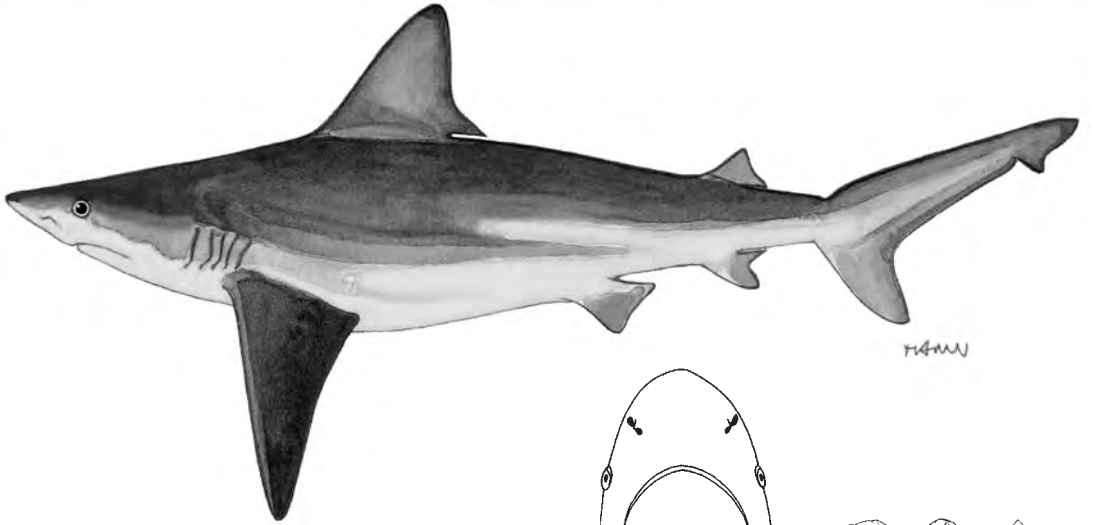
Distribution: Wide-ranging, but with a patchy distribution in all tropical and subtropical to temperate seas. In the area it occurs off Morocco and the Straits of Gibraltar, Madeira, the Canary Islands, Western Sahara, Mauritania, Cape Verde Islands, Senegal to Côte d'Ivoire and Cameroon, but probably is or was more widespread. In the eastern Atlantic it extends to Spain and Portugal and into the western Mediterranean Sea, and also off the southwest coast of South Africa. Also known from the western Atlantic, western Indian Ocean, and western and eastern Pacific. Some records of this species from off islands may in part refer to *C. galapagensis*.



Carcharhinus plumbeus (Nardo, 1827)

Frequent synonyms / misidentifications: *Carcharhinus milberti* (Valenciennes in Müller and Henle, 1839) / *Carcharhinus altimus* (Springer, 1950); *C. galapagensis* (Snodgrass and Heller, 1905); *C. obscurus* (Lesueur, 1818); *C. leucas* (Valenciennes in Müller and Henle, 1841).

FAO names: **En** – Sandbar shark; **Fr** – Requin gris; **Sp** – Tiburón trozo.



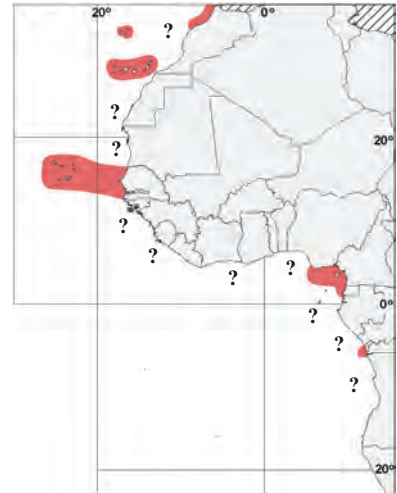
Diagnostic characters: A medium-sized, stout-bodied shark. **Snout broadly rounded and short**, preoral length 90 to 130% of internarial width; anterior nasal flaps low and broadly triangular; eyes small, internal nictitating lower eyelids present; spiracles absent; gill slits relatively short, height of third gill slit about 2.4 to 3.7% of total length; gill arches without papillae. **Teeth finely serrated, those in upper jaw broadly triangular** and erect to slightly oblique, with broad, heavy cusps; lower teeth with narrow, erect cusps; anteroposterior tooth row counts on each side 13 to 15/12 to 15, total tooth row counts 28 to 32/27 to 32. **First dorsal fin triangular, very high** (especially in adults), height 8.4 to 15.0% of total length; **first dorsal fin with a weakly convex or nearly straight anterior margin, a pointed or narrowly rounded apex, an origin over insertions of pectoral fins** and the midlength of its base close to the pectoral-fin insertions and far from the pelvic-fin origins; second dorsal fin moderately high although much smaller than first dorsal fin, height 2.6 to 3.3% of total length; second dorsal fin with a shallowly concave or nearly straight posterior margin, an origin about opposite origin of anal fin, a slightly elongated free rear tip, and an inner margin less than 200% of fin height; anal fin with a deeply notched posterior margin and without long preanal ridges; pectoral fins long, broad, and falcate, with narrowly rounded or pointed apices. Precaudal vertebral centra 82 to 97, total vertebral centra 152 to 189. **Interdorsal ridge present**; no keels on caudal peduncle. **Colour:** back grey, or rarely brown; belly whitish.

Size: Maximum total length to about 239 cm, records of specimens to 300 cm uncertain; size at birth 56 to 75 cm; males maturing at 131 to 178 cm and females 144 to 183 cm.

Habitat, biology, and fisheries: A coastal species usually found over sandy or muddy bottoms, including the intertidal; often coming near estuaries but sometimes occurring in oceanic waters; depth from 0 to 280 m on the uppermost slope. Number of young 1 to 14 per litter; pupping grounds and nursery areas occur in shallow inshore waters. Feeds mainly on bottom-dwelling animals, including flatfishes, rays, crabs and snails; also on schooling fishes and squids. This is a popular shark for public display in large aquaria worldwide, as it is hardy

and impressive and not too large, but to the writer's knowledge does not figure in ecotouristic diving and has not bitten people. Separate statistics are not reported for this species in the area or elsewhere except for the western Atlantic. An important fisheries species in most places where it occurs; caught with longlines, hook-and-line, and set bottom gillnets. It is also fished with rod-and-reel by sports anglers as a game fish in other areas. It is utilized smoked and dried-salted and probably fresh for human consumption; the hides are prized for leather and other products; the fins are of high value for sharkfin soup; and the liver is extracted for oil (rich in vitamin A). The sandbar shark is highly vulnerable to overexploitation because of its highly valuable meat and fins, slow maturation time, low fecundity, inshore pupping and nursery grounds that are subject to fishing and habitat degradation, and long life. The species is protected off the east coast of the United States after a catastrophic decline from overfishing. Listed on the IUCN Red List as Vulnerable worldwide but Lower Risk/Conservation Dependent in the United States where it is under strict protection. Its status is uncertain in the area but needs investigation because of intensive inshore fisheries of long duration.

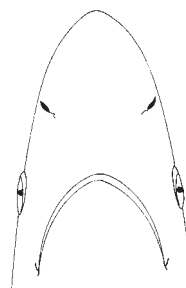
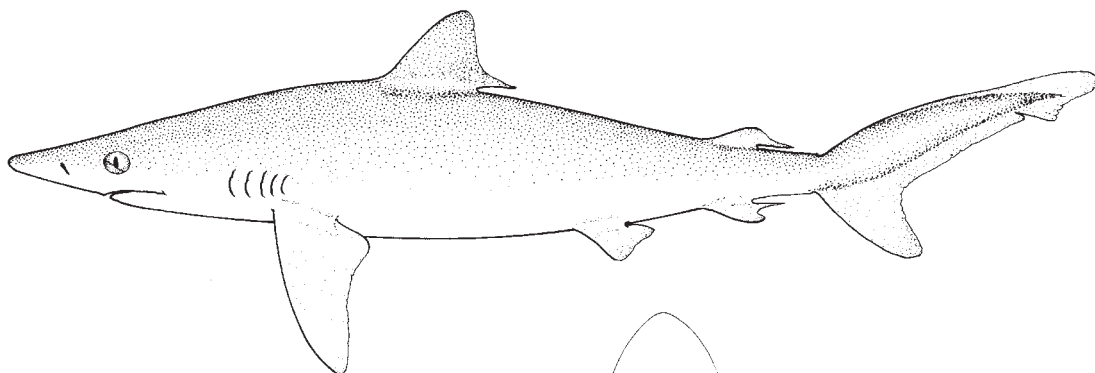
Distribution: Wide-ranging in coastal waters of most tropical to warm-temperate seas, but possibly absent from the eastern Pacific. In the area records of this species are sporadic but from off Morocco, Madeira, the Canary Islands, Senegal, Cape Verde Islands, the Gulf of Guinea, and Congo; possibly more wide-ranging in the area but with status uncertain from Angola and Namibia and apparently absent from the west and southwest coast of South Africa. Northward it extends to Portugal and possibly Spain and throughout the Mediterranean Sea. Also present in the western Atlantic from southern New England to southern Brazil, the western Indian Ocean off East and South Africa (eastern Cape and KwaZulu-Natal), in the western Pacific and the East China Sea, around the Hawaiian Islands, and possibly off the Galapagos Islands.



***Carcharhinus signatus* (Poey, 1868)**

Frequent synonyms / misidentifications: *Hypoprion signatus* (Poey, 1868); *H. bigelowi* Cadenat, 1956 / *Carcharhinus falciformis* (Bibron in Müller and Henle, 1841).

FAO names: **En** – Night shark; **Fr** – Requin de nuit; **Sp** – Tiburón de noche.



ventral view of head



upper and lower teeth

Diagnostic characters: Body fusiform and rather stout. **Snout noticeably elongated, preoral length 170 to 190% of internarial width, narrow and pointed;** nostrils with a short, narrow-based anterior nasal flap; **labial folds very short; eyes relatively large,** internal nictitating lower eyelids present; spiracles absent; gill slits relatively short, height of third gill slit about 2.7 to 3.3% of total length; gill arches without papillae. **Teeth with smooth-edged or weakly serrated cusps, those in upper jaw increasingly oblique toward sides, their bases with 2 to several very prominent cusplets or strong serrations; teeth in lower jaw narrow, nearly erect and without denticulations at their bases;** anteroposterior tooth row counts 15 to 16/14 to 16 on each side, total tooth row counts 31 to 34/29 to 32. **First dorsal fin relatively low,** height 6.4 to 8.4% of total length; first dorsal fin with a shallowly convex anterior margin, a narrowly rounded apex, an origin over or slightly behind free rear tips of pectoral fins, and the midlength of its base much closer to the pectoral-fin insertions than the pelvic-fin origins; **second dorsal fin very low** and much smaller than first dorsal fin, height 1.6 to 1.9% of total length; second dorsal fin with a shallowly concave or nearly straight posterior margin, an origin about opposite origin of anal fin, an elongated free rear tip, and an inner margin 100 to 200% of fin height; anal fin with a deeply notched posterior margin and without long preanal ridges; pectoral fins long, narrow, slightly falcate and with pointed to narrowly rounded tips. **A low interdorsal ridge present between dorsal fins;** no keels on caudal peduncle. Precaudal vertebral centra 101 to 104, total vertebral centra 184 to 192. **Colour:** back greyish blue with some scattered black spots; belly greyish white; eyes green; lining of mouth white.

Size: Maximum total length about 280 cm; size at birth about 60 to 72 cm: males maturing between about 160 to 190 cm, and females maturing between about 159 and 194 cm.

Habitat, biology, and fisheries: A deepwater semi-oceanic species, usually found below 275 to 366 m in the day and rising to about 183 m at night, rarely occurring above 160 m. Number of young 4 to 18 per litter. Feeds on fishes, squids and shrimps. Separate statistics are not reported for this species in the area or elsewhere. Caught mainly with floating longlines, only at night, in targeted or bycatch fisheries; also by sports anglers in the western North Atlantic fishing in deep water with rod-and-reel. The flesh is consumed fresh, the liver used for oil, and carcasses processed for fishmeal; fins are small but presumably marketed. The conservation

status of this shark is problematical, as it declined catastrophically in the western Atlantic over the past 3 decades. Listed as Vulnerable worldwide (Atlantic) and Data Deficient in the present area by the IUCN Red List but Vulnerable is likely for the area due to unregulated offshore fisheries of long duration.

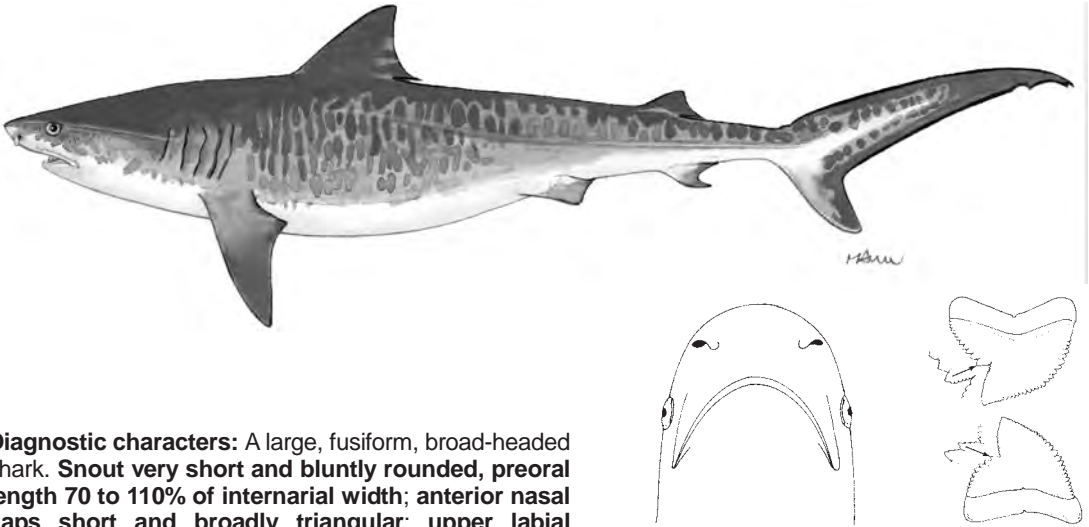
Distribution: Restricted to the Atlantic Ocean and with a patchy distribution within the eastern central Atlantic from Senegal, Cape Verde Islands, Guinea, Côte d'Ivoire, Benin, Congo, northern Angola and northern Namibia, but likely more wide-ranging or formerly so; also from the western Atlantic coast of the United States south to Brazil and Argentina.



***Galeocerdo cuvier* (Péron and Lesueur in Lesueur, 1822)^{4/}**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Tiger shark; Fr – Requin tigre commun; Sp – Tintorera tigre.



Diagnostic characters: A large, fusiform, broad-headed shark. **Snout very short and bluntly rounded, preoral length 70 to 110% of internarial width; anterior nasal flaps short and broadly triangular; upper labial furrows about as long as snout, reaching to front of eyes; eyes large, with internal nictitating lower eyelids; spiracles present, these small, slit-like, and conspicuous; gill slits moderately long, height of third gill slit about 2.9 to 3.4% of total length; gill arches without papillae. Teeth coarsely serrated and with strong distal cusplets, their outer edges deeply notched and the tips directed obliquely outward, and their inner edges broadly convex; anteroposterior tooth row counts 9 to 12/8 to 11 on each side, total tooth row counts 18 to 26/18 to 25. First dorsal fin moderately high, height 6.4 to 9.1% of total length; first dorsal fin with a broadly convex anterior margin, an angular or narrowly rounded apex, an origin over the pectoral-fin insertions or inner margins, and the midlength of its base much closer to the pectoral-fin insertions than to the pelvic-fin origins; second dorsal fin high although much smaller than first dorsal fin, height 1.9 to 3.8% of total length; second dorsal fin with a shallowly concave or sometimes nearly straight posterior margin, an origin slightly anterior to origin of anal fin, a moderately elongated free rear tip, and an inner margin somewhat less than 200% of its height; anal fin with a deeply notched posterior margin and without long preanal ridges; pectoral fins moderately large, broad and falcate and with pointed or narrowly rounded tips. A strong interdorsal ridge present between dorsal fins; a low rounded lateral keel present on each side of caudal peduncle. Precaudal vertebral centra 100 to 112, total vertebral centra 216 to 234. **Colour:** back dark grey or greyish brown with **dark brown or black rectangular vertical bars and spots on sides and fins**, conspicuous in young but fading with growth and obscure in adults.**

ventral view of head

upper and lower teeth

Size: Maximum total length at least 550 cm and possibly to 740 cm; common to 400 cm; size at birth between 68 and 85 cm; males mature between 226 and 290 cm and females between 250 and 350 cm.

Habitat, biology, and fisheries: Inhabits coastal as well as offshore waters, near the surface and bottom, on the continental and insular shelves and semi-oceanic over the continental slopes. Depth range 0 to at least 200 m. Often found in shallow waters close inshore, including river estuaries and the intertidal. Possibly lacks a placenta but prolific with 10 to 82 young per litter, gestation period possibly a year. This is an apical predator

^{4/} Name sometimes emended to *Galeocerdo cuvieri*.

feeding on many species of bony fishes, other sharks, batoids, marine mammals, turtles, seabirds, sea snakes, squids, conchs and crabs. May swallow a variety of indigestible and non-nutritive items, and readily feeds on carrion including dead whales. It has been regarded as a risk to people in the water because of its occurrence in shallow water, large size, large jaws and teeth, and broad prey spectrum. There are several instances of it having bitten people but it has rarely caused fatalities. It is generally docile when encountered by divers and has become a popular subject of ecotouristic diving in Australia, Mexico, South Africa and Mozambique (but apparently not in the area). A few large public aquaria keep these spectacular sharks for public viewing but they are too large and active for most facilities. Separate statistics are not reported for this species in the area and little data is available elsewhere (80 tonnes total catch from the western Atlantic and eastern North Atlantic by four countries). It is targeted in Guinea-Bissau and Gabon. This shark is utilized for its hide, fins, liver oil (with high Vitamin A content), and meat (utilized dried-salted in some places), while offal is made into fishmeal. Its conservation status is poorly known worldwide, but is of concern because of its biological characteristics, exposure to fisheries wherever it occurs, fishing activity on nursery areas, and possible declines outside the area. Ranked as Lower Risk/Near Threatened worldwide by the IUCN Red List, but probably requires higher ranking in some places where it has declined from human-induced problems.

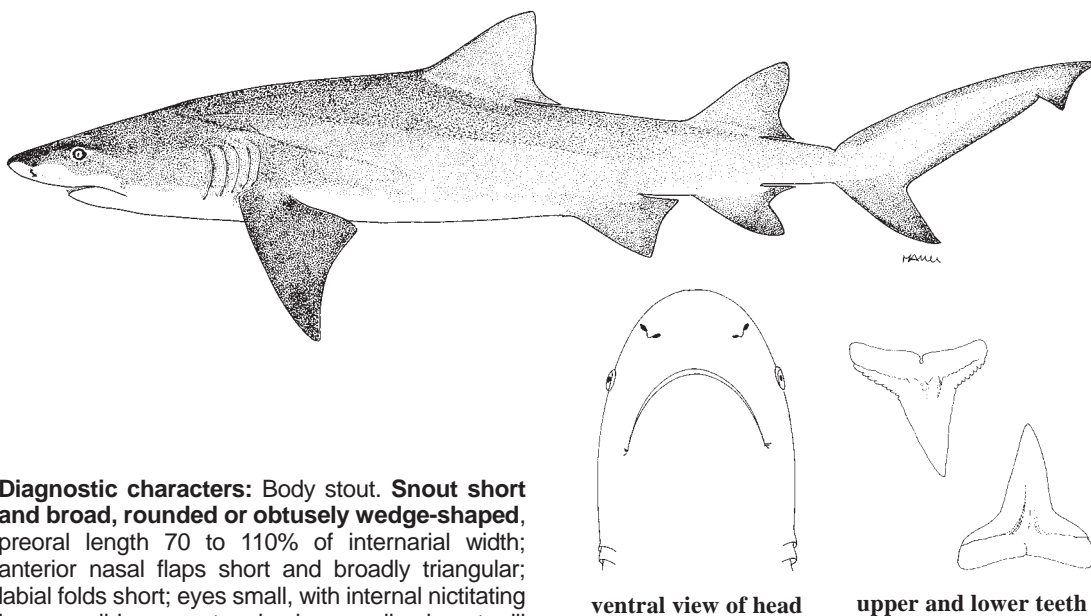
Distribution: Circumglobal in most tropical seas, with seasonal migrations into warm-temperate and temperate seas; it disappears from subtropical latitudes during winter. Its known distribution is spotty in the area, with records from Morocco, possibly Madeira, the Canary Islands, Senegal, Gambia, Cape Verde Islands, Guinea, Côte d'Ivoire, Ghana, Congo, and possibly Angola but probably is or was more widespread. Elsewhere in the eastern Atlantic it occurs off the Azores, off Iceland and Great Britain, and in the Mediterranean Sea.



***Negaprion brevirostris* (Poey, 1868)**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Lemon shark; Fr – Requin citron; Sp – Tiburón galano.



Diagnostic characters: Body stout. **Snout short and broad, rounded or obtusely wedge-shaped**, preoral length 70 to 110% of internarial width; anterior nasal flaps short and broadly triangular; labial folds short; eyes small, with internal nictitating lower eyelids present; spiracles usually absent; gill slits moderately long, height of third gill slit about 3.4 to 4.1% of total length; inner gill arches without gillraker papillae.

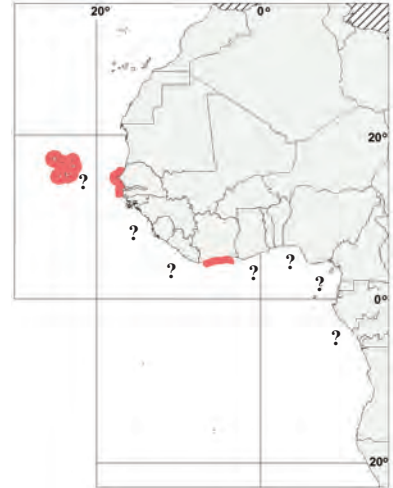
Teeth narrow, their cusps smooth-edged, erect in anterior part of jaws, but becoming progressively oblique toward the sides; serrations present on bases of upper teeth; anteroposterior tooth row counts 15/14 to 15 on each side, total tooth row counts 30 to 33/29 to 33. First dorsal fin moderately high, height 6.6 to 8.9% of total length; first dorsal fin with a narrowly rounded apex, an origin behind pectoral-fin free rear tips, and the midlength of its base closer to the pelvic-fin origins than the pectoral-fin insertions; **second dorsal fin nearly as large as first dorsal fin**, height 5.4 to 8.0% of total length; second dorsal fin with a shallowly to deeply concave posterior margin, an origin somewhat anterior to anal-fin origin, a slightly attenuated free rear tip, and an inner margin less than fin height; anal fin with a deeply notched posterior margin and without long preanal ridges; pectoral fins moderately large, broad, and falcate. **No interdorsal ridge between dorsal fins;** no keels on caudal peduncle. Precaudal vertebral centra 117 to 121, total vertebral centra 197 to 206. **Colour:** olive grey or yellowish brown, but often darker; belly yellowish or whitish.

Size: Maximum total length to about 340 cm; common to 240 cm, most individuals under 300 cm; size at birth 60 to 65 cm; males maturing at about 224 cm and females at about 239 cm.

Habitat, biology, and fisheries: A sluggish demersal shark found in coastal waters from the intertidal down to at least 92 m, occasionally present in the open ocean near the surface over the continental slopes. Occasionally enters river mouths, but apparently not as commonly as the bull shark and never penetrates far inland. Feeds mainly on bony fishes (catfish, mullets, mojarras) and rays; also on crabs, shrimps and carrion. Number of young 4 to 17 per litter, gestation period about 10 to 12 months; nursery areas occur in shallow coastal lagoons and shallow waters along mangrove islands. The lemon shark occasionally bites people and boats and may defend itself vigorously when harassed. This species is rare in the area but common in the western Atlantic where it is an important ecotouristic dive shark in the Bahamas, and is kept in many public aquaria in the United States and also in Europe. Fished in most of its range including off Senegal in the shark

fishery. It is used for human consumption as meat and vitamin oil, and fins for soup. It is processed for fishmeal, cut up for crab bait, and its hides processed into leather. Separate statistics are not reported for this species. Its conservation status is uncertain in the area but its lengthy maturation, small litters, inshore habitat with proximity to human activities, poor monitoring of numbers, and presence in fisheries catches throughout its range should be cause for concern. The IUCN Red List ranks it as Lower Risk/Near Threatened worldwide (Atlantic and eastern Pacific). Its seeming rarity in the present area and long-term fisheries and possible habitat problems may make it locally Vulnerable.

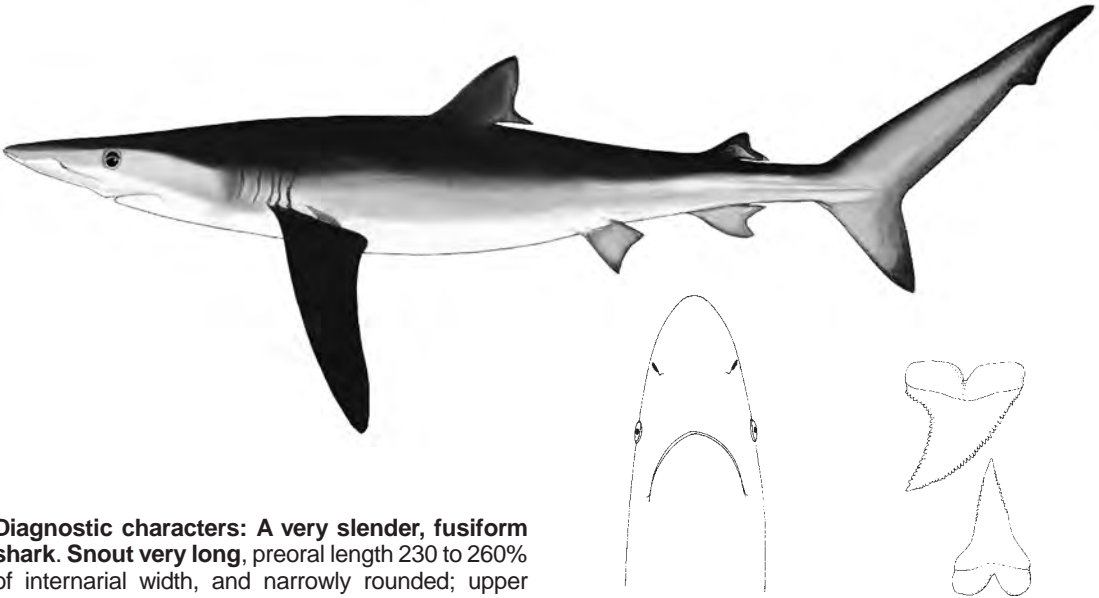
Distribution: Confined to the tropical and warm-temperate Atlantic and possibly the eastern Pacific. Within the area, it has been reported from Senegal, Guinea-Bissau, Cape Verde Islands, and Côte d'Ivoire, but possibly is more wide-ranging. Elsewhere, occurs in the western Atlantic from New Jersey to Brazil and in the eastern Pacific from Mexico to Ecuador.



Prionace glauca (Linnaeus, 1758)

Frequent synonyms / misidentifications: None / None.

FAO names: En – Blue shark; Fr – Peau bleue; Sp – Tiburón azul.



Diagnostic characters: A very slender, fusiform shark. Snout very long, preoral length 230 to 260% of internarial width, and narrowly rounded; upper labial furrows very short; **eyes large**, with internal nictitating lower eyelids present; spiracles absent; gill slits moderately long, height of third gill slit about 2.9 to 3.4% of total length; **inner gill arches with gillraker papillae** (visible through open mouth). Teeth serrated, **broadly triangular and curved in upper jaw**, narrower in lower jaw; **upper medial tooth very large**, nearly the size of teeth on either side of it (but sometimes absent); anteroposterior tooth row counts 12 to 15/12 to 13 on each side, total tooth row counts 27 to 30/27 to 30. **First dorsal fin low**, height 5.6 to 7.6% of total length; first dorsal fin with a convex anterior margin, a narrowly rounded apex, an origin well posterior to free rear tips of pectoral fins, **and the midlength of its base closer to the pelvic-fin origins than the pectoral-fin insertions**; second dorsal fin relatively high but much smaller than first dorsal fin, height 2.1 to 3.1% of total length; second dorsal fin with a shallowly concave posterior margin, an origin slightly posterior to anal-fin origin, an attenuated free rear tip, and its inner margin between 100 and 150% of fin height; anal fin with a deeply notched posterior margin and without long preanal ridges; **pectoral fins very long, narrow and somewhat falcate, with narrowly rounded tips**. **No interdorsal ridge between dorsal fins; a weak keel present on each side of caudal peduncle**. Precaudal vertebral centra 142 to 151, total vertebral centra 237 to 252. **Colour:** in life, **dark blue above, bright blue on sides**, white below, fading to purple blackish after death, tips of pectoral and anal fins dusky.

ventral view of head

upper and lower teeth

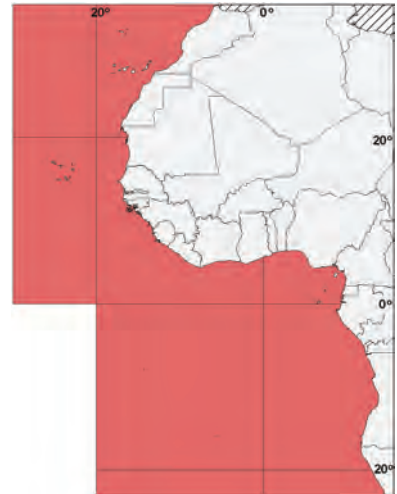
Size: Maximum total length to about 380 cm, though larger specimens up to 4.8 to 6.5 m long are mentioned on poor evidence in the earlier literature; most specimens are below 335 cm; size at birth about 34 to 48 cm; males maturing between 182 and 218 cm, females maturing between 166 and 221 cm.

Habitat, biology, and fisheries: A slow-cruising, very common oceanic shark capable of bursts of speed when excited. Usually well offshore and in the open sea near or at the surface, but sometimes penetrating coastal waters; depth range 0 to more than 476 m. Number of young per litter highly variable, 1 to 135, but usually over 20; gestation period about a year. Feeds on a wide variety of bony fishes, small sharks, squids, pelagic crustaceans and occasionally sea birds and carrion. Uncommonly bites people, but often timid around divers when not baited. Blue sharks are the subject of ecotouristic diving elsewhere, particularly in the United States and off South Africa. Usually caught with pelagic longlines but also other gear including hook-and-line,

Habitat, biology, and fisheries: A slow-cruising, very common oceanic shark capable of bursts of speed when excited. Usually well offshore and in the open sea near or at the surface, but sometimes penetrating coastal waters; depth range 0 to more than 476 m. Number of young per litter highly variable, 1 to 135, but usually over 20; gestation period about a year. Feeds on a wide variety of bony fishes, small sharks, squids, pelagic crustaceans and occasionally sea birds and carrion. Uncommonly bites people, but often timid around divers when not baited. Blue sharks are the subject of ecotouristic diving elsewhere, particularly in the United States and off South Africa. Usually caught with pelagic longlines but also other gear including hook-and-line,

pelagic trawls, and occasionally bottom trawls. Its meat easily spoils unless properly bled and refrigerated, but it is marketed fresh and also smoked and dried-salted for human consumption. Its hides are used for leather; fins for sharkfin soup base; liver for vitamin oil, and offal for fishmeal. This shark is considered a game fish and is taken in large numbers by sports anglers with rod-and-reel, particularly in the United States. Enormous numbers of blue sharks are caught as mostly bycatch of high-seas longline fisheries worldwide and used primarily for the fin trade (of which it is the mainstay of oceanic sharks), but these are for the most part not reported to FAO which recorded only 14 510 tonnes of blue sharks worldwide in 2004 (estimated at 290 200 individuals if each individual weighed 50 kg) from only 15 countries (Benin, Brazil, Canada, the Channel Islands, Chile, Denmark, France, Liberia, Namibia, New Zealand, Portugal, South Africa, Spain, and the United Kingdom). FAO fisheries statistics for blue sharks are currently mostly reported from the present area by Benin, Liberia, Namibia, Portugal, Spain, and South Africa with total catches of 11 168 tonnes reported for 2004 of which Spain reported 9 955 tonnes or most of the area catch and over half of the world total reported to FAO. The International Commission for Conservation of Atlantic Tuna (ICCAT) reported 18 814 tonnes of blue shark as bycatch of Atlantic tuna fisheries in 2005. This species is one of the most abundant large marine vertebrates, but massive and wide-ranging oceanic bycatch fisheries and new, expanding targeted fisheries threaten it as with other large oceanic sharks caught by the same fisheries. It is ranked as Lower Risk/Near Threatened worldwide on the IUCN Red List. The Red List compilers estimated the annual blue shark catch as 10 to 20 million individuals (or 50 000 to 100 000 tonnes per year if each individual weighed 50 kg). The writer attended a recent (2007) IUCN workshop on pelagic sharks where it was suggested that the blue shark, despite the immense fisheries decimating it, was 'extinction proof' and could not be listed as Vulnerable because of its sheer numbers and relatively high fecundity for a shark. With the extinction of the passenger pigeon (with an estimated population of 3 to 5 billion individuals before settlement of North America) in mind, the writer suspects that the blue shark might not fare any better and needs international regulation of pelagic fisheries to ensure its survival.

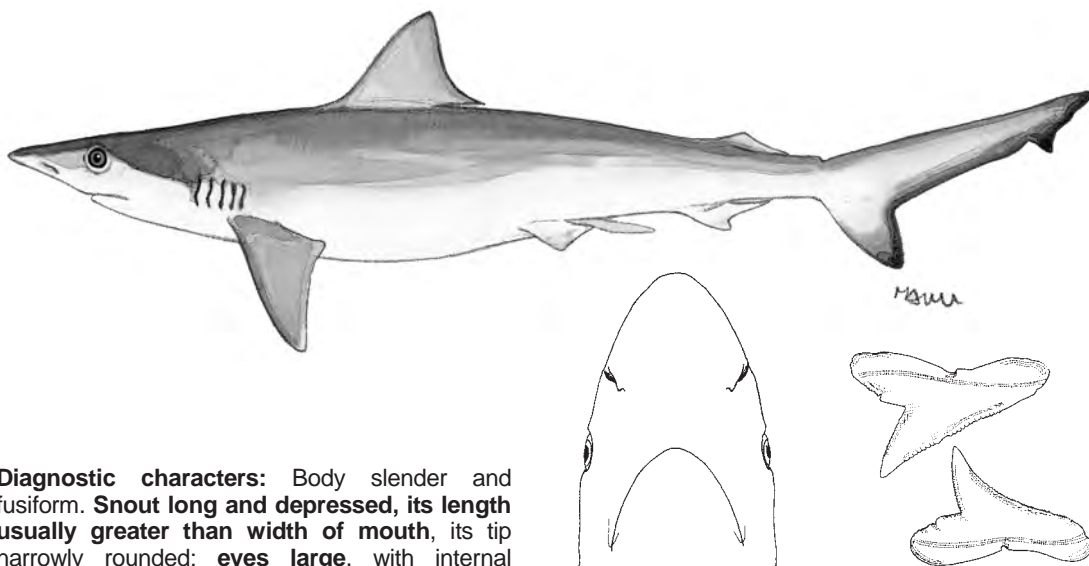
Distribution: The blue shark is among the most wide-ranging of cartilaginous fishes, and is circumglobal in all tropical and temperate seas, but tends to be commoner or at least more frequently recorded in temperate waters. It probably occurs throughout the eastern central Atlantic area, and in the eastern Atlantic extends northward to the Azores and Norway and southward to the west coast of South Africa. Details of its distribution in the area are sketchy in the area as elsewhere, but it is specifically reported from off Madeira, the Canary Islands, western Sahara, Mauritania, Côte d'Ivoire, southern Angola, and Namibia.



***Rhizoprionodon acutus* (Rüppell, 1837)**

Frequent synonyms / misidentifications: None / *Rhizoprionodon terraenovae* (Richardson, 1837).

FAO names: En – Milk shark; Fr – Requin à museau pointu; Sp – Cazón lechoso.



Diagnostic characters: Body slender and fusiform. Snout long and depressed, its length usually greater than width of mouth, its tip narrowly rounded; eyes large, with internal nictitating lower eyelids present; spiracles absent; gill slits short, gill arches without papillae; labial furrows well-developed and moderately long, the upper ones about equal in length to eye diameter and ending well behind eyes; teeth similar in both jaws, low-crowned, oblique and narrow-cusped, with the outer edges deeply notched and without cusplets, smooth-edged in young but often finely serrated in adults; anteroposterior tooth row counts 11/11 to 13/13 (usually 12/12) on each side, total tooth row counts 23 to 27/22 to 26 (usually 25/24). First dorsal fin moderately high, with a narrowly rounded apex, origin over or posterior to free rear tips of pectoral fins, free rear tip in front of pelvic fin origins, base closer to pectoral bases than pelvic bases; second dorsal fin very low, with posterior margin weakly concave, much smaller than first dorsal fin and smaller than anal fin, second dorsal-fin origin far posterior to midlength of anal-fin base and just anterior to anal-fin insertion; anal fin with a pair of long preanal ridges and a shallowly concave but not deeply notched posterior margin; pectoral fins relatively short, broad and weakly falcate, reaching to somewhat anterior to midpoint of first dorsal-fin base when appressed to body. A low interdorsal ridge present between dorsal fins; no keels on caudal peduncle. Precaudal vertebral centra 55 to 79, total vertebral centra 121 to 162. **Colour:** grey or grey-brown above, white below, dorsal and anal fins with dusky or blackish edges, fins slightly darker than back.

ventral view of head

upper and lower teeth

Size: Maximum total length exceptionally to 178 cm, but most adults smaller, less than 110 cm long. Size at birth between 25 and 39 cm; males maturing at about 68 to 72 cm and reaching 178 cm; females maturing at about 70 to 81 cm and reaching 165 cm.

Habitat, biology, and fisheries: An abundant, small, inshore shark of coastal tropical continental waters, ranging from the surfline and the intertidal down to at least 200 m. Often found off sandy beaches and sometimes in estuaries, but does not tolerate low salinities and does not range into fresh water. Number of young 2 to 8 in a litter, gestation period about one year. Feeds on a wide variety of small bony fishes, also squid, octopuses, cuttlefish, sea snails, crabs, and shrimps. Probably one of the most common small inshore sharks where it occurs, and often eaten by other larger sharks. Not kept in aquaria as far as known, and not

viewed by ecotouristic divers; but other species of *Rhizoprionodon* are aquarium subjects in the United States and dive subjects in the Bahamas. Probably caught in the region close inshore and also offshore. Separate statistics are not reported for this species. Caught on hook-and-line and in bottom trawls. Utilized for food (fresh and dried-salted); also for fishmeal. Its fins are small but the writer has seen small fins utilized in Far East markets, so it could figure in the fin trade in the area. Ranked as Least Concern worldwide by the IUCN Red List, protected off Australia. Conservation status in the area unknown but of concern because of intense inshore fisheries and habitat degradation.

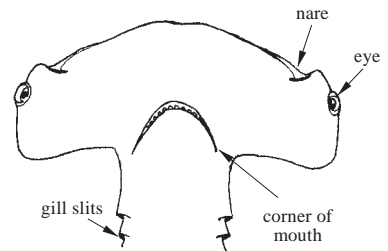
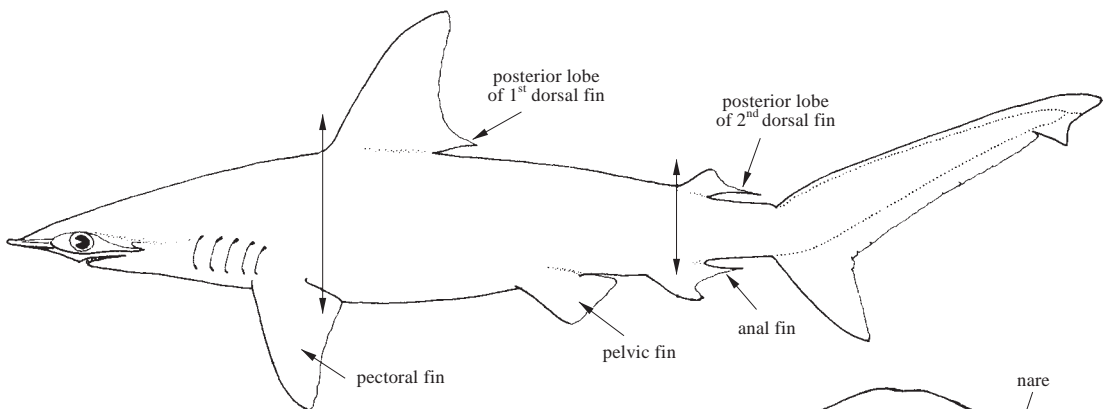
Distribution: In the area found from Madeira and Mauritania southward to Angola; elsewhere in the Mediterranean Sea and the Indo-West Pacific from South Africa and the Red Sea to Japan and Australia.



SPHYRNIDAE

Hammerhead and bonnethead sharks

Diagnostic characters: Small- to large-sized sharks (adults 67 to over 610 cm total length). Body elongate and moderately slender, cylindrical or somewhat compressed. **Anterior portion of head much flattened dorsoventrally and widely expanded laterally in “hammer” form, with the eyes at its outer edges; eyes with well-developed internal nictitating lower eyelids;** anterolateral teeth blade-like, with a single cusp and no cusplets; posterior teeth similar to anterolateral teeth in species occurring in the area. Two dorsal fins, **the first dorsal fin high and pointed, its base much shorter than caudal fin and wholly anterior to origins of pelvic fins; second dorsal and anal fins much smaller than the first dorsal fin** and either equal-sized or with the anal fin somewhat larger than the second dorsal fin; caudal fin much less than half of total length and strongly asymmetrical, with an undulated dorsal-caudal margin, a well-marked subterminal notch, and a small, but well-defined ventral lobe. Caudal peduncle slightly compressed, not strongly flattened dorsoventrally or widely expanded laterally, without lateral keels but with **upper and lower precaudal pits present. Intestine with a scroll valve. Colour:** back predominantly grey or brassy, sometimes yellow or very dark grey, no prominent markings except dark fin tips in young of some species; underside white or light grey.



ventral view of head

Habitat, biology, and fisheries: Hammerhead sharks inhabit all tropical and warm-temperate seas, from the surface, surf-line and intertidal zone down to at least 275 m in waters near continents, continental islands, and oceanic islands. Juveniles of the large species found in the area are coastal off continents and islands, while adults are primarily semi-oceanic although they often approach the coasts and are found inshore in search of food. All species are viviparous (placental viviparous, with a yolk-sac placenta), and have 4 to 42 young per litter. Hammerheads feed on a wide variety of bony fishes, sharks, batoids including stingrays, cephalopods (squids, octopuses and cuttlefishes), gastropods, bivalves, and crustaceans (shrimps, mantis shrimps, brachyurid crabs, lobsters, barnacles and isopods), but apparently don't feed on marine mammals or other very large marine vertebrates or regularly scavenge on mammalian meat. Hammerhead sharks are important for fisheries in the area and are used as food and also for the preparation of various subproducts, including Vitamin A from the liver and fins for the Oriental fin soup market. Countries which currently report hammerhead catches in the area include Benin, Guinea-Bissau, Republic of Congo, Liberia, Portugal and Spain (1 716 tonnes total in 2004). The conservation status of hammerheads is of concern because of heavy bycatch and targeted fisheries that catch them wherever they occur (including fisheries on their nursery grounds which may be decimating the young), the high and increasing value of their fins (particularly from the three large species), their vulnerability to gillnets because of their head-shape (which helps to snare them in net-meshes), the high activity level of certain large species which means that they perish quickly when caught in nets or on longlines, and often poor or nonexistent species-specific data for most species or even family-specific fisheries statistics for most countries in the area. Catches of large hammerheads (*Sphyrna*

lewini, *S. mokarran*) have declined markedly in some areas and need regulation. A few species of hammerheads have been reported to occasionally bite people, but large species are generally timid when approached by divers. Hammerheads (particularly *Sphyrna lewini* and *S. mokarran*) are popular subjects for ecotouristic diving worldwide and a few species are kept in public aquaria for display.

Similar families occurring in the area

No other shark family has the characteristic hammer- or shovel-shaped head of the Sphyrnidae. Hammerheads are most closely similar to the Carcharhinidae, and are derived from a subgroup of that family.

Key to species occurring in the area

- 1a. Anterior margin of head nearly straight in adults, moderately convex in young; prenarial grooves hardly developed; teeth strongly serrated at all sizes; first dorsal fin markedly falcate; second dorsal about a third as high as first dorsal fin, with a short inner margin; posterior margins of second dorsal and pelvic fins deeply concave (Fig. 1) ***Sphyrna mokarran***
- 1b. Anterior margin of head moderately convex in adults, strongly so in young; prenarial grooves well developed; teeth smooth in young, weakly serrated in large individuals; first dorsal fin erect or slightly falcate; second dorsal less than a third the height of first dorsal fin, with a long inner margin; posterior margins of second dorsal and pelvic fins slightly concave to nearly straight → 2
- 2a. Median indentation present on anterior margin of head; free rear tip of second dorsal fin nearly reaching upper caudal-fin origin; anal-fin base noticeably larger than that of second dorsal fin (Fig. 2) ***Sphyrna lewini***
- 2b. Median indentation absent from anterior margin of head; free rear tip of second dorsal fin well ahead of upper caudal-fin origin; anal-fin base about as large as that of second dorsal fin (Fig. 3) ***Sphyrna zygaena***

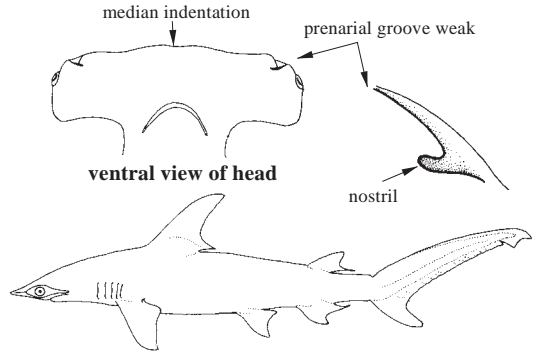


Fig. 1 *Sphyrna mokarran*

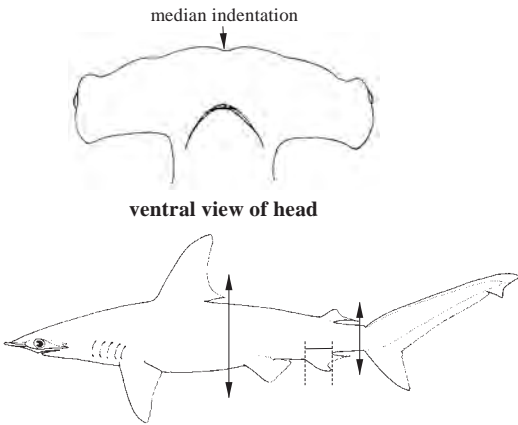


Fig. 2 *Sphyrna lewini*

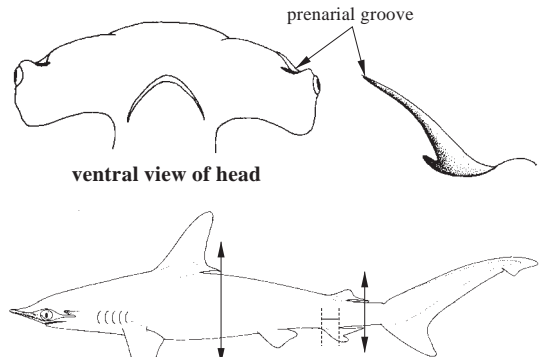




Fig. 3 *Sphyrna zygaena*

List of species occurring in the area^{1/}

The symbol  is given when species accounts are included.

 *Sphyrna lewini* (Griffith and Smith, in Cuvier, Griffith and Smith, 1834).^{2/}

 *Sphyrna mokarran* (Rüppell, 1837).

 *Sphyrna zygaena* (Linnaeus, 1758).

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^{1/} *Sphyrna tudes* (Valenciennes, 1822) was included in the area in the previous version of this review (Compagno, 1981) but records from the area are uncertain. One of two syntypes of *S. tudes* was recorded from Nice, France in the Mediterranean Sea where it has not been recently collected and recorded by contemporary authors and may be either extremely rare or possible the Nice syntype has incorrect locality data. The other syntype is from Cayenne, French Guiana on the western central Atlantic and Caribbean coasts of South America where the species is or was relatively common and has been the subject of commercial fisheries (Compagno, 2002).

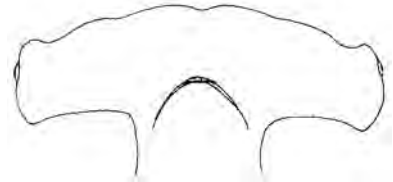
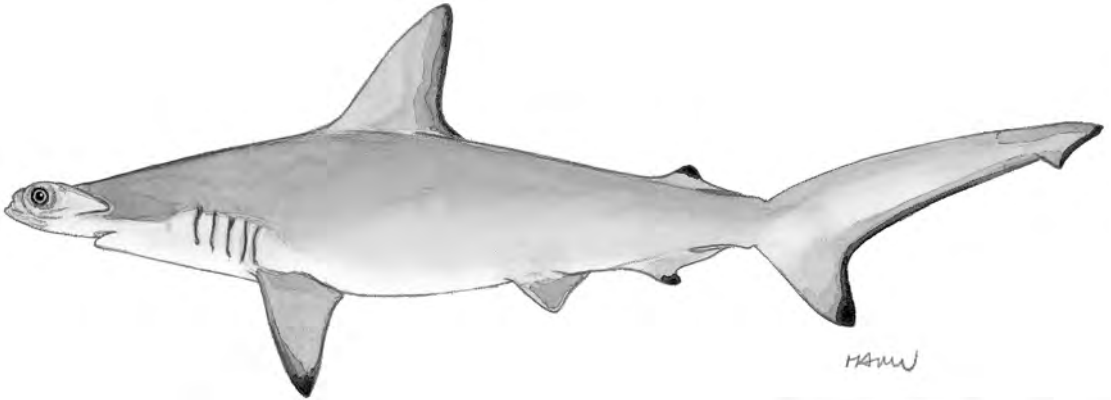
^{2/} *Sphyrna couardi* Cadenat, 1951 was distinguished as a poorly-known large species (to 3 m) of hammerhead that was said to be confined to the area off Senegal, Guinea and Gabon. *S. couardi* unfortunately most resembled *S. lewini* except for light-edged fins. Gilbert (1967a,b), Cadenat & Blache (1981) and Compagno (1981, 1984) tentatively recognized *S. couardi*, but McEachran & Seret (1987) synonymised it with *S. lewini*, which is followed here. Compagno (1988) considered it a species dubium because of its poor description without type material.

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Sphyrna lewini (Griffith and Smith, *in* Cuvier, Griffith and Smith, 1834)

Frequent synonyms / misidentifications: *Sphyrna diplana* Springer, 1941; *S. couardi* Cadenat, 1951 / *Sphyrna mokarran* (Rüppell, 1837); *S. zygaena* (Linnaeus, 1758).

FAO names: En – Scalloped hammerhead; Fr – Requin-marteau halicorne; Sp – Cornuda común.



Diagnostic characters: Body elongate and laterally compressed. Head “hammer”-shaped, its anterior contour broadly arched in young, but moderately arched in adults, with a shallow but distinct indentation at the midline and a deep rounded depression opposite each nostril; lateral expansions of head very prominent, broad transversely and narrow from front to back; eyes large, their horizontal diameter almost equal to length of shortest (fifth) gill slit, posterior margins of eyes slightly posterior to or nearly opposite front of mouth; nostrils with strong prenarial grooves anterior and medial to their incurrent apertures; mouth broadly arched, with small labial furrows on lower jaw only; corners of mouth about opposite outer corners of head; teeth triangular, deeply notched posteriorly, usually with smooth-edged cusps (sometimes slightly serrate in large individuals), mostly cuspidate. Fifth gill slit shorter than the four preceding ones, and located posterior to pectoral-fin origins. Pectoral fins short, broad and slightly falcate, their posterior margins weakly concave; pelvic fins with a nearly straight posterior margin. First dorsal fin high and moderately falcate, with its origin above or just behind level of pectoral-fin insertions, its free rear tip not very slender and ending well anterior to pelvic-fin origins, and its inner margin about one third the length of the fin base; free rear tip of first dorsal fin well anterior to pelvic-fin origins; second dorsal fin small, less than 0.25 of the height of first dorsal fin, with a greatly elongated free rear tip extending backward nearly to upper precaudal pit, inner margin about twice as long as anterior margin, and a shallowly concave posterior margin; anal fin strongly falcate, its base rather short and 1.3 to 1.6 times second dorsal base and its posterior margin deeply notched. **Colour:** uniform grey, greyish brown or olivaceous above, shading to white below; pectoral fins tipped grey or black below.

Size: Maximum total length at about 4.2 m; commonly to 3.6 m; size at birth between 42 and 55 cm; males maturing at 140 to 165 cm and females at about 212 cm.

Habitat, biology, and fisheries: The most common hammerhead in the area, estuarine and inshore to well offshore and semi-oceanic at or near the surface, with young mostly in coastal waters including estuaries. Depth range from the intertidal and surface to at least 275 m. Individuals solitary, in pairs, or in small to huge schools. A powerful swimmer performing extensive migrations. Viviparous, with a yolk-sac placenta, number of young 15 to 31 per litter. Feeds on pelagic fishes, other sharks and rays, squids, lobsters, shrimps and crabs. Probably the most abundant tropical hammerhead, readily available to inshore artesional and small

commercial fisheries as well as to offshore operations. Caught mostly with pelagic and fixed bottom longlines and drift gillnets, but also pelagic and bottom trawls; the young are easily caught on light longline gear. The meat is utilized fresh, fresh-frozen, dried-salted and smoked for human consumption; the fins are used to prepare shark fin soup base and are of high value, especially from large individuals; the hides are used for leather, the oil for vitamins, and carcasses for fishmeal. Statistics for this species in the area were reported to FAO by Guinea-Bissau and Spain in 2004 (315 tonnes landed), but the writer suspects that most of the hammerhead catch in the area (1 716 tonnes in 2004) consisted of this species because of its abundance in the tropics compared to *S. mokarran* and *S. zygaena*. Its conservation status is of concern because of steep declines due to overfishing in some areas. The IUCN currently lists this species as Lower Risk/Near Threatened on its Red List but this may be optimistic due to fishing pressure worldwide and may change in the near future. Adults are often unaggressive or timid when approached by divers, and are popular subjects for ecotouristic diving worldwide. Small and medium-sized individuals make spectacular aquarium displays, and are kept by public aquaria elsewhere than in the area (seen by the writer in Honshu, Japan and Oahu, Hawaiian Islands).

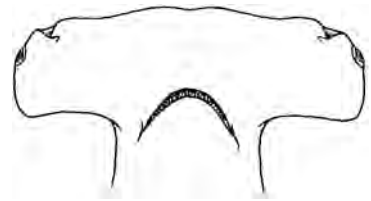
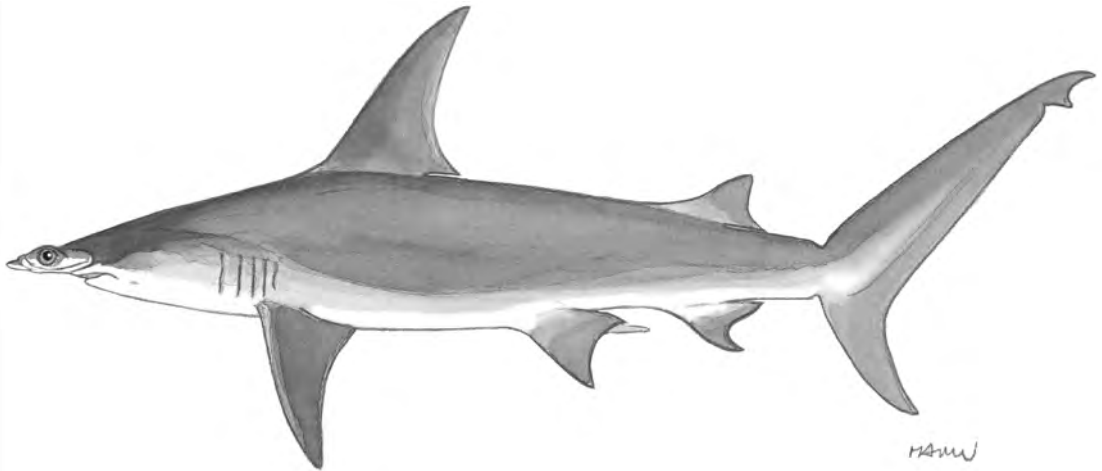
Distribution: A pantropical species occurring in the area from Morocco and the Canary Islands to Senegal, Republic of the Congo, and probably Angola; also in the Mediterranean Sea. The scalloped hammerhead may be the most abundant species of *Sphyrna* in the eastern central Atlantic. The species is essentially circumglobal in coastal warm temperate and tropical seas although recently a separate species has been suggested and not yet named for scalloped hammerheads from the western North Atlantic which have molecular genetic differences from *S. lewini*.



Sphyrna mokarran (Rüppell, 1837)

Frequent synonyms / misidentifications: None / *Sphyrna lewini* (Griffith and Smith, in Cuvier, Griffith and Smith, 1834); *S. zygaena* (Linnaeus, 1758); *S. tudes* (Valenciennes, 1822).

FAO names: En – Great hammerhead; Fr – Grand requin marteau; Sp – Cornuda gigante.



ventral view of head

Diagnostic characters: Body elongate and laterally compressed. Head “hammer”-shaped, **its anterior contour moderately arched in young but nearly straight in adults, with a shallow but distinct indentation at the midline and a shallow rounded depression opposite each nostril; lateral expansions of head very prominent, broad transversely and narrow from front to back; nostrils with weak prenarial grooves; eyes small, their horizontal diameter much less than length of shortest (fifth) gill slit, posterior margins of eyes well anterior to mouth;** mouth broadly arched, with small labial furrows on lower jaw only; corners of mouth about opposite or behind outer corners of head; teeth triangular, deeply notched posteriorly, **with strongly serrated edges and stout cusps. Fifth gill slit shorter than the four preceding ones, and located posterior to pectoral-fin origins.** Pectoral fins short, broad, and **strongly falcate, their posterior margins strongly concave;** pelvic fins with **deeply concave posterior margins.** First dorsal fin very high, strongly falcate, with its origin above or just behind level of pectoral-fin insertions, its free rear tip not very slender and ending well anterior to pelvic-fin origins, and its inner margin less than a third of the fin-base length; second dorsal fin very large and tall for a hammerhead, with a rather short inner margin about equal to the second dorsal anterior margin, a free rear tip ending well anterior to the upper precaudal pit, and a **deeply concave posterior margin;** anal fin strongly falcate, its base about as long as second dorsal base and its posterior margin **deeply notched.** **Colour:** grey or grey-brown above, paler below; fins with dusky tips in young.

Size: Maximum total length to at least 5.5 or 6.0 m, and possibly greater; commonly between 2.4 and 3.7 m; size at birth between 60 and 70 cm; males maturing at about 234 to 269 cm, females at about 250 to 300 cm.

Habitat, biology, and fisheries: A powerful coastal and semi-oceanic species coming close inshore, often on and around coral reefs; also occurring near the surface over deep water not far from land (semioceanic). Depth range from the intertidal and surface to at least 80 m. Viviparous, with a yolk-sac placenta, number of young 18 to 38 per litter. Feeds on a wide variety of bony fishes as well as other sharks, rays, squids, crabs and lobsters. Although less abundant than *Sphyrna lewini*, this species is regularly caught in the tropics, with longlines, other line gear, fixed bottom nets, gillnets, and with pelagic and bottom trawls. Bycatch fisheries

may take young sharks inshore (including nursery areas) and targeted and bycatch fisheries take juveniles and adults wherever they occur. Utilized for its meat, fresh, fresh-frozen, dried-salted and smoked for human consumption; for hides, processed into leather; for fins used for sharkfin soup base, which are highly valuable and are bought for higher prices than those of other hammerheads; for liver oil, processed for vitamins; and carcasses for fishmeal. Separate statistics are not reported to FAO for this species in the area or elsewhere, but catches are probably included in the statistics for Sphyrnidae although likely to be smaller than *Sphyrna lewini* or *S. zygaena*. Its conservation status is of special concern because of its large size, relative unavailability compared to other large hammerheads, extremely high fin value (which promotes 'finning' or removal of fins from the sharks and discarding carcasses at sea), lack of species-specific catch statistics, vulnerability to gillnets, lower fecundity compared to other large hammerheads, and presence as a complementary bycatch (for fins) in major offshore longline fisheries that target tuna and swordfish. The IUCN currently lists this species as Endangered globally based on evidence for dramatic declines, although they may be underestimated due to the rise in illegal, unregulated, and unreported fishing. There is still an urgent need for data collection in this region to assess its status in the eastern central Atlantic. The great hammerhead has been regarded as potentially hazardous to people in the water, but few biting incidents have been reported and its reputation is apparently somewhat exaggerated. It is often docile and not aggressive when confronted by divers and is sought as a spectacular viewing subject by ecotouristic shark divers worldwide.

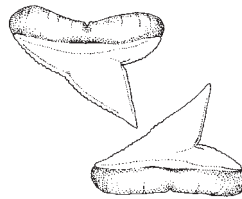
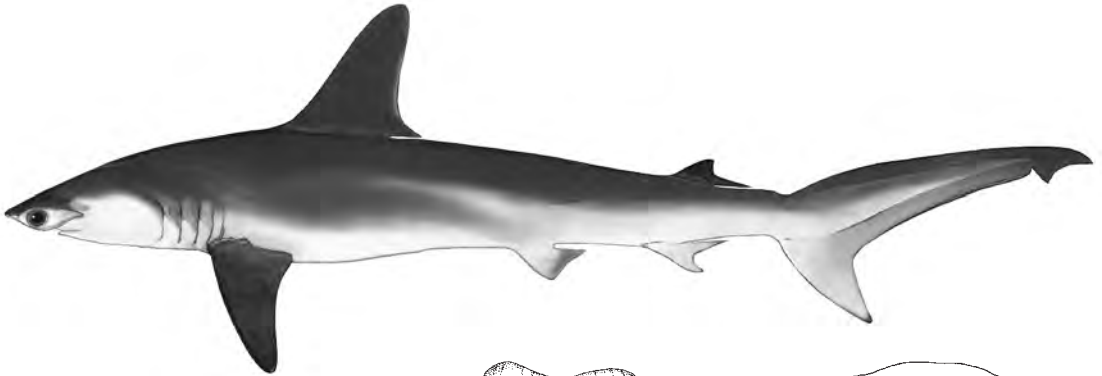
Distribution: A wide-ranging tropical species. In the area it occurs off Morocco, Western Sahara, Mauritania, Senegal, possibly the Canary Islands, Gambia, Cape Verde Islands, Guinea and Ghana, but is probably more widespread; northward extending into the Mediterranean Sea. Essentially circumglobal in coastal and offshore warm temperate and tropical seas, found elsewhere in the Western Atlantic and Indo-Pacific including the east coast of South Africa and Mozambique.



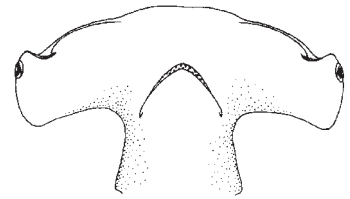
***Sphyrna zygaena* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: None / *Sphyrna lewini* (Griffith and Smith, in Cuvier, Griffiths and Smith, 1834); *S. mokarran* (Rüppell, 1837).

FAO names: **En** – Smooth hammerhead; **Fr** – Requin-marteau commun; **Sp** – Cornuda cruz (=Pez martillo).



upper and lower teeth



ventral view of head

Diagnostic characters: Body elongated and laterally compressed. Head 'hammer'-shaped, its anterior contour strongly arched in young but moderately rounded in adults, without a median indentation but with a deep rounded

depression opposite each nostril; lateral expansions of head very prominent, broad transversely and narrow from front to back; eyes large (their horizontal diameter almost equal to length of shortest (fifth) gill slits, their posterior margins about opposite mouth or just anterior to it; nostrils with strong prenarial grooves anterior and medial to their incurrent apertures; eyes large, their horizontal diameter greater than length of shortest (fifth) gill slits; mouth broadly arched, with small labial furrows on lower jaw only, corners of mouth anterior or about opposite to outer corners of head; teeth triangular, deeply notched posteriorly, with smooth or weakly serrated edges, mostly cuspidate. Fifth gill slits shorter than the four preceding ones, and located posterior to pectoral-fin origins. Pectoral fins short, broad and slightly falcate, with weakly concave or nearly straight posterior margins; pelvic fins with straight to shallowly concave posterior margins. First dorsal fin high, moderately falcate, with its origin above or just behind level of pectoral-fin insertions, its free rear tip not very slender and ending well anterior to the pelvic-fin origins, and its inner margin less than one third of the length of its base; second dorsal fin small, with a very long inner margin almost twice the length of its anterior margin, its free rear tip ending well anterior to upper precaudal pit, and its posterior margin nearly straight to shallowly concave; anal fin falcate, with base slightly longer than second dorsal-fin base and a deeply notched posterior margin. **Colour:** brownish olive or plain grey above, white or grey-white below; fins nearly plain, dusky, or blackish tipped.

Size: Maximum total length probably between 3.7 and 4 m, commonly between 2.75 and 3.35 m; size at birth between 50 and 60 cm; adults maturing at about 210 to 240 cm.

Habitat, biology, and fisheries: A common to abundant coastal and semi-oceanic species, living close inshore (especially the young) and near the surface in deep water not far offshore; depth 0 to at least 109 m. A strong-swimming shark, migrating northward in summer; young often found in large schools of hundreds of individuals. Viviparous, with a yolk-sac placenta, number of young 29 to 37 per litter. Feeds on bony fishes, other sharks, rays, crustaceans and squids. May occasionally bite people, but this is poorly documented.

Caught with pelagic longlines, handlines, and even pelagic and bottom trawls. Utilized fresh, dried-salted, and possibly smoked for human consumption; hides are processed for leather; liver oil is extracted for vitamins; fins are processed into sharkfin soup base; and carcasses utilized for fishmeal. Catch statistics for this species were reported by Portugal and Spain in the area in 2004, but with a modest catch (130 tonnes); probably countries reporting unidentified Sphyrnidae to FAO for the area include this species in the catch. Conservation status uncertain because of other species being confused with *Sphyrna zygaena*, but of concern because of heavy fisheries pressure in most places where it occurs. The IUCN currently lists this species as Vulnerable globally on its Red List due to large observed declines in Sphyrnidae in several regions, including the Mediterranean Sea, where this species is more abundant than *S. lewini*.

Distribution: Essentially circumglobal in temperate and tropical seas, extending to somewhat higher latitudes than other large hammerheads but also known from the tropics although often confused with *S. lewini* and less abundant than that species in tropical waters. In the area it occurs from Morocco, Western Sahara and Mauritania to Senegal, including Madeira, the Canary Islands, Cape Verde Islands, Guinea, Côte d'Ivoire, and Ghana, also off southern Angola (recent records from the RV F. Nansen) and possibly off Namibia; also northward in the Mediterranean and to the British Isles, and southward on the west and east coasts of South Africa and off Mozambique. Elsewhere, the smooth hammerhead is wide-ranging in the western Atlantic, Indian Ocean and the western, central and eastern Pacific.



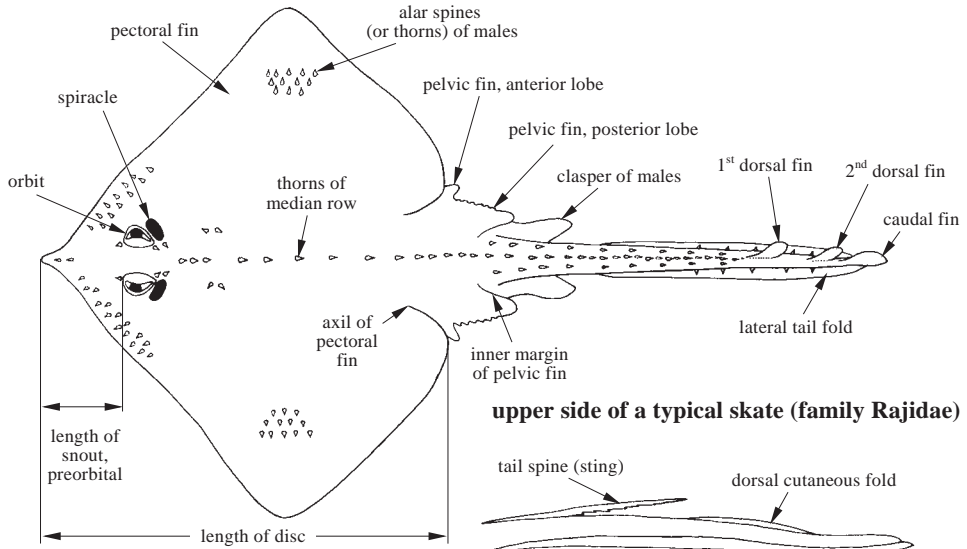
BATOID FISHES

by B. Séret

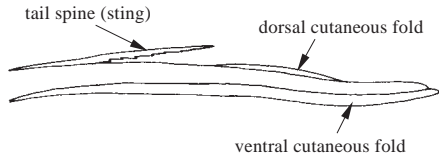
Institut de Recherche pour le Développement and Muséum National d'Histoire Naturelle, Paris, France

TECHNICAL TERMS AND MEASUREMENTS

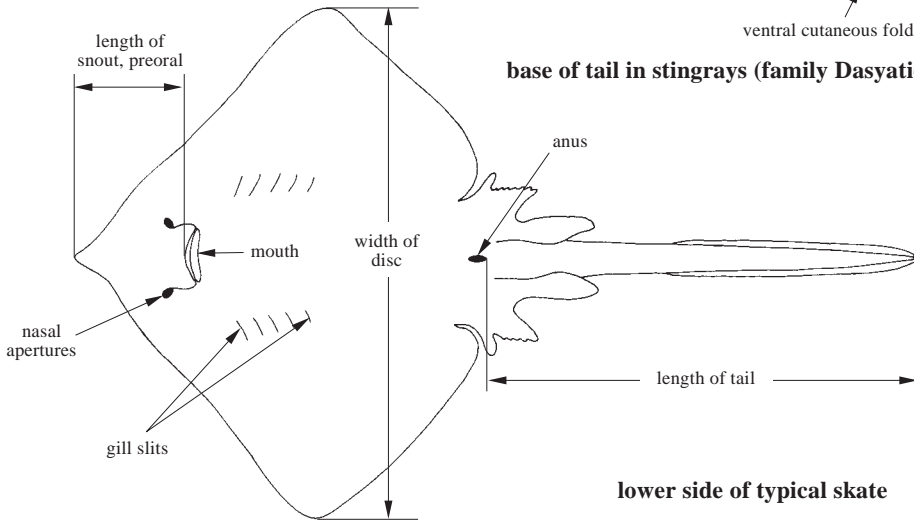
(straight-line distances)



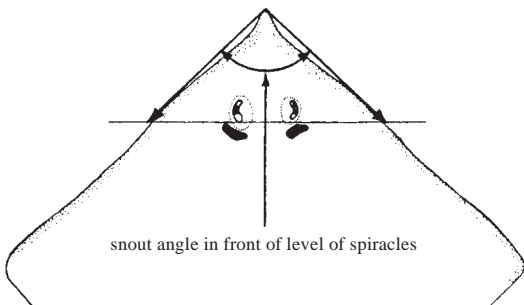
upper side of a typical skate (family Rajidae)



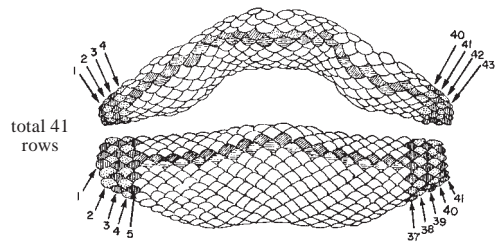
base of tail in stingrays (family Dasyatidae)



lower side of typical skate



anterior part of disc of a skate



total 41 rows

teeth of a stingray (arrows indicate method of counting pavement pattern in batoids)

GENERAL REMARKS

Recent phylogenetic analysis of the Chondrichthyan fishes (fishes with cartilaginous skeleton) hypothesized that the batoids (order Rajiformes) are flattened sharks: derived from a group of squaloid sharks and evolved to adapt to benthic life. Like sharks, batoids have gill slits, usually 5 pairs (6 in Hexatrygonids) on their ventral side (in lateral position in sharks). The batoids have enlarged pectoral fins, fused to the sides of the head and the trunk to form a more or less depressed disc variably shaped: wedge-shaped, circular, oval, or rhomboidal. The eyes and spiracles are well developed, usually located on the dorsal side of the head, but the spiracles are laterally located in pelagic rays and the eyes are vestigial in some torpedos. The tail and caudal fin are well developed and not clearly demarcated from the disc within sawfishes and guitarfishes and, like in sharks, they serve to propel the fish by lateral undulations. The tail and caudal fin are variably reduced (within torpedos, skates and myliobatids) with the tail often slender and clearly demarcated from the disc; and not used for locomotion, these batoids swim by vertical flappings of their enlarged pectoral fins. The mouth and nostrils are ventral or subterminal on the head in all batoids, except in *Manta*. Most of the batoids have 2 dorsal fins, but some torpedos, skates and myliobatids have either a single dorsal fin or none. The anal fin is absent. Teeth on jaws are arranged in transverse rows and are constantly replaced from inside of the mouth as in sharks; although some myliobatid rays have their teeth fused to form large tooth plates. The skin of the batoids is more or less covered with dermal denticles and thorns, sometimes enlarged to form spiny tubercles or bucklers. Some rays are completely naked.

Within the batoids, as with sharks, the fertilization is internal and males possess cylindrical copulatory organs or claspers which are derived from pelvic-fin cartilages. All batoids, except skates, are live-bearing (ovoviviparous or aplacental viviparous), the embryos developing in the uterus of the female, using the nutrients of their own yolk sacs. Within myliobatid rays and some torpedos and guitarfishes, the embryos utilize their own yolk, as well as "uterine milk" secreted by the uterus of the mother. Skates (about 46% of living species of batoids) are oviparous (egg-laying). The fertilized eggs are large, protected by a horny capsule ("mermaids purses") and are deposited on the bottom by the females. Usually it takes several months to hatch. The fecundity is variable, very low in live-bearing species (litters from 1 to a few pups only) and somewhat higher in oviparous species (up to about 150 eggs / year for some skates). Some rays give birth throughout the year, but in other species birth is distinctly seasonal. At birth, females batoids often segregate from males and concentrate in nursery grounds (most probably to protect the young from predation).

Batoids vary greatly in size, ranging from about 8 cm total length (some dwarf torpedos) to over 7 m in total length (some sawfishes) and from 5 cm to about 6 m in disc width (the manta ray and some devil rays). Their weight ranges from about 20 g to 3 tonnes (the manta ray). But most batoids are of small to moderate size, less than 60 cm in total length.

Most batoids are predators consuming a wide variety of prey. Many feed on benthic organisms such as various invertebrates (worms, crustaceans, molluscs, etc.) and bottom fishes. A variety of feeding strategies are employed. The torpedos use their electric organs to stun their prey before swallowing them; sawfishes use their saw to kill schooling fishes; eagle and cownose rays crush their prey (such as oysters, clams, etc.) with their strong tooth plates; and the manta and devil rays are plankton feeders, filtering large amounts of seawater through their large mouth to retain the small pelagic organisms (zooplankton and small pelagic fishes) on their gill plates.

Batoids are primarily marine, but some are also found in brackish (estuaries, coastal lagoons) and fresh waters. Sawfishes and some stingrays are euryhaline and can live both in marine and freshwater. One family, the Potamotrygonids (freshwater stingrays), is confined to the tropical rivers of South America draining into the Atlantic Ocean. Batoids are widely distributed in all oceans, from the Arctic to the Antarctic, and from shallow coastal waters to great depths. A few species like some devil rays and the pelagic stingray (*Pteroplatytrygon violacea*) occur in the high seas in the epipelagic zone. Some have a large geographical distribution, others are endemic to restricted areas.

Very little is known about the ecological role of the batoids in the oceanic ecosystem, however one can suppose they are important because of their function as predators and their local abundance in some areas. Batoids are also food items for large predators like sharks, for example the stingrays constitute a favourite prey for the scalloped hammerhead shark.

The living batoids are grouped into 20 families, 85 genera and more than 650 species, a number of them have been discovered recently and are currently being described. Compared to the other areas of the world ocean, the batoid fauna of the eastern central Atlantic (FAO Fishing area 34 and part of 47) is relatively diverse with 11 families, 25 genera and about 80 nominal species (vs. western central Atlantic with 11 families, 31 genera and 74 species and western central Pacific with 19 families, 37 genera and about 150 species). The taxonomic status of a few species is still uncertain and should be revised, and about 7 new species, including a new genus of guitarfish, are currently under study and description. The most diverse group in the eastern central Atlantic is the family Rajidae (skates) with about 30 species, although skates are not abundant at tropical latitudes. Off West Africa, the most common batoids are the stingrays and the guitarfishes which are locally abundant in the coastal waters of the whole area. Sawfishes, once common in West Africa, have almost totally disappeared and the whole group of pristids is in urgent need of listing in Appendix 1 of CITES; indeed, they have not been reported from most of the west African countries for more than a decade, except for some sporadic records from Guinea Bissau. In the same way, the freshwater stingray, *Dasyatis garouaensis*, may be extinct due to habitat degradation.

In the Eastern Tropical Atlantic, some batoids are heavily exploited, however the fishery statistics reported by FAO do not reflect the level of exploitation. According to the FAO data, the landings (Areas 34 and 47) varied from 8 400 tonnes in 1990 to about 12 000 tonnes in 2013 (FIGIS). These figures are most probably far from the real ones as some catches are not declared by the countries. Most of these landings are reported within the category "Rajiformes", so that it is impossible to know the composition of the catches. However, huge amounts of stingrays and now of guitarfishes are landed by artisanal fisheries, using various nets and lines. The proportion of guitarfishes is increasing in the landings because they are targeted for their fins which have a high value at exportation. Other batoids such as the eagle- and cownose rays are seasonally caught in large quantities. Also, batoids are bycatch of industrial fisheries, mainly performed by foreign fleets, using trawlnets (for demersal fishes of the outer-shelf and upper slope) and purse seines (tuna fisheries). Some batoids, such as the giant guitarfishes, are targeted by anglers.

In West Africa, the flesh of the batoids is mainly consumed salted or smoked. The fish are cut into pieces and smoked to facilitate conservation during transport within countries. Sometimes, salted fish are ground to feed farmed animals (chicken). The skin of electric rays is sometimes used to make amulets (for the protection of the fishing boats). In the past, the saw of pristids was used to make ceremonial masks (for adolescent initiation) and roofbeams (for the protection of the houses and their inhabitants).

Batoids are not aggressive and mostly harmless, however accidents may occur with stingrays, mainly when handled. Sawfishes may cause some hazard to fishermen when trapped in a net or on a line, but such accidents are now unlikely because of their extreme rarity. Torpedos may cause some electric shock to divers when molested.

KEY TO FAMILIES OCCURRING IN THE AREA

- 1a. Body shark-like, only moderately depressed; pectoral fins moderately enlarged; tail not distinctly demarcated from trunk or disc → 2
- 1b. Body distinctly depressed, pectoral fins broadly enlarged; tail more or less distinctly demarcated from trunk or disc → 4

- 2a. Snout extremely prolonged as a flat, narrow, firm blade, edges of which are armed with a single series of large tooth-like structures (saw) (Fig. 1) **Pristidae**
- 2b. Snout wedge-shaped and variously prolonged, but not as a blade and without lateral teeth → 3

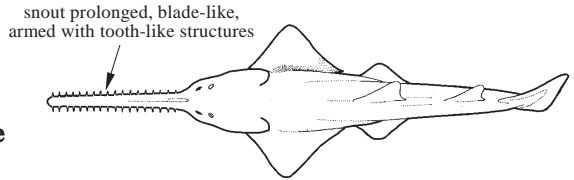


Fig. 1 Pristidae

- 3a. Caudal fin conspicuously bilobed, lunate, both lobes pointed; rear edges of pectoral fins falling short of origin of pelvic fins; origin of first dorsal fin over or slightly anterior to bases of pelvic fins (Fig. 2) **Rhinidae**
- 3b. Caudal fin not bilobed; rear edges of pectoral fins extending to origin of pelvic fins or farther; origin of first dorsal fin well posterior to rear tips of pelvic fins (Fig. 3). . . . **Rhinobatidae**

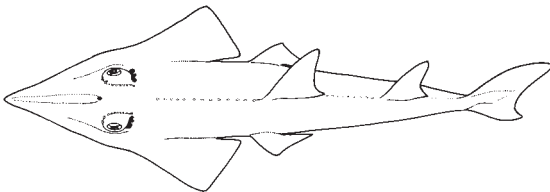


Fig. 2 Rhinidae

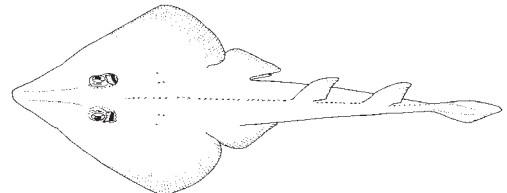


Fig. 3 Rhinobatidae

- 4a. Tail short and stout; 2 dorsal fins present; caudal fin well developed → 5
- 4b. Tail variable in shape and length, but mostly slender; if present at all, dorsal fins very small and caudal fin rudimentary → 6

- 5a. Disc not very thick, its margins more or less thin, not conspicuously fleshy; consistency of body mostly firm; disc roundish or bluntly angled anteriorly, without electric organs; strong sharp thorns on disc and tail; mouth straight (Fig. 4) **Zanobatidae**
- 5b. Disc thicker than most other batoids, fleshy towards margins; consistency of body soft and flabby; well developed electric organs along side of head within anterior part of disc; shape of disc truncate or emarginate anteriorly; body totally naked; mouth curved (Fig. 5) . . **Torpedinidae**

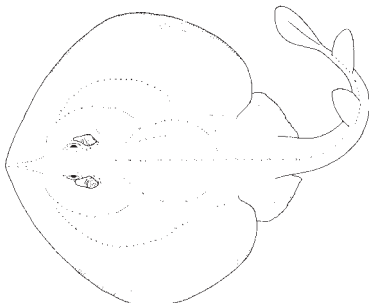


Fig. 4 Zanobatidae

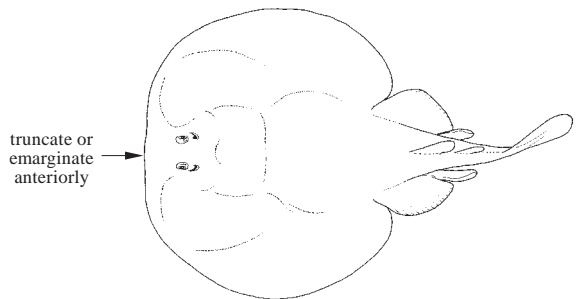


Fig. 5 Torpedinidae

- 6a. Tail moderately slender, 2 small dorsal fins and a rudimentary caudal fin present; pseudobranchial folds present at anterior walls of spiracles (Fig. 6); no serrated sting on tail (Fig. 7) **Rajidae**
- 6b. Tail short, moderately to very slender, or very long and whip-like; at most a single dorsal fin on base of tail in some species; no caudal fin; no pseudobranchial folds at anterior walls of spiracles; usually 1 or more serrated sting on base of tail **→ 7**

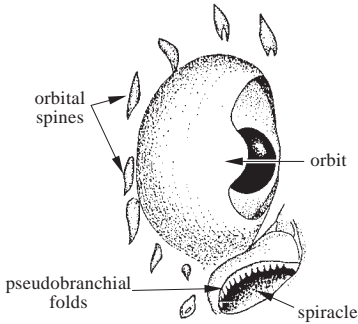


Fig. 6 pseudobranchial folds

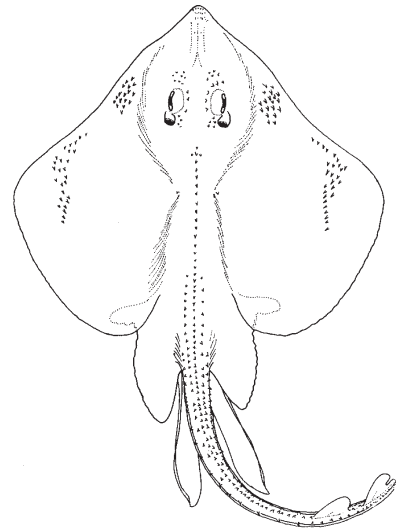


Fig. 7 Rajidae

- 7a. Eyes and spiracles on top of head; anterior part of head not marked off from disc, no separate cephalic fins or rostral lobes **→ 8**
- 7b. Eyes and spiracles on sides of head; anterior part of head distinctly marked off from disc, or anterior margins of pectorals forming separate cephalic lobes or fins **→ 9**
- 8a. Disc more than 1.5 times as broad as long; tail distinctly shorter than disc width; posterior margin of nasal curtains smooth-edged; no papillae on floor of mouth (Fig. 8) **Gymnuridae**
- 8b. Disc at most 1.3 times as broad as long; tail (if complete) much longer than disc width in most species; posterior margin of nasal curtains fringed; several fleshy papillae on floor of mouth (Fig. 9) **Dasyatidae**

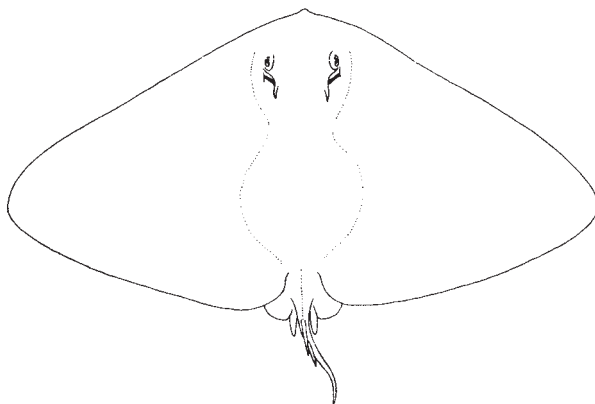


Fig. 8 Gymnuridae

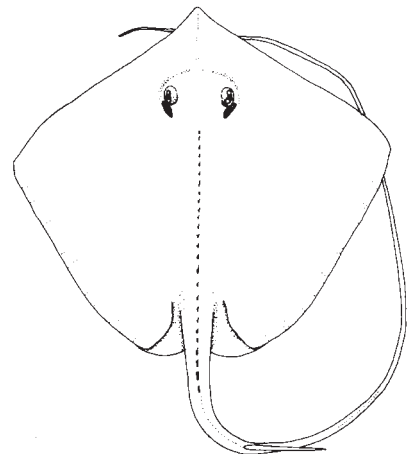


Fig. 9 Dasyatidae

9a. Pectoral fins anteriorly separated and forming 2 thin cephalic fins; teeth minute and set in bands of many series in 1 or both jaws (Fig. 10) **Mobulidae**

9b. Anterior parts of pectoral fins forming a fleshy lobe extending below front of head, or this lobe with a more or less deep median notch, thus forming 2 basally connected lobes; teeth large, flat, and in a few series only → 11

10a. Subrostral lobe undivided; several fleshy papillae on floor of mouth (Fig. 11) **Myliobatidae**

10b. Subrostral lobe deeply incised in midline, thus forming 2 basally continuous lobes; no papillae on floor of mouth (Fig. 12) **Rhinopteridae**

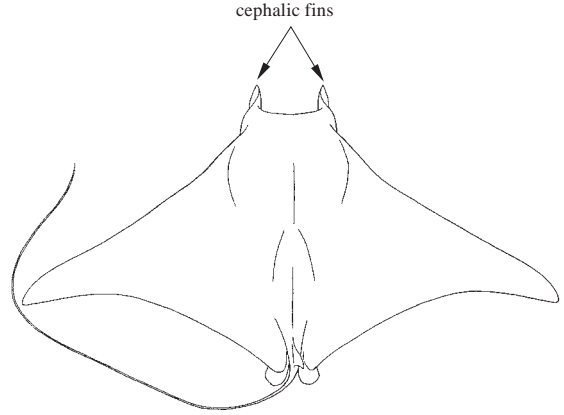


Fig. 10 Mobulidae

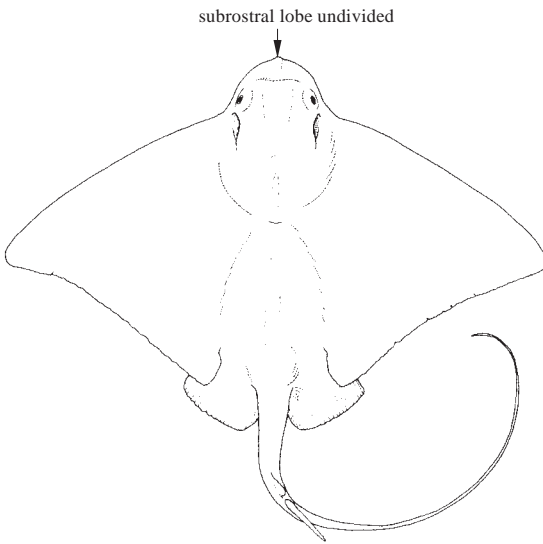


Fig. 11 Myliobatidae

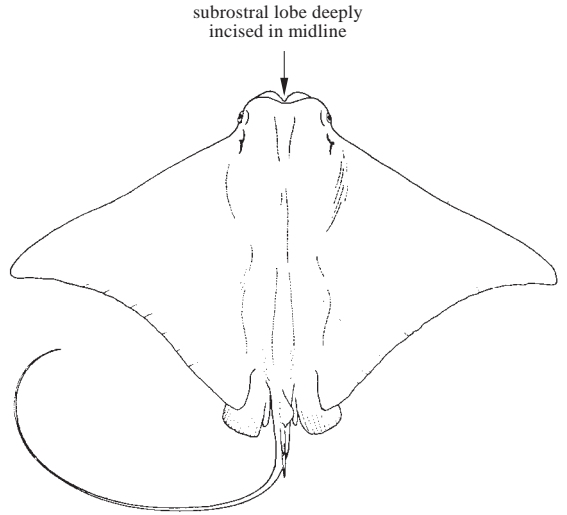



Fig. 12 Rhinopteridae



LIST OF FAMILIES AND SPECIES OCCURRING IN THE AREA

Note on recent taxonomic changes in batoids: After reviewing the proofs of this guide a number of changes in the taxonomy of batoid fishes are needed based mostly on genetic data (Last *et al.* in prep.). The following changes will eventually be recognized: The guitarfish *Glaucostegus cemiculus* should be placed in the family Glaucostegidae; all other West African guitarfishes stay in the family Rhinobatidae. The deep-water skates of the genus *Bathyraja* (*B. hesperaficana*, *B. richardsoni* and *B. smithii*) should be placed in the family Arhynchobatidae. All other West African skates stay in the family Rajidae. McEchran, Séret and Miyake (1989) considered the skate *Raja miraletus* as a clinal species with three populations (Mediterranean, ECA, southern African). However, recent genetic studies have shown it is a complex of three species. The species occurring in the ECA is under description (Last *et al.*, in prep). The skate *Dipturus batis* is a complex of two species – *D. batis* and a larger one referred as *Dipturus* sp. *intermedial*. Occurrence of both species in ECA should be determined. The cownose-ray family Rhinopteridae should be fused with the mantas and devil rays in the family Mobilidae. B. Séret, Paris, 2 Feb. 2016.

The symbol  is given when species accounts are included. A question mark indicates that the taxonomic status of the species is still uncertain and needs to be revised.


Order PRISTIFORMES

PRISTIDAE : Sawfishes







-  *Pristis pectinata* Latham, 1794.
-  *Pristis pristis* (Linnaeus, 1758).^{1/}

Order RHINOBATIFORMES


RHINIDAE (= Rhynchobatidae) : Wedgefishes, Giant guitarfishes

-  *Rhynchobatus luebberti* Ehrenbaum, 1915.
New genus, new species by Séret *et al.* (in prep.).

RHINOBATIDAE : Guitarfishes



-  *Acroteriobatus blochii* (Müller and Henle, 1841).
-  *Glaucostegus cemiculus* (Geoffroy St Hilaire, 1817).
-  *Rhinobatos albomaculatus* Norman, 1930.
-  *Rhinobatos irvinei* Norman, 1931.
-  *Rhinobatos rhinobatos* (Linnaeus, 1758).
-  *Rhinobatos* sp.^{2/}

ZANOBATIDAE : Panrays

-  *Zanobatus schoenleinii* (Müller and Henle, 1841).
Zanobatus sp. n. Séret (in prep.).

Order TORPEDINIFORMES

TORPEDINIDAE : Electric rays, torpedos

-  *Tetronarce nobiliana* (Bonaparte, 1835).
-  *Torpedo mackayana* Metzelaar, 1919.
-  *Torpedo bauchotae* Cadenat, Capapé and Desoutter, 1978.
-  *Torpedo mackayana* Metzelaar, 1919.

^{1/} *Pristis microdon* Latham, 1794 was recently reviewed by Faria *et al.* (2013) and shown to be a synonym of *Pristis pristis* (Linnaeus, 1758). These groups are thus combined into a single species account under *P. pristis* for the purpose of this guide.

^{2/} Known only by the photograph of an alive specimen taken in the “Banc d’Arguin”, Mauritania, this possible species is distinguished by its almost isosceles disc, a large blackish blotch on dorsal side of snout and a white line surrounding the lower edges of the body.

- ♠ *Torpedo marmorata* Risso, 1810.
- ♠ *Torpedo torpedo* (Linnaeus, 1758).
- Torpedo* sp. 1 (under description by Séret and Carvahlo).
- Torpedo* sp. 2 (under description by Séret and Carvalho).
- Torpedo* sp. 3 (under description by Séret and Carvalho).
- Torpedo* sp. 4 (under description by Séret and Carvalho).

Order RAJIFORMES

RAJIDAE : Skates

- Amblyraja radiata* (Donovan, 1808).
- ♠ *Bathyraja hesperaficana* Stehmann, 1995.
- ♠ *Bathyraja richardsoni* (Garrick, 1961).
- ♠ *Bathyraja smithii* (Müller and Henle, 1841).
- Dipturus* sp. Mauritania.
- ♠ *Dipturus batis* (Linnaeus, 1758).
- ♠ *Dipturus doutrei* (Cadenat 1960).
- ♠ *Dipturus nidarosiensis* (Storm, 1881).
- ♠ *Dipturus oxyrinchus* (Linnaeus, 1758).
- ♠ *Leucoraja circularis* (Couch, 1838).
- ♠ *Leucoraja leucosticta* (Stehmann, 1971).
- ♠ *Leucoraja naevus* (Müller and Henle, 1841).
- Malacoraja spinacidermis* (Barnard, 1923).
- ♠ *Neoraja africana* (Stehmann and Séret, 1983).
- Raja africana* Capapé, 1977.^{3/}
- ♠ *Raja brachyura* Lafont, 1873.^{4/}
- ♠ *Raja clavata* Linnaeus, 1758.
- ♠ *Raja herwigii* Krefft, 1965.
- ♠ *Raja maderensis* Lowe, 1838.
- ♠ *Raja microocellata* Montagu, 1818.
- ♠ *Raja miraletus* Linnaeus, 1758.
- ♠ *Raja montagui* Fowler, 1910.
- Raja rouxi* Capapé, 1977.
- ♠ *Raja straeleni* Poll, 1951.
- ♠ *Raja undulata* Lacépède, 1802.
- ♠ *Rajella barnardi* (Norman, 1935).
- Rajella bathyphila* (Holt and Byrne, 1908).
- Rajella bigelowi* (Stehmann, 1978).
- ♠ *Rajella dissimilis* (Hulley, 1970).
- ♠ *Rajella leoparda* (von Bonde and Swart, 1923).
- ♠ *Rajella ravidula* (Hulley, 1970).
- ♠ *Rostroraja alba* (Lacépède, 1803).

^{3/} Not to be confused with homonym *Raja africana* Bloch and Schneider, 1801, junior synonym of *Urogymnus asperrimus* (Bloch and Schneider, 1801).

^{4/} Not to be confused with homonym *Raja brachyura*, Günther, 1880, junior synonym of *Bathyraja brachyurops* (Fowler, 1910).

Order MYLIOBATIFORMES

DASYATIDAE : Stingrays

- ♠ *Dasyatis centroura* (Mitchill, 1815).
- ♠ *Dasyatis garouaensis* (Stauch and Blanc, 1962).
- ♠ *Dasyatis* cf. *hastata* (De Kay, 1842).
- ♠ *Dasyatis margarita* (Günther, 1870).
- ♠ *Dasyatis margaritella* Compagno and Roberts, 1984.
- ♠ *Dasyatis marmorata* (Steindachner, 1892).
- ♠ *Dasyatis pastinaca* (Linnaeus, 1758).
- ♠ *Dasyatis rudis* (Günther, 1870).
- ♠ *Dasyatis ukpam* (Smith, 1863).^{5/}
- ♠ *Pteroplatytrygon violacea* (Bonaparte, 1832).
- ♠ *Taeniura grabata* (Geoffroy St Hilaire, 1817).
- ♠ *Urogymnus asperrimus* (Bloch and Schneider, 1801).

GYMNURIDAE : Butterfly rays

- ♠ *Gymnura altavela* (Linnaeus, 1758).
- ? *Gymnura hirundo* (Lowe, 1843).
- ♠ *Gymnura micrura* (Bloch and Schneider, 1801).

MYLIOBATIDAE: Eagle rays

- ♠ *Aetobatus narinari* (Euphrasen, 1790).
- ♠ *Myliobatis aquila* (Linnaeus, 1758).
- ♠ *Pteromylaeus bovinus* (Geoffroy St Hilaire, 1817).

RHINOPTERIDAE: Cownose rays

- ♠ *Rhinoptera bonasus* (Mitchill, 1815).
- ♠ *Rhinoptera marginata* (Geoffroy St Hilaire, 1817).
- ? *Rhinoptera peli* Bleeker, 1863.

MOBULIDAE: Manta, Devil rays

- ♠ *Manta birostris* (Walbaum, 1792).
- ♠ *Mobula japonica* (Müller and Henle, 1841).
- ♠ *Mobula rochebrunei* (Vaillant, 1879).
- ♠ *Mobula tarapacana* (Philippi, 1892).
- ♠ *Mobula thurstoni* (Lloyd, 1908).

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^{5/} Compagno (1999) places this species in the genus *Urogymnus* Müller and Henle, 1837, but *Dasyatis ukpam* (Smith, 1863) is considered valid by Eschmeyer's Catalog of Fishes, so that name will be used for this guide.

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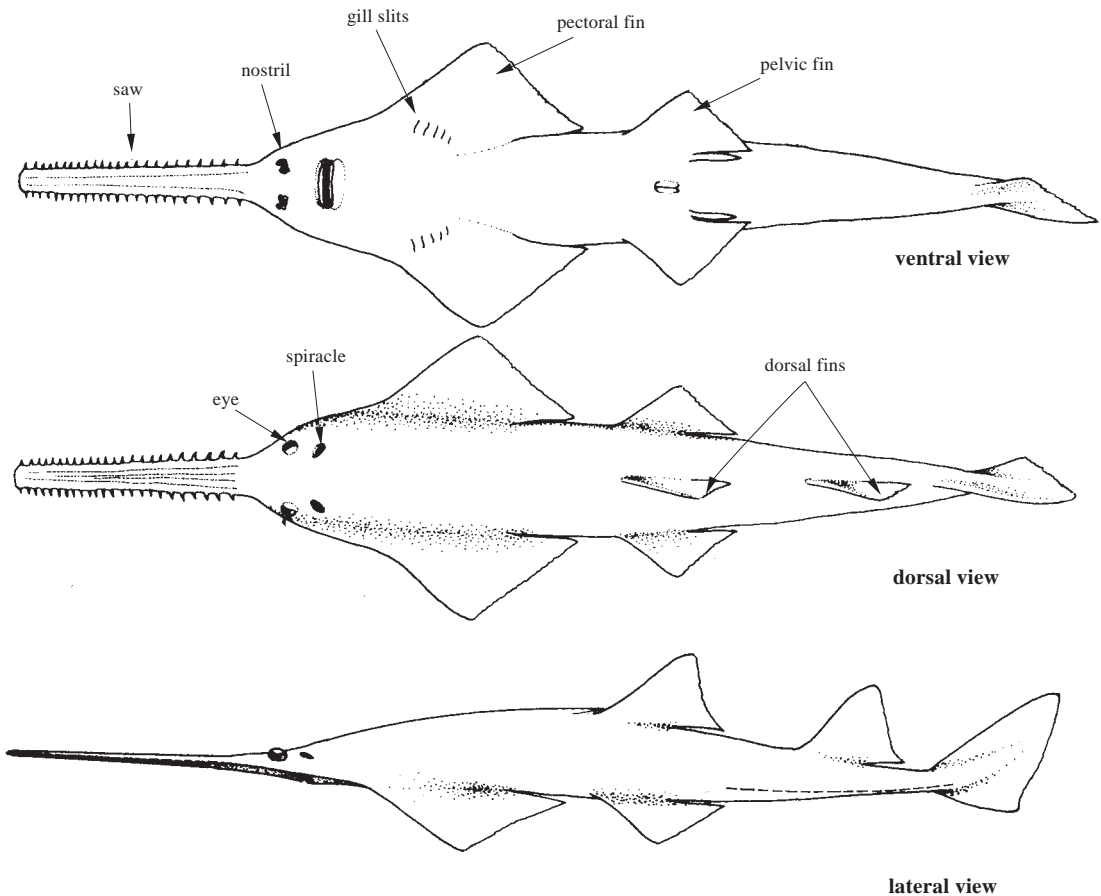
Order PRISTIFORMES

PRISTIDAE

Sawfishes

by B. Séret, Institut de Recherche pour le Développement and Muséum National d'Histoire Naturelle, Paris, France

Diagnostic characters: Large batoids, regularly attaining 500 cm in total length, and reported to reach up to 8 m. **Body shark-like**, moderately depressed anteriorly, **tail stout and not demarcated from trunk** with a longitudinal ridge along lower sides; disc triangular. **Snout prolonged as a strong rostral blade, the "saw", armed on each side with a single row of large rostral teeth**; the saw can reach one-third to one-fifth of the total length. **Two large equal-sized and angular dorsal fins which are widely separated**, first over pelvic-fin base; **caudal fin well developed** with or without a distinct ventral lobe. **Pectoral fins not broadly enlarged, attached to anterior part of head, not reaching level of mouth**. Pelvic fins with single triangular lobe. No anal fin. Eyes and spiracles on top of head; spiracles well behind eyes. Gills slits (5 pairs), mouth and nostrils on ventral side of head; mouth transverse and straight; nostrils well anterior and completely separated from mouth. Oral teeth small, rounded-oval, forming bands of numerous rows (up to 60), arranged in pavement on both jaws. Entire body densely covered with small, ovoid dermal denticles; no thorns or enlarged denticles. **Colour:** dorsal and lateral surfaces uniform brownish, grey-brown, greenish or yellowish; ventral surface white.



Habitat, biology, and fisheries: Sawfishes have a circumglobal distribution in tropical and warm-temperate seas. They occur in shallow (often less than 10 m depth) coastal waters and often penetrate in freshwater (rivers and lakes), are found mainly on soft and muddy bottoms of bays, estuaries, river mouths and coastal lagoons. Some species are more frequent in freshwater and have riverine populations. They are active bottom-dwellers and often rest on the bottom when not chasing. Sawfishes are ovoviviparous (aplacental viviparous), the embryos feeding on their own yolk, but it is suggested that the mother also provides uterine milk. Litters vary from 1 to 24 pups, usually 6 to 9. Gestation period and reproductive cycle are poorly known, sexual maturity could be achieved after 20 years. Sawfishes feed on benthic invertebrates and small schooling fishes. The saw is used to dislodge prey from the bottom and also to stun small fishes before swallowing. Sawfishes are mostly caught as bycatch in artisanal fisheries and can be captured with various gears including gill and trammel nets, beach seine, longlines and sometimes bottom trawls. Sawfishes are exploited for their flesh, fins and saw. The flesh is marketed and utilized locally, fresh, dried-salted or smoked; the fins are exported to Asia and the saws are sold as natural curios to tourists and in the past were used to make ceremonial masks (for adolescent's initiation) and roof-tree for the protection of the house and its inhabitants. The decline of sawfish populations is observed throughout their entire distribution, particularly in estuarine and freshwater habitats. Off West Africa, their populations are very depleted and sawfishes are no longer caught or observed in many countries, except for sporadic records from Guinea Bissau. Although the FAO fishery data include some landings of Pristidae in the fishing area 34 (48 tonnes in 1997, 41 tonnes in 1999 and 42 tonnes in 2000 then no catch is reported up to now), it is more likely that these figures are erroneous, as sawfishes have disappeared in most parts of the area. The last records are 1992 for Senegal, 1999 for Guinea-Conakry and 2004 for Guinea-Bissau. All sawfish species are included in Appendix 1 of the CITES since 2007.

Similar families occurring in the area

No other family of rays has a prologed snout resembling a saw; no other family, except for the Rhinobatids and Rhinids are shark-like in appearance.

Key to the species of Pristidae occurring in the area

- 1a. Caudal fin with a short but conspicuous ventral lobe (Fig. 1a) ***Pristis pristis***
- 1b. Caudal fin without a distinct ventral lobe (Fig. 1b); origin of first dorsal fin over or slightly anterior to pelvic-fin origins (saw with 20 to 32, usually 25 or more, rostral teeth) . . ***Pristis pectinata***

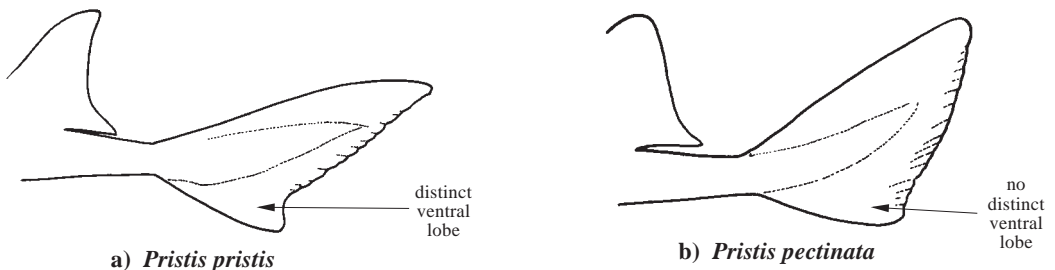


Fig. 1 caudal fin

List of species occurring in the area

The symbol is given when species accounts are included.

- Pristis pectinata* Latham, 1794.
- Pristis pristis* (Linnaeus, 1758).^{1/}

^{1/} *Pristis microdon* Latham, 1794 was recently reviewed by Faria *et al.* (2013) and was shown to be a synonym of *Pristis pristis* (Linnaeus, 1758). These groups are thus combined into a single species account under *P. pristis* for the purpose of this guide.

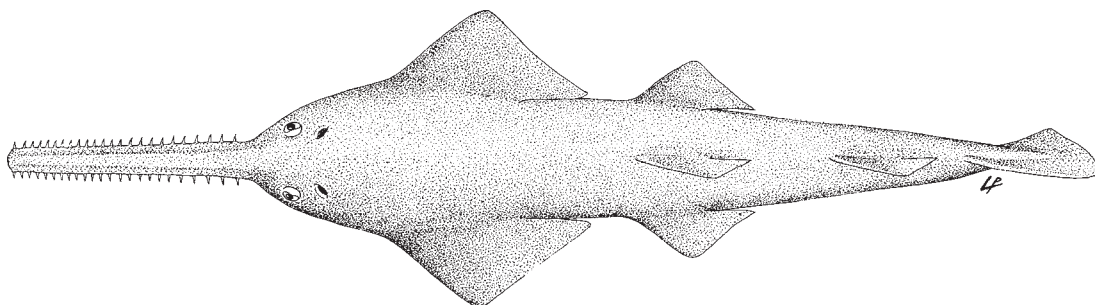
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Pristis pectinata Latham, 1794

Frequent synonyms / misidentification: None / None.

FAO names: En – Smalltooth sawfish; Fr – Poisson-scie tident; Sp – Pejepeine.



Diagnostic characters: A large sawfish with a relatively narrow saw, its sides nearly parallel, with 20 to 32 pairs of rostral teeth, usually 25 to 29 (but average 23 in eastern central Atlantic specimens), posteriormost teeth just anterior to base of saw. Rostral teeth moderately flattened, enlarged and awl-like with double edges and a groove on the posterior margin; interspace between posteriormost 2 rostral teeth 2 to 4 times wider than that between the first 2 rostral teeth. **First dorsal-fin origin over or slightly anterior to pelvic-fin origins;** its insertion well behind pelvic-fin origins. **Caudal fin without ventral lobe.** **Colour:** dorsal side greyish, ventral side white or yellowish.

Size: Maximum total length 554 cm, possibly up to 760 cm total length, females mature at 460 cm total length; size at birth about 60 cm total length (75 cm in the area).

Habitat, biology, and fisheries: Inshore and intertidal, but also off some oceanic islands suggesting that it is able to cross deep waters, also penetrates freshwater. A common or formerly common sawfish in the Atlantic. A sluggish bottom dweller, known to stir up benthic prey with its saw but in the area, it apparently feeds mainly on pelagic schooling fishes such as sardinellas and mullets, but also on sharks and guitarfishes up to 1 m total length. Males mature between 378 and 420 cm total length, females mature at about 400 cm total length. Ovoviviparous with litters from 1 to 14 pups. Likely to migrate seasonally, present in coastal waters from March to July in Senegal, but absent in December. This sawfish was the most common in West Africa, its flesh was utilized fresh, dried-salted or smoked and its fins exported to Asia. The saw was marketed as curios to tourists or used to make traditional handicrafts (ceremonial masks, rooftrusses). Today, the sawfishes are very rare, resulting from overexploitation and habitat destruction. This species is ranked as Critically Endangered on the IUCN's Red List.

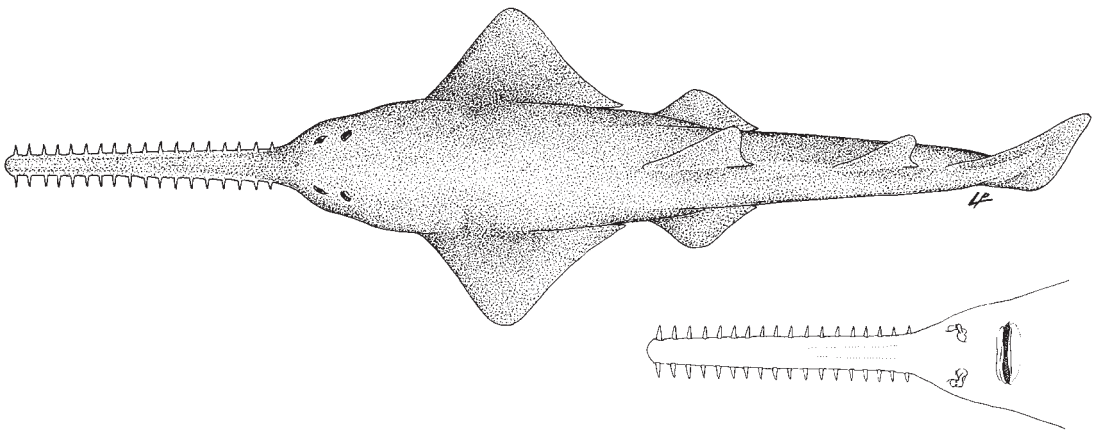


Distribution: Circumtropical in all warm and warm-temperate seas, also penetrates rivers. In the eastern tropical Atlantic, occurs from the Straits of Gibraltar to Angola.

Pristis pristis (Linnaeus, 1758)

Frequent synonyms / misidentification: *Pristis microdon* Latham, 1794; *P. perotteti* Müller and Henle, 1841 / None.

FAO names: En – Common sawfish; Fr – Poisson-scie commun; Sp – Pez sierra común.



ventral view of head

Diagnostic characters: A large sawfish with a **relatively broad and stout saw**, somewhat tapering but not widening posteriorly, with **16 to 20 pairs of rostral teeth**. Rostral teeth evenly spaced, relatively elongated and narrow, with double edges and a groove on their posterior margin. **First dorsal-fin origin over pelvic-fin origins**; its insertion about over pelvic-fin insertion. **Caudal fin with a small but distinct ventral lobe**. **Colour:** dorsal side uniform grey-ochre, ventral side creamy white.

Size: Maximum total length 750 cm, size at birth from 60 to 76 cm total length. Weight recorded up to 500 kg.

Habitat, biology, and fisheries: Inshore and intertidal, enters estuaries, coastal lagoons and freshwater. Its biology is poorly known. A bottom dweller feeding on a variety of benthic invertebrates and small schooling fishes. Utilization in the area is not documented as catches are rare and species identification often uncertain. This species is ranked as Critically Endangered on the IUCN's Red List due to evidence of a massive reduction in extent of occurrence.

Distribution: Circumtropical, in warm and warm-temperate seas, penetrates into rivers. In the eastern tropical Atlantic, occurs from Straits of Gibraltar to Angola, also in the Mediterranean Sea.

Remarks: Faria *et al.* (2013) recently used a combination of taxonomic, morphological, and genetic methods to synonymize the species *Pristis microdon* (Latham, 1794) with *P. pristis*.



Order RHINOBATIFORMES

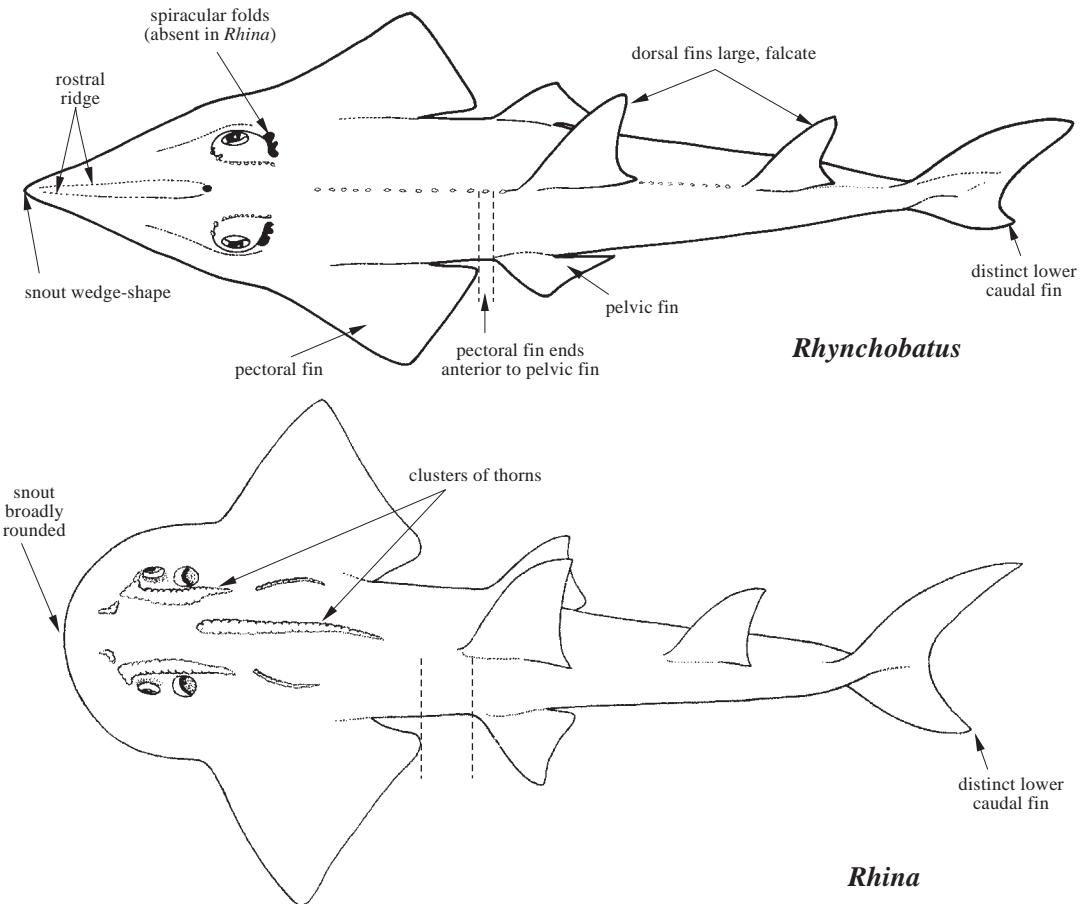
RHINIDAE

(= RHYNCHOBATIDAE)

Wedgefishes, giant guitarfishes

by B. Séret, Institut de Recherche pour le Développement and Muséum National d'Histoire Naturelle, Paris, France

Diagnostic characters: Moderate to large batoids (from 10 cm to over 3 m total length) with disc quite thick and only slightly depressed anteriorly; **snout short to moderately elongated, blunt rounded or angular, strong shark-like tail** with **two large subequal dorsal fins**, widely separated and falcate like shark fins; first dorsal-fin origin in front of pelvic-fin insertion, **caudal fin with developed upper and lower lobes** and posterior margin deeply concave; **pectoral fins moderately enlarged, fused to body but still distinct**, their origin in front of level of mouth but behind that of nostrils; **pelvic fins with a single triangular lobe**. Five pairs of small gill slits on ventral side. Eyes dorsolateral on head, just in front of spiracles; spiracles large and often with small skin folds or ridges on their posterior margin. Nostrils large and oblique. Mouth more or less arched. Oral teeth blunt, in numerous rows on both jaws (up to 80). Body entirely covered with small flattened dermal denticles and with enlarged thorns around orbits and in mediadorsal line on trunk and tail; additional thorns often present on snout and across pectoral girdle. **Colour:** dorsal side grey-brown, more or less yellowish, with pattern of coloured (white, black, blue) spots, blotches or ocelli of various size, ventral side white.

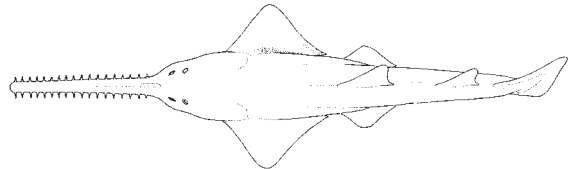


Habitat, biology, and fisheries: Rhinids consist of a small family of large tropical rays known as wedgefishes, giant guitarfishes or sharkfin guitarfishes. They occur in the shallow warm waters of the eastern tropical Atlantic, and in the Indo-West Pacific from South Africa to Australia through the Indo-Malaysian region, and in the Red Sea. They are benthic rays, resting on soft sediment in coastal areas and also in coral reefs. Although they are bottom-dwellers, they are also strong active swimmers when feeding. Their diet consists of benthic invertebrates and fishes. All species are ovoviviparous (aplacental viviparous). Wedgefishes are caught by bottom-trawls, gill and trammel nets, but also with longlines and beach seines. Despite their large size, they are harmless to people. Their flesh is utilized fresh, dried-salted or smoked and their fins have high value in the Asian sharkfin trade. The giant guitarfishes are also targeted by sport anglers because of their dogged resistance when hooked; a specimen of *Rhynchobatus djiddensis* of 54 kg is listed in the IGFA records (Seychelles, 1995). Due to their large size and coastal habitat, the giant guitarfishes are vulnerable to exploitation and the West African species is listed endangered in the IUCN Red List (2006).

Similar families occurring in the area

The systematic treatment of the families within the Rhinobatiformes proposed by Compagno (1999a, b) is adopted here.

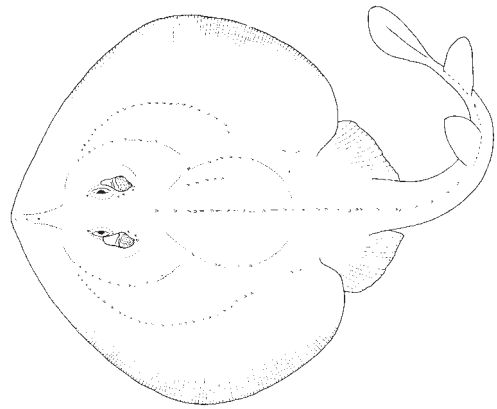
Pristidae: body shark-like; snout extremely prolonged into a stout blade, armed laterally of strong rostral teeth, resembling a saw.



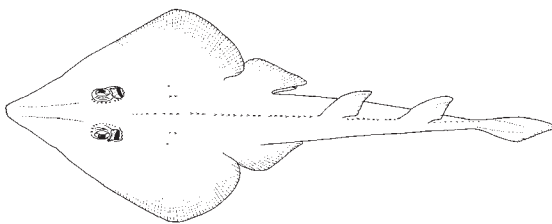
Pristidae

Rhinobatidae: body less shark-like and more depressed; pectoral-fin free rear tips posterior to pelvic-fin origins; dorsal fins small; first dorsal-fin origin behind rear tips of pelvic fins.

Zanobatidae: body not shark-like, disc flat, more or less circular or heart-shaped, tail less stout and demarcated from the disc, dorsal fins small, not falcate and far behind pelvic fins; pelvic-fin origins in front of pectoral rear tips.



Zanobatidae



Rhinobatidae

Key to the species of Rhinidae occurring in the area

- 1a. Snout angular and wedge-shaped (Fig. 1) *Rhynchobatus luebberti*
 1b. Snout broadly rounded (Fig. 2). **Gen. n., sp. n.**^{1/}

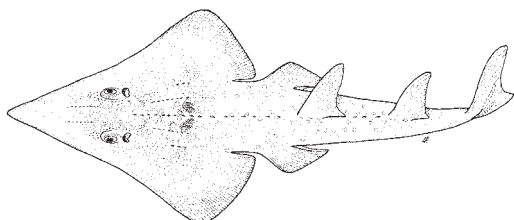


Fig. 1 *Rhynchobatus luebberti*

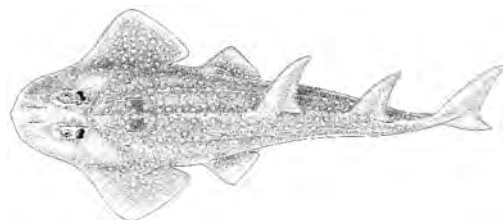




Fig. 2 **Gen. n., sp. n.** (Mauritania)

List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Rhynchobatus luebberti* Ehrenbaum, 1915.
 Gen. n., sp. n. Séret *et al.* (in prep.).^{1/}

References

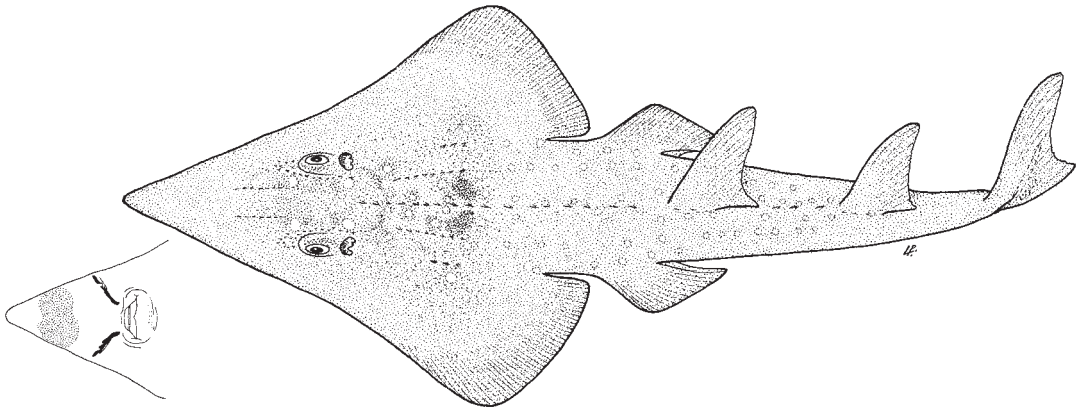
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^{1/} A new genus of a large guitarfish (about 2 m TL), and new species, has been recently discovered in Mauritanian waters, it resembles *Rhynchobatus luebberti* but its snout is broadly rounded like that of the shark-ray (*Rhina ancylostoma*); it is currently under description by Séret *et al.* on the basis of 3 specimens.

***Rhynchobatus luebberti* Ehrenbaum, 1915**

Frequent synonyms / misidentification: *Rhynchobatus atlanticus* Regan, 1915 / None.

FAO names: **En** – African wedgefish; **Fr** – Poisson-paille africain; **Sp** – Pez cuña africano.



underside of head

Diagnostic characters: A large guitarfish with a **triangular disc and shark-like tail, snout pointed and typically wedge-shaped**. Tail with a dermal fold along each lower edge. Two large and falcate dorsal fins; **caudal fin with distinct upper and lower lobes**. Two dermal folds on posterior margin of spiracles. Nostrils very large and oblique, separated from each other and from the mouth; nasal valves small. About 42 to 46 / 54 to 56 rows of oral teeth arranged in pavement. A row of pointed thorns along each rostral ridge, 2 additional thorns may occur on snout tip, a patch of thornlets and thorns in front of orbit extending backward to level of spiracles as a simple row; a median row of large pointed thorns from nape to first dorsal fin and between dorsals, flanked by 2 other short rows on the nape-shoulder area, additional short rows of thorns may be present on outer shoulders. Body covered in small dermal denticles, their crown with a median posterior cusp prolonging a median ridge and short lateral cusp. **Colour:** more or less yellowish above with **a pattern of numerous circular dark-rimmed white spots, 2 large backish blotches (sometimes 4) on shoulders, placed between the 3 rows of thorns;** alternating pale and dark crossbars may occur on the interorbital space; lower side white, with **a large transverse blackish blotch on snout**. Number of trunk vertebrae 44 to 49; number of pectoral radials 71 to 77.

Size: Maximum total length about 3 m; a female of 286 cm caught off Dakar weighed 163 kg; size at birth between 79 and 85 cm total length. Males mature at about 2 m total length.

Habitat, biology and fisheries: The African wedgefish occurs only along the West African coast. It lives in coastal waters over sandy or muddy bottom, from shore line to about 40 m depth. Feeding mainly on small coastal fishes and also on some crustaceans, it is a powerful swimmer when hunting, otherwise it rests on the bottom. Ovoviviparous, with litters of 4 or 5 pups. Caught by bottom-trawls, gill and trammel nets, also with longlines and beach seines. Catches are regular but not really common. The flesh utilized fresh, dried-salted or smoked, and its fins, which have a high value, are exported to Asian markets. In some areas (Senegal and Mauritania), it has become rare in the last decade and is now protected inside the National Park of Banc d'Arguin (PNBA) in Mauritania. Because of its vulnerability (large size, coastal habitat, high value of fins), it is ranked as Endangered on the IUCN's Red List, but it is not currently listed in CITES appendices.

Distribution: Only in the eastern tropical Atlantic, from Mauritania to Congo.

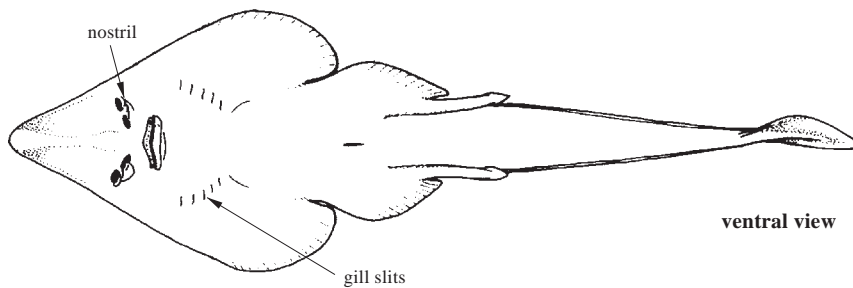
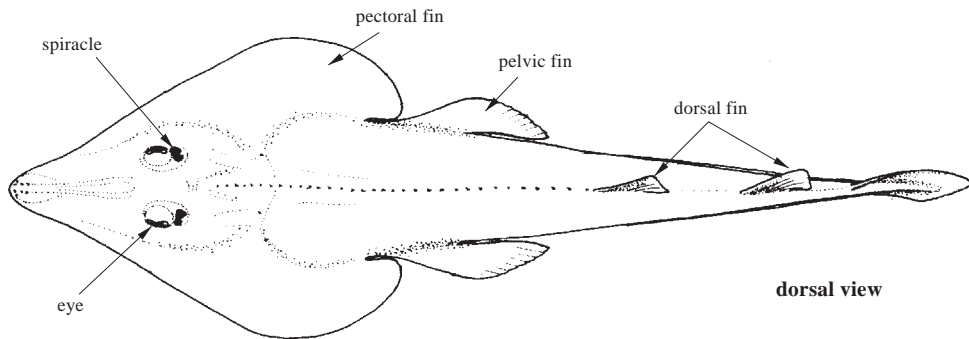


RHINOBATIDAE

Guitarfishes

by B. Séret, Institut de Recherche pour le Développement and Muséum National d'Histoire Naturelle, Paris, France

Diagnostic characters: Medium-sized to large batoids (from 50 cm up to 300 cm total length), with **large triangular disc**, anteriorly flattened, less so posteriorly, snout short to moderately elongated, usually pointed, bluntly rounded in some species, supported by a strong rostral cartilage extending to tip of snout, with rostral ridges more or less separated; disc width much less than distance from tip of snout to cloaca; **tail massive, more or less depressed, not distinctly demarcated from disc** and resembling that of a shark, slightly rounded dorsally, flattened ventrally, ventrolateral dermal folds along lower edges of tail, from about level of first dorsal fin to caudal fin. **Two moderately large equal-sized and widely separated dorsal fins on tail; first dorsal fin on posterior half of body**, its origin behind rear tips of pelvic fins. Pectoral fins moderately large, their origin in front of mouth (tip of anteriormost pectoral radials extending to or only a little beyond level of nostrils) and their rear margin posterior to pelvic-fin origins. **Pelvic fins as a single, angular or rounded lobe.** **Caudal fin large, asymmetrical, like that of a shark, but without a distinct lower lobe.** Five pairs of small gill slits on ventral side. Eyes dorsolateral on head and just in front of spiracles. Spiracle posterior margin with 1 or 2 dermal folds, sometimes rudimentary. Mouth straight or slightly arched on ventral side; numerous small oral teeth (up to 60 rows), molar-like and in pavement arrangement. Nostrils anterior to mouth and separated from it by less than their own widths, more or less oblique, sometimes almost transverse; anterior nasal flaps (nasal valves) well separated, insertion variably extending onto internasal space, but never united to form a nasal curtain; posterior nasal flaps (nasal lobes) variably developed. Body covered with tiny dermal denticles of various shapes, often with enlarged denticles (thorns, tubercles) on snout, around orbits, over spiracles, on nape-shoulder area, and in mediodorsal line on trunk and tail. Number of trunk vertebrae 30 to 49, total number of vertebrae 141 to 236, number of pectoral radials 58 to 76. **Colour:** dorsal surface either uniform grey-brown, yellowish to greenish, or with a pattern of dark and light spots, blotches, lines and bars; ventral side usually white sometimes with a dark blotch on underside of snout.



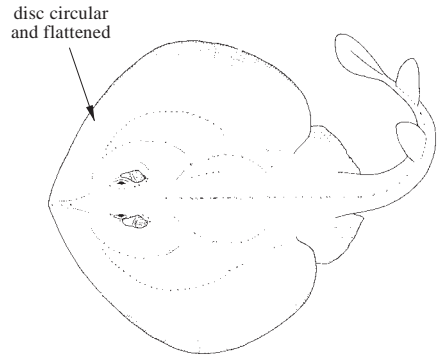
Habitat, biology, and fisheries: Guitarfishes are coastal batoids with a circumglobal distribution, they mostly occur in tropical and warm-temperate seas. They do not penetrate in freshwater (except *Glaucostegus typus*) but may be found in brackish waters or estuaries. Some species are found in deep water down to about 400 m on the continental slope. They are bottom-dwellers, cruising over or resting on sandy and muddy bottom, but they are very active swimmers when hunting and foraging to feed on benthic invertebrates and fishes. All species are ovoviviparous, embryos develop in their own yolk sac, but mothers may also provide uterine milk; fecundity relatively low with litters from a few to about 20 pups. Guitarfishes are taken as bycatch in artisanal and coastal fisheries with gill and trammel nets and bottom trawls, also with longlines and beach-seines. The meat is utilized fresh, dried-salted or smoked, and the fins are exported to the Asian sharkfin market. In the area, the catches have recently increased, probably to compensate the decline of shark stocks. This is reflected by FAO fishery data showing that the declared landings increased in Fishing Area 34 from 225 tonnes in 1997 to 1 946 tonnes in 2000, then decreasing to 1 102 tonnes in 2010. Due to the strong increase of the catches of guitarfishes, their fisheries should be monitored. Harmless to people.

Similar families occurring in the area

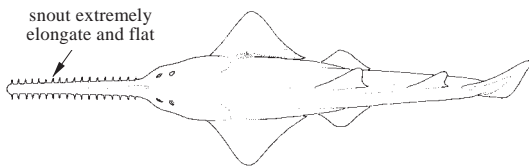
Zanobatidae: body not shark-like, disc circular and flattened, tail slender and distinctly demarcated from disc, large thorns on disc and tail.

Pristidae: body thicker and more shark-like, snout extremely prolonged into a stout blade, armed laterally of strong rostral teeth, resembling a saw.

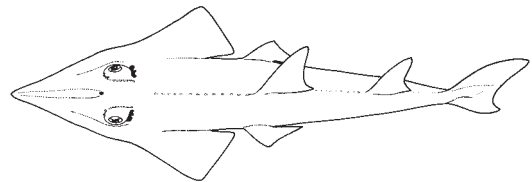
Rhinidae: body thicker and more shark-like; pectoral fins with origins behind nostrils and with free rear tips anterior to pelvic-fin origins; dorsal fins larger and strongly falcate; pelvic fins higher and more angular; caudal fin with a strong ventral caudal lobe.



Zanobatidae



Pristidae



Rhinidae

Key to the species of Rhinobatidae occurring in the area

- 1a. Inner ends of anterior nasal flaps greatly extended onto internasal space, where they almost meet at midline; length of nostrils less than internasal distance; a single dermal fold on posterior margin of spiracles; snout short and obtusely pointed (Fig. 1) ***Acroteriobatus blochii***
- 1b. Inner ends of anterior nasal flaps do not extend beyond level of inner corner of nostrils and thus widely separate; length of nostrils greater than internasal distance; 2 dermal folds on posterior margin of spiracles, the inner smaller; snout elongate and pointed (Figs 2 & 3). → 2

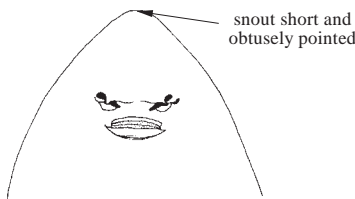


Fig. 1 *Acroteriobatus blochii*

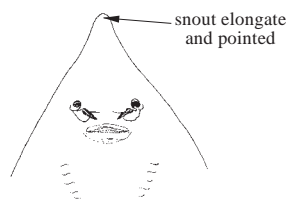


Fig. 2 *Rhinobatos albomaculatus*

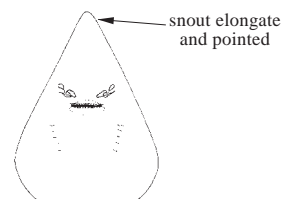







Fig. 3 *Glaucostegus cemiculus*

- 2a. Anterior nasal flaps not extending onto internasal space (Fig. 2); preorbital length equal to or a little shorter than distance from rear edge of orbits to pectoral-fin insertion; interspace between rostral ridges narrow, the ridges joining toward tip of snout or nearly so; usually a dark blotch on underside of snout ***Glaucostegus cemiculus***
- 2b. Anterior nasal flaps extending onto internasal space to about level of inner corner of nostrils (Fig. 3); preorbital length distinctly shorter than distance between rear margins of orbits and pectoral-fin insertion; rostral ridges separated throughout their entire length; underside of snout white → 3
- 3a. Upper side uniformly brown without any colour pattern ***Rhinobatos rhinobatos***
- 3b. Upper side with a variegated pattern of light roundish spots → 4
- 4a. Upper side brown with numerous small, circular, bluish white spots with blackish rims; no thorns on shoulders; thorns in mid-dorsal row blunt and flattened, often indistinct in large specimens ***Rhinobatos albomaculatus***
- 4b. Upper side greenish to khaki with a symmetrical pattern of large, rather few, circular, faint pale spots with dark rims, their diameter almost equal to that of iris; 3 thorns on each shoulder; small and pointed thorns in mid-dorsal row persistent ***Rhinobatos irvinei***

List of species occurring in the area

The symbol  is given when species account are included.

-  *Acroteriobatus blochii* (Müller and Henle, 1841).
-  *Glaucostegus cemiculus* (Geoffroy St Hilaire, 1817).
-  *Rhinobatos albomaculatus* Norman, 1930.
-  *Rhinobatos irvinei* Norman, 1931.
-  *Rhinobatos rhinobatos* (Linnaeus, 1758).
- Rhinobatos* sp.^{1/}

Remarks

The genus *Rhinobatos* was proposed to be split out by Campagno (1999) into subgenera elevated to the genus level, and this recommendation has been followed here for *Acroteriobatus blochii* (Müller and Henle, 1841). The species *Glaucostegus cemiculus* (Geoffroy St Hilaire, 1817) has been placed in the new family Glaucostegidae, but the original family designation at the time of writing has been retained for the sake of organization.

References

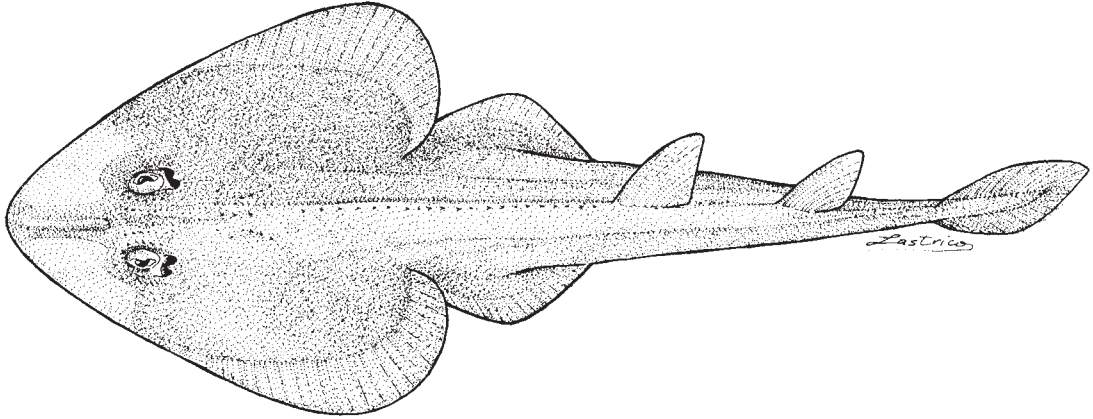
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^{1/} Known only by the photograph of an alive specimen taken in the “Banc d’Arguin”, Mauritania, this possible species is distinguished by its almost isosceles disc, a large blackish blotch on dorsal side of snout and a white line surrounding the lower edges of the body.

***Acroteriobatus blochii* (Müller and Henle, 1841)**

Frequent synonyms / misidentifications: *Rhinobatos blochii* Müller and Henle, 1841 / None.

FAO names: En – Bluntnose guitarfish, fiddlefish; Fr – Raie-guitare épointée; Sp – Guitarra embocada.



underside of head

Diagnostic characters: A guitarfish with a **short and rounded snout**, its angle about 95°, disc width more than 3 times preorbital length; pectoral anterior margin strongly convex beyond angular snout tip; **anterior nasal flaps extending onto internasal space and close together, separated only by a short interspace** (subgenus *Acroteriobatus*); eye slightly larger than spiracles; a **single dermal fold** on posterior margin of spiracles; mid-dorsal row of small thornlets from postorbites to first dorsal fin disappearing with growth. **Colour:** dorsal side plain brownish; young with a few small white spots; ventral side white.

Size: Maximum total length about 100 cm.

Habitat, biology, and fisheries: A rare and poorly known species found inshore, in shallow bays and off sandy beaches. Ovoviviparous. Specimens and data needed. Listed as Least Concern in IUCN Red List.

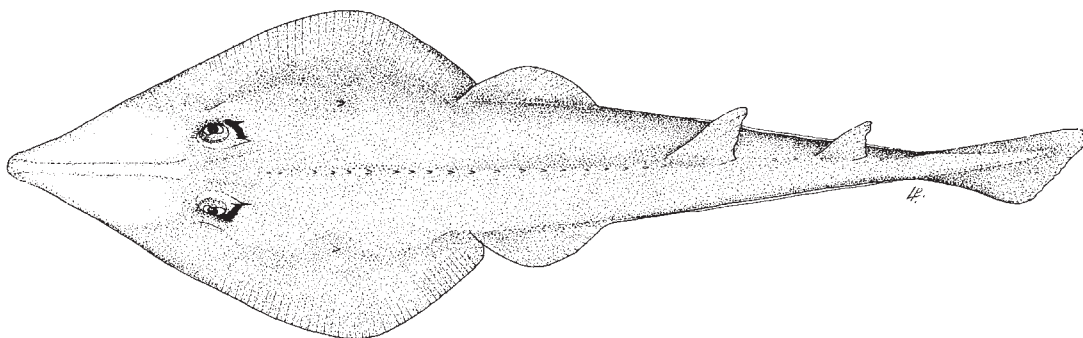
Distribution: Southern Africa, from Cape Province to Namibia, common in Walvis Bay (22°54'S), i.e. about the southern limit of the eastern central Atlantic area. Records from Angola by Penrith (1974) and from Senegal and Mauritania by Belloc (1934) are doubtful.



***Glaucostegus cemiculus* (Geoffroy St Hilaire, 1817)**

Frequent synonyms / misidentifications: *Rhinobatos cemiculus* Geoffroy St Hilaire, 1817; *R. rasmus* Garman, 1908; *R. congolensis* Giltay, 1928 / None.

FAO names: En – Blackchin guitarfish; Fr – Raie-guitare fousseuse; Sp – Guitarra barbanegra.



Diagnostic characters: Guitarfish with a **typical wedge-shaped disc**, **snout elongate and pointed**, forming an angle of about 60°, **rostral ridges separated by a narrow interspace** posteriorly and almost joining anteriorly; **preorbital length equal to or a little shorter than distance from rear margin of orbits to pectoral insertions**. Tail shark-like, not demarcated from disc. Posterior margin of spiracles with 2 dermal folds, **anterior nasal flaps not extending onto internasal space**, but confined to anterior margin of nostrils. Caudal fin without a definite lower lobe. Skin rough, a pair of thorns at tip of snout, some thorns around orbits, a mid-dorsal row of large pointed thorns from nape to first dorsal fin and between dorsals, and 1 to 3 thorns on each shoulder persisting in adults. **Colour:** dorsal side uniform beige to light brown, except for the semi-transparent snout area; ventral side white, usually with a blackish blotch on tip of snout, fading in adults.

Size: Maximum total length 265 cm, and a weight of about 78 kg (Joal, Senegal), commonly 200 cm with a weight of 25 kg. Males mature between 138 and 154 cm total length, females mature between 153 and 164 cm total length; size at birth about 34 cm total length.

Habitat, biology, and fisheries: A coastal guitarfish, resting on sandy and muddy bottoms, mainly in shallow waters but occasionally down to 80 m depth, also in bays and estuaries. An active swimmer when hunting prey; young feed on benthic fishes (flatfishes and apodes) and crustacea, adults are more selective, feeding mainly on crustacea. Ovoviviparous, with litters of 20 pups (female of 252 cm total length), commonly 6 or 7 pups, both oviducts are functional. Probably the most common guitarfish in the area. Caught with gill and trammel nets, also with lines and bottom trawls. The flesh is eaten fresh, dried-salted and smoked, the fins have high value and are exported to Asia. Due to the growing demand of the shark-fin trade, the catches of guitarfishes have been increasing in the area. In some regions, the large specimens are targeted by sport anglers in surfcasting. Listed as Endangered in the IUCN Red List.

Distribution: Only in the eastern central Atlantic from Portugal to Angola, and in the Mediterranean Sea.

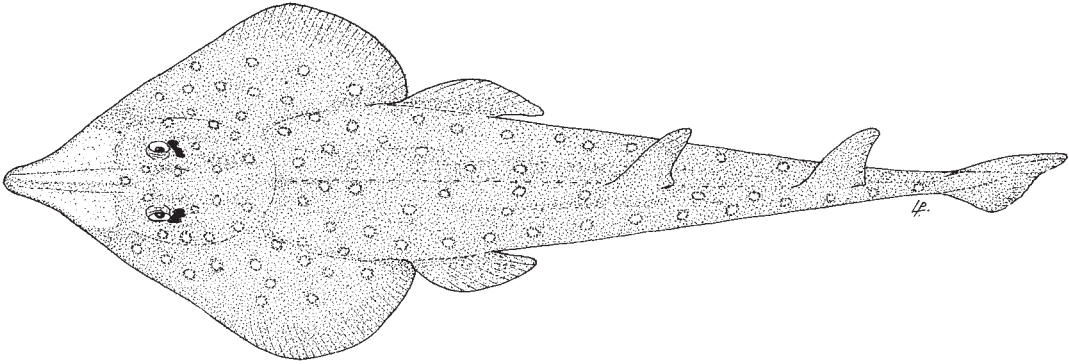
Remarks: This species has been placed in the new family Glaucostegidae, but the original family designation at the time of writing has been retained for the sake of organization.



***Rhinobatos albomaculatus* Norman, 1930**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Whitespotted guitarfish; Fr – Poisson-guitare à lunaires; Sp – Guitarra pecosa.



Diagnostic characters: A guitarfish with a **typical wedge-shaped snout**, forming an angle of about 60°; **rostral ridges separated by a large interspace throughout their length**; preorbital length distinctly shorter than distance from rear margins of orbits to pectoral insertions; 2 dermal folds on posterior margin of spiracles; **anterior nasal flaps extending onto internasal space to about level of inner corner of nostrils**; thornlets around orbit and in mid-dorsal row from nape to first dorsal fin and between dorsal fins, reducing in number and size with growth so that only a mid-dorsal row of small and blunt thornlets persists in adults. **Colour:** dorsal side khaki-brown with a **pattern of numerous small, circular, bluish white spots with blackish rims, symmetrically arranged on disc and trunk**; ventral side plain white.

Size: Maximum total length 80 cm, commonly 50 to 60 cm total length (it is the smallest West African guitarfish); males mature at about 46 cm total length, females at about 52 cm total length. Size at birth about 15 cm total length.

Habitat, biology, and fisheries: Coastal waters, over sandy bottom, down to about 35 m depth. A sluggish bottom-dweller, feeding on benthic invertebrates, mainly shrimps. Ovoviparous with litters of 2 or 3 pups only. Listed as Vulnerable in the IUCN Red List due to susceptibility to capture and declines reported in similar species.

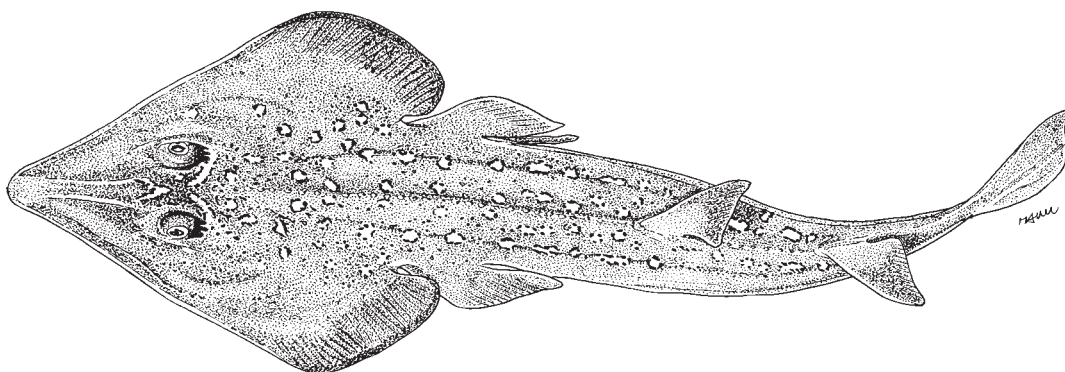
Distribution: Only in the eastern central Atlantic, from southern Senegal to Angola.



Rhinobatos irvinei Norman, 1931

Frequent synonyms / misidentifications: None

FAO names: En – Spineback guitarfish; Fr – Raie-guitare d'Irvine; Sp – Irvine guitarra.



Diagnostic characters: A guitarfish with a **typical wedge-shaped disc, snout elongate and pointed**, forming an angle of about 50°, **rostral ridges separated by a relatively large interspace; preorbital length shorter than distance from rear margin of orbits to pectoral insertions**. Tail shark-like, not demarcated from disc. Posterior margin of spiracles with 2 dermal folds, **anterior nasal flaps not extending onto internasal space**, but confined to anterior margin of nostrils; caudal fin without a distinct lower lobe. Skin with tiny dermal denticles, no thorns on snout, a few thorns in front of orbits, over spiracles and 3 on shoulders; a mid-dorsal row of blunt and flattened thorns from nape to first dorsal fin and a few between dorsals. **Colour** : dorsal side greenish brown with a **distinct pattern of numerous white irregular blotches rimmed with dark spots, arranged in rows on trunk and forming a typical X marking on interorbital space**, black dots scattered on body; ventral side white.

Size: Maximum total length about 100 cm; commonly 60 to 66 cm total length. Males mature at about 42 cm total length.

Habitat, biology, and fisheries: A little known guitarfish, occurring on soft bottoms in shallow waters. A sluggish bottom-dweller feeding on benthic invertebrates, mainly crustacea. Ovoviviparous, litters of 1 or 3 pups. Listed as Vulnerable in the IUCN Red List.

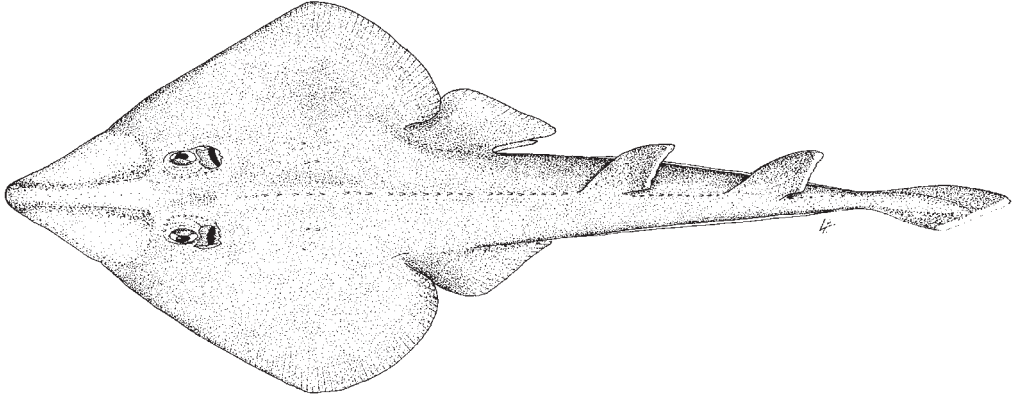
Distribution: In the eastern central Atlantic from Western Sahara to southern Angola, with an unconfirmed record in Morocco; record from Namibia needs confirmation.



***Rhinobatos rhinobatos* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Common guitarfish; Fr – Raie-guitare commune; Sp – Guitarra común.



Diagnostic characters: A guitarfish with a typical wedge-shaped disc, snout elongated and pointed, forming an anterior angle of about 60°, rostral ridges widely separated throughout their length. **Preorbital length distinctly shorter than distance from rear margin of orbits to pectoral insertions**, tail shark-like, not demarcated from disc. Posterior margin of spiracles with 2 dermal folds, **anterior nasal flaps not extending onto internasal space**, but confined to anterior margin of nostrils; caudal fin without a distinct lower lobe; body covered with small dermal denticles, no thorns on snout tip but some enlarged denticles along rostral ridges, thornlets around orbits, a mid-dorsal row of small thorns from nape to first dorsal fin and between dorsal fins, and 2 or 3 thorns on each shoulder persisting in adults; thorn pattern more developed in young. **Colour:** dorsal side uniform khaki-brown to reddish brown with a faint pattern of greenish longitudinal stripes on trunk, sometimes a V or X marking on interorbital space resembling that of *Rhinobatos irvenei*; rostral area semi-translucent; ventral side white.

Size: Maximum total length about 100 cm (a female of 977 mm total length from Senegal weighed 2.7 kg, a gravid 1 of 955 mm total length weighed 3.4 kg). Males mature at about 56 cm total length and females at about 64 cm total length. Size at birth about 25 cm total length.

Habitat, biology, and fisheries: A coastal guitarfish found over soft bottoms in shallow waters, but occasionally down to about 90 m depth. A sluggish bottom-dweller. Feeds on benthic invertebrates (mainly crustacea) and fishes (mainly apodes). Ovoviviparous with litters of 2 to 7 pups (commonly 3 to 5), both oviducts are functional. Locally abundant, caught with gill and trammel nets, also with beach seines, longlines and bottom trawls. The flesh is eaten fresh, dried-salted and smoked, fins are also marketed although they are relatively small. Listed as Endangered in the IUCN Red List due to pressure from fisheries and observed declines in similar species.

Distribution: Only in the eastern Atlantic from Bay of Biscay to Angola, and in the Mediterranean Sea.

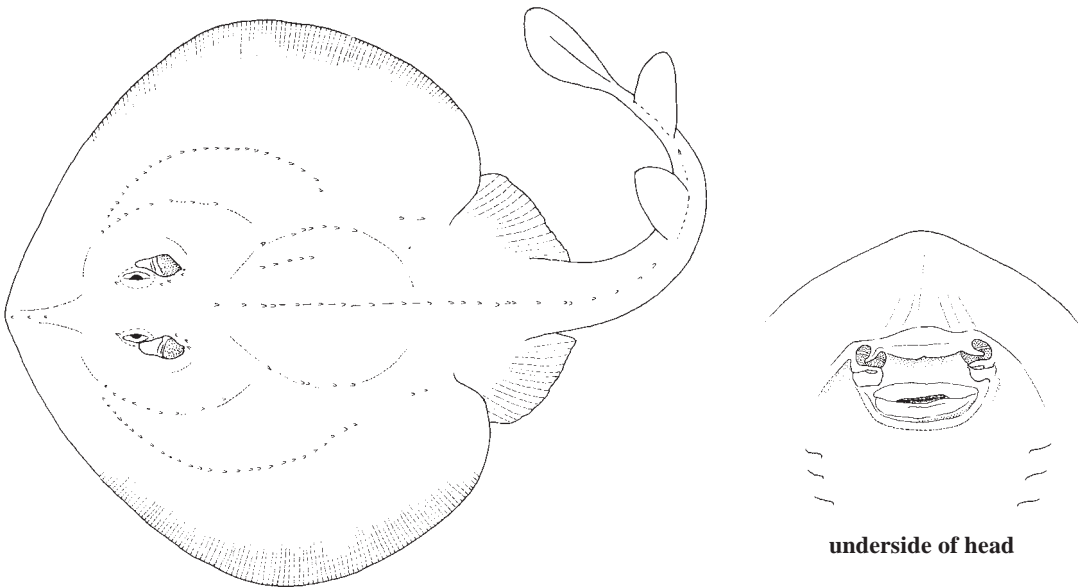


ZANOBATIDAE

Panrays

by B. Séret, Institut de Recherche pour le Développement and Muséum National d'Histoire Naturelle, Paris, France

Diagnostic characters: Small to moderate-sized batoids (up to about 60 cm total length) with large pectoral fins forming a **heart-shaped or subcircular, flattened disc**; **snout short and blunt angled**; **tail slender, depressed and demarcated from disc**. Pelvic fins developed, and exposed in dorsal view: pectoral posterior margin covering only pelvic-fin origins. **Two relatively small, equal-sized dorsal fins on posterior tail**, with rounded apex and convex posterior margin; first dorsal-fin origin well behind free rear tip of pelvic fins. **Caudal fin elongated and rounded**, without a distinct lower lobe. Five small gill slits on ventral side of the head. Eyes on top of head, just in front of large spiracles. Mouth small, straight and transverse. Numerous small oral teeth, rounded-oval, without cusps on their crowns. **Nostrils well developed, just in front of mouth, and connected to it by a groove**; **nasal flaps (anterior nasal valves) extending onto internasal area and only separated from each other by a short space**; nasal lobes (posterior nasal valves) enlarged and cornet-shaped. Body densely covered with tiny dermal denticles giving the skin a silky aspect, and with a pattern of thorns and thornlets on snout, around orbits, on nape-shoulder area, in concentric rows on pectoral fins and in mid-dorsal row on trunk and tail. **Colour:** dorsal side brownish or greenish, with variegated pattern of dark brown blotches and transverse bars, sometimes with some white or black dots; ventral side creamy white to yellowish, with or without dark posterior pectoral and pelvic margins, sometimes a few dark blotches scattered on belly; oronasal and gill area sometimes darker.



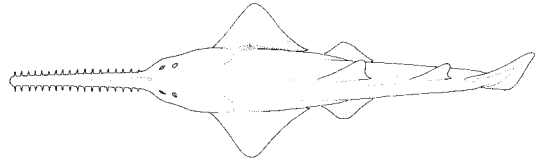
Habitat, biology, and fisheries: Panrays are coastal batoids found from shallow waters to about 100 m depth on the continental shelf. They are bottom dwellers that feed on small invertebrates including crustaceans, worms and molluscs. Ovoviviparous with only the right oviduct functional, litters from 1 to 4 pups, short gestation periods of about 5 months. They are caught as bycatch, mainly in bottom-trawls and gillnets. Their meat is not utilized because they are extremely difficult to skin, thus they are always discarded by fishermen. Listed as Data Deficient on the IUCN Red List.

Similar families occurring in the area

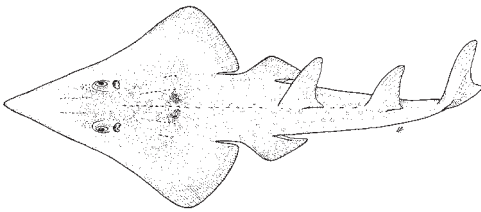
Pristidae: body shark-like; snout extremely prolonged into a stout blade, armed laterally of strong rostral teeth, resembling a saw.

Rhinidae: body shark-like, disc triangular with snout wedge-shaped or broadly rounded, tail very massive and not demarcated from trunk; dorsal fins large and falcate, caudal fin with a strong ventral caudal lobe.

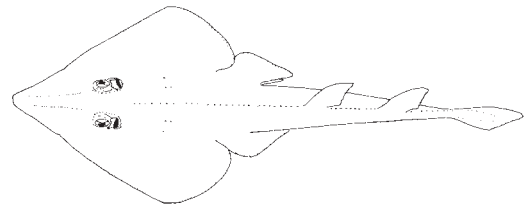
Rhinobatidae: body more or less shark-like; disc triangular with snout wedge-shaped, tail relatively massive and not demarcated from trunk; dorsal fins moderate in size and not falcate, caudal fin with no pronounced lower lobe.



Pristidae



Rhinidae



Rhinobatidae

Key to species of Zanobatidae occurring in the area

- 1a. Small growing species (up to 36 cm total length); disc heart-shaped; several concentric series of thorns on pectoral fins; disc with numerous dark brown blotches often surrounded by lines of small white spots, faint transverse dark bars; dermal denticles arrow-shaped. ***Zanobatus sp. n.***
(Gulf of Guinea only)
- 1b. Medium-sized species (about 60 cm total length); disc subcircular with a short angled snout; only a few series of thorns on pectoral fins, mainly on basal cartilages; disc with a few brown blotches and several conspicuous transverse bars; dermal denticles ovoid and flat ***Zanobatus schoenleinii***
(from Morocco to Angola)

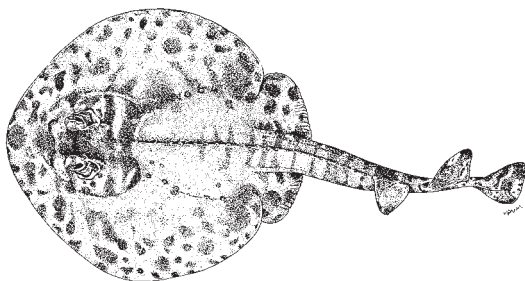


Fig. 1 *Zanobatus sp.n.*

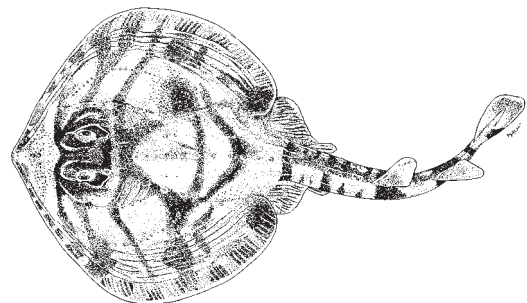




Fig. 2 *Zanobatus schoenleinii*

List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Zanobatus schoenleinii* (Müller and Henle, 1841).
Zanobatus sp. n Séret (in prep.).

Remarks

These species of zanobatids includes a single genus with only 2 species in the area, one described and another one under description. The family Zanobatidae was defined by Fowler (1928) and subsequently the genus *Zanobatus* was placed in the family Platyrrhinidae or subfamily Platyrrhininae of Rhinobatidae by various authors. A phylogenetic analysis based on skeletal and muscular characters made by McEachran *et al.* (1996) showed that *Zanobatus* should indeed be separated from the other platyrrhinids, hence the resurrection of the family Zanobatidae.

These species of zanobatids occur only in the eastern Atlantic, from Morocco to Angola; the record from India is doubtful and needs confirmation.

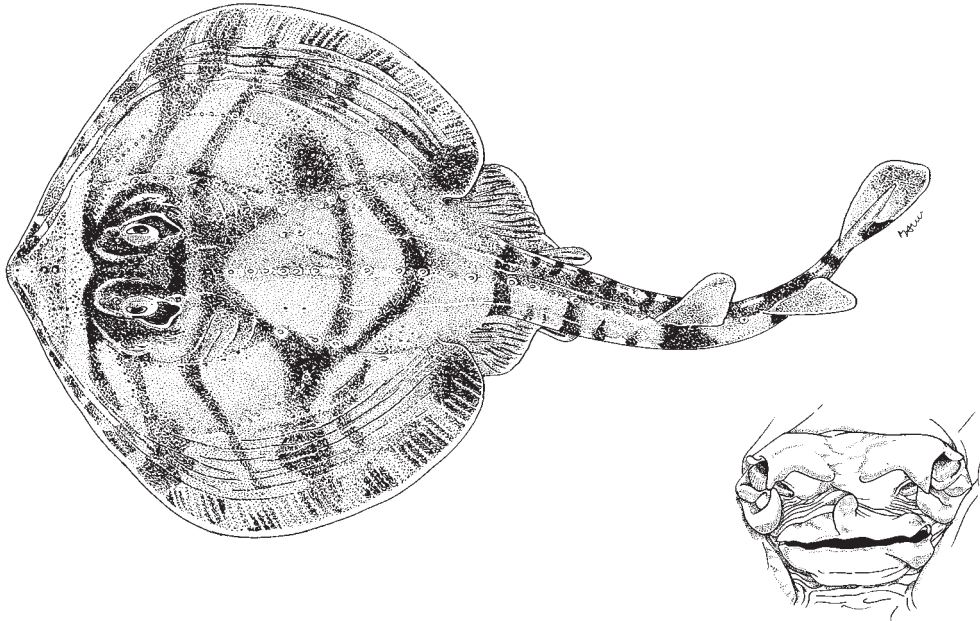
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***Zanobatus schoenleinni* (Müller and Henle, 1841)**

Frequent synonyms / misidentification: *Platyrhinoidis atlantica* Chabanaud, 1928.

FAO names: En – Striped panray; Fr – Raie tigrée; Sp – Raja de Altura.



oronasal area

Diagnostic characters: Medium-size panray with a **flat subcircular disc, snout short and obtuse, tail thick but relatively slender and demarcated from disc**, semicircular in cross-section with ventral side flat. Eye and spiracle on top of head and close together, spiracles large and without dermal folds on posterior margin. Nostrils and mouth on ventral side. Nostrils large and connected to mouth by a groove; nasal flaps (anterior nasal valves) extending onto internasal area and only separated from each other by a short space; nasal lobes (posterior nasal valves) enlarged and horn-shaped. Mouth small, straight and transverse with thick lips, and a dermal knob on upper jaw symphysis. Numerous small oral teeth, the number of rows increasing with the total length, thus varying from 65 to 110. Body densely and entirely covered with tiny denticles, their crown ovoid and flat, without cusps or ornamentations, giving the skin a silky aspect. Thorns and thornlets on disc arranged in series of rows on snout, around orbits, in arched rows on pectoral basal cartilages (pro-, meso- and metapterygium), and **1 or 2 concentric arched rows on centre of pectoral fins**, a mid-dorsal row from nape to first dorsal fin, some between dorsal fins and on caudal peduncle, additional rows of small thornlets may occur on outer pectoral fins. Number of trunk vertebrae 28 to 32, total number of vertebrae 127 to 147, number of pectoral radials 79 to 83. **Colour:** dorsal side variable, grey-brown, brownish to greenish with a **typical pattern of dark brown blotches and transverse bars on disc**; some dark cross-bars may occur on tail, no white dots but sometimes black dots peppered on disc; tip of thorns brown; ventral side also variable, creamy white to yellowish, with or without dark posterior pectoral and pelvic margins, sometimes with a few brown blotches scattered on belly, oronasal and gill area may be darker, ochre to reddish brown.

Size: Maximum total length about 60 cm, common between 40 and 50 cm total length (length of 100 cm previously published was overestimated). A female of 54 cm total length weighs 1.4 kg (Senegal). Females mature at 37 to 40 cm total length, males at about 30 cm total length. Size at birth about 19 cm total length.

Habitat, biology, and fisheries: In shallow coastal waters of the eastern central Atlantic, down to 40 m depth, but mainly between 10 and 15 m, over sandy bottoms. It is an active bottom-dweller feeding on benthic invertebrates, mainly shrimp. Ovoviviparous with litters from 1 to 4, usually 2 pups, always developing in the right oviduct, although both ovaries produce oocytes, the left one is often more developed than the right one; gestation period short, about 5 months. Caught, sometimes in great numbers, as bycatch in artisanal and coastal fisheries with gillnets and bottom-trawls, but they are discarded because their meat, although edible, is not utilized, panrays being very hard to skin.

Distribution: Only in the eastern central Atlantic, from Morocco to Angola. Record from India doubtful.



Order TORPEDINIFORMES

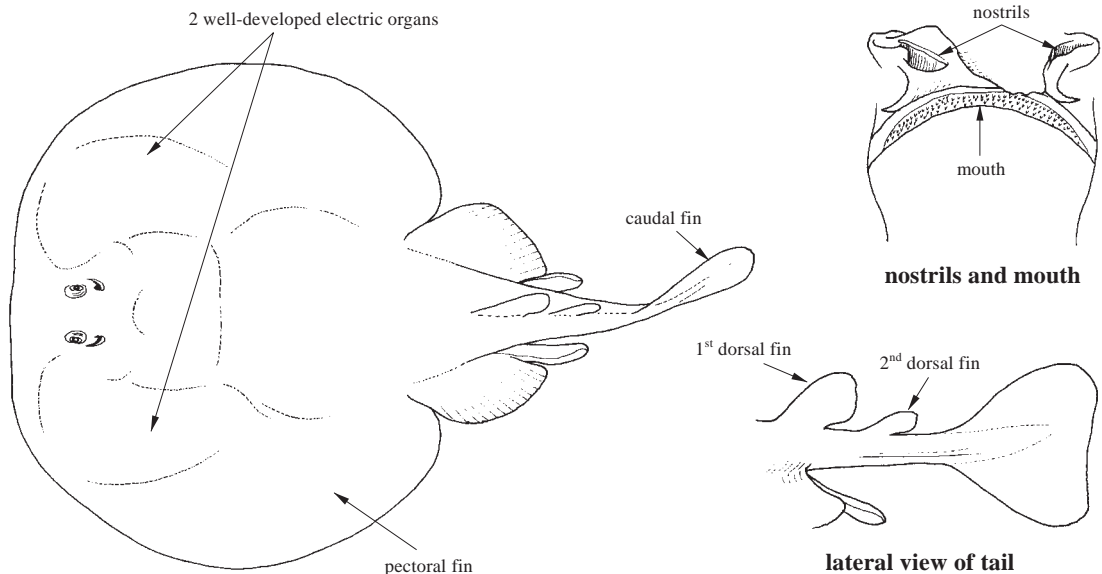
TORPEDINIDAE

Electric rays

by M.R. de Carvalho, Universidade de São Paulo, São Paulo, Brazil and

B. Séret, Institut de Recherche pour le Développement and Muséum National d'Histoire Naturelle, Paris, France

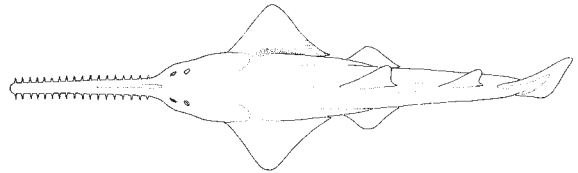
Diagnostic characters: Batoid fishes of small to moderately large size (total length to about 180 cm, but most species less than 100 cm in total length). Precaudal (body) region very depressed and flattened; head, trunk and enlarged pectoral fins forming a more or less circular disc. **Anterior contour of disc straight, truncated or slightly arched**, with an extremely short snout. Eyes and spiracles relatively small or moderately developed and close together on top of disc. Posterior and lateral margins of spiracles smooth or with papillae; pseudobranchial folds present inside anterior spiracular border. Nostrils transverse or subcircular and relatively large, closer to mouth than to anterior margin of snout, and connected to mouth by nasoral grooves; **anterior narial lobes expanded posteriorly and medially to form joint nasal curtain continuous in front of mouth, partly overlapping mouth posteriorly; nasal curtain with smooth posterior margin, but sometimes with a small lobe or indentation. Mouth of moderate size and usually very arched, not flanked by longitudinal furrows, but sometimes with grooves at corners; well-developed labial cartilages absent; oral teeth small, numerous (ranging from 25 to 70 rows in adults) and monocuspid, in quincunx arrangement along each jaw; tooth cusp relatively sharp. Five small gill slits ventrally on anterior half of disc; gillrakers absent. Pectoral fins very thick and fleshy near margin, completely attached from sides of head to just posterior to origin of pelvic fins; disc about as wide as long. Two well-developed and kidney-shaped electric organs, visible externally on either side of head and middisc region; electric organs with an irregular honeycomb pattern of stacked electric plates or discs. Pelvic fins broadly rounded and not subdivided into anterior and posterior lobes. Tail very stout and shark-like, strongly demarcated from disc, usually shorter than disc length, with cutaneous fold on both sides along lower lateral margin; precaudal tail somewhat depressed; caudal stings or serrated spines lacking from dorsal tail surface. No electric organs in tail. Two dorsal fins with first distinctly larger than second; first dorsal fin located partially or totally above pelvic-fin base; dorsal fins with rounded-angular apices; caudal fin very large, larger than dorsal fins, subtriangular, and with upper and lower lobes continuous around vertebral column, sometimes separated by slight indentation; upper and lower lobes of caudal fin more or less equal in dimensions. Skin very soft and naked, entirely devoid of dermal denticles, thorns or tubercles. **Colour:** dorsal surface uniformly dark grey, brown or blackish, or with various light and dark ornamentations (ocelli, spots, mottlings, vermiculations) on variable shades of brown or grey; ventral surface usually lighter or whitish, often with dark margin of disc and pelvic fins.**



Habitat, biology, and fisheries: Torpedo rays form a relatively diverse assemblage, with some 20 to 25 species currently recognized as valid. They inhabit continental shelves from tropical to temperate latitudes circumglobally, usually to depths of about 100 m, and most commonly occur in shallow water coastal regions. Some species, however, occur at depths of up to 750 m (*Tetronarce macneilli* in Australia). Torpedos are unable to penetrate freshwater and are also usually absent from estuarine areas. Generally, they are sluggish benthic fishes, frequently covering themselves at least partially with sand or mud to ambush prey, but they are capable of intense, rapid bursts of energy to hunt. Torpedos may also be observed swimming slowly in the water column, usually at night, where they may actively hunt by overswimming prey items that are quickly immobilized by their electric organ discharges. Prey items are grasped by their pectoral discs, which serve to push prey items into their capacious mouths. Food consists of ray-finned fishes and invertebrates living on the bottom, and torpedos may ingest prey items considerably larger than expected. This is because their jaws and mouths are highly distensible, providing a surprisingly wide gape that allows torpedos to ingest relatively large prey items whole. The electric organs can discharge up to 45 volts, depending on the size of the ray, and are used to stun prey and to defend themselves against predators. Some of the larger species may also make rather long migrations. All species are viviparous without placentae. Some 10 species occur in our area, half of which are undescribed (these are presently being described elsewhere by the authors). Caught as bycatch in trawls, and less so by hook-and-line. Torpedo rays have a low market acceptance and are not regularly consumed. They are harmless unless interacted with, and can deliver a strong shock to the unwary when being captured.

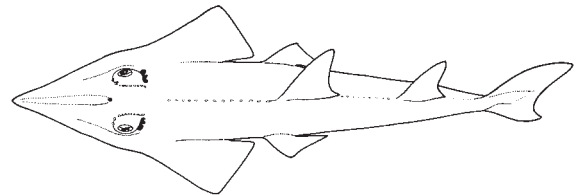
Similar families occurring in the area

Pristidae: body shark-like, with pectoral fins mostly separate from head; margin of pectoral fins not thick, soft, or flaccid; long snout forming rostral saw present; eyes and spiracles situated partially laterally on head; partially or totally covered with scales (denticles); nasal curtain absent; no electric organs in pectoral fins.



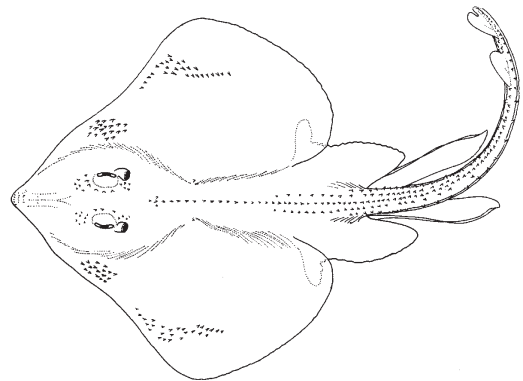
Pristidae

Rhynchobatidae, Rhinobatidae, Zanobatidae: body shark-like, demarcation of tail from disc not as abrupt (especially in Zanobatidae); pectoral fins only moderately expanded; snout strongly angular, anterior disc margin not straight; tail longer than disc; margin of disc not thick, soft, or flaccid; partially or totally covered with scales (denticles); nasal curtain absent in forms from the area; no electric organs in disc.



Rhynchobatidae

Other rays (Rajidae, Dasyatidae, Gymnuridae, Myliobatidae, Rhinopteridae, Mobulidae): disc margin very thin; no electric organs in disc; snout broadly angular, anterior disc margin not straight; tail slender to whip-like; numerous dermal denticles, thorns or serrated caudal stings present.









Rajidae

Key to the species of Torpedinidae occurring in the area (only described species are included)

- 1a. Margins of spiracles smooth, without distinct rim, knobs or papillae; dorsal coloration greyish brown, violet-brown or blackish brown, without distinct and regular whitish spots or markings ***Tetronarce nobiliana***
- 1b. Margins of spiracles with low but distinct rim, and few to numerous knobs or papillae; dorsal coloration with variegated pattern of blotches, spots and/or vermiculations → 2
- 2a. Margin of spiracles with low but distinct rim, lacking knobs or papillae; dorsal coloration with numerous small, scattered whitish spots also forming irregular ocellated white markings not much larger than spiracles, over a uniform reddish brown background ***Torpedo mackayana***
- 2b. Margin of spiracles with distinct knobs or papillae → 2
- 3a. Spiracular papillae knob-like, not very elongated (especially in adults); dorsal disc coloration with very distinct, usually symmetrically arranged ocelli (ranging from just a few to 7 or slightly more, but usually 5) which have lighter whitish outlines and dark bluish centres ***Torpedo torpedo***
- 3b. Spiracular papillae elongated, tentacular and not knob-like; dorsal disc coloration without bluish ocelli → 4
- 4a. Extremities of spiracular papillae not converging in centre of spiracular lumen, and usually ranging from 9 to 11; eye diameter about equal to interspiracular distance; very distinctive vivid colour pattern consisting of numerous rosette-like ocelli included in reticulated pattern ***Torpedo bauchotae***
- 4b. Extremities of spiracular papillae converging in centre of spiracular lumen, and usually ranging from 7 to 9; eyes diameter about 1.5 times interspiracular distance; dorsal coloration brown to reddish brown usually with variable mottling giving a marble-like pattern ***Torpedo marmorata***

List of species occurring in the area^{1/}

The symbol  is given when species accounts are included

-  *Tetronarce nobiliana* (Bonaparte, 1835).
-  *Torpedo bauchotae* Cadenat, Capapé and Desoutter, 1978.
-  *Torpedo mackayana* Metzelaar, 1919.
-  *Torpedo marmorata* Risso, 1810.
-  *Torpedo torpedo* (Linnaeus, 1758).
- Torpedo* sp. 1 (under description by Séret and Carvalho).
- Torpedo* sp. 2 (under description by Séret and Carvalho).
- Torpedo* sp. 3 (under description by Séret and Carvalho).
- Torpedo* sp. 4 (under description by Séret and Carvalho).

^{1/} *Torpedo* and *Tetronarce* are used as full genera according to Séret and Carvalho (in prep).

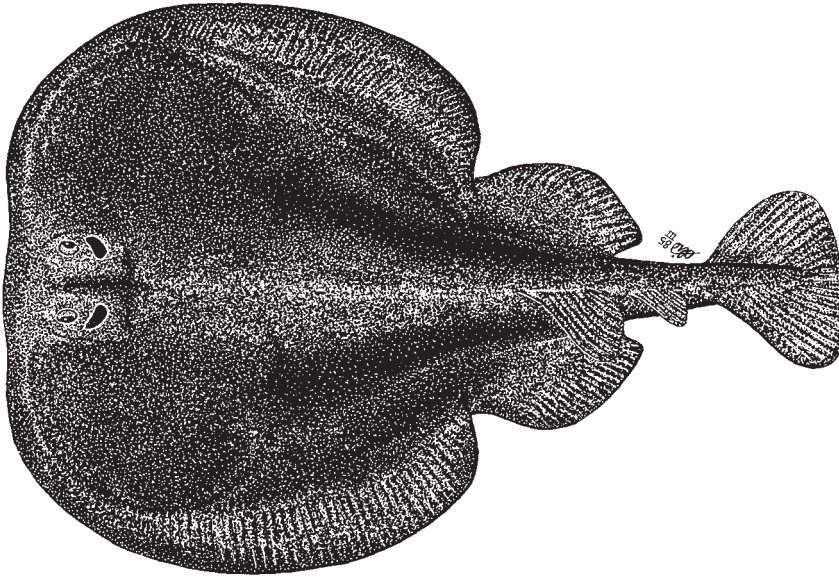
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***Tetronarce nobiliana* Bonaparte, 1835**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Atlantic torpedo; Fr – Torpille noire; Sp – Tremolina negra.



Diagnostic characters: A large-size electric ray with a **fleshy and thick body**, a **subcircular disc**, snout short anterior to eyes; tail thick and short; wide at base, tapering rearward, with 2 well-developed dorsal fins; **the first one distinctly larger than the second**; caudal fin large and triangular with 2 well-developed vertical lobes; pelvic fins with broadly convex outer margin. **Skin totally naked** (without dermal denticles) above and below. Eyes small, just in front of spiracles. **Spiracles with smooth margin** (without tentacles or papillae). A pair of conspicuous pores (pores of endolymphatic canals) side-by-side on nuchal region. **Colour: uniform dark chocolate to purplish brown above**, white below with dark brown margins.

Size: Maximum total length about 180 cm; maximum weight 90 kg.

Habitat, biology, and fisheries: Benthopelagic, depth range from 2 to 350 m. Mainly on soft bottoms of the outer shelf and upper slope, but adults are likely to be found well over the bottom. Reported to migrate long distances. Feeds mainly on bony fishes. Ovoviviparous. Can produce powerful electric shocks up to 20 volts. No interest to fisheries, occasionally caught as bycatch by deep-trawling fisheries.

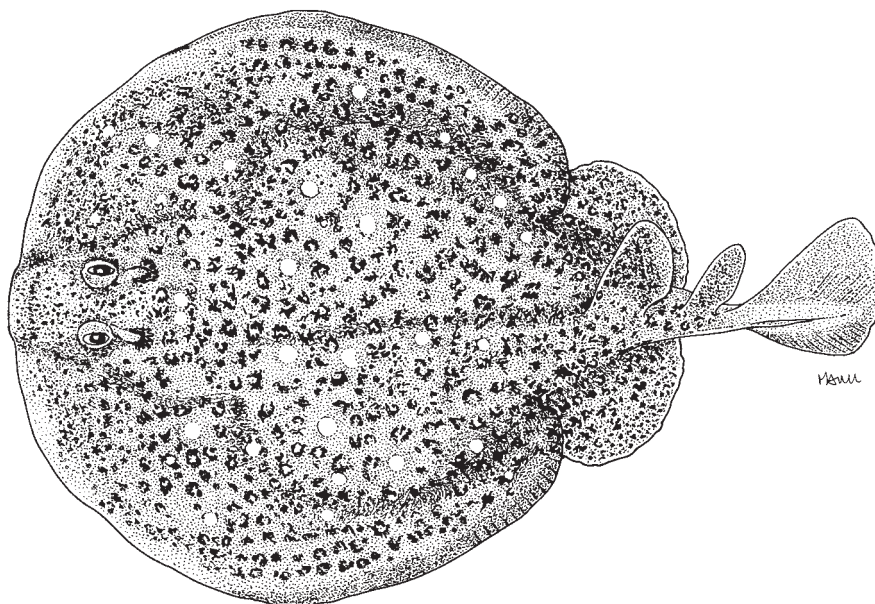
Distribution: In the eastern Atlantic, from Scotland to South Africa, and in the Mediterranean Sea. Also in the western Atlantic from Nova Scotia to Brazil.



Torpedo bauchotae Cadenat, Capapé and Desoutter, 1978

Frequent synonyms / misidentifications: None / None.

FAO names: En – Rosette torpedo; Fr – Torpilla à rosettes; Sp – Tremolina.



Diagnostic characters: A medium-size electric ray with a **fleshy and thick body**, a **subcircular disc**, snout short anterior to eyes; tail thick and short; wide at base, tapering rearward, with 2 well-developed dorsal fins; the first one only slightly larger than the second; caudal fin large and triangular with 2 well-developed vertical lobes; pelvic fins with broadly convex outer margin. **Skin totally naked** (without dermal denticles) above and below. Eyes small, just in front of spiracles. **Spiracles with small tentacles on margins of varying length, sometimes reduced to knob-like papillae**. A pair of conspicuous pores (pores of endolymphatic canals) side-by-side on nuchal region. **Colour:** a very distinctive vivid colour pattern consisting of numerous rosette ocelli included in reticulated patterns.

Size: Maximum total length 60 cm.

Habitat, biology, and fisheries: Benthic, depth range from 5 to 60 m. Ovoviviparous. Rare.

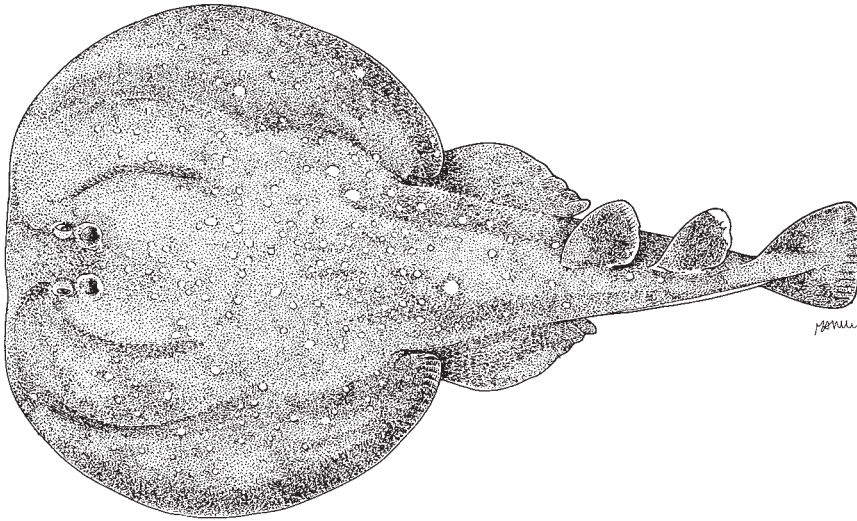
Distribution: In the eastern Atlantic, from Senegal to Angola.



***Torpedo mackayana* Metzelaar, 1919**

Frequent synonyms / misidentifications: None / None.

FAO names: En – McKay's electric ray; Fr – Torpille de McKay; Sp – Tremolina de McKay.



Diagnostic characters: A medium-size electric ray with a **fleshy and thick body**, a **subcircular disc**, snout short anterior to eyes; tail thick and short; wide at base, tapering rearward, with 2 well-developed dorsal fins; the first one only slightly larger than the second; caudal fin large and triangular with 2 well-developed vertical lobes; pelvic fins with broadly convex outer margin. **Skin totally naked** (without dermal denticles) above and below (the "spinous papillae" on the rear margin of pectoral mentioned in literature are tips of pectoral radials). Eyes small, just in front of spiracles. **Spiracles with smooth margins**. A pair of conspicuous pores (pores of endolymphatic canals) side-by-side on nuchal region. **Colour:** greyish brown with some small white blotches irregularly scattered on disc and tail; ventral side white.

Size: Maximum total length about 40 cm.

Habitat, biology, and fisheries: Benthic, depth range between 30 and 50 m. Ovoviviparous.

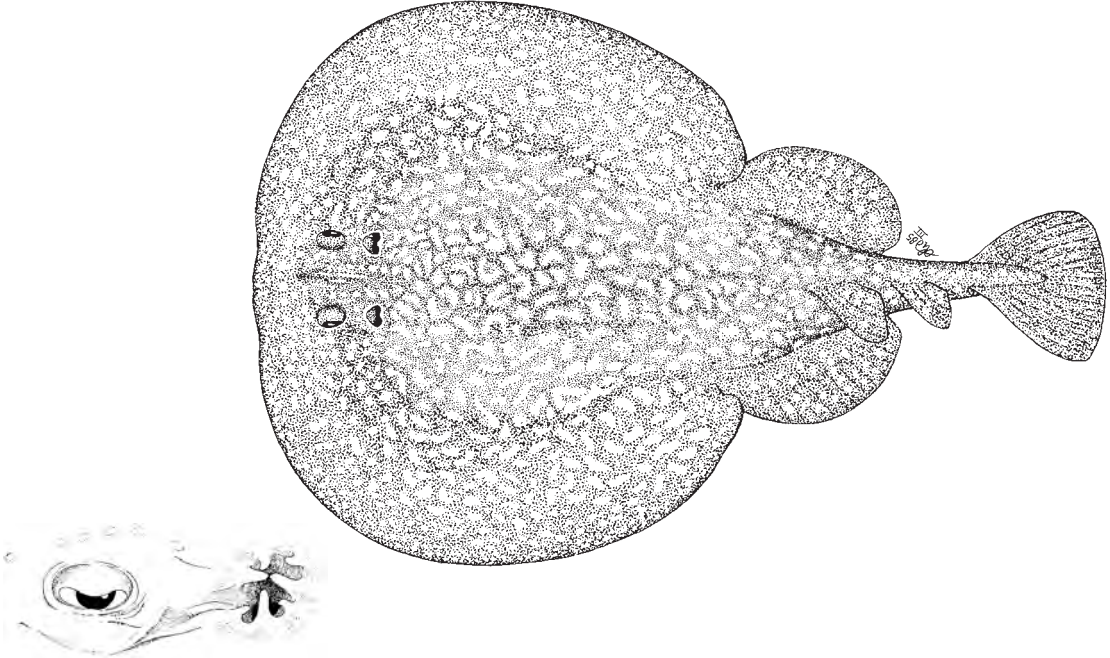
Distribution: In the eastern Atlantic, from Senegal to Congo.



***Torpedo marmorata* Risso, 1810**

Frequent synonyms / misidentifications: None / None.

FAO names: En – Marbled electric ray; Fr – Torpille marbrée; Sp – Tremolina mármol.



eye and spiracle

Diagnostic characters: A medium-size electric ray with a **fleshy and thick body**, a **subcircular disc**, snout short anterior to eyes; tail thick and short; wide at base, tapering rearward, with 2 well-developed dorsal fins; the first one only slightly larger than the second; caudal fin large and triangular with 2 well-developed vertical lobes; pelvic fins with broadly convex outer margin. **Skin totally naked** (without dermal denticles) above and below. Eyes small, just in front of spiracles. **Spiracles typically with 6 to 8 long tentacles, their tips coming close together in centre of spiracular opening**; sometimes length of tentacles variable. A pair of conspicuous pores (pores of endolymphatic canals) side-by-side on nuchal region, as well as 5 additional pores irregularly arranged.

Colour: **brown background with variable mottling or marbling**, but never uniform; ventral side creamy white.

Size: Maximum total length at least to 60 cm. Females mature at about 40 cm total length, males at 29 cm total length. Size at birth 10 to 14 cm total length.

Habitat, biology, and fisheries: Benthic mainly on soft bottoms, sometimes on rocky bottoms; depth range from 2 to 370 m. Feeds on small benthic fishes and invertebrates. Ovoviviparous, litters from 2 to 32 pups, gestation period about 10 months. Caught as bycatch in trawl nets, but discarded as no interest to fisheries. Sometimes kept in public aquariums.

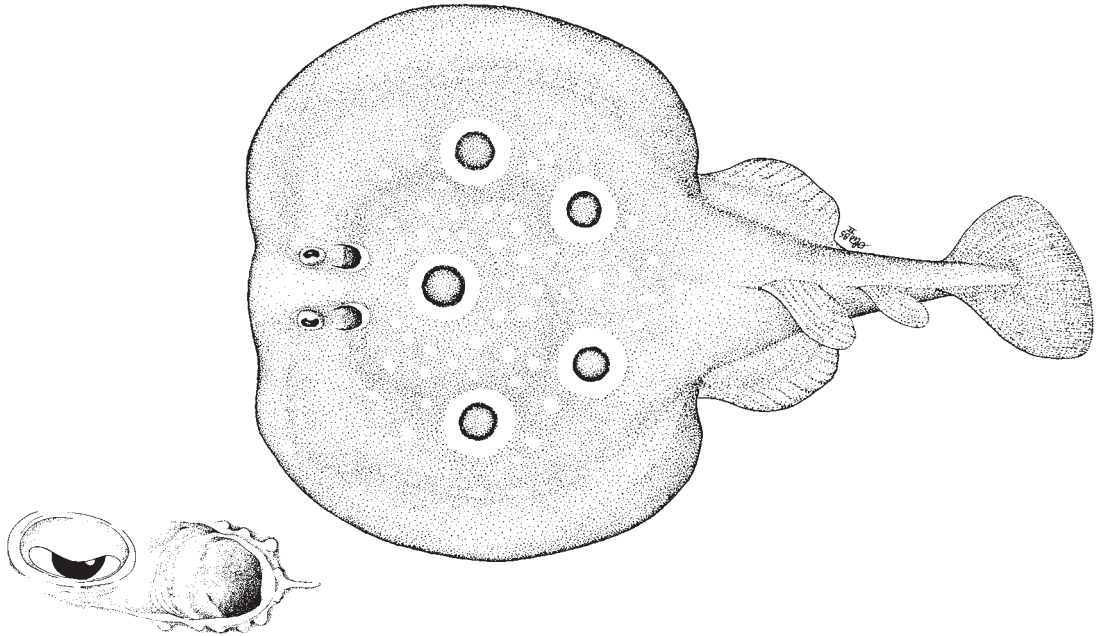
Distribution: In the eastern Atlantic, from British Isles to Cap Blanc, Maritania, and in the Mediterranean Sea.



Torpedo torpedo (Linnaeus, 1758)

Frequent synonyms / misidentifications: None / None.

FAO names: **En** – Common torpedo; **Fr** – Torpille ocellée; **Sp** – Tremolina.



eye and spiracle

Diagnostic characters: A medium-size electric ray with a **fleshy and thick body**, a **subcircular disc**, snout short anterior to eyes; tail thick and short; wide at base, tapering rearward, with 2 well-developed dorsal fins; the first one only slightly larger than the second; caudal fin large and triangular with 2 well-developed vertical lobes; pelvic fins with broadly convex outer margin. **Skin totally naked** (without dermal denticles) above and below. Eyes small, just in front of spiracles. **Spiracles with small tentacles on margins of varying length, sometimes reduced to knob-like papillae.** A pair of conspicuous pores (pores of endolymphatic canals) side-by-side on nuchal region. **Colour:** light brown to reddish brown with a **distinct pattern of ocelli, usually 5** but varying from 0 to 9; consisting of **blue centres, circled by a narrow black ring and surrounded by a larger pale yellowish ring**; often associated with white blotches scattered on disc; ventral side creamy white.

Size: Maximum total length 60 cm. Size at birth 8 to 10 cm total length.

Habitat, biology, and fisheries: Benthic, mainly on soft bottoms, of the inner continental shelf, from seashore to about 70 m depth. Feeds on small benthic fishes and invertebrates. Ovoviviparous, litter from 3 to 21 pups. Can produce electric shocks up to 200 volts. No interest to fisheries. Regularly caught as bycatch in trawlnets, but discarded as no interest to fisheries. Sometimes kept in public aquariums.

Distribution: In the eastern Atlantic, from Bay of Biscay to Madeira and in the Mediterranean Sea; records from the Azores, Canary Islands, and coast of Africa likely misidentifications.



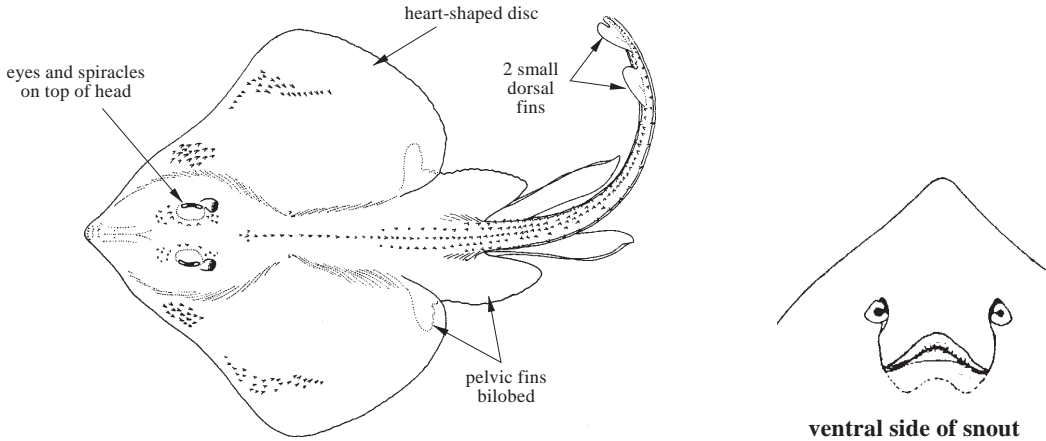
Order RAJIFORMES**RAJIDAE****Skates**

by J.D. McEachran, Texas A & M University, USA and

B. Séret, Institut de Recherche pour le Développement and Muséum National d'Histoire Naturelle, Paris, France

D **Diagnostic characters:** Batoid fishes of very small size (20 to 30 cm total length for *Fenestraja*) to moderately large size (more than 200 cm total length for *Bathyraja*, *Dipturus* and *Rostroraja*). Body strongly depressed: **head, trunk, and broadly expanded pectoral fins forming a rhomboid or heart-shaped disc**. Pectoral fins fused to sides of head and trunk from tip to about midlength of snout to insertion of pelvic fins. **Tail moderately slender, distinctly demarcated from disc**, with a narrow longitudinal fold along each side; **tail length less than 2 times disc width**. Snout ranging from acutely angled to obtusely rounded. Front of cranium extending as a rostral bar, which is stout to very delicate; anterior pectoral-fin rays either extending to tip of snout (species with delicate rostral bar) or to about two-thirds length of snout (species with stout rostral bar). Eyes and spiracles on top of head, spiracles immediately behind eyes and **with pseudobranchial folds on anterior walls**. Nostrils small and located near front of mouth; **anterior lobes expanded posteriorly as large nasal curtains that are joined to a broad isthmus in front of mouth**. Mouth transverse to strongly bowed (generally more strongly arched in mature males than in mature females or juveniles). Numerous small teeth in bands in jaws, obtuse to pointed and showing sexual dimorphism in many species; placed either in pavement pattern or in parallel rows or in combination of both. Two small dorsal fins far posterior on tail, or rarely 1 or both dorsal fins absent; caudal fin near tip of tail and consists of narrow fold on dorsal surface of tail, and occasionally present on ventral surface as low fold or ridge. **Pelvic fins bilobed or rarely with single lateral lobe, 2 lobes separate by more or less deep notch along outer margin or anterior lobe completely separate from posterior lobe**. Dorsal surface densely to sparsely covered with denticles and variously covered with small to moderately large thorns; latter usually arranged in patches, or rows, but often in 1 to several distinct regions; at least a median row of thorns along tail (except some *Anacanthobatis* and *Malacoraja* species); mature males generally possess alar and malar thorns (claw-like thorns that either reside in slits or grooves in the integument [alar thorns] or located on the integument [malar thorns] along the anterior margin of the disc. Ventral surface smooth or with denticles on snout and along anterior margin of disc, or more or less covered with denticles, and rarely with some thorns. Squamation varies with growth, age, and sex. **Colour:** dorsal surface ranging from nearly white to brownish black, and often patterned with small to large spots, bars, reticulations, or ocelli or in combinations of these. Ventral surface uniformly dark or light, or mottled with both, or a light centre of the disc is bordered with dark; some species with darkly pigmented sensory pores. Generally deep-water skates plain dark coloured on both sides; shallow-water species are mainly white ventrally and often extremely variegated on dorsal surface. Colour and pattern may vary within species depending on nature of substrate.

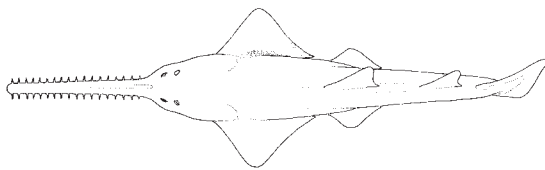
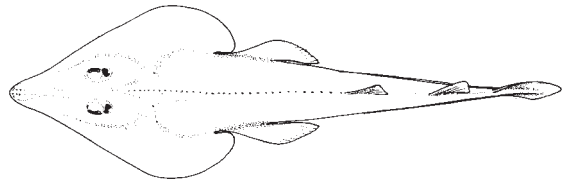
Within most species proportional measurements and squamation vary with growth. In most cases, small juveniles have relatively short snouts, long tails, and few and relatively large thorns. Adults of these species have relatively long snouts, short tails, and more and relatively small thorns. Intermediate sized specimens of these species have intermediate values of snout length, tail length, and number and size of thorns. In many species length ratio of anterior to posterior pelvic fin lobes is less in mature males than in mature females or juveniles. In males the posterior pelvic lobe apparently lengthens in relation to clasper development. Small juvenile *Leucoraja* and *Rajella* species have a reduced triangular patch of thorns over the nuchal and scapular region that consists of several strong nuchal thorns and single strong thorns over each scapula. Thorns within the triangular areas circumscribed by these thorns develop with growth. Thus in the key below presence or absence of a triangular patch of thorns over the nuchal and scapular region does not distinguish small specimens of *Leucoraja* and *Rajella* species from species of *Raja* that possess scapular and nuchal thorns. For all of the above reasons, small juvenile specimens of many species are difficult to identify.



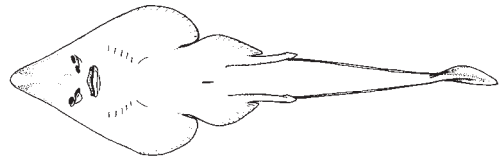
Habitat, biology, and fisheries: Skates are widely distributed in all oceans from the Arctic to the Antarctic and from shallow coastal waters to abyssal depths (3 000 m); they are rare over inner continental and insular shelves in tropical latitudes, and are absent in the vicinity of coral reefs. Species are predominantly marine; some species enter brackish waters, but only a single species enters freshwater. They are bottom dwellers typically with small ranges but some of the larger species occur over several ocean basins. Skates predominately feed on a wide variety of bottom- and near bottom-dwelling invertebrates and fishes. All species are oviparous and deposit large fertilized eggs in leathery egg capsules (mermaid's purses). They are the most diverse of the batoid taxa in number of species, geographic distribution, and depths inhabited. However, not much data concerning the general biology of many species are available. There is a commercial fishery on skates in several parts of the world but not in the area. Only the wings of skates are used for human consumption in fresh, salted, or smoked form.

Similar families occurring in the area

Pristidae, Rhinobatidae: body shark-like, tail massive and not distinctly demarcated from body or disc; pectoral fins moderately enlarged.

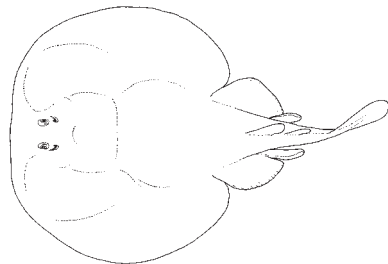


Pristidae



Rhinobatidae

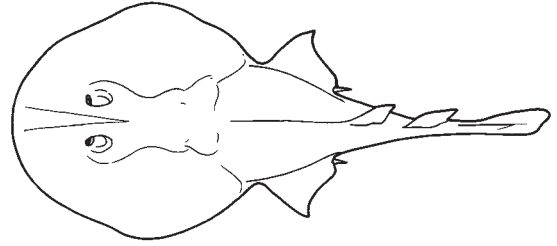
Torpedinidae: disc thick and with fleshy margins, well-developed electric organs along sides of head; tail massive and not demarcated from disc; no denticles or thorns on body.



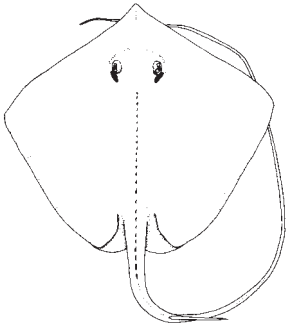
Torpedinidae

Narcinidae: disc moderately thick and with fleshy margins, well-developed electric organs along sides of head; tail massive and not demarcated from disc; no denticles or thorns on body.

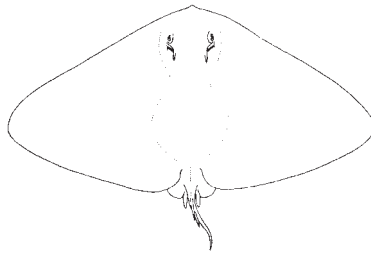
Dasyatidae, Gymnuridae, Myliobatidae, Rhinopteridae, Mobulidae: pelvic fins with single lobe; tail in most species very long and whip-like distally; usually 1 or more greatly enlarged and serrated spine(s) on tail; no pseudobranchial folds in spiracles.



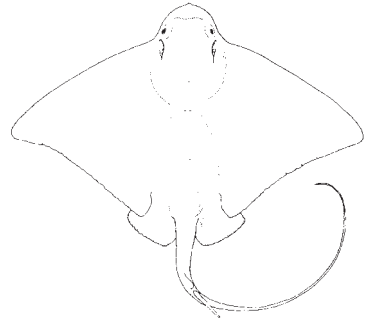
Narcinidae



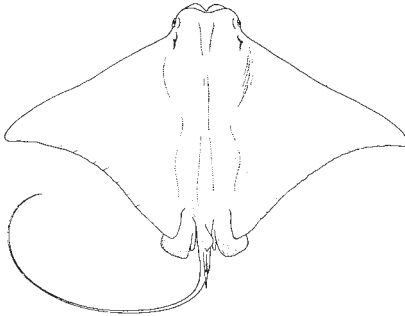
Dasyatidae



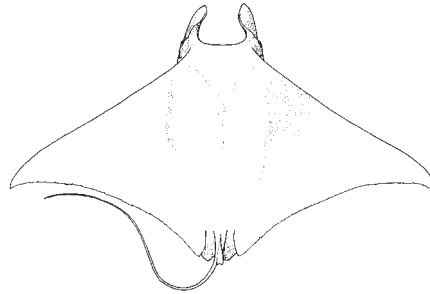
Gymnuridae



Myliobatidae



Rhinopteridae

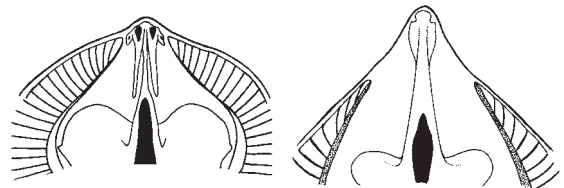


Mobulidae

Key to species of Rajidae occurring in the area

1a. Distal half of snout flexible, rostral cartilage distally very slender; anterior margin of pectoral-fin rays extending nearly to tip of snout (*Bathyraja*, *Neoraja*) (Fig. 1a) . . . → 2

1b. Distal half of snout firm, rostral cartilage moderately stout to stout; anterior pectoral-fin rays distinctly separated from tip of snout (Fig.1b) → 5



a) *Bathyraja*, *Neoraja*

b)

Fig. 1

- 2a. Thorns present on dorsal surface of disc along inner margin of orbits, along midline of nape, and over shoulder regions; more than 30 tooth rows in upper jaw; maximum size about 35 cm total length ***Neoraja africana***
- 2b. Thorns absent on dorsal surface of disc, small specimens may have few orbital thorns; less than 30 tooth rows in upper jaw; maximum size about 100 cm total length → 3
- 3a. Ventral side of disc predominately white to light coloured; except margin of disc and tail dark and dark spots between gill openings ***Bathyraja smithii***
- 3b. Ventral side of disc predominately dark brown or dark grey → 4

- 4a. Anterior pelvic lobe 80 to 90% of length of posterior lobe (Fig. 2); midrow of tail with 15 to 17 moderate sized thorns; generally a single thorn between dorsal fins; ventral surface without spinules or denticles; maximum size about 90 cm total length ***Bathyraja hesperaficana***
- 4b. Anterior pelvic lobe less than 70% of length of posterior lobe (Fig. 2); midrow of tail with 12 to 14 small thorns; no thorns between dorsal fins; ventral surface covered to some degree with denticles and spinules; maximum size about 175 cm total length ***Bathyraja richardsoni***

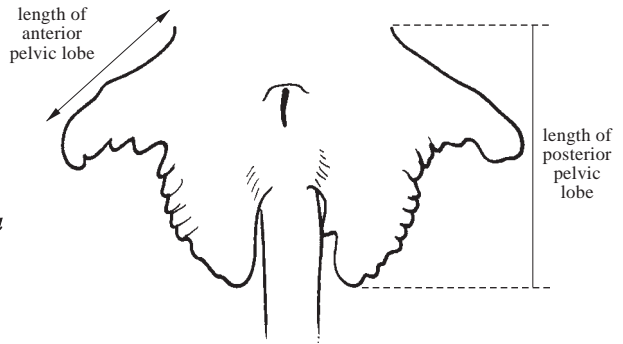


Fig. 2 pelvic lobes

- 5a. Snout moderately to extremely elongated, anterolateral margin of disc concave (line connecting tip of snout to anterior aspect of lateral corner of disc free of disc) (Fig. 3a); internarial width usually less than 70% of distance from tip of snout to anterior margin of nare → 6
- 5b. Snout generally not elongated, anterolateral margin of disc straight to slightly convex (line connecting tip of snout to anterior aspect of lateral corner of disc intersecting disc) (Fig. 3b); internarial width usually more than 70% of distance from tip of snout to anterior margin of nare → 11

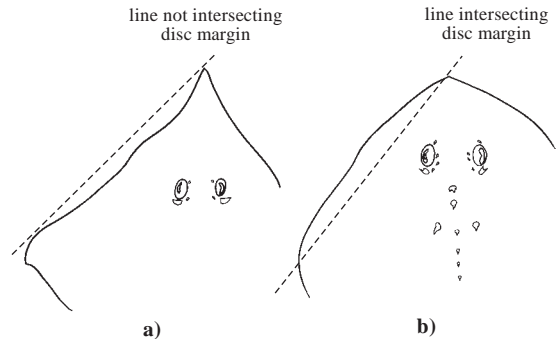


Fig. 3

- 6a. Ventral surface of disc predominately white, with greyish to blackish margin; ampullar pores (sensory pores) and canals on ventral surface of disc not darkly pigmented ***Rostroraja alba***
(large juveniles and adults)
- 6b. Ventral surface variably dark; ampullar pores (sensory pores) and often ampullar canals on ventral surface of disc generally darkly pigmented (***Dipturus***) → 7

- 7a. Tail relatively narrow to broad; tail not tapering, and often widening toward first dorsal fin, tail width at base equal or greater than at midlength (Fig. 4a) → 8
- 7b. Tail relatively narrow; tail tapering toward first dorsal fin, tail width at base greater than tail width at midlength (Fig. 4b) → 9

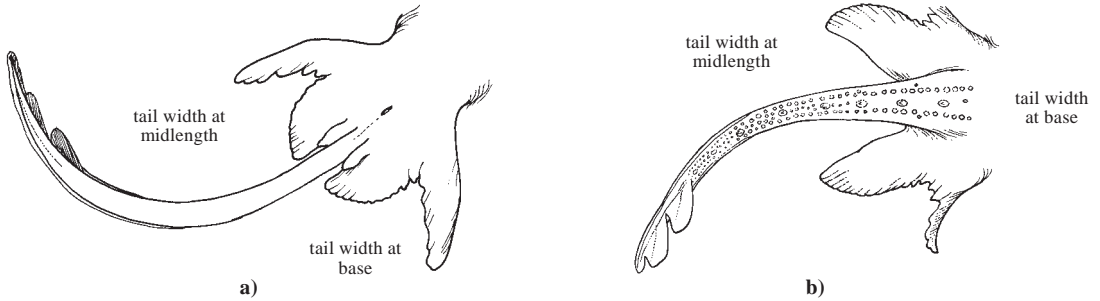


Fig. 4

- 8a. Distance from tip of snout to middle of cloaca equal to or shorter than distance from middle of cloaca to tip of tail *Dipturus* sp.
- 8b. Distance from tip of snout to middle of cloaca greater than distance from middle of cloaca to tip of tail *Dipturus doutrei*
- 9a. Dorsal surface of disc uniform dark brown; ventral surface of disc uniform dark brown and often covered with blackish mucous; dorsal midline of tail with 40 to 50 small thorns; ventral surface of disc nearly uniformly covered with denticles . . . *Dipturus nidarosiensis*
- 9b. Dorsal surface of disc patterned with dark and/or light spots; or dusky blotches; ventral surface of disc patterned with dark blue greyish and brown colours, never covered with blackish mucous; dorsal midline of tail with 5 to 30 thorns; ventral surface of disc naked except for denticles on head and along anterior margin of disc. → 10
- 10a. Upper jaw with 30 to 40 tooth rows; interorbital width 14 to 18% preorbital length *Dipturus oxyrinchus*
- 10b. Upper jaw with 40 to 60 tooth rows; interorbital width 25 to 40% preorbital length . . . *Dipturus batis*
- 11a. Thorns lacking on tail and on disc behind shoulder region *Malacoraja spinacidermis*
- 11b. Thorns present on tail and, to some degree on disc behind shoulder region → 12

- 12a. Triangular patch of thorns present over nuchal and shoulder region (*Leucoraja, Rajella*) (Fig. 5a) → 13
- 12b. Triangular patch of thorns absent over nuchal and shoulder region (several nuchal thorns and 1 or 2 scapular thorns are present in some species of *Raja* but a distinct triangular patch over region is absent) (Fig. 5b) → 21

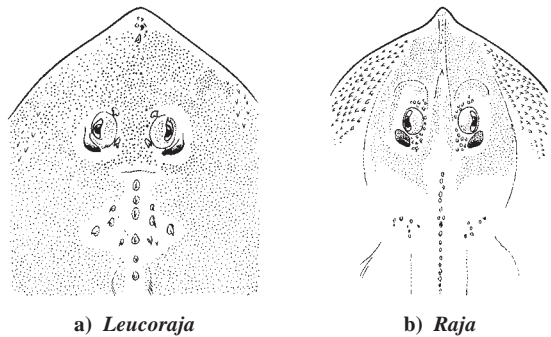


Fig. 5 thorn patches

- 13a.** Dorsal surface of disc with pair of ocelli (circular or oval spots surrounded by 1 or more rings), and with 2 or more of colours expressed in pattern lacking from remainder of disc) ***Leucoraja naevus***
- 13b.** Dorsal surface of disc without pair of ocelli → 14
- 14a.** More than 50, usually more than 60 rows of teeth in upper jaw. → 15
- 14b.** Fewer than 50 rows of teeth in upper jaw. → 17
- 15a.** Dorsal surface of disc plain coloured or with faint dark spots and blotches. ***Rajella leoparda***
- 15b.** Dorsal surface of disc with white spots, or blotches or light blotches → 16
- 16a.** Dorsal surface with 4 to 6 distinct, symmetrically arranged, pairs of creamy white spots surrounded by narrow dark ring; ventral surface uniformly white ***Leucoraja circularis***
- 16b.** Dorsal surface with several indistinct, symmetrically to randomly arranged, white spots or light blotches; ventral surface ranging from mostly white with dark markings to nearly uniformly dark ***Leucoraja leucosticta***
- 17a.** Single row of thorns along midline of disc and tail ***Rajella bathyphila***
- 17b.** Several rows of thorns along midbelt of disc and tail, middle row distinctly largest in juveniles but middle row smaller or lacking in adults → 18
- 18a.** Distance from centre of cloaca to origin of first dorsal fin at least 110% of distance from centre of cloaca to tip of snout ***Rajella bigelowi***
- 18b.** Distance from centre of cloaca to origin of first dorsal fin equal to or shorter than distance from centre of cloaca to tip of snout → 19
- 19a.** Preorbital length 10.5 to 13% total length; snout angle 100 to 120° ***Rajella barnardi***
- 19b.** Preorbital length 13 to 15% total length; snout angle 90 to 100° → 20
- 20a.** Ventral side of disc white, with broad dark margin from outer corners to posterior margin; ventral side of tail greyish brown, except for distal section under dorsal and caudal fins that is white or mottled with dark; tip of snout with few thorns ***Rajella dissimilis***
- 20b.** Ventral side of disc white to pale ochre, with outer margins only slightly darker; ventral side of tail uniformly darker than ventral side of disc or mottled with dark, except origin of tail white and tip mottled with white; tip of snout without thorns or thornlets . . . ***Rajella ravidula***
- 21a.** Dorsal surface of disc plain coloured, no pattern (small juveniles). ***Rostroraja alba***
- 21b.** Dorsal surface of disc with dark spots and blotches forming marbled, banded, or reticulate pattern, or with 1 or more pairs of dark rings or ocelli → 22
- 22a.** Dorsal surface of disc solely patterned with pair of dark rings, and occasionally pair of less distinct darks rings on posterior section of disc ***Raja africana***
- 22b.** Dorsal surface of disc patterned with dark spots and blotches forming marbled, banded, or reticulate pattern, or with ocelli → 23
- 23a.** One or more pairs of ocelli (dark ring enclosing pigment spot not represented on remainder of dorsal surface) on centre of pectoral fins → 24
- 23b.** No ocelli on dorsal surface of disc → 25

- 24a.** Ocelli on centre of pectoral fins consist of blue spot encircled by dark ring *Raja miraletus*
- 24b.** Ocelli on centre of pectoral fins consist of creamy spot encircled by dark ring *Raja herwigii*
- 25a.** Dorsal surface of disc variegated, with light spots, irregular blotches, or bands that run more or less parallel to disc margin, or run across disc → **26**
- 25b.** Dorsal surface of disc spotted, blotched, marbled, or reticulated with dark and light markings, often including dark rings → **28**
- 26a.** Dorsal surface of disc patterned with light bands more or less parallel to disc margin; interorbital width 150 to 200% of horizontal diameter of orbit (width greater in adults than in juvenile specimens) *Raja microocellata*
- 26b.** Dorsal surface of disc patterned with transverse dark bands and light spots; interorbital width 100 to 170% of horizontal diameter off eye → **27**
- 27a.** Dorsal surface of disc ochre to greyish brown, with strongly oblique undulating dark bands bordered by small white spots; ventral surface of disc white; ventral surface of tail greyish brown; ventral surface without denticles except for snout, anterior margin of disc and tail *Raja undulata*
- 27b.** Dorsal surface of disc dark brown, with pattern of irregular light spots or blotches forming broad undulating transverse bands alternating with narrower unspotted bands; ventral surface of disc white centrally and grey on snout and along broad margin of disc, with black blotches on tip of snout, axil of pectoral fins, tip of anterior pelvic lobe, and tip of tail; ventral surface largely covered with denticles in juveniles and usually totally covered with denticles in adults *Raja maderensis*
- 28a.** Dorsal surface of disc patterned with numerous small dark spots extending to margin of disc; 60 to 90 tooth rows in upper jaw. *Raja brachyura*
- 28b.** Dorsal surface of disc patterned with dark or light dots, spots and blotches but patterns do not extend to margins of disc; usually less than 50 tooth rows, occasionally up to 60, in upper jaw. → **29**
- 29a.** Ventral surface of disc white with broad dark margin, dark pigment on posterior lobe of pelvic fins, central sections of pectoral fins, branchial region, belly, and cloaca, or ventral surface uniform dark; ventral surface of tail marbled dark and white → **30**
- 29b.** Ventral surface of disc uniform white, with or without pale greyish margin; ventral surface of tail white → **31**
- 30a.** Orbit diameter about 25% of preorbital length; distance from centre of cloaca to tip of tail about equal to distance from tip of snout to centre of cloaca; maturity reached between 500 and 600 mm total length. *Raja straeleni*
- 30b.** Orbit diameter about 32% of preorbital length; distance from centre of cloaca to tip of tail about 110% of distance from tip of snout to centre of cloaca; maturity reached at about 410 and 425 mm total length *Raja rouxi*
- 31a.** Dorsal surface of disc without denticles in juveniles and partially covered with denticles in adults; dorsal surface with thorns limited to midline of disc and tail; ventral surface of disc lacks thorns; dorsal surface of disc brown, with many dark spots that fail to reach margin and frequently concentrated into rings; tail without distinct cross-bars *Raja montagui*
- 31b.** Dorsal surface of disc uniformly covered with denticles in juveniles and adults; dorsal surface with thorns along midline of disc and tail, and large buckler-like thorns scattered over disc in adults; ventral surface may possess buckler-like thorns, especially in adult females; dorsal surface of disc brown to greyish brown, with pattern of dark and light spots and blotches; tail with light and dark cross-bars *Raja clavata*

List of species occurring in the area

The symbol ♠ is given when species accounts are included.

- ♠ *Bathyraja hesperaficana* Stehmann, 1995.
- ♠ *Bathyraja richardsoni* (Garrick, 1961).
- ♠ *Bathyraja smithii* (Müller and Henle, 1841).
- Dipturus* sp. (Mautitania, 1000 m depth, to 420 mm TL).
- ♠ *Dipturus batis* (Linnaeus, 1758).
- ♠ *Dipturus doutrei* (Cadenat, 1960).
- ♠ *Dipturus nidarosiensis* (Storm, 1881).
- ♠ *Dipturus oxyrinchus* (Linnaeus, 1758).
- ♠ *Leucoraja circularis* (Couch, 1838).
- ♠ *Leucoraja leucosticta* (Stehmann, 1971).
- ♠ *Leucoraja naevus* (Müller and Henle, 1841).
- Malacoraja spinacidermis* (Barnard, 1923). (Northwest Africa to Cape Point, South Africa, also from the Iceland-Faroes Ridge in the eastern North Atlantic and above 40° N in the western North Atlantic between 1 000 to 1 400 m depth, to 700 mm TL).
- ♠ *Neoraja africana* (Stehmann and Séret, 1983).
- Raja africana* Capapé, 1977 (Mauritania and Tunisia, 200 m depth, to 375 mm TL).^{1/}
- ♠ *Raja brachyura* Lafont, 1873.^{2/}
- ♠ *Raja clavata* Linnaeus, 1758.
- ♠ *Raja herwigi* Krefft, 1965.
- ♠ *Raja maderensis* Lowe, 1838.
- ♠ *Raja microocellata* Montagu, 1818.
- ♠ *Raja miraletus* Linnaeus, 1758.
- ♠ *Raja montagui* Fowler, 1910.
- Raja rouxi* Capapé, 1977 (Gabon to Congo, 200 to 250 m depth, to 432 mm TL).
- ♠ *Raja straeleni* Poll, 1951.
- ♠ *Raja undulata* Lacépède, 1802.
- ♠ *Rajella barnardi* (Norman, 1935).
- Rajella bathyphila* (Holt and Byrne, 1908) (Rio de Oro, North Atlantic, north of 45° N, 600 to 2 000 m depth, to 900 mm TL).
- Rajella bigelowi* (Stehmann, 1978). (Rio de Oro to Guinea, eastern North Atlantic from Rockall Trough east of British Isles, western North Atlantic Grand Banks to Gulf of Mexico, 650 to 2 200 m depth, to 500 mm TL)
- ♠ *Rajella dissimilis* (Hulley, 1970).
- ♠ *Rajella leoparda* (von Bonde and Swart, 1923).
- ♠ *Rajella ravidula* (Hulley, 1970).
- ♠ *Rostroraja alba* (Lacépède, 1803).

^{1/} Not to be confused with homonym *Raja africana* Bloch and Schneider, 1801, junior synonym of *Urogymnus asperrimus* (Bloch and Schneider, 1801).

^{2/} Not to be confused with homonym *Raja brachyura*, Günther, 1880, junior synonym of *Bathyraja brachyurops* (Fowler, 1910).

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- Stehmann, M.** 1995. First and new records of skates (Chondrichthyes, Rajiformes, Rajidae) from the West African continental slope (Morocco to South Africa), with descriptions of two new species. *Archive of Fishery and Marine Research*, 43: 1–119.

***Bathyraja hesperaficana* Stehmann, 1995**

Frequent synonyms / misidentifications: None / None.

FAO names: En – West African skate; Fr – Raie-caban ouest-africaine; Sp – Ray de Africa del Oeste.

Diagnostic characters: Disc broadly rhombic, about 1.3 to 1.4 times as broad as long; snout moderately obtuse, anterior angle of snout 100° to 116°; anterolateral margin of disc slightly undulated; outer corners abruptly rounded, forming a 90° angle; posterolateral margin slightly convex; posterior corners abruptly rounded.

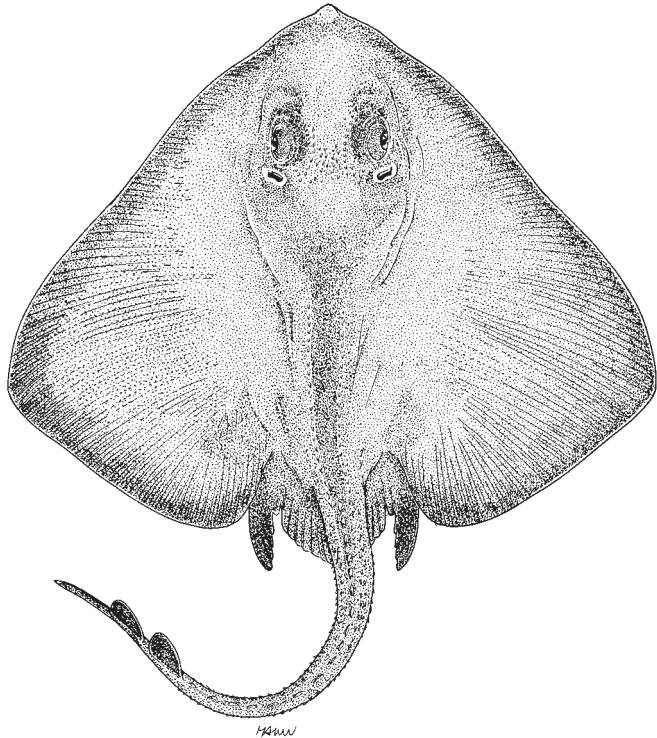
Snout short, preorbital length 11.4 to 12% total length. Mouth is slightly arched; teeth are arranged in 24 or 25 rows in upper jaw. **Pectoral fin radials extend to near tip of snout and anterior half of snout flexible.** Anterior pelvic-fin lobe connected to posterior lobe by membrane, and **anterior lobe broad and flattened and 82 to 91% of length of posterior lobe.** Tail length about 52.5 to 54% total length, lateral tail fold extending from axil of pelvic fins to about midlength of tail; dorsal fins similar in shape and size and separated by interspace equal to 20 to 80% first dorsal-fin base. **Thorns absent on disc but 15 to 17 low thorns occur along midline of tail to origin of first dorsal fin; 1 or 2 small thorns between dorsal fins.** Denticles scattered over margin of disc and on midline of disc from snout to base of tail, **denticles absent on ventral surface.**

Precaudal vertebrae number 34, predorsal caudal vertebrae number 67; pectoral-fin radials number 81. **Colour:** upper surface dusky brownish grey and slightly darker along midline of trunk, orbits, edges of disc, tip of anterior pelvic lobes; dorsal and caudal fins blackish; ventral surface dusky brownish grey and darker along margin of disc and outer margins of posterior pelvic lobes, with anterior nasal lobes, jaws, sides of mouth, and centre of belly white.

Size: Maximum to about 90 cm total length.

Habitat, biology, and fisheries: This species occurs along continental and insular slopes and rises between 750 and 2 000 m.

Distribution: Mauritania and Cape Verde Islands to Gabon.



***Dipturus doutrei* (Cadenat, 1960)**

Frequent synonyms / misidentifications: *Raja doutrei* Cadenat, 1960 / None.

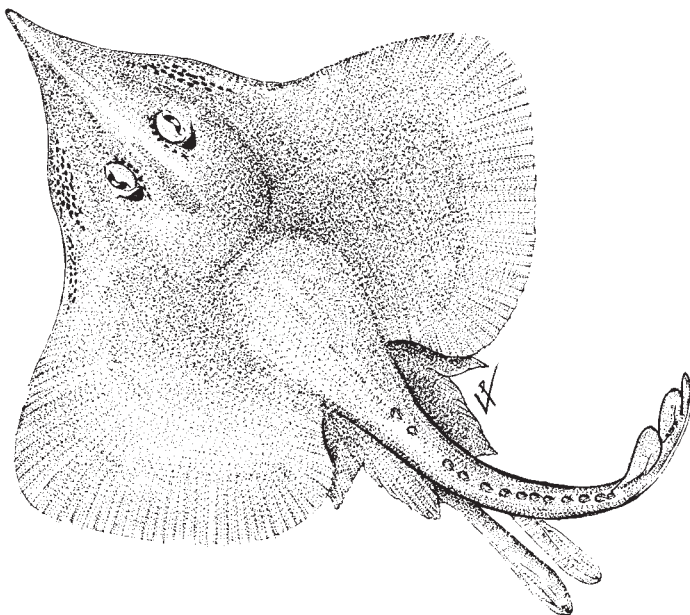
FAO names: En – Violet skate; Fr – Raie violette; Sp – Raya violeta.

Diagnostic characters: Disc rhombic, 1.11 to 1.16 times as broad as long; snout acute, anterior angle of snout 70 to 82°; anterolateral margin of disc strongly concave; outer corners abruptly rounded, forming about an 80° angle; posterolateral margin slightly convex; posterior corners abruptly rounded. **Snout very long, preorbital length 17.8 to 22.8% total length.** Mouth straight to slightly arched; teeth are arranged in 27 to 35 rows in upper jaw. **Pectoral fin radials extend to about midsnout length and anterior half of snout is very stout.** Anterior pelvic fin lobe connected to posterior lobe by membrane, and **anterior lobes narrow and 74 to 109% of posterior lobes.** Tail is relatively massive, depressed, not tapering distally, and length 41 to 46% of total length, lateral tail fold extending from distal third of tail to distal end of second dorsal fin; dorsal fins similar in shape, with first larger than second and separated by interspace equal to 20% first dorsal fin base. **Thorns absent on disc except for single preorbital and single post orbital thorns; tail with 11 to 26 indistinct thorns along midline from base to origin of first dorsal fin; thorns absent between dorsal fins.** Precaudal vertebrae number 43 to 49. **Colour:** dorsal surface is brown with scattered darker blotches; ventral surface brown, with ampullar (sensory) pores darkly pigmented.

Size: Maximum to about 100 cm total length.

Habitat, biology, and fisheries: This species is benthic along outer continental and insular shelves and slopes between 163 and 1 200 m.

Distribution: Mauritania to South Africa.



***Leucoraja leucosticta* (Stehmann, 1971)**

Frequent synonyms / misidentifications: *Raja leucosticta* Stehmann, 1971 / *Leucoraja circularis* (Couch, 1838).

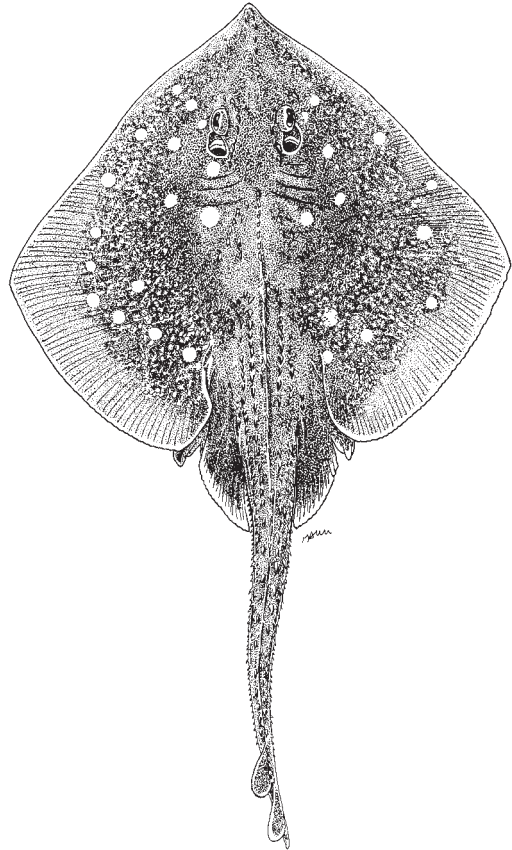
FAO names: En – Whitedappled skate; Fr – Raie à taches laiteuses; Sp – Raya mancha lechoso.

Diagnostic characters: Disc heart-shaped, 1.11 to 1.14 times as broad as long; snout obtuse, anterior angle of snout about 112°; anterolateral margin of disc undulated; outer corners broadly rounded, forming obtuse angle; posterolateral margin broadly rounded, posterior corners abruptly rounded. **Snout moderately long, preorbital length 9.6 to 11.3% total length.** Mouth slightly arched; teeth are arranged in 60 to 69 rows in upper jaw. **Pectoral-fin radials extend to about two-thirds length of snout and anterior half of snout is very stout.** Anterior pelvic-fin lobe connected to posterior lobe by membrane, and **anterior lobes narrow and 63 to 77% of posterior lobes.** Tail is relatively broad and moderately depressed at base and tapering posteriorly, and length 56 to 58% of total length, lateral tail fold extending from anterior third of tail to near tip of tail; dorsal fins similar in shape and size and separated by narrow interspace. **Thorns present on tip of snout, along interorbital margin, in triangular patch over nuchal and scapular region, and along midbelt of disc, posterior to shoulder region, and tail, to origin of first dorsal fin; thorns absent between dorsal fins, midrow of thorns on disc and tail very small.** Denticles present over much of dorsal side of disc and ventral side of snout. Precaudal vertebrae number 33, predorsal caudal vertebrae number 65 to 70; pectoral-fin radials number 76 to 80. **Colour:** dorsal surface dark brown, with symmetrically arranged light or white spots or blotches; ventral surface largely white, except posterior half of margin or disc grey, and tail between base and origin of first dorsal fin grayish to uniformly dark.

Size: Maximum 61 cm total length.

Habitat, biology, and fisheries: This species is benthic along outer continental shelves and upper slopes between 150 and 300 m.

Distribution: Senegal to Gabon.



Neoraja africana (Stehmann and Séret, 1983)

Frequent synonyms / misidentifications: None / None.

FAO names: **En** – West African pygmy skate; **Fr** – Raie-flossade ouest-africaine; **Sp** – Raya pigmeo de Africa del Oeste.

Diagnostic characters: Disc heart-shaped, 1.2 to 1.3 times as broad as long; snout obtuse, anterior angle of snout about 135°; anterolateral margin of disc moderately to strongly undulated; outer corners broadly rounded, forming obtuse angle; posterolateral margin broadly rounded, posterior corners abruptly rounded. **Snout very short, preorbital length 7.6 to 8.7% total length, and with triangular process at tip.** Mouth slightly arched; teeth are arranged in 45 to 49 rows in upper jaw. **Pectoral-fin radials extend to near tip of snout and anterior half of snout is very flexible.** Anterior pelvic-fin lobe is connected to posterior lobes by membrane, and **anterior lobes are narrow, pointed, and equal to or slightly longer than posterior lobes.** Tail is moderately broad and moderately depressed at base and tapering posteriorly, and about 60% of total length, lateral tail fold extending from posterior third of tail to near tip of tail; dorsal fins similar in shape and confluent, and first is larger than second. Course denticles cover most of dorsal surface but not ventral surface; **thorns present along interorbital margin, over nuchal and scapular regions, and series of 17 to 28 thorns along midline from nuchal region to first dorsal fin.** Precaudal vertebrae number 25, predorsal caudal vertebrae number 66 to 68; pectoral-fin radials number 61 to 63. **Colour:** dorsal surface brownish grey, ventral surface whitish on centre of disc and pelvic fins, except blackish brown over anterior gill region and blackish brown blotches on belly; remainder of disc and pelvic fins blackish brown, tail pale ochre.

Size: Maximum to 304 mm total length.

Habitat, biology, and fisheries: This species is benthic along continental and insular slopes between 1 490 and 1 640 m.

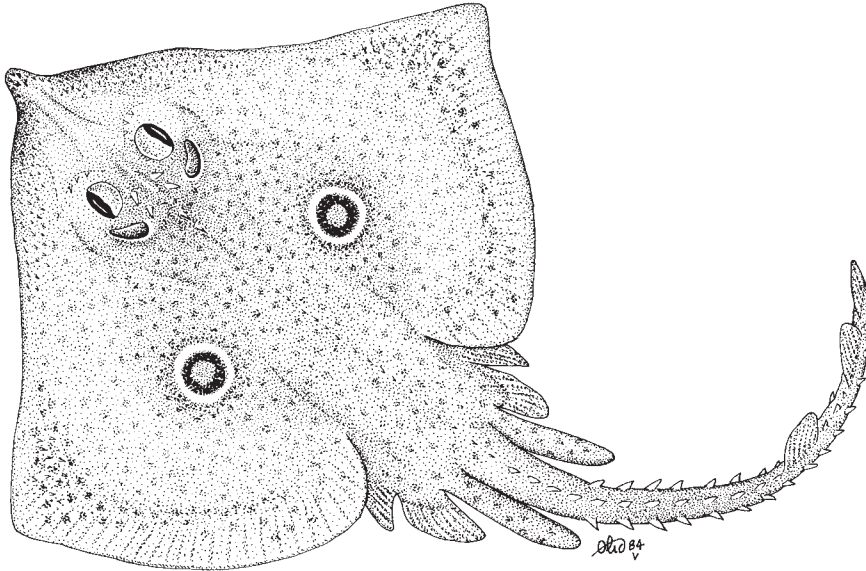
Distribution: Gabon and Rio de Oro.



***Raja miraletus* Linnaeus, 1758**

Frequent synonyms / misidentifications: *Raja ocellifera* Regan, 1906 / None.

FAO names: En – Brown ray; Fr – Raie-miroir; Sp – Raya de espejos.



Diagnostic characters: Disc broadly rhombic, 1.3 to 1.4 times as broad as long; snout moderately obtuse, anterior angle of snout about 110 to 116°; anterolateral margins of disc moderately concave; outer corners broadly rounded, forming slightly obtuse angle; posterolateral margin evenly convex, posterior corners abruptly rounded. **Snout moderately long, preorbital length 9.4 to 13.6% total length.** Mouth slightly arched; teeth are arranged in 34 to 50 rows in upper jaw. **Pectoral-fin radials extend along two-thirds of snout length and anterior half of snout is stout.** Anterior pelvic-fin lobe is connected to posterior lobe by membrane, and **anterior lobes are moderately narrow, blunt, and about half length of posterior lobes.** Tail is moderately broad and moderately depressed at base and tapering posteriorly, and about 55 to 58% of total length, lateral tail fold extending from posterior third of tail to near tip of tail; dorsal fins similar in shape and confluent, and first is larger than second. Denticles sparse on dorsal and ventral surfaces except on ventral side of snout and along anterior margin of disc; **thorns present along interorbital margin, over nuchal and scapular regions, and series of 12 to 27 thorns along midline from nuchal region to first dorsal fin.** Precaudal vertebrae number 24 to 31, predorsal caudal vertebrae number 44 to 52; pectoral-fin radials number 78 to 88. **Colour:** dorsal surface ochre-brown, with small dark spots confined to inner two-thirds of disc and tricoloured ocellus centred on each pectoral fin, ocellus has blue centre surrounded by narrow black inner ring and outer yellow or orange ring; ventral surface white.

Size: Maximum to 627 mm total length.

Habitat, biology, and fisheries: This species is benthic on continental and insular shelves and upper slopes to about 300 m.

Distribution: Northern Portugal to Durban, South Africa, including Mediterranean, Madeira, and the Canary Islands.



***Raja straeleni* Poll, 1951**

Frequent synonyms / misidentifications: None / *Raja rouxi* Capapé, 1977.

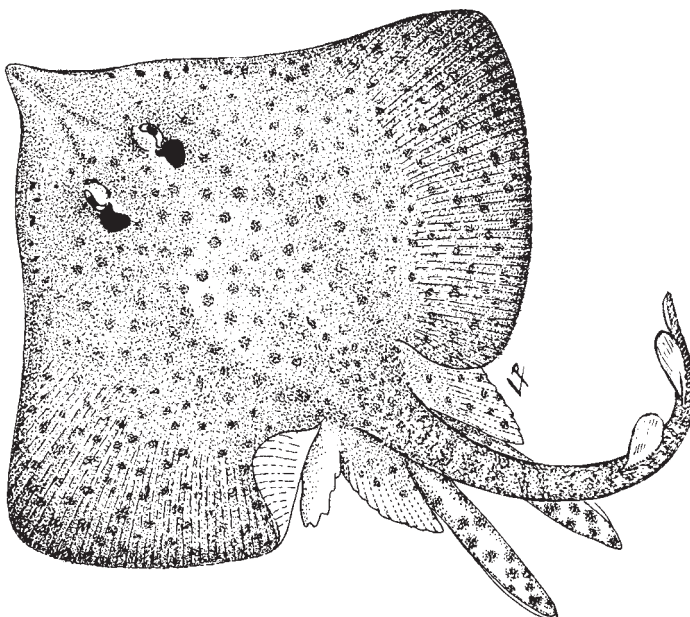
FAO names: En – Biscuit skate; Fr – Raie tachetée; Sp – Raya manchada.

Diagnostic characters: Disc broadly rhombic, 1.2 to 1.4 times as broad as long; snout moderately obtuse, anterior angle of snout about 92 to 111°; anterolateral margins of disc moderately undulating; outer corners abruptly rounded, forming slightly obtuse angle; posterolateral margin evenly convex, posterior corners abruptly rounded. **Snout moderately long, preorbital length 11.3 to 14.1% total length.** Mouth moderately arched; teeth are arranged in 33 to 41 rows in upper jaw. **Pectoral-fin radials extend along two-thirds of snout length and anterior half of snout is stout.** Anterior pelvic-fin lobe is connected to posterior lobe by membrane, and **anterior lobes are moderately narrow, blunt, and about two-thirds to three-fourths length of posterior lobes.** Tail is moderately broad and moderately depressed at base and tapering posteriorly, and about 51 to 58% of total length, lateral tail fold extending from anterior third of tail to near tip of tail; dorsal fins similar in shape and size, and separated by distance equal to about half to three-fourths first dorsal-fin base length. Denticles cover most dorsal surface except for centres of pectoral fins; **thorns present along interorbital margin, over nuchal and scapular regions, and along midline of disc from nuchal region to first dorsal fin.** Precaudal vertebrae number 24 to 31, predorsal caudal vertebrae number 46 to 55; pectoral-fin radials number 73 to 81. **Colour:** dorsal surface brown with dark brown to black spots and blotches symmetrically arranged over disc and tail, occasionally with transversely oblong gold and black ocelli on centre of each pectoral fin; ventral surface sooty grey, with margin of disc and posterior pelvic-fin lobes dark, tail white, dark, or marbled light and dark.

Size: Maximum size 850 mm total length.

Habitat, biology, and fisheries: This species is benthic on outer continental and insular shelves and slopes between 80 and 800 m.

Distribution: Rio de Oro, Mauritania to South Africa.



Rajella barnardi (Norman, 1935)

Frequent synonyms / misidentifications: *Rajella confundens* Hulley, 1970 / *Rajella leoparda* (von Bonde and Swart, 1923).

FAO names: **En** – Bighorn skate; **Fr** – Raie grande épine; **Sp** – Raya de grande espina.

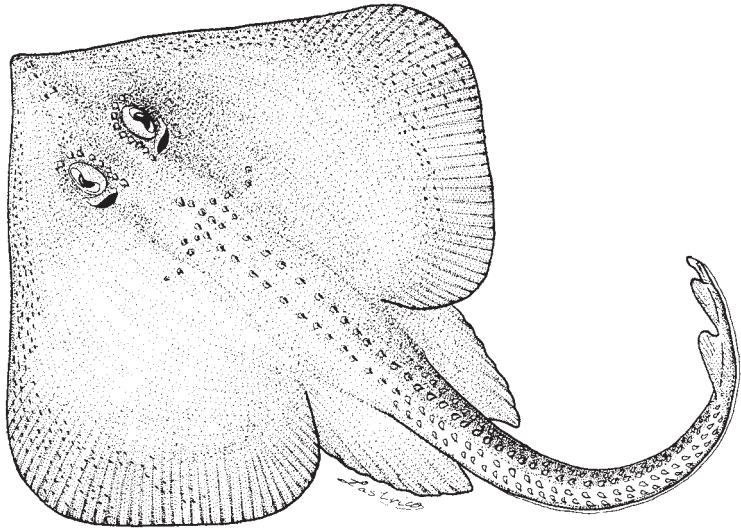
Diagnostic characters: Disc heart-shaped, about 1.2 times as broad as long; snout moderately obtuse, anterior angle of snout 90 to 120°; anterolateral margins of disc moderately undulating; outer corners broadly rounded, forming moderately obtuse angle; posterolateral margin strongly convex, posterior corners abruptly rounded. **Snout moderately short, preorbital length 10.6 to 13% total length.** Mouth slightly arched; teeth are arranged in 33 to 41 rows in upper jaw. **Pectoral-fin radials extend along two-thirds of snout length and anterior half of snout is stout.** Anterior pelvic-fin lobe is connected to posterior lobe by membrane, and **anterior lobes are moderately narrow, blunt, and about three-fourths length of posterior lobes.** Tail

is relatively broad and moderately depressed at base and tapers posteriorly, and about 51 to 60% of total length, lateral tail fold extending from posterior tips of pelvic fins to second dorsal-fin base; dorsal fins similar in shape and size, and confluent at bases. Denticles located along anterior margin of disc and along midbelt of disc and tail; **thorns present on rostrum, along interorbital margin, in triangular patch over nuchal and scapular regions, and along midline of disc from nuchal region to first dorsal fin.** Precaudal vertebrae number 27 to 31, predorsal caudal vertebrae number 52 to 65; pectoral-fin radials number 52 to 77. **Colour:** dorsal surface brownish grey; ventral surface white to pale greyish or ochre.

Size: Maximum to 700 mm total length.

Habitat, biology, and fisheries: This species is benthic along continental and insular slopes between 200 and 1 700 m.

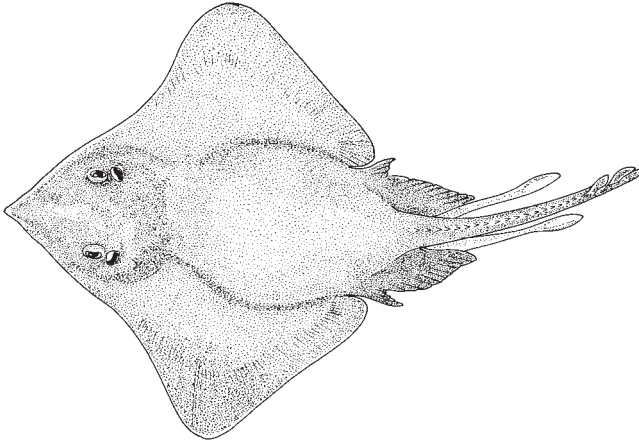
Distribution: Canary Islands, Mauritania to South Africa.



Bathyraja richardsoni (Garrick, 1961)

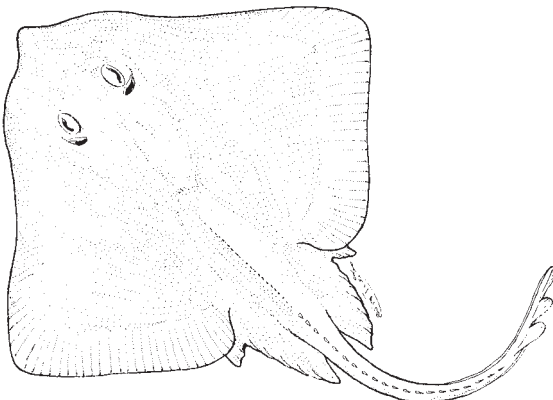
En – Richardson's ray; **Fr** – Raie de Richardson; **Sp** – Raya de Richardson.

Maximum size 175 cm total length. Benthic along continental and insular slopes and rises between 1 370 and 2 500 m from Bay of Biscay and Canary Islands, also in western North Atlantic from Labrador to North Carolina and from western South Pacific off New Zealand. Thorns absent on disc but distributed along midline of tail. Denticles uniformly distributed on dorsal surface and distributed to variable degrees on ventral surface. Dorsal surface brownish grey; ventral surface brownish grey, with white areas along midline.

***Bathyraja smithii*** (Müller and Henle, 1841)

En – African softnose skate; **Fr** – Raie de Smith; **Sp** – Raya de Smith.

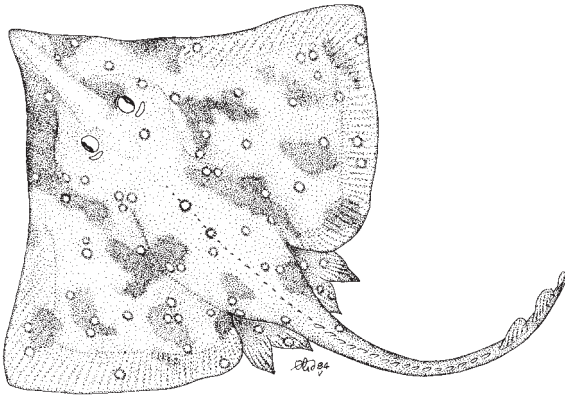
Maximum size 115 cm total length; males mature at about 650 mm total length. Benthic along continental and insular slopes between 658 and 868 m from Namibia to Agulhas Bank. Thorns absent on dorsal surface of disc but 15 occur along midline of tail; denticles distributed over most of dorsal surface of disc except for centre of pectoral fins and along posterior margin, denticles limited to lateral surfaces of tail on ventral surface. Dorsal surface chocolate brown, with anterior pelvic lobes edged with white; ventral surface white, with narrow brown margin from tip of snout to outer extreme of disc and broad brown margin from outer extreme of disc to axil of pectoral fins; brown blotch around cloaca, posterior margin of pelvic lobes brown, and tail brown.



***Dipturus batis* (Linnaeus, 1758)**

En – Blue skate; **Fr** – Pocheteau gris; **Sp** – Noriega.

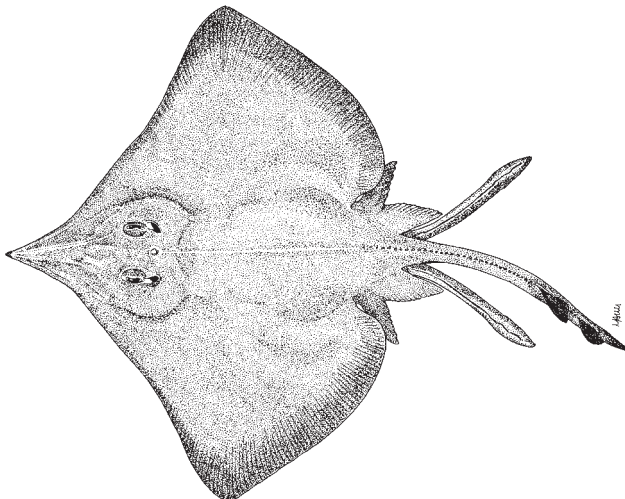
Maximum size 250 cm total length for mature females, males slightly smaller. Benthic along outer continental and insular shelves and slopes between 100 and 1 000 m from northern Norway and Iceland to Canary Islands and Senegal. Thorns absent on dorsal surface of disc but 12 to 18 occur along midline of tail, with 1 or 2 thorns between dorsal fins; denticles limited to head and anterior margin of disc in adults, denticles absent on disc in juveniles. Dorsal surface olive grey to brown, with variable pattern of light spots and dusky blotches; ventral surface ashy to bluish grey, with ampullary (sensory) pores and canals darkly pigmented. Recent genetic studies showed that *D. batis* is a complex of 2 species in the northeast Atlantic. Listed as Critically Endangered by the IUCN on its Red List as a result of depletions due to bycatch.



***Dipturus nidarosiensis* (Storm, 1881)**

En – Norwegian skate; **Fr** – Pocheteau de Norvège; **Sp** – Raya noruega.

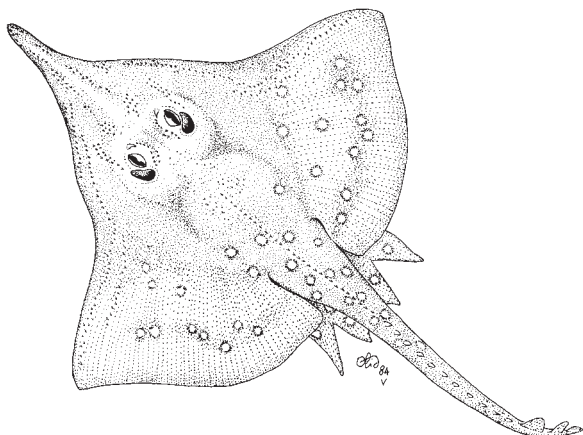
Maximum size 200 cm total length. Benthic along continental and insular slopes from 200 to 1 000 m from southern Norway and western Ireland to northern Mauritania. Thorns absent on disc but 40 to 50 occur along midline of tail in males and in additional lateral rows in females; denticles limited to head and anterior margin of disc. Dorsal surface dark greyish brown; ventral surface dark brown, with ampullary (sensory) pores darkly pigmented. Listed as Near Threatened by the IUCN on its Red List.



***Dipturus oxyrinchus* (Linnaeus, 1758)**

En – Longnose skate; **Fr** – Pocheteau noir; **Sp** – Raya picuda.

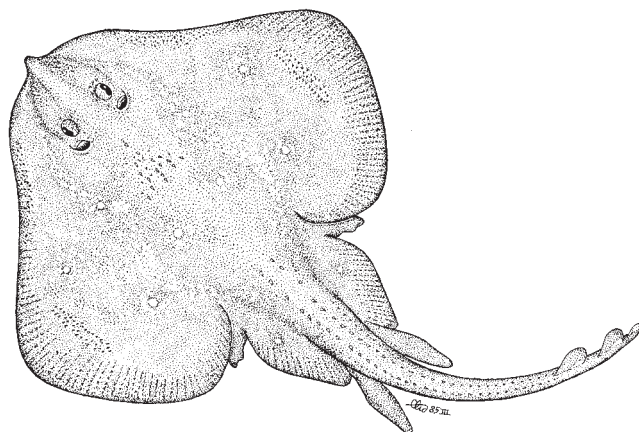
Maximum size 150 cm total length. Benthic along continental and insular shelves and slopes between 90 and 900 m from central Norway, the Faeroes, and Shetland Islands to Senegal and Canary Islands. Thorns absent on disc but 4 to 11 occur along midline of tail, single thorn present or absent between dorsal fins; denticles scattered over most of disc in adults but absent in juveniles. Dorsal surface light brown (juveniles) to dusky brown or grey (adults), with pattern of light spots and dark spots; ventral surface dark brown to bluish grey, with ampullar (sensory) pores and canals darkly pigmented. Listed as Near Threatened by the IUCN on its Red List.



***Leucoraja circularis* (Couch, 1838)**

En – Sandy ray; **Fr** – Raie circulaire; **Sp** – Raya falsa vela.

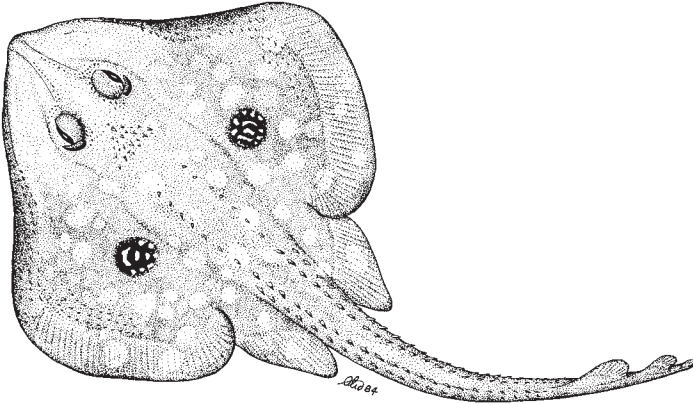
Maximum size about 100 cm total length. Benthic along continental and insular shelves and slopes between 70 and 250 m from southern Norway and northern Scotland to Mauritania and the Canary Islands. Thorns present along inner margin of orbit, in triangular patch over shoulder and nuchal region, and along dorsal and lateral surfaces of tail to first dorsal fin, midrow tail thorns are absent in adults; denticles cover most of dorsal surface and snout on ventral surface. Dorsal surface is reddish brown, with small symmetrically arranged creamy spots on pectoral and pelvic fins; ventral surface is white. Listed as Vulnerable by the IUCN on its Red List.



***Leucoraja naevus* (Müller and Henle, 1841)**

En – Cuckoo ray; **Fr** – Raie fleurie; **Sp** – Raya santiguesa.

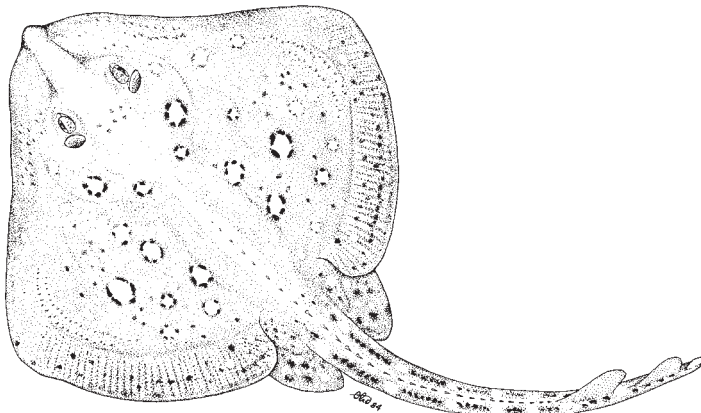
Maximum size 700 mm total length. Benthic along continental and insular shelves and upper slopes between 20 and 400 m, usually 20 to 150 m, from Ireland, Britain, and the northern North Sea to Senegal. Thorns present on inner margins of orbits, in triangular patch over shoulder and nuchal region, and in band along midline of disc and tail to first dorsal fin, midrow thorns along disc and tail are absent in adult specimens; denticles cover most of dorsal surface and along anterior margin of disc on ventral surface. Dorsal surface is ochre to light greyish brown, with pair of large, round, dark spots with reticulated yellow markings on centre of each pectoral fin; ventral surface white.



***Raja brachyura* Lafont, 1873**

En – Blonde ray; **Fr** – Raie lisse; **Sp** – Raya boca de rosa.

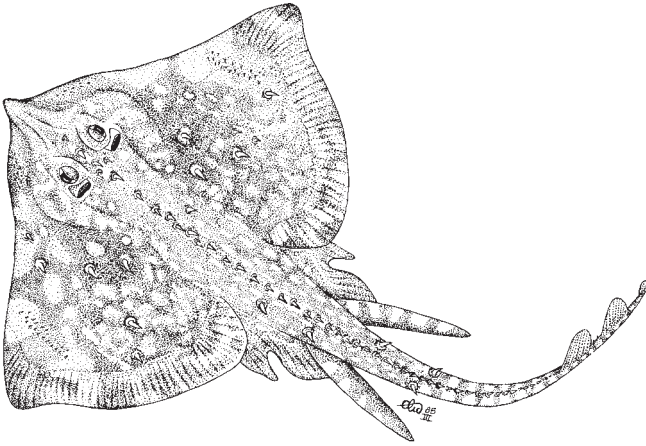
Maximum size 120 cm total length. Benthic along continental and insular shelves to 100 m from the Shetland Islands and western North Sea to Rio del Oro, Mauritania. Thorns present along inner margin of orbits and number 40 to 45 along midline from nape to first dorsal fin (females and juveniles) or along nuchal region and along midline of tail to first dorsal fin (mature males); denticles cover most of dorsal surface and anterior margin of ventral side of disc. Dorsal surface ochre, with numerous small dark spots to edge of disc and few light blotches surrounded by dark spots over central area of disc; ventral surface white. Listed as Near Threatened by the IUCN on its Red List.



***Raja clavata* Linnaeus, 1758**

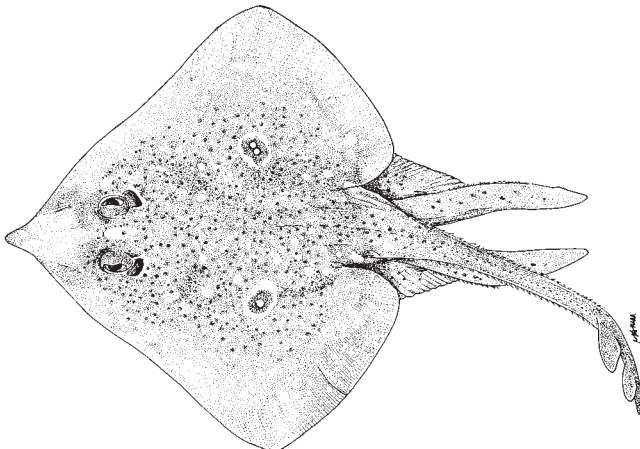
En – Thornback ray; **Fr** – Raie bouclée; **Sp** – Raya de clavos.

Maximum size 900 mm total length. Benthic along continental and insular shelves and upper slopes to about 300 m from Norway and Iceland to South Africa, Madeira and Canary Islands and Mediterranean and Black Seas. Thorns present on inner margin of orbits and number 30 to 50 along midline of disc and tail (number of midrow thorns reduced in mature males); denticles cover most of dorsal surface and along anterior margin of disc on ventral side. Adults have large buckler-like thorns scattered over dorsal surface and on ventral surface in females. Dorsal surface is various shades of brown, usually with variegations or marbling of light and dark spots, or rarely uniform brown; ventral surface white with grey margins. Listed as Near Threatened by the IUCN on its Red List.

***Raja herwigi* Krefft, 1965**

En – Cape Verde skate; **Fr** – Raie du Cap Vert; **Sp** – Raya de Cabo Verde.

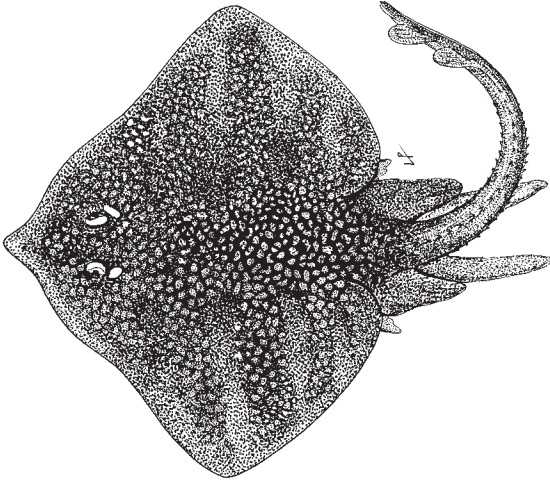
Maximum size 500 mm total length. Benthic along continental and insular shelves between 55 and 102 m of Cape Verde Islands. Thorns present on inner margin of orbits, 1 anterior and 1 posterior to orbit and along midline of disc and tail to first dorsal fin; denticles cover most of dorsal surface; denticles occur along anterior margin of ventral surface. Dorsal surface yellowish brown with reticular pattern of small brown spots and pair of large yellow spots surrounded by thick dark ring; ventral surface is white with light grey margin.



Raja maderensis Lowe, 1838

En – Madeiran ray; **Fr** – Raie de Madère; **Sp** – Raya de Madeira.

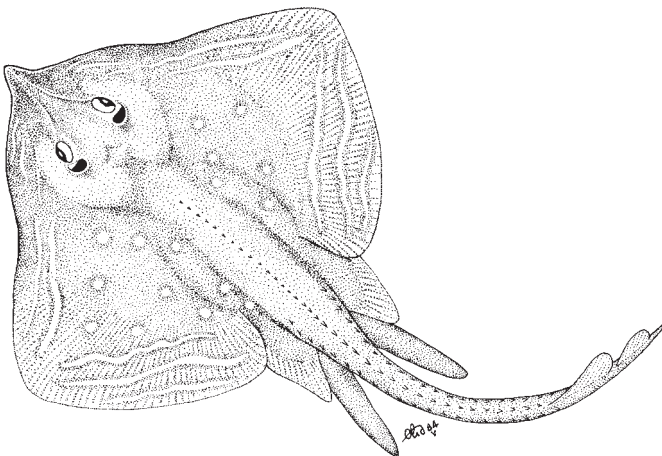
Maximum size 800 mm total length. Benthic along continental and insular shelves to 105 m from Madeira, Azores, and Canary Islands to Senegal. Thorns present on inner margin of orbits, number 21 to 25 along midline of disc and tail, and occur along lateral sides of tail; denticles cover most of dorsal surface and anterior margin of disc on ventral surface. Dorsal surface dark brown, with dense pattern of small light spots often arranged in undulating, transverse bands; ventral surface white with greyish snout and margin of disc, and black on tip of tail.



Raja microocellata Montagu, 1818

En – Small-eyed ray; **Fr** – Raie m  lee; **Sp** – Raya colorada.

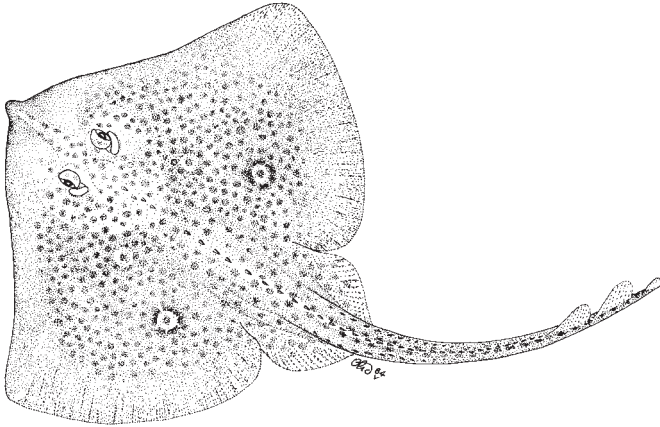
Maximum size 800 mm total length. Benthic along continental and insular shelves to about 100 m from southwest Ireland and England to Rio de Oro. Thorns on inner margin of orbits and number about 50 along midline from nape to origin of first dorsal fin; denticles cover most of dorsal surface, and snout and anterior margin of disc on ventral surface. Dorsal surface greyish, olive to light brown with light blotches and bands parallel to margin of disc; ventral surface white. Listed as Near Threatened by the IUCN on its Red List.



Raja montagui Fowler, 1910

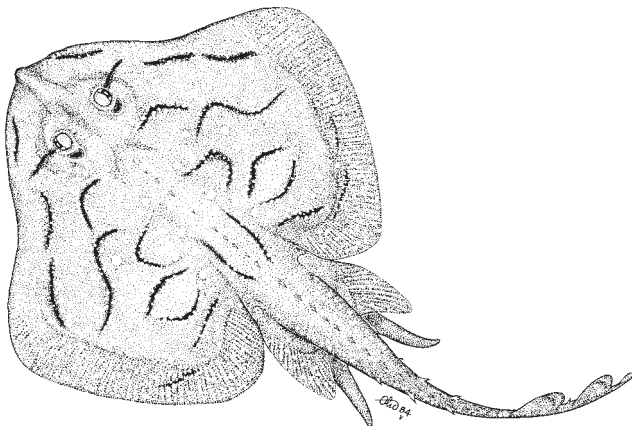
En – Spotted ray; **Fr** – Raie douce; **Sp** – Raya pintada.

Maximum size 800 mm total length. Benthic on continental and insular shelves between the shoreline and 100 m from Shetland Islands and southern North Sea to Morocco, Canary Islands and throughout much of the Mediterranean Sea. Thorns present on inner margin of orbits and number 20 to 50 along midline from nuchal region to origin of first dorsal fin, 1 or 2 thorns between dorsal fins; denticles cover most of dorsal surface except for centres of pectoral fins and on ventral surface along anterior margin, over gill regions and on belly. Dorsal surface brown, with densely distributed small dark spots and often concentration of dark spots surrounding pale area over posterior section of pectoral fins; ventral surface white.

***Raja undulata*** Lacépède, 1802

En – Undulate skate; **Fr** – Raie brunette; **Sp** – Raya mosaica.

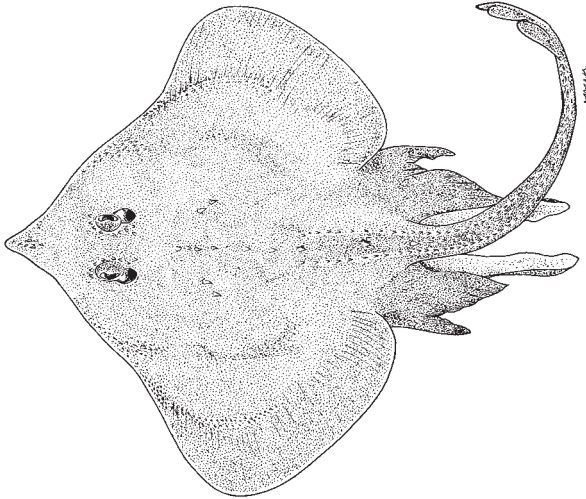
Maximum size 100 cm total length. Benthic on continental and insular shelves between near shore and 200 m from southern Ireland and southwestern England to Mauritania. Thorns along inner margin of orbits, over nuchal region and scapula, and along midline of disc and tail to first dorsal fin and 0 to 2 thorns between dorsal fins; denticles cover most of dorsal surface except for centres of pectoral fins, and on ventral surface along anterior margins. Dorsal surface ochre to greyish brown, with undulating dark bands outlined by series of white spots; ventral surface white, with tail greyish brown. Listed as Endangered by the IUCN on its Red List due to possible declines and patchy distribution.



***Rajella dissimilis* (Hulley, 1970)**

En – Ghost skate; **Fr** – Raie fantôme; **Sp** – Raya fantasma.

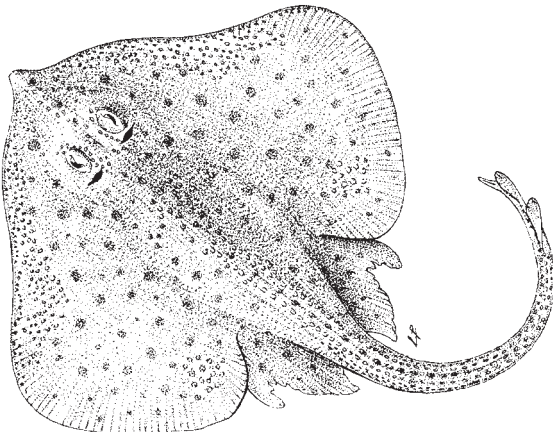
Maximum size 700 mm total length. Benthic along continental and insular slopes between 400 to 1 640 m from Rio de Oro, Mauritania to Cape Town. Thorns present on tip of rostrum, on inner margin of orbit, in triangular patch over nuchal and scapular region, in 3 rows along midline from shoulder region to first dorsal fin; denticles sparse on dorsal surface and limited to snout, posterior margin of disc and sides of tail; ventral surface naked. Dorsal surface brownish grey; ventral surface white, with margin of posterior half of disc, margin of pelvic fins, and tail greyish brown except posterior third with whitish speckles and area under fins white.



***Rajella leoparda* (von Bonde and Swart, 1923)**

En – Leopard skate; **Fr** – Raie-léopard; **Sp** – Raya leopardo.

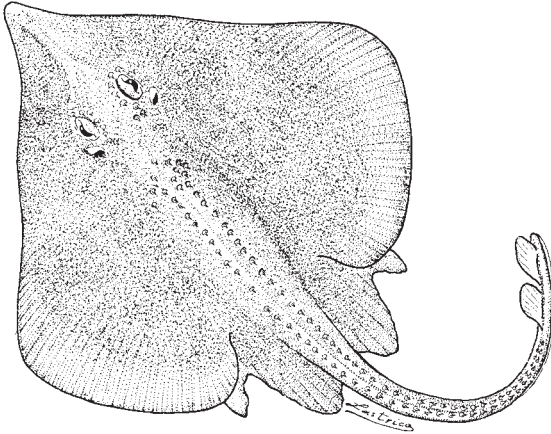
Maximum size 950 mm total length. Benthic along continental shelf between 130 to 1 920 m from Mauritania to South Africa. Thorns present on tip of rostrum, along inner margin of orbit, in triangular patch over nuchal and scapular region, and in 3 rows along midline from shoulder region; denticles sparse on snout and along anterior margin of disc. Dorsal surface greyish brown; ventral surface coffee brown, with areas around nasal curtains, mouth, gill slits, and centre of belly white.



Rajella ravidula (Hulley, 1970)

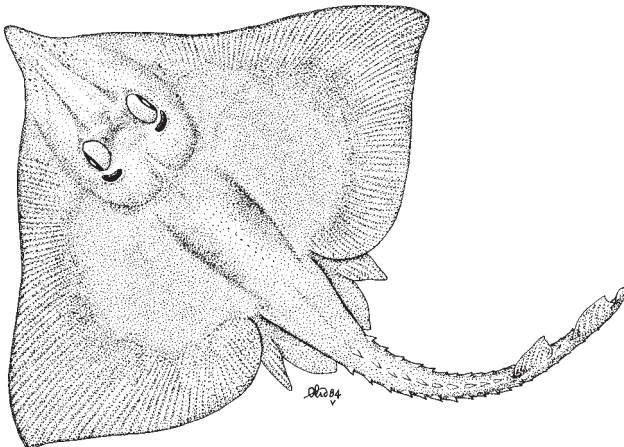
En – Smoothback skate; **Fr** – Raie suave; **Sp** – Raya suave.

Maximum size 800 mm total length. Benthic along the slope between 1 000 and 1 250 m from Luderitz, Namibia to Cape of Good Hope, South Africa, with single records from Canary Islands, Morocco, and Mauritania. Thorns present along inner margins of orbits, in triangular patch over nuchal region, and in 1 to 3 rows along midline from shoulder region to first dorsal fin; denticles covering most of dorsal surface and denticles lacking on ventral surface. Dorsal surface greyish brown, ventral surface creamy white with dusky margin.

***Rostroraja alba*** Lacépède, 1803

En – White skate; **Fr** – Raie blanche; **Sp** – Raya bramante.

Maximum size 200 cm total length. Benthic along continental and insular shelves and upper slopes between 40 and 400 m from southwestern Ireland and southwest England to east coast of South Africa, Canary Islands and Mediterranean Sea. Thorns along inner margins of orbits and number about 15 along midline of tail; denticles lacking on dorsal surface of juveniles and nearly uniformly distributed on dorsal surface in adults and limited to anterior margin of disc on ventral surface. Dorsal surface reddish brown to greyish blue, with many small light spots; ventral surface white with dark disk and pelvic-fin margins. Listed as Endangered by the IUCN on its Red List due to observed declines in its Northeast Atlantic range.



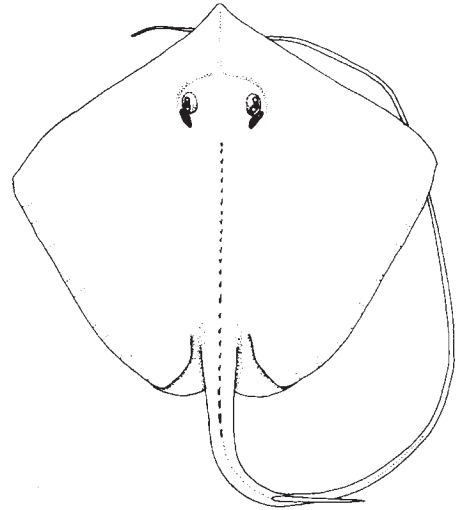
Order MYLIOBATIFORMES

DASYATIDAE

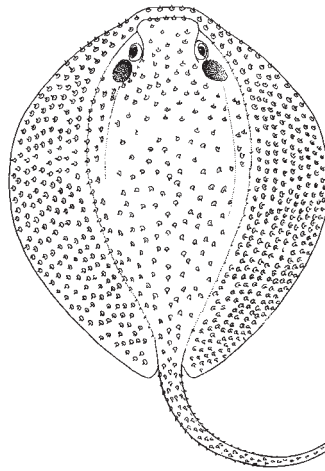
Stingrays

by B. Séret, Institut de Recherche pour le Développement and Muséum National d'Histoire Naturelle, Paris, France

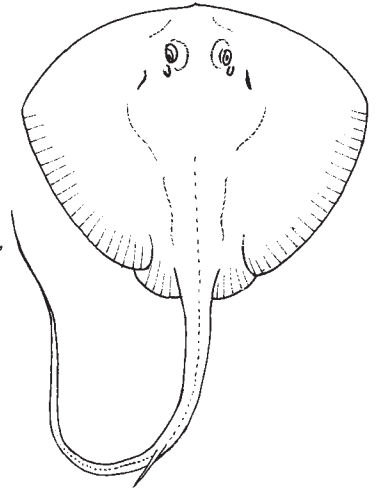
Diagnostic characters: Small to very large batoids (from 30 cm to more than 200 cm in disc width) with **large, depressed disc variously shaped (oval, circular, or rhombic)**, snout obtuse, rounded or more or less pointed and projecting; **disc not more than 1.3 times as broad as long**; tail elongate and tapering, often whip-like, **strongly demarcated from disc** and usually with a **strong serrated sting on base**. Five gill slits on ventral side. Eyes and spiracles on top of head. A transverse row of fleshy papillae often present on floor of mouth. Numerous (up to 50 rows) small teeth forming bands and in pavement along both jaws. Nostrils just anterior to mouth and connected to it by a groove. Anterior nasal flaps greatly expanded and fused together to form a large nasal curtain, its posterior margin fringed and overlapping upper jaw. Pelvic fins rounded to angular, not divided into anterior and posterior lobes. No dorsal or caudal fin. No lateral tail fold but a ventral fold more or less developed and / or a dorsal ridge on tail behind sting present in some species. Dorsal surface naked or variously covered with dermal denticles, often with thornlets, thorns and tubercles. **Colour:** most species are uniform coloured, greyish brown, beige, greenish or yellowish, some species exhibit distinct variegated colour patterns with spots, blotches, mottlings, or reticulations on dorsal side, ventral side usually white (dark purple in *Pteroplatytrygon violacea*).



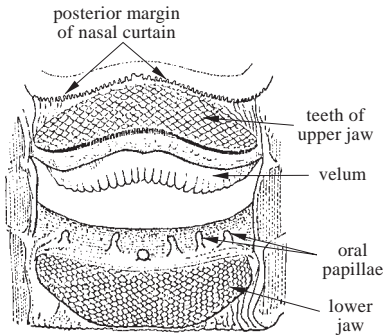
Dasyatis



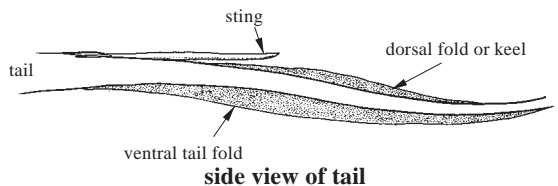
Urogymnus



Pteroplatytrygon



open mouth of *Dasyatis*



side view of tail

Habitat, biology, and fisheries: Stingrays occur mainly in tropical to warm-temperate coastal waters worldwide; although primarily marine, a number of species live in brackish and freshwater, and are likely to penetrate far upstream in rivers. All but one are demersal species (*Pteroplatytrygon violacea* is epipelagic), living mostly in shallow waters over the continental shelf but some are found on the continental slope down to about 480 m depth. All species are viviparous with litters of 2 to 6 pups developing in the oviducts until birth, gestation periods up to 12 months. Feed mostly on benthic invertebrates. Stingrays constitute a large group of more than 60 species, the taxonomic status of some of them still uncertain. In the eastern central Atlantic, 12 species occur; some are very rare, a few are very common and locally abundant, the taxonomic status of 1 (*Dasyatis* cf. *hastata*) is under revision. Stingrays are utilized for human consumption, their meat is eaten fresh, dried-salted or smoked. They are mainly caught with gill and trammel nets, and bottom trawls. In some places, large specimens are caught with lines-and-rods by sport anglers. Although there is no specific fishery data for West African stingrays, landings are important throughout the area. Stingrays are not naturally aggressive but are potentially dangerous to bathers and fishermen due to their venomous sting, however accidents are rare and happen mainly when fish are handled. Some aggressive behaviour is observed when they are artificially fed like at places in “Stingray City” in the Cayman Islands where stingray feeding has been practised for years as a tourist attraction – the rays are so eager to get their daily food that they actively bump the tourists with their snouts as soon as they enter the water.

Similar families occurring in the area

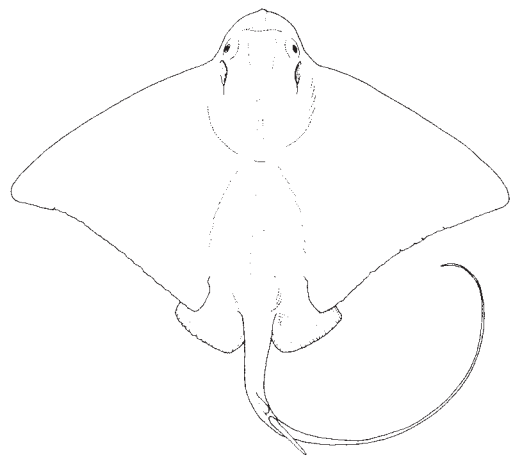
Gymnuridae: disc much broader (1.5 times) than long; tail very thin and shorter than half disc width; nasal curtain smooth-edged; no oral papillae.

Myliobatidae, Rhinopteridae, Mobulidae: head distinctly demarcated from body, anterior portions of pectorals forming separate lobes or fins; eyes and spiracles on sides of head.

Other families of batoids: lack characteristic tail sting; tail stout to moderately slender; 1 or 2 dorsal fins and rudimentary caudal fin.



Gymnuridae



Myliobatidae

Key to the species of Dasytidae occurring in area

- 1a. Tail (if complete) distinctly longer than disc and very slender; disc oval or more or less rhombic; with or without a sting on tail → 2
- 1b. Tail about as long as disc and relatively thick, not whip-like; disc roundish, broader than long; sting present on tail, sometimes 2 stings *Taeniura grabata*

- 2a. Disc oval, never a sting on tail *Urogymnus asperrimus*
- 2b. Disc more or less rhombic; 1 or more stings on tail → 3

- 3a. Anterior margin of disc evenly convex, dorsal surface of disc mostly naked. (No enlarged tubercles over scapular region), ventral surface of disc uniformly brown to black; ventral surface of tail with well-developed fin-fold or flap, usually taller than tail) *Pteroplatytrygon violacea*
- 3b. Anterior margin of disc subangular, with tip of snout forming apex of angle → 4

- 4a. Dorsal side of disc with a distinct pattern of blue mottling on a golden-brown background; lower tail fold very short, about twice the length of tail sting from its origin *Dasyatis marmorata*
- 4b. Dorsal side of disc plain-coloured, without a distinct pattern; lower tail-fold long extending backward from the tail sting a distance more than twice the tail sting length → 5

- 5a. Disc rhombic in shape, anterior disc margin forming an obtuse angle (Fig. 1) → 6
- 5b. Disc roundish or oval, tip of snout more or less projecting (Fig. 2) → 9

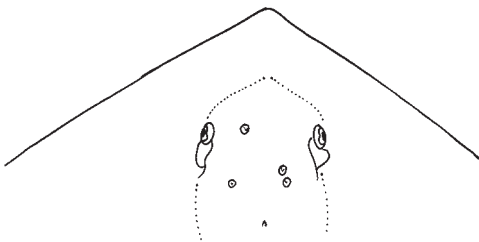


Fig. 1 snout obtuse

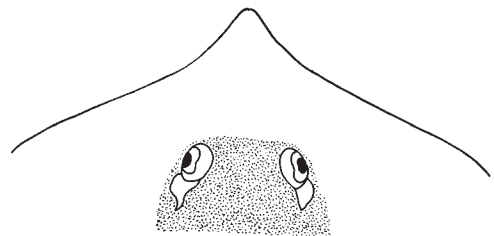



Fig. 2 snout projecting

- 6a. Dorsal surface of disc entirely rough (covered with numerous, close-set denticles); no enlarged denticles or thorny tubercles on disc, but some on tail; ventral tail fold high (at least as deep as tail above it); dorsal ridge on tail behind sting absent or reduced; very large species (200 cm disc width) *Dasyatis rudis*
- 6b. Dorsal surface of disc naked or partially rough; thorny tubercles on disc and/or on tail → 7

- 7a. Disc and tail naked; a more or less developed mid-dorsal row of thorny tubercles from nape to base of sting; a long ventral tail fold and a long dorsal ridge on tail behind sting (about 150 cm disc with) *Dasyatis pastinaca*
- 7b. Disc partially rough; tail rough; a conspicuous mediiodorsal row of thorny tubercles → 8

- 8a. Rough thorny tail; an irregular mid-dorsal row of thorny tubercles, and some large tubercles with erected cusps and round striated bases (bucklers) scattered on disc; ventral tail fold short and low (about half as deep as tail above it); no dorsal ridge on tail behind sting; very large species (up to 200 cm disc width) ***Dasyatis centroura***
- 8b. Tail rough but not strongly thorny behind sting; 2 short rows of enlarged thorny denticles on each shoulder, these rows lying parallel to the mid-dorsal row of thorny tubercles, each bear backwardly directed cusps and with smooth, oval bases more or less embedded in skin; ventral tail fold high (as deep as tail above it); dorsal ridge present on tail behind sting; observed size 104 cm (adult male) ***Dasyatis cf. hastata***
- 9a. Disc almost circular, snout hardly projecting; dorsal surface rough, with a midbelt of close-set granulations (flattened heart-shaped denticles); young with 1 or 2 midscapular pearl-like tubercles; an irregular mid-dorsal row of conical thorny tubercles, and some tubercles scattered on disc; no dorsal ridge on tail behind sting; base of tail circular in cross-section; large sized species (about 120 cm disc width) ***Dasyatis ukpam***
- 9b. Disc oval, snout projecting; dorsal surface partially naked, dorsal midbelt of granulations more or less developed; no thorny tubercles; a midscapular pearl-like tubercle (sometimes lacking) often flanked with 1 or 2 smaller tubercles; dorsal ridge present on tail behind sting; base of tail horizontally oval in cross-section → 10
- 10a. Disc flattened; tip of snout projecting as a small triangular process; large, midscapular pearl-like tubercle present or absent, more often a row of 1 to 4 small enlarged dermal denticles; dorsal midbelt of granulations absent (on juveniles) or reduced (on adults); size about 35 cm disc width ***Dasyatis garouaensis***
- 10b. Disc thick; snout projecting but without a triangular process at tip; a large midscapular, pearl-like tubercle, sometimes flanked with 1 or 2 smaller tubercles; dorsal midbelt of granulations well developed (on adults) and covering head, trunk and root of tail → 11
- 11a. Small species (30 cm maximum disc width), snout relatively pointed; upper jaw moderately undulate; teeth numerous 28-41 / 34-50; 113 to 127 pectoral radials ***Dasyatis margaritella***
- 11b. Large species (65 cm maximum disc width); snout projecting but not pointed; upper jaw strongly undulate; teeth less numerous 24-32 / 28-36; 129 to 136 pectoral radials ***Dasyatis margarita***

List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Dasyatis centroura* (Mitchill, 1815).
-  *Dasyatis garouaensis* (Stauch and Blanc, 1962).
-  *Dasyatis cf. hastata* (De Kay, 1842).
-  *Dasyatis margarita* (Günther, 1870).
-  *Dasyatis margaritella* Compagno and Roberts, 1984.
-  *Dasyatis marmorata* (Steindachner, 1892).
-  *Dasyatis pastinaca* (Linnaeus, 1758).
-  *Dasyatis rudis* (Günther, 1870).
-  *Dasyatis ukpam* (Smith, 1863).^{1/}
-  *Pteroplatytrygon violacea* (Bonaparte, 1832).
-  *Taeniura grabata* (Geoffroy St Hilaire, 1817).
-  *Urogymnus asperrimus* (Bloch and Schneider, 1801).

^{1/} Compagno (1999) places this species in the genus *Urogymnus* Müller and Henle, 1837, but *Dasyatis ukpam* (Smith, 1863) is considered valid by Eschmeyer's Catalog of Fishes, so that name will be used for this guide.

Remarks

Dasyatis garouaensis is the most flattened West African stingray and is the only West African stingray typically occurring in freshwater, but the species has been found in coastal lagoons. The species may have disappeared due to the degradation of its habitat, resulting from the construction of dams on the Benoue and other rivers and the last record is dated from 1989.

The validity of *Dasyatis rudis* is doubtful as stated by Séret (1990). The specimen of Old Calabar (Nigeria) of the original description deposited in the Natural History Museum London, has been lost. In the collection of the Smithsonian Institution, Washington, there are jaws, a tail and 2 embryos from Sierra Leone identified as *D. rudis* by Springer & Collette (1971) but the jaws resemble those of a guitarfish (very high number of tooth rows, about 200); the tail and the embryos have features of *D. "hastata"*. Specimens are wanted.

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Dasyatis centroura (Mitchill, 1815)

Frequent synonyms / misidentification: None / None.

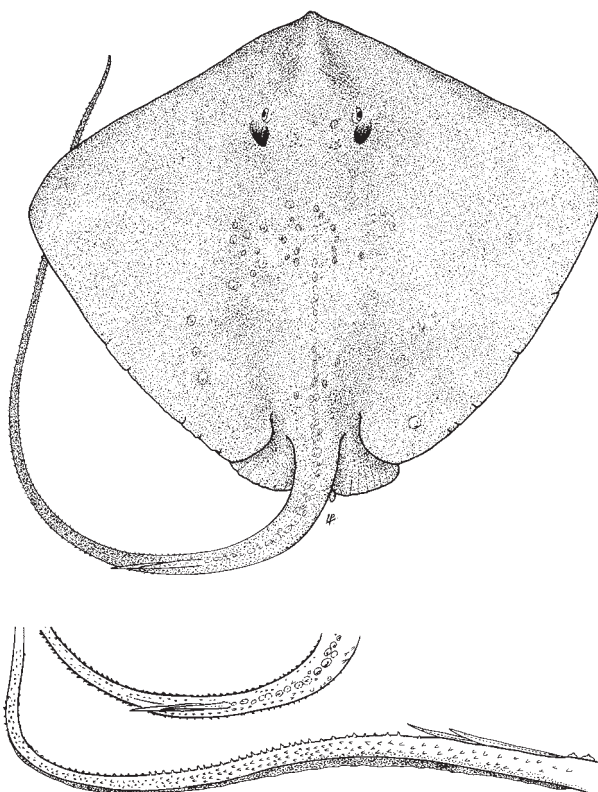
FAO names: **En** – Roughtail stingray; **Fr** – Pastenague épineuse; **Sp** – Raya-látigo isleña.

Diagnostic characters: **Disc rhombic**, about 1.2 to 1.3 times as broad as long; its **anterior margins almost straight** and **outer corners abruptly rounded**; snout angle about 130° to 140°, tip of snout not projecting. Tail slender, whip-like, about 1.5 to 2 times as long (if undamaged) as disc, and with 1 (sometimes 2 or 3) long, serrated, venomous sting on its base; tail with a **short dorsal ridge** only below sting and with a **low longitudinal fold** on ventral side from below origin of sting backwards for a distance about equal to that from cloaca to origin of sting. Mouth straight; about 45 rows of small and blunt oral teeth arranged in pavement; a transverse row of 5 or 6 fleshy papillae on floor of mouth. Dorsal side of disc sparsely and irregularly prickled with small pointed denticles; **an irregular mid-dorsal row of thorny tubercles from nape to sting**, and **additional thorns scattered on head and wings**, mainly on shoulder area; **tail rough** with numerous thornlets all around decreasing in size backwards. **Colour:** dorsal side uniform dark brown to olive brown, ventral side whitish to yellowish, often with darker margins. Tail behind sting, including tail folds, blackish.

Size: One of the largest stingrays with a maximum disc width of 210 cm (more than 300 cm in total length if tail is undamaged). Weight exceeding 200 kg. Males mature at 130 to 150 cm disc width, females at 140 to 160 cm disc width. Size at birth 34 to 37 cm disc width.

Habitat, biology, and fisheries: A demersal stingray found over coastal soft bottoms of the inner continental shelf down to about 90 m depth, but recorded also from 300 m depth. Feeds on benthic prey, mainly worms, crustaceans, bivalves and fishes. Ovoviviparous, litters from 2 to 6 pups. Caught occasionally as bycatch, with gill and trammel nets and also with bottom tawls and longlines. Meat is utilized like that of other stingrays, eaten fresh, dried-salted or smoked. Potentially dangerous to bathers and fishermen due to the venomous sting, and rough tail.

Distribution: In the western north Atlantic from Cape Cod to Gulf of Mexico, and in the south western Atlantic from Brazil to Argentina. In the eastern Atlantic from Bay of Biscay to Angola; also in the Mediterranean Sea.

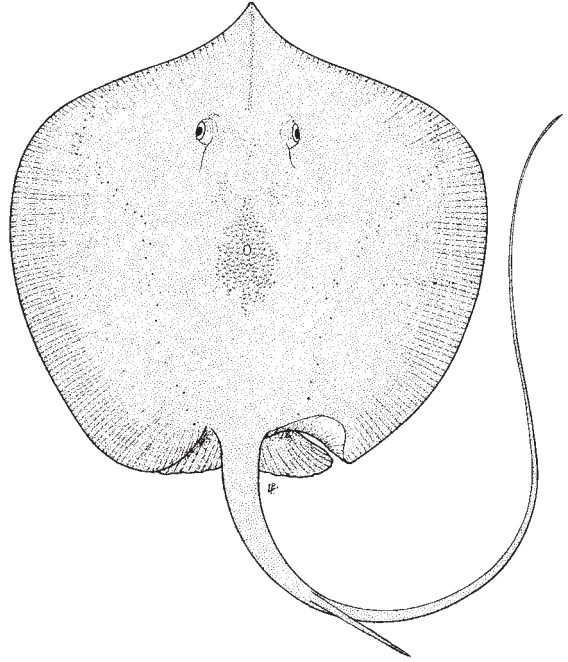


***Dasyatis margarita* (Günther, 1870)**

Frequent synonyms / misidentification: None / *Dasyatis margaritella* Compagno and Roberts, 1984.

FAO names: En – Daisy stingray; Fr – Pastenague marguerire; Sp – Raya-látigo margarita.

Diagnostic characters: Disc oval-rounded, about as broad as long, **anterior margins distinctly concave** so that tip of **snout projects**, snout angle in front of spiracle 120°; outer corners broadly rounded and thus indistinct. **Tail slender, whip-like**, its length (if undamaged) 2.5 times as long as disc, with **1 long, serrated and venomous sting** on its base; its base horizontally oval in cross-section; **a relatively short, low fold on ventral side** of tail from below origin of sting backward; **a short and low dorsal ridge** on tail below sting. **Jaws strongly undulated** with **24–32 / 28–36 rows of small, blunt teeth** arranged in pavement, 5 fleshy papillae on floor of mouth. Number of **pectoral radials 129 to 136**. Dorsal side naked in young except for a large, pearl-like tubercle on midshoulder. A midbelt of flat denticles developing with growth from head to upper surface of tail to sting; outer pectoral margins naked. No thorny tubercles but **always a large pearl-like tubercle** on midshoulder, sometimes flanked by 1 or 2 additional smaller ones; tail rough with some tiny denticles on upper surface. **Colour:** dorsal side uniform brownish to grey-brown; ventral side whitish with pectoral margins more or less darker.



Size: Maximum disc width 65 cm, maximum weight about 20 kg.

Habitat, biology, and fisheries: A common demersal stingray found over soft bottoms of the inner continental shelf; also penetrates brackish waters. A sluggish bottom-dweller, resting on sandy and muddy bottoms and feeding on various benthic invertebrates. Ovoviviparous, with litters from 1 to 3 pups. Caught with trammel nets, bottom trawls and beach seines. The meat is eaten, like that of other stingrays, fresh, dried-salted and smoked. Often confused with its sibling but smaller species *D. margaritella* which is more common. Listed as Endangered on the IUCN Red List due to observed declines in catches.

Distribution: In the eastern Atlantic, from Senegal to the Congo.



Dasyatis margaritella Compagno and Roberts, 1984

Frequent synonyms / misidentification: None / *Dasyatis margarita* (Günther, 1870).

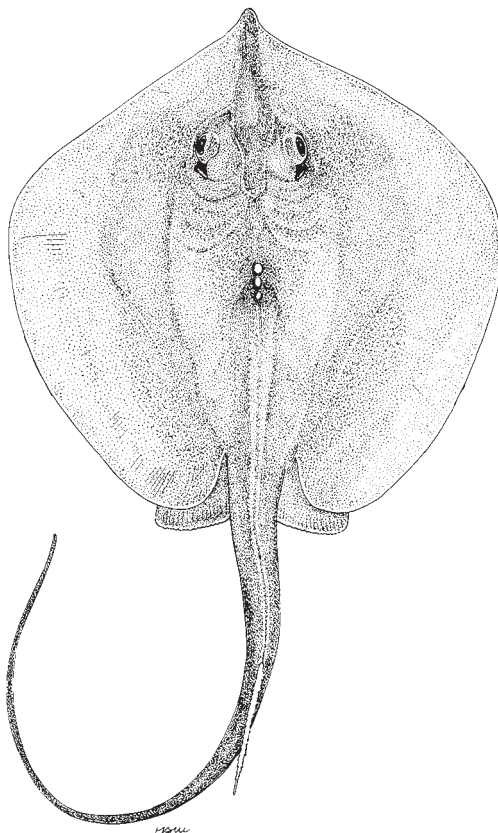
FAO names: **En** – Lesser daisy stingray; **Fr** – Petite pastenague marguerite; **Sp** – Pequeña raya-látigo margarita.

Diagnostic characters: Disc oval-rounded, about as broad as long, **anterior margins distinctly concave** so that tip of **snout projects**, snout angle in front of spiracle 120°; outer corners broadly rounded and thus indistinct. **Tail slender, whip-like**, its length (if undamaged) 2.5 times as long as disc, with **1 long, serrated and venomous sting** on its base; its base horizontally oval in cross-section; **a relatively short, low fold on ventral side** of tail from below origin of sting backward; **a short and low dorsal ridge** on tail below sting. **Jaws only slightly undulated** with **24–41 / 34–50 rows of small, blunt teeth** arranged in pavement, 5 fleshy papillae on floor of mouth. Number of **pectoral radials 113 to 127**. Dorsal side naked in young except for a large, pearl-like tubercle on midshoulder. A midbelt of flat denticles developing with growth from head to upper surface of tail to sting (at about 21 cm disc width when the dermal armature is entirely developed, but it is still limited to the midshoulder in *D. margarita*); outer pectoral margins naked. No thorny tubercles but **always a large pearl-like tubercle** on midshoulder, sometimes flanked with 1 or 2 additional smaller ones; tail rough with some tiny denticles on upper surface. **Colour:** dorsal side uniform brownish to grey-brown; ventral side whitish with pectoral margins more or less darker.

Size: Maximum disc width 30 cm. Maximum weight 1 kg. Males mature at 21 cm disc width.

Habitat, biology, and fisheries: The most common stingray in West African coastal waters; found over soft bottoms of the inner continental shelf, mainly in shallow waters, but down to 60 m depth; also penetrates brackish waters and lower rivers. A sluggish bottom-dweller, resting on sandy and muddy bottoms and feeding on various benthic invertebrates. Ovoviviparous, with litters from 1 to 3 pups. Caught with trammel nets, bottom trawls and beach seines. The meat is eaten, like that of other stingrays, fresh, dried-salted and smoked.

Distribution: In the eastern Atlantic, from Mauritania to the Congo.



Dasyatis marmorata (Steindachner, 1892)

Frequent synonyms / misidentification: None / *Dasyatis chrysonota* (Smith, 1828); *D. pastinaca* (Linnaeus, 1758).

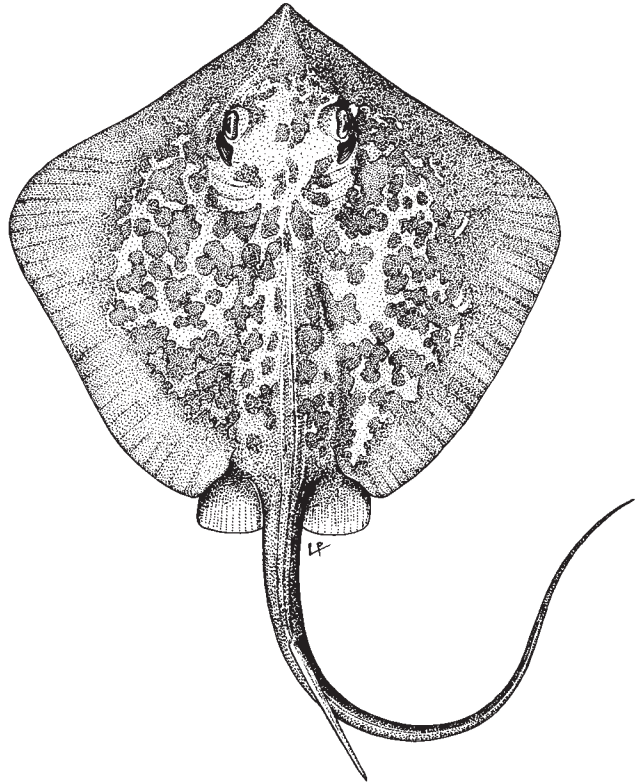
FAO names: En – Blue stingray; Fr – Pastenague marbrée; Sp – Chucho marmolado.

Diagnostic characters: Disc rhombic, about 1.2 times as broad as long; **anterior margins weakly concave** and forming an obtuse angle of about 110°; tip of snout not projecting. **Tail slender**, about 1.5 times as long as disc (if undamaged), with **1 serrated and venomous sting** on its base. **A relatively short, low longitudinal fold on ventral side of tail, its length about twice that of sting**, from origin of sting backwards, and a **short dorsal ridge** originating below the sting. **Disc smooth**, sometimes a few enlarged denticles in mid-dorsal line, embedded in the skin. Mouth nearly straight, small and blunt oral teeth arranged in pavement; a transverse row of 3 to 5 fleshy papillae on floor of mouth. **Colour: dorsal side with a distinct pattern of blue mottling on a golden brown background**; ventral side white. Tail blackish, sting whitish.

Size: Maximum disc width 75 cm (about 1.5 m in total length if tail undamaged). Males mature from 33 to 35 cm disc width, females from 40 to 41 cm. Size at birth about 16 cm disc width.

Habitat, biology, and fisheries: A demersal stingray found in coastal waters over soft bottoms of the inner continental shelf down to about 100 m depth, often in bays and off sandy beaches. Feeds mainly on crustacea (crabs, shrimps), worms and small benthic fishes. Ovoviviparous, with litters from 1 to 6 pups. Often confused with *Dasyatis pastinaca*, but much less common and distinguished by its striking colour pattern. Caught with trammel nets and bottom trawls, also beach seines. Meat eaten like that of other stingrays, fresh, dried-salted and smoked.

Distribution: In the eastern Atlantic from Mauritania to the Congo; records from southern Africa should most probably be referred to *D. chrysonota*.



Dasyatis pastinaca (Linnaeus, 1758)

Frequent synonyms / misidentification: None / *Dasyatis cf. hastata* (De Kay, 1842).

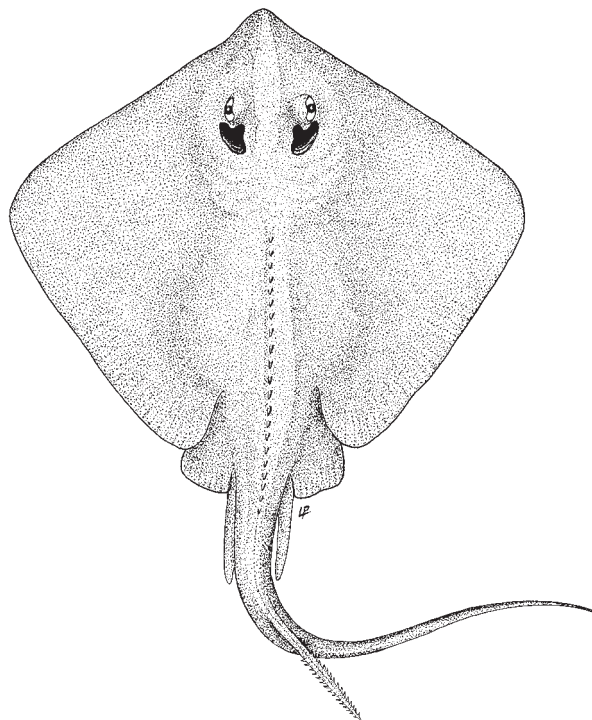
FAO names: En – Common stingray; Fr – Pastenague commune; Sp – Raya látigo común.

Diagnostic characters: Disc rhombic, about 1.2 times as broad as long, **anterior margins more or less straight**, snout forming an obtuse angle of about 110°; **tip of snout not projecting**; outer corners broadly angular; **tail slender, whip-like**, its length (if undamaged) about 1.3 to 1.5 times as long as disc, with a **long, serrated and venomous sting** on its base; **a relatively long, low fold on ventral side of tail** originating at level of sting origin and extending backward, and **a long dorsal ridge below the sting backward**. Mouth nearly straight; 22 to 46 rows small, blunt teeth, arranged in pavement, 5 bulbose papillae on floor of mouth. **Dorsal side mostly smooth, a mid-dorsal row of a few thornlets from nape to root of tail, reducing with growth**, otherwise no thorns on disc. **Colour:** dorsal side uniform greyish to greenish brown; ventral side white with dark pectoral margins.

Size: Maximum disc width 140 cm (about 250 cm in total length if tail undamaged), commonly 60 cm disc width.

Habitat, biology, and fisheries: A demersal stingray found in warm and temperate coastal waters of the inner continental shelf, down to 200 m depth. A bottom-dweller, feeding on benthic invertebrates and small fishes. Ovoviviparous, litters from 4 to 7 pups; gestation period about 4 months. Caught mainly with bottom trawls, marketed as wings, eaten fresh. Not common in West Africa and often confused with other stingrays, mainly with *Dasyatis cf. hastata*.

Distribution: In the eastern Atlantic, from southern Norway to Mauritania, the Canary Islands, with disjunct records along the coast to South Africa, also in the Mediterranean and Black Seas.



***Dasyatis cf. hastata* (De Kay, 1842)**

Frequent synonyms / misidentification: None / *Dasyatis centroura* (Mitchill, 1815); *D. pastinaca* (Linnaeus, 1758).

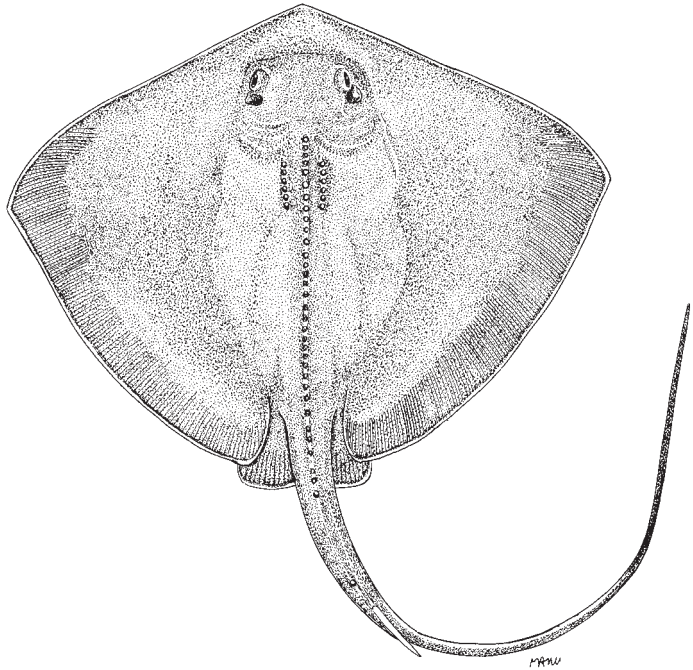
FAO names: En – Green stingray; Fr – Pastenague verte; Sp – Raya-látigo verde.

Diagnostic characters: Disc rhombic, about 1.3 times as broad as long; **anterior margins almost straight**, forming an obtuse angle of about 110°; tip of snout not projecting. **Tail slender, whip-like**, about 1.5 times as long as disc (if undamaged), with **1 long, serrated sting** on its base; **a low ridge on dorsal side of the tail**, below the sting, and **a well developed ventral tail fold** as deep as the tail at its level. Mouth straight, small blunt teeth arranged in pavement. Dorsal side partially and irregularly prickled with scattered small denticles, more close-set on back of head and trunk, an irregular mediadorsal row of thorny tubercles with oval base embedded in the skin and backwards directed pointed cusps, **a short row of thorny tubercles on each shoulder, parallel to the mid-dorsal row**; tail rough behind sting. **Colour:** dorsal side uniform greenish brown; ventral side white, with darker margins; tail brownish behind sting; ventral tail fold blackish.

Size: Maximum observed disc width 104 cm (adult male, Senegal), but possibly much wider.

Habitat, biology, and fisheries: A relatively common but unnamed stingray found over coastal soft bottoms of the inner continental shelf. Its biology is almost unknown. This stingray resembles the western Atlantic *Dasyatis americana* and has been recorded as *Dasyatis hastata* in West Africa. Pending on a revision of its status (in preparation), it is herein provisionally named *D. cf. hastata*.

Distribution: In the eastern Atlantic, from Mauritania to the Congo.



Dasyatis ukpam (Smith, 1863)

Frequent synonyms / misidentification: *Urogymnus ukpam* (in Compagno, 1999) / None.

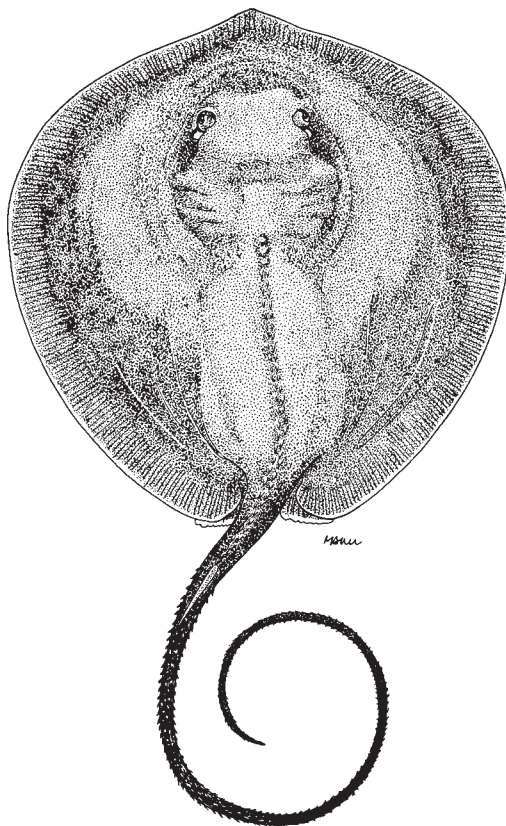
FAO names: En – None.

Diagnostic characters: A stingray with a **subcircular and thick disc**; snout weakly prominent, tail slender, whip-like, **lacking sting or with a reduced sting that disappears with growth**; base of tail circular in cross-section; **no dorsal ridge on tail behind sting, ventral tail fold very reduced**. Mouth slightly arched, 38–40 / 38–48 rows of teeth arranged in pavement; 4 or 5 fleshy papillae on floor of mouth. Dorsal side of disc very rough, a **midbelt of close-set rounded or heart-shaped denticles**, sometimes 1 or 2 pearl-like tubercles on midshoulder, an irregular **mid-dorsal row of large thorny conical tubercles** from nape to sting and some additional ones scattered on centre of disc; disc becoming more and more spinose with growth; **tail very rough** with numerous sharp thornlets decreasing in size backward. **Colour:** dorsal side uniform grey-brown to dark brown; ventral side white, with dark pectoral margins; tail blackish.

Size: Maximum disc width 120 cm.

Habitat, biology, and fisheries: According to Smith (1863), this stingray was “extremely abundant” in the rivers around Old Calabar (Nigeria), but nowadays, it is rather rare, the last records date from the 1980s. Although described from freshwater, it also occurs in brackish and marine waters of coastal lagoons in the Gulf of Guinea. Biology unknown. Ranked as Endangered on the IUCN Red List.

Distribution: Recorded from Guinea-Bissau to the Congo.



***Pteroplatytrygon violacea* (Bonaparte, 1832)**

Frequent synonyms / misidentification: *Dasyatis violacea* Bonaparte, 1832 / None.

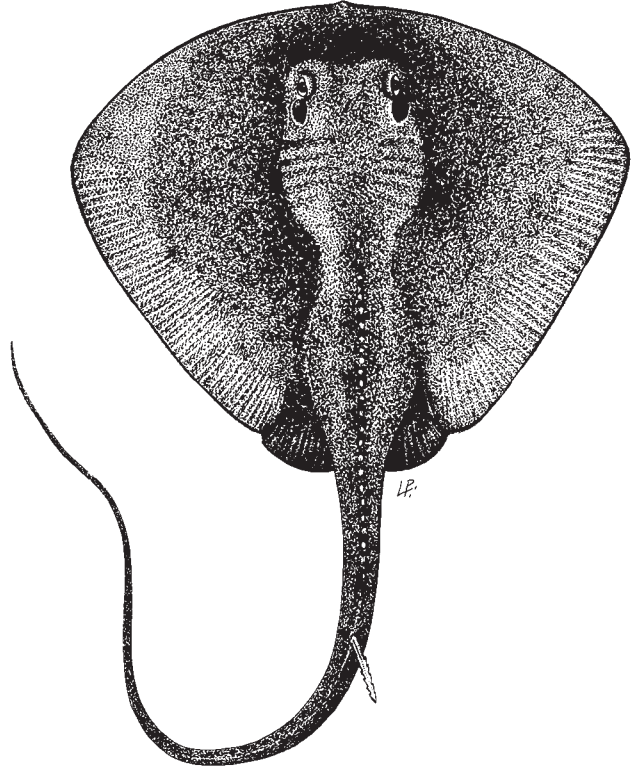
FAO names: En – Pelagic stingray; Fr – Pastenague violette; Sp – Raya-látigo violeta.

Diagnostic characters: Disc rhombic with broadly convex anterior margins forming an obtuse arc of a circle, unique among stingrays, tip of snout a very small, almost indistinct, projection; outer corners broadly angular. Tail slender, whip-like, its length less than twice disc length; a long, serrated and venomous sting far backward on dorsal surface of tail; **a long and well-developed flap-like ventral fold, no dorsal ridge** behind sting. **Eyes do not protrude. Dorsal side of disc smooth**, except for a mid-dorsal row of small thorns from nape to sting. **Colour: dorsal and ventral sides uniform purplish-violet**, somewhat lighter on ventral side.

Size: Maximum disc width 96 cm for a weight of 49 kg (eastern Pacific); males mature from 37 to 41 cm disc width, females from 40 to 50 cm disc width; size at birth from 14 to 24 cm disc width.

Habitat, biology, and fisheries: This is the unique pelagic stingray, living in the open seas and well off the bottom. An agile swimmer, feeding on squid, crustaceans, jellyfish and small fish; it uses its pectoral fins to direct prey into its mouth. Growth rate of females 19.5 cm/year and 12 cm/year for males. Ovoviviparous with nourishment of the embryos by uterine milk once the egg yolk has been used, litters from 4 to 9 pups, short gestation period of 2 to 3 months; sperm storage of up to a year supposed. Rarely caught, except as bycatch by the purse seines and longlines of the tuna fisheries, but mostly discarded. Although pelagic, this stingray lives well in captivity, a number of aquariums exhibit specimens with success, enabling collection of biological data on this species (e.g. studies carried out by H. Mollet at the Monterey Bay Aquarium, CA).

Distribution: Nearly circumglobal in pelagic waters, probably widespread in all tropical and temperate seas. In the eastern central Atlantic, recorded mainly in the Gulf of Guinea, but probably occurs throughout the area.



Taeniura grabata (Geoffroy St Hilaire, 1817)

Frequent synonyms / misidentification: None / None.

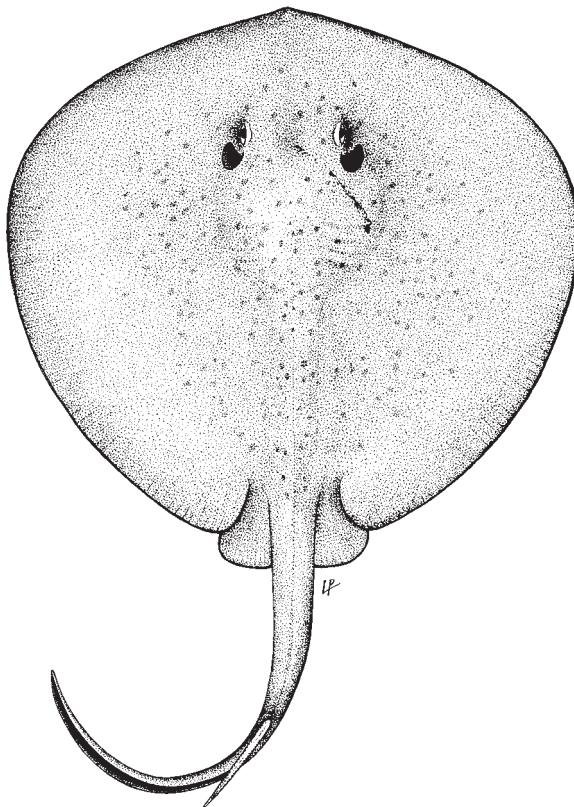
FAO names: En – Round stingray; Fr – Pastenague ronde; Sp – Chucho redondo.

Diagnostic characters: Disc subcircular, slightly broader than long; hence the common name of round stingray. Tail short, not whip-like, its length less than that of disc; base of tail thick and depressed; 1 or 2 strong and long venomous stings on tail; a well-developed ventral tail fold from level of sting origin to tip of tail, no dorsal ridge behind sting. Dorsal side smooth on young but irregularly prickled in adults, with a irregular mid-dorsal row of thorny tubercles from nape to sting and some thorns scattered on shoulders. **Colour:** dorsal side light to dark brown, often with black spots scattered on disc (mainly in young); ventral side yellowish to pink-white with dark margins, tail and ventral tail fold blackish.

Size: Maximum disc width 100 cm; maximum weight 84 kg.

Habitat, biology, and fisheries: A demersal stingray found mainly over sandy bottoms and *Posidonia* grass in coastal waters, but also down to about 300 m depth. Rests on the bottom, partially covered with sand or mud. Feeds on bottom fishes and crustaceans. Ovoviviparous. Rarely caught by trammel nets and bottom trawls.

Distribution: In the eastern Atlantic from the Gulf of Biscay to Angola, including the Canary Islands and Cape Verde, also in the southern Mediterranean and Red Sea.



***Urogymnus asperrimus* (Bloch and Schneider, 1801)**

Frequent synonyms / misidentification: *Urogymnus africanus* (Bloch and Schneider, 1801) / None.

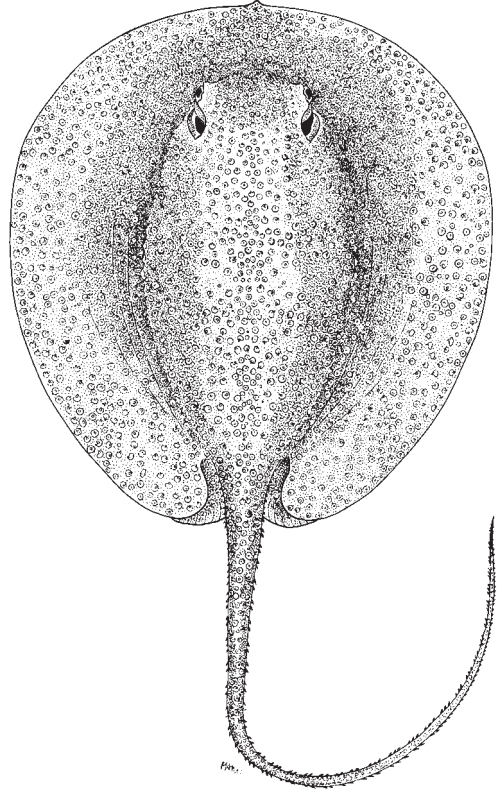
FAO names: En – Porcupine ray; Fr – Pastenague-hérissou; Sp – Chucho erizo.

Diagnostic characters: Disc oval, slightly longer than wide, **and thick**; snout tip very small, almost indistinct; tail slender, whip-like, tapering rapidly from base, its length about equal to disc length, base almost circular in cross-section, **no sting, no ventral tail fold (or very reduced in young), no dorsal ridge** on tail. Eye small, mouth narrow, 2 to 5 fleshy papillae on floor of mouth. **Dorsal side of disc strongly prickled with numerous thorny tubercles scattered all over the disc**, and a midbelt of close-set heart-shaped denticles; tail also very rough with numerous thorns all around, their size decreasing towards the tip. **Colour:** dorsal side plain light grey-brown; ventral side white; whip of tail blackish.

Size: Maximum disc width at least 100 cm (over 220 cm in total length).

Habitat, biology, and fisheries: A demersal stingray found over sandy bottoms and in reef habitats. Biology unknown. Very rare. Specimens wanted. Listed as Vulnerable on the IUCN Red List.

Distribution: Widespread in the western Pacific and Indian Oceans. In the eastern central Atlantic, a single record from Guinea by Bloch and Schneider (original description of *U. africanus*).

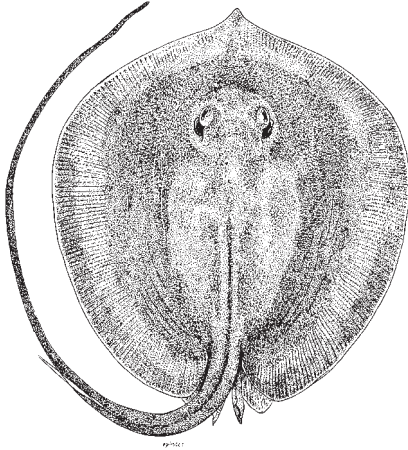


***Dasyatis garouaensis* (Stauch and Blanc, 1962)**

Frequent synonyms / misidentification: *Potamotrygon garouaensis* Stauch and Blanc, 1962 / None.

En – Smooth freshwater stingray; **Fr** – Pastenague de Garoua.

Maximum size 35 cm disc width. Known from the riveres Benoue, Sanaga, Cross and Niger in Cameroon, and the coastal lagoon of Lagos, Nigeria. Disc very flat and thin, naked or with a few flat denticles, but no pearl-like tubercle on shoulders. Very rare, if not extirpated, due to the construction of dams on the rivers and ranked as Vulnerable on the IUCN Red List.

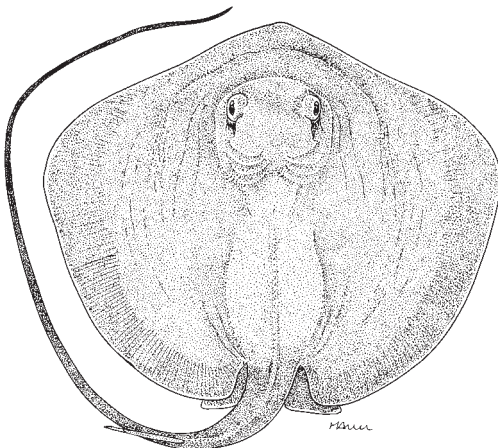


***Dasyatis rudis* (Günther, 1870)**

Frequent synonyms / misidentification: None / None.

En – Small-tooth stingray.

Maximum size (to 200 cm disc width) is uncertain. The taxonomic status of this species is doubtful; it was briefly described from a stuffed specimen from Nigeria. Records from Sierra Leone (jaws and 2 embryos) were assigned to other species. Listed herein to attract the attention of the potential observers. Disc entirely rough, covered with numerous, close-set denticles, but without enlarged, thorny tubercles, except for a few on tail.

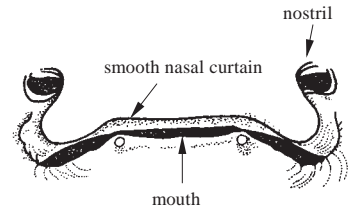
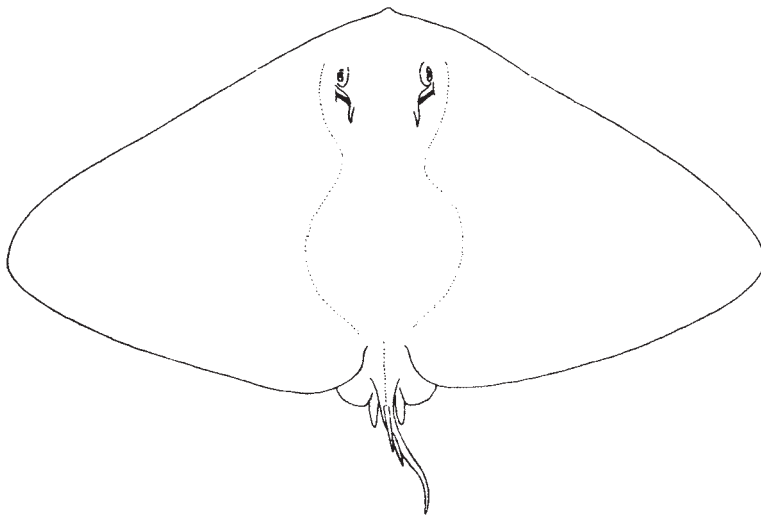


GYMNURIDAE

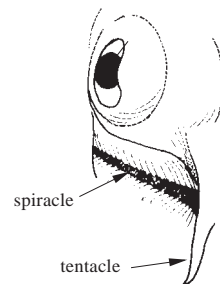
Butterfly rays

by B. Séret, Institut de Recherche pour le Développement and Muséum National d'Histoire Naturelle, Paris, France

Diagnostic characters: Medium to large batoids (maximum disc width over 2 m), with a **strongly depressed lozenge-shaped disc**; **disc 1.6 to 2.2 times as broad as long**; snout short and obtusely angular; anterior margins slightly sinuous, outer pectoral corners narrowly angled; pectoral fins continuous along sides of head, not forming subrostral lobes or cephalic fins. **A short and very slender, whip-like tail, much shorter than disc** and distinctly demarcated from it; sting and tail folds present or absent, when present the upper and lower folds are reduced and low; a single small dorsal fin on the tail in some species; reduced to a low keel or absent in others, **no caudal fin**. Pelvic fin rounded, not divided into lobes. Five small gill slits on ventral side. Eyes and spiracles on top of head, spiracles with tentacles on their posterior margin in some species. Mouth transverse and arched, **no fleshy papillae** on floor of mouth, 52 to 130 rows (number increasing with growth) of oral small teeth with long cusps. Nostrils just anterior to mouth and connected to it by a groove; anterior nasal flaps extended on internasal space and fuse to form a **short nasal curtain overlapping mouth**; posterior margin usually **not fringed**. Dorsal side of **disc smooth** in most species, with some fine denticles and a few tubercles in large specimens of some species. **Colour:** dorsal side of disc variously coloured, grey, light to dark brown or greenish, uniform coloured or with pattern of spots, lines and reticulations; ventral side white, sometimes with a bronze or rusty cast.



detail of mouth



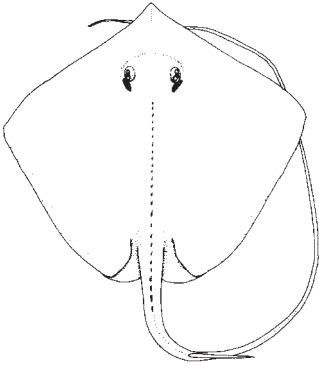
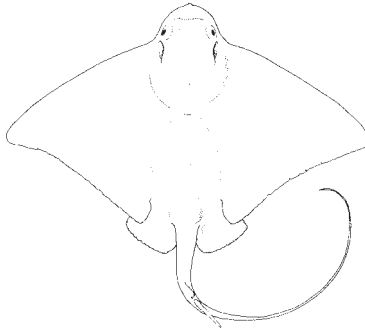
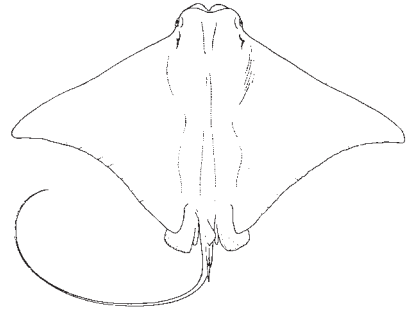
spiracular tentacle

Habitat, biology, and fisheries: Butterfly rays are widespread in tropical and warm-temperate coastal waters, found over the soft bottoms of the continental shelf, from shoreline to about 110 m depth; some species penetrate in the brackish waters of estuaries and coastal lagoons. They are demersal and slow-swimming bottom-dwellers, often resting on sandy and muddy bottoms, covered by sediments. They feed on benthic invertebrates (crabs, shrimps, bivalves) and small fishes. All species are ovoviviparous, with nourishment of the embryos by uterine milk when yolk sack is resorbed; litters from 2 to 6 pups. Butterfly rays are caught by trammel nets and bottom trawls and their meat is eaten like that of other stingrays, fresh, dried-salted and smoked.

Similar families occurring in the area

Dasyatidae: disc not more than 1.3 times as broad as long; tail much longer than disc; nasal curtains deeply fringed; fleshy papillae present on floor of mouth.



Myliobatidae, Rhinopteridae, Mobulidae: head distinctly demarcated from body; anterior portions of pectorals forming separate lobes or cephalic fins; eyes and spiracles on sides of head.

**Dasyatidae****Myliobatidae****Rhinopteridae****Key to the species of Gymnuridae occurring in the area**

- 1a. Tail with 1 or more serrated stings → 2
 1b. Tail without sting; no tentacle on posterior margin of spiracle ***Gymnura micrura***
- 2a. No keel on dorsal side of tail ***Gymnura hirundo***
 (from Madeira)
 2b. A keel on dorsal side of tail; a distinct tentacle on posterior margin of spiracles . . . ***Gymnura altavela***

List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Gymnura altavela* (Linnaeus, 1758).
 ? *Gymnura hirundo* (Lowe, 1843) (probably a synonym of *G. altavela*).
 *Gymnura micrura* (Bloch and Schneider, 1801).

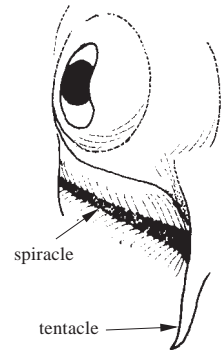
References

- Bigelow, H.B. & Schroeder, W.C.** 1953. Sawfishes, guitarfishes, skates and rays, and chimaeroids. In J. Tee-Van, C.M. Breder, A.E. Parr, W.C. Schroeder & L.P. Schultz, eds. *Fishes of the Western North Atlantic, Part 2. Memoirs of the Sears Foundation for Marine Research*, 1: 1–588. Yale University, New Haven, CT.
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- Séret, B.** 1986. *Poissons de mer de l'Ouest Africain tropical*. Initiation et Documents techniques, 49. Paris, ORSTOM, 450 p.

Gymnura altavela (Linnaeus, 1758)

Frequent synonyms / misidentification: None / None.

FAO names: **En** – Spiny butterfly ray; **Fr** – Raie-papillon épineuse; **Sp** – Raya mariposa.



detail of eye and spiracle

Diagnostic characters: Disc lozenge-shaped, at least twice as broad as long; anterior margins slightly sinuous; outer corners narrowly angled; snout short and obtusely angled (about 135°); tail slender and short, about one-third of disc length, with **1 or 2 long, serrated and venomous stings**; **a low longitudinal fold or keel on upper side of tail below the sting, a similar keel on ventral side of the tail along its entire length.** **A distinct, single long tentacle at the inner rear corner of each spiracle.** Mouth small and straight, 60 to 140 rows of teeth in parallel rows or in pavement. Posterior margin of nasal curtain smooth (only finely fringed in some young individuals). **Colour:** dorsal side light to dark brownish variously patterned with dark and light spots and blotches scattered on disc, often giving a marbled appearance; sometimes with an ocellus-like pale edged blotch on centre of pectorals; tail with several alternating dark and light crossbars, distinct in young; ventral side white to creamy white; sometimes with a rusty cast.

Size: Maximum disc width 208 cm but possibly larger (some doubtful records up to 400 cm); males mature at about 101 cm disc width; size at birth 38 cm to 44 cm disc.

Habitat, biology, and fisheries: A demersal butterfly ray found in coastal waters of the inner continental shelf from shoreline to about 55 m depth. A sluggish bottom-dweller resting on sandy and muddy bottoms. Feeds on various benthic invertebrates (bivalves, shrimps, crabs) and small fishes. Ovoviviparous. Regularly caught with trammel nets and bottom trawls; also with lines by sport anglers in some places. Its meat is eaten like that of other stingrays, fresh, dried-salted and smoked. List as Vulnerable in the IUCN Red List globally and in the area.

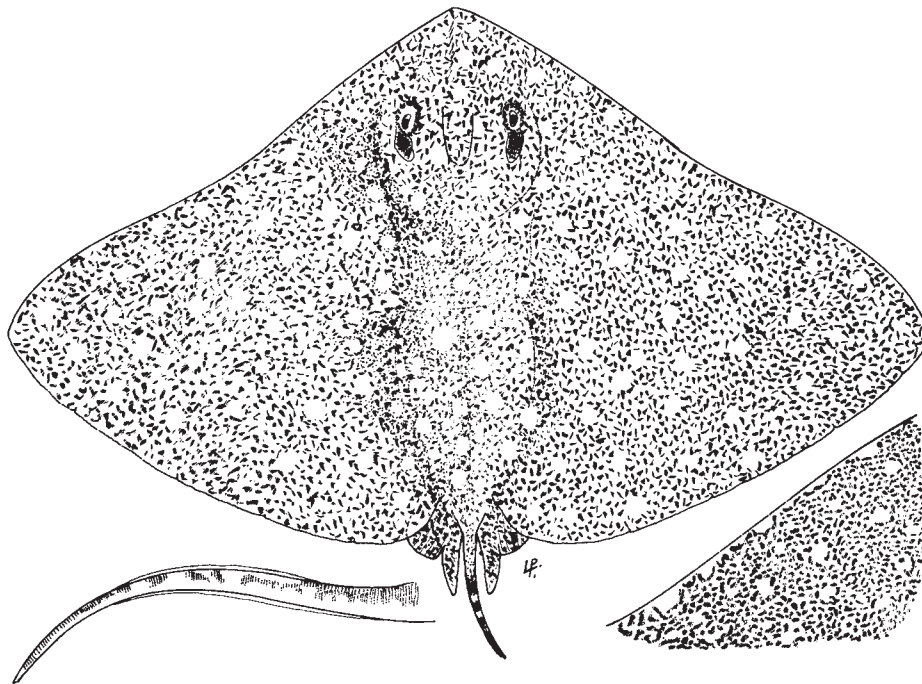
Distribution: In the western Atlantic, from Massachusetts to northern Argentina. In the eastern Atlantic, from Portugal to Congo, including Madeira and the Canary Islands, also in the Mediterranean Sea.



***Gymnura micrura* (Bloch and Schneider, 1843)**

Frequent synonyms / misidentification: None/ None.

FAO names: En – Smooth butterfly ray; Fr – Raie-papillon glabre; Sp – Raya mariposa menor.



Diagnostic characters: Disc lozenge-shaped, 1.6 to 1.8 times as broad as long; anterior margins slightly sinuous; outer corners narrowly angled; snout short and obtusely angled (about 120 to 130°); tail slender and short, about one-third of disc length, **without sting**; **a dorsal and ventral keel, opposite on the posterior two-thirds of the tail**. **No spiracular tentacle** at the inner posterior corner of each spiracle. Mouth small and straight, 60 to 120 rows of teeth in parallel rows. Posterior margin of nasal curtain smooth (only finely fringed in some young individuals). **Colour:** dorsal side grey, brown, or green, always with a variegated pattern of light and dark blotches and reticulations on disc, giving a marbled appearance; tail with 3 or 4 distinct crossbars; ventral side whitish with darker margins.

Size: Maximum disc width 120 cm, commonly 90 cm; males mature at 42 cm disc width, females at 50 cm disc width; size at birth 22 cm disc.

Habitat, biology, and fisheries: A demersal butterfly ray found in coastal waters of the inner continental shelf, also occurring in estuaries. A sluggish bottom-dweller resting on sandy and muddy bottoms. Feeds on various benthic invertebrates (bivalves, shrimps, crabs) and small fishes. Ovoviviparous. Regularly caught with trammel nets and bottom trawls; its meat is eaten like that of stingrays, fresh, dried-salted and smoked.

Distribution: In the western Atlantic, from Chesapeake Bay to Brazil; common in Gulf of Mexico, but unrecorded from the greater and Lesser Antilles. In the eastern Atlantic, from Senegal to Congo.

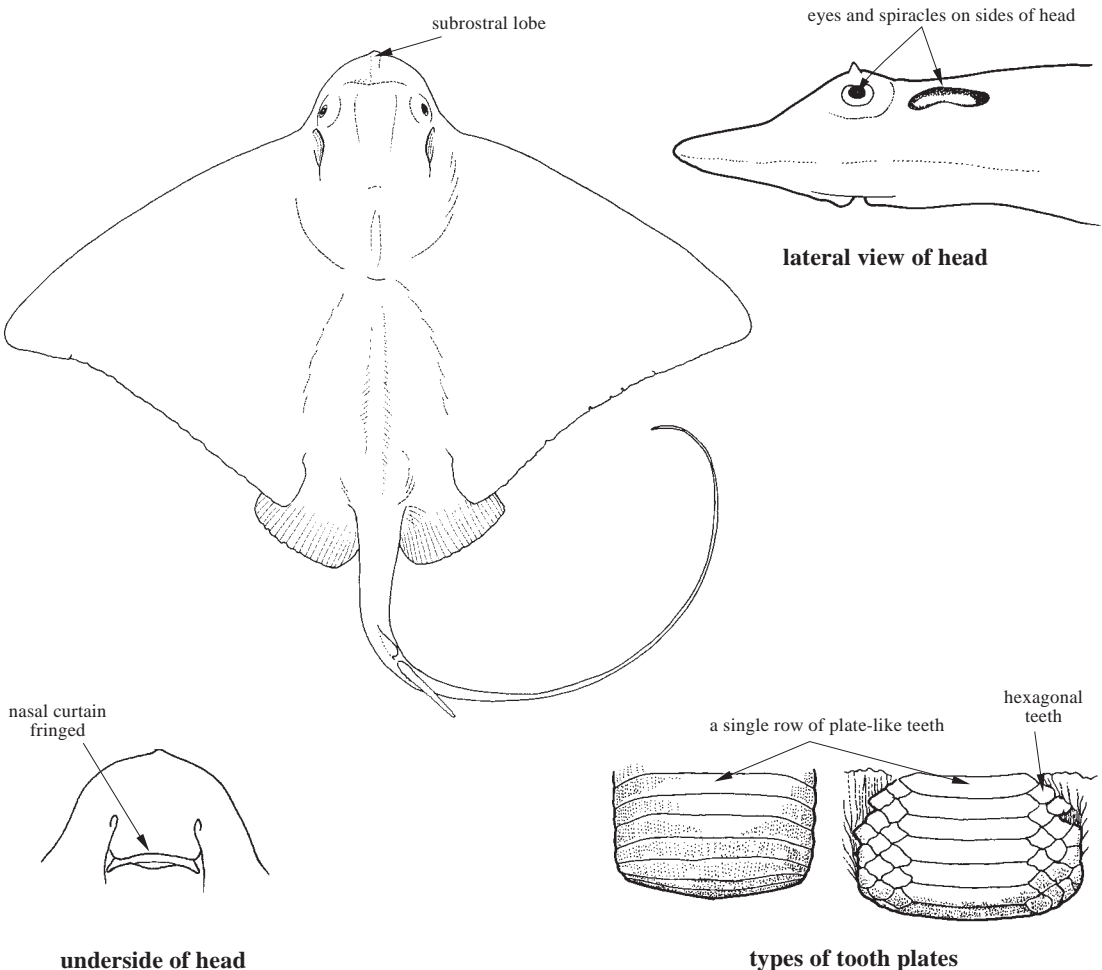


MYLIOBATIDAE

Eagle rays

by B. Séret, Institut de Recherche pour le Développement and Muséum National d'Histoire Naturelle, Paris, France

Diagnostic characters: Moderate to large-sized batoids (maximum disc width about 250 cm), **disc thick**, more or less depressed, **rhombic to lozenge-shaped**, much broader than long; **head distinctly elevated** from disc, anterior part of pectoral fins forming an **undivided fleshy subrostral lobe** which extends below front of head; snout short, rounded or angular; pectoral fins falcate with narrowly angled apices. Pelvics not divided into anterior and posterior lobes. **Tail slender, whip-like, and distinctly demarcated from disc**, its length 1.3 to 3 times disc length, with a **small dorsal fin** on its base in front of **1 or several long, serrated and venomous sting(s)** (sometimes lacking). Five small gill slits on ventral side. Eyes in lateral position on head and just anterior to spiracles. Mouth narrow, almost straight; several fleshy papillae on floor of mouth; **oral teeth large, plate-like and hexagonal, typically with a medial row of broad teeth and 3 rows of narrower teeth on each side, teeth normally in 1 to 7 rows** in either jaw but occasionally with more rows. Nostrils just anterior to mouth, and connected to it by a groove; anterior nasal flaps expanded and fused to form a **broad nasal curtain** overlaping mouth; its posterior margin finely fringed. Dorsal side of disc mostly smooth, sometimes with minute denticles, and a few small thorns around orbits and on the midline of the disc. **Colour:** dorsal side uniform coloured or with variegated pattern of spots, blotches, transverse stripes and reticulations; ventral side whitish, sometimes with dark margins.



Habitat, biology, and fisheries: Eagle rays are circumglobal, widespread in tropical to temperate coastal waters over continental shelf and around offshore islands. They are semipelagic, often swimming in large groups over the bottom or near the surface; mostly found in coastal waters but also recorded down to 527 m depth; rarely in brackish waters and apparently never in freshwater. They are strong and agile swimmers, likely to migrate over long distances. They swim "like birds" by flapping their wing-like pectoral fins; also they occasionally jump out of the water. The powerful jaws and plate-like teeth form a grinding mill that enable them to feed on hard-shelled molluscs (bivalves and gastropods) and crustacea that they dislodge from the bottom with tips of the pectoral fins and their subrostral lobe. All species are ovoviviparous, the embryos are nourished by uterine milk when their yolk sac is resorbed; litters from 1 to 4 pups. They may cause damages to aquaculture operations by feeding on farmed molluscs. Some species are very colourful and often displayed in public aquariums. They are caught as bycatch in pelagic and trawl fisheries, also in trammel nets. Their meat is eaten fresh, dried-salted or smoked.

Similar families occurring in the area

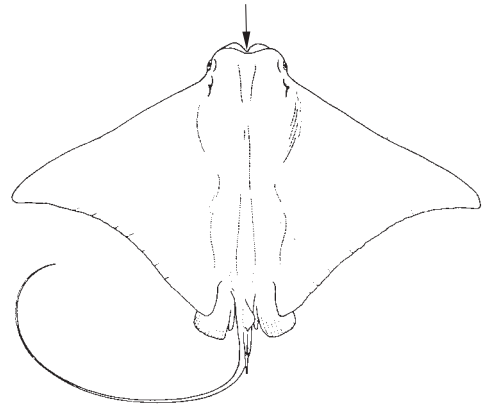
Rhinopteridae: subrostral lobe and snout deeply notched medially, forming 2 rounded lobes; 3 rows of wide medial plate-like teeth (rather than 1 medial row) on jaws; no fleshy papillae on floor of mouth.

Mobulidae: anterior part of pectoral fins forming 2 separate cephalic lobes (or horns), teeth very small, not plate-like, not forming a grinding mill; internal gill arches with large and complex filter plates.

Dasyatidae and Gymnuridae: anterior portions of pectoral fins continuous along sides of head, no separate subrostral lobe or cephalic fins; eyes and spiracles on top of head.

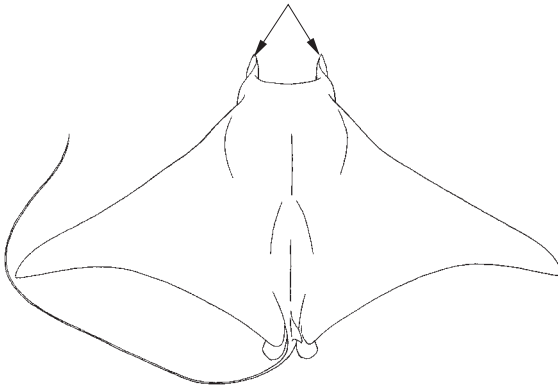
Other batoid families: lack serrated tail sting; tail not whip-like.

subrostral lobe deeply
notched medially



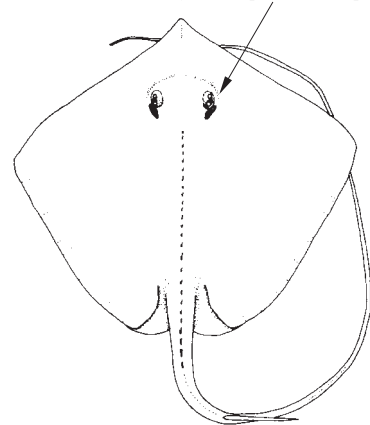
Rhinopteridae

2 cephalic lobes



Mobulidae

eyes and spiracles on top of head



Dasyatidae

Key to the species of Myliobatidae occurring in the area

- 1a. A single series of very large plate-like teeth in each jaw (distinct colour pattern; nasal curtain notched) (Fig. 1a) ***Aetobatus narinari***
- 1b. Several (usually 7) series of plate-like teeth in each jaw, those of the median series much wider than the lateral ones (Fig. 1b) → 2

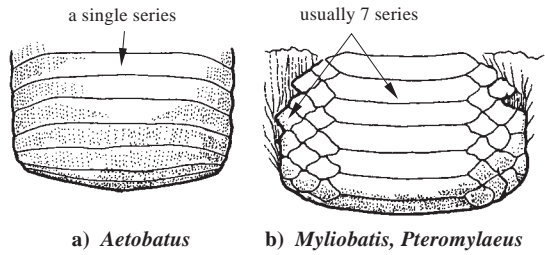


Fig. 1 arrangement of teeth in upper jaw

- 2a. Subrostral lobe connected to pectoral fins through a continuous border along sides of head; rostrum broad and rounded (Fig. 2) . . . ***Myliobatis aquila***
- 2b. Subrostral lobe separate from pectoral fins, which end at side of head at level of rear margin of orbit; rostrum elongate and bluntly pointed (Fig. 3) ***Pteromylaeus bovinus***

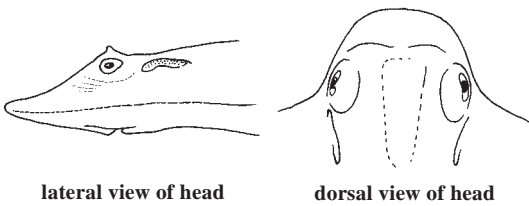


Fig. 2 *Myliobatis*

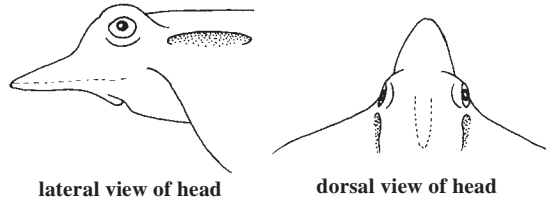


Fig. 3 *Pteromylaeus*

List of the species occurring in the area

The symbol ♠ is given when species accounts are included.

- ♠ *Aetobatus narinari* (Euphrasen, 1790).
- ♠ *Myliobatis aquila* (Linnaeus, 1758).
- ♠ *Pteromylaeus bovinus* (Geoffroy St Hilaire, 1817).

References

Bigelow, H.B. & Schroeder, W.C. 1953. Sawfishes, guitarfishes, skates and rays, and chimaeroids. In J. Tee-Van, C.M. Breder, A.E. Parr, W.C. Schroeder & L.P. Schultz, eds. *Fishes of the Western North Atlantic, Part 2. Memoirs of the Sears Foundation for Marine Research*, 1: 1–588. Yale University, New Haven, CT.

Compagno, L.J.V. 1999. Checklist of living elasmobranchs. In W.C. Hamlett, ed. *Sharks, Skates and Rays, the Biology of Elasmobranch Fishes*. Baltimore, John Hopkins University Press, pp. 470–498.

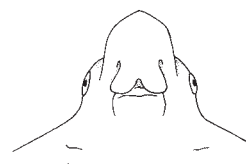
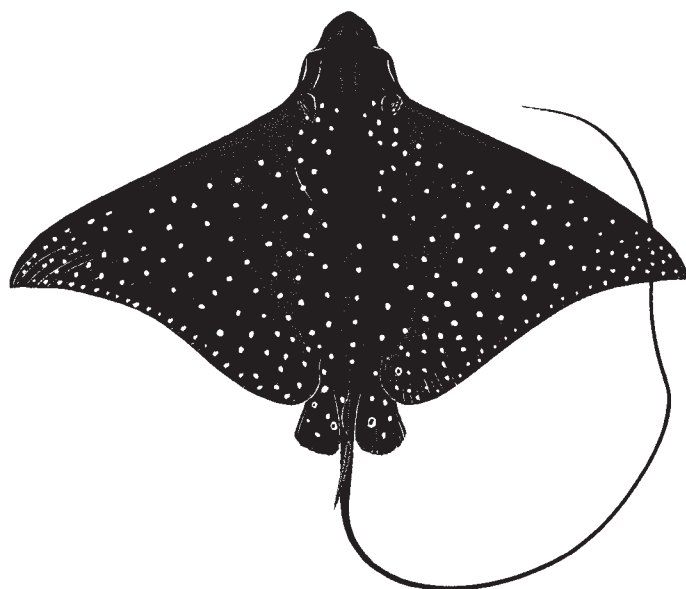
Fischer, W., Bianchi, G. & Scott, W.B. (eds). 1981. *FAO Species Identification Sheets for Fishery Purposes. Eastern Central Atlantic. Fishing Areas 34, 47 (in part). Volume V. Sharks, Batoid Fishes, Lobsters*. Rome, FAO, pag. var.

Séret, B. 1986. *Poissons de mer de l'Ouest Africain tropical*. Initiation et Documents techniques, 49. Paris, ORSTOM, 450 p.

Aetobatus narinari (Euphrasen, 1790)

Frequent synonyms / misidentification: None / None.

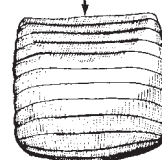
FAO names: En – Spotted eagle ray; Fr – Aigle de mer léopard; Sp – Chucho pintado.



ventral view of head



lateral view of head



tooth plates

Diagnostic characters: Disc rhombic to lozenge-shaped, about 2.1 times as broad as long; thick. **Head elevated, distinct from disc;** snout rounded and relatively short; **subrostral lobe, below anterior part of head, rounded and separated from remainder of pectoral fins** at level of spiracles; **pectoral fins wing-like** with their outer corners narrowly angular; pelvic fins single-lobed, distinctly extending posterior to pectoral posterior margins. **Tail slender and whip-like**, much longer than disc (up to 3.5 times longer than disc), with a **small dorsal fin** on its base, just in front of **one or several long and serrated sting(s)**; low dorsal and ventral tail ridges behind sting. Five gill slits on ventral side. Eyes and spiracles on sides of head. Mouth almost straight, a transverse row of fleshy papillae on floor of mouth; **a single series of broad, plate-like teeth**. Nasal curtain with a notch at symphysis; its posterior margin fringed. Dorsal and ventral surfaces smooth, sometimes with a short mid-dorsal band of denticles on nape-shoulder area, in large individuals. **Colour:** dorsal surface greyish, olive grey or chestnut brown, with a **pattern of whitish, yellowish or bluish spots variable in size and shape (rounded, elliptical, or annular)**; ventral surface white with dark margins; tail blackish behind sting.

Size: Maximum disc width 230 cm; commonly to 140 cm; maximum weight over 200 kg; size at birth from 18 to 36 cm disc width.

Habitat, biology, and fisheries: A demersal and semipelagic eagle ray, found in coastal waters over the continental shelf, mainly inshore. Solitary or in large groups of several hundred individuals during spawning season. An active swimmer, likely to migrate long distances and to jump out of the water during spawning season or when pursued by sharks. Viviparous, with litters of up to 10 pups. Feeds mainly on hard-shelled molluscs (bivalves, gastropods), also on cephalopods and shrimps. Caught with longlines, trammel nets, trawls and purseseines. Its meat is eaten fresh, dried-salted or smoked. Ranked as Near Threatened on the IUCN Red List.

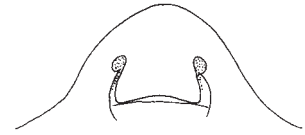
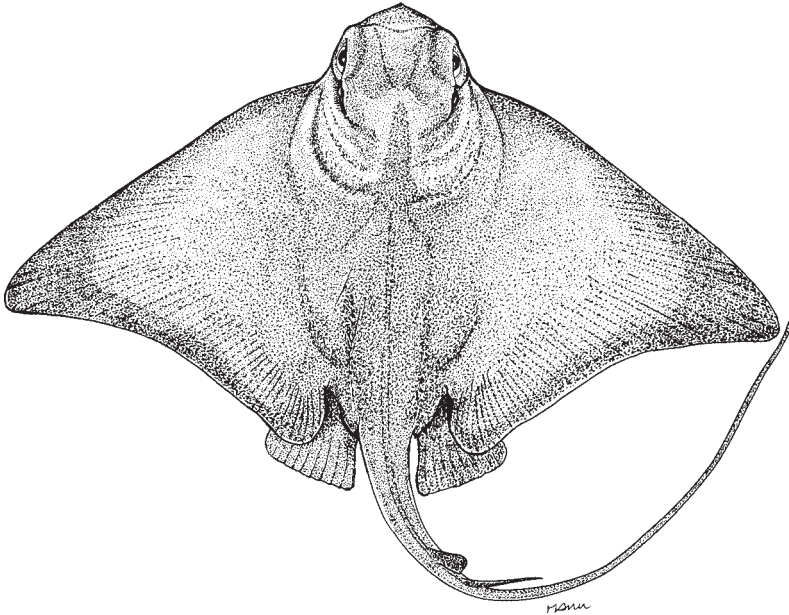
Distribution: Circumglobal, in all tropical to warm-temperate seas. In the eastern Atlantic, Mauritania to Angola.



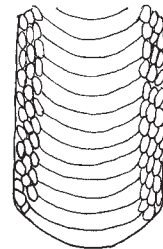
Myliobatis aquila (Linnaeus, 1758)

Frequent synonyms / misidentification: None / None.

FAO names: En – Common eagle ray; Fr – Aige commun; Sp – Aquila marina.



ventral view of head



tooth plates

Diagnostic characters: Disc rhombic to lozenge-shaped, about 2 times as broad as long; thick. **Head elevated, distinct from disc;** snout projecting and rounded, **subrostral lobe, below anterior part of head, broadly rounded and connected to pectoral fins** by continuous borders along side of head; **pectoral fins wing-like** with their outer corners narrowly angular; pelvic fins single-lobed, broad and distinctly extending posterior to pectoral posterior margins. **Tail slender and whip-like**, much longer than disc (up to 2.5 times longer than disc), with a **small dorsal fin** on its base, in front of **one (rarely 2) long and serrated sting**. Five gill slits on ventral side. Eyes and spiracles on sides of head. Mouth almost straight, a transverse row of fleshy papillae on floor of mouth; **usually 7 series of broad, plate-like teeth; the teeth of the median series much larger than the lateral ones.** Nasal curtain greatly expanded, its posterior margin slightly emarginate and fringed. Dorsal and ventral surfaces smooth, sometimes with a irregular mid-dorsal band of denticles from nape to tail in large individuals. Large adult males develop a large tubercle in front of orbits. **Colour:** dorsal side uniform yellowish to greenish brown; ventral side white with reddish brown margins; tail blackish behind sting.

Size: Maximum disc width 100 cm (over 150 cm in total length).

Habitat, biology, and fisheries: A demersal and semi-pelagic eagle ray, found in coastal waters over the continental shelf, mainly inshore, from shore line to about 100 m depth. Solitary or in groups, swimming over soft bottoms, likely to migrate long distances. Feeds on various benthic invertebrates (mainly hard-shelled molluscs and crustaceans). Viviparous with litters up to 7 pups. Caught with trammel nets, bottom trawl and purse-seines. Its meat is eaten fresh, dried-salted or smoked.

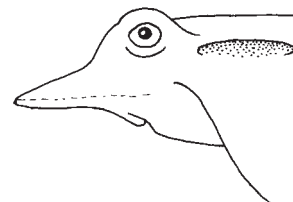
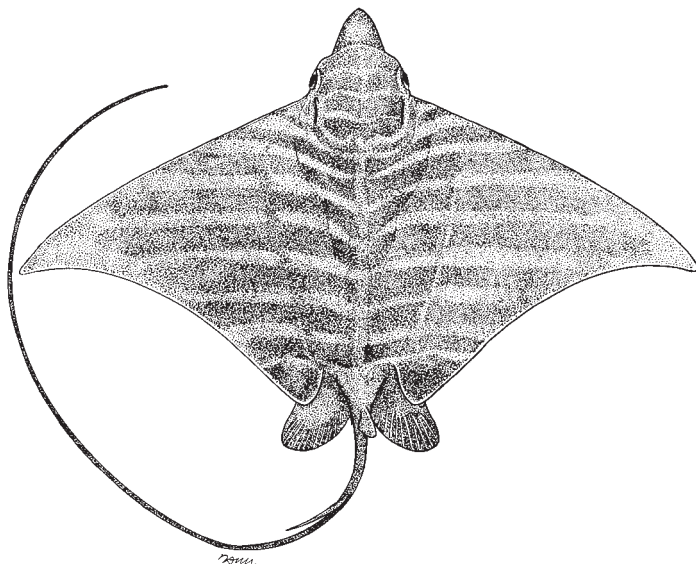
Distribution: In the eastern Atlantic, from the United Kingdom to South Africa, also in the Mediterranean Sea, but most common at tropical latitudes. Also reported from southwestern Indian Ocean, from the Natal coast.



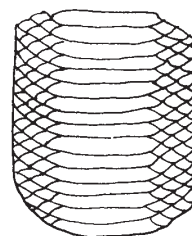
Pteromylaeus bovinus (Geoffroy St Hilaire, 1817)

Frequent synonyms / misidentification: None / None.

FAO names: En – Bull ray; Fr – Aigle-vachette; Sp – Chucho vaca.



lateral view of head



tooth plates

Diagnostic characters: Disc rhombic to lozenge-shaped, about 1.5 to 2 times as broad as long; thick. **Head elevated and distinct from disc;** snout projecting as a single subrostral lobe elongate and pointed below front of head; **subrostral lobe completely separated from pectoral fins;** pectoral fins wing-like, their outer corners narrowly angular; pelvic fins single-lobe, extending well posterior to pectoral posterior margins. **Tail slender and whip-like,** up to 3 times longer than disc, with a **small dorsal fin** on its base, in front of **1 to 4 long and serrated sting(s)**. Five gill slits on ventral side. Eyes and spiracles on sides of head. Mouth almost straight, a transverse row of fleshly papillae on floor of mouth; **7 series of plate-like teeth, median teeth much larger than the lateral ones.** Nasal curtain greatly expanded, its posterior margin fringed in young. Dorsal and ventral surfaces smooth; large individuals with a mid-dorsal band of denticles from nape to tail. Large adult males develop a large tubercle in front of orbit. **Colour:** dorsal side brown to greenish brown, with a pattern of 7 to 9 transverse dark bands, more or less distinct in young; ventral side white; tail blackish behind sting.

Size: Maximum disc width 150 cm (over 260 cm in total length), commonly up to 100 cm disc width; maximum weight 60 kg.

Habitat, biology, and fisheries: A demersal and semipelagic eagle ray, found in the coastal waters over the continental shelf, mainly inshore, from shoreline to about 100 m depth. Often observed swimming in groups close to the bottom. Feeds on various benthic invertebrates, mainly molluscs and crustaceans. Viviparous with litters up to 6 pups. Caught with trammel nets, bottom trawls, purse-seines and long lines. The meat is eaten fresh, dried-salted or smoked.

Distribution: In the eastern Atlantic, from Portugal to South Africa, also in the Mediterranean Sea; in the southwestern Indian Ocean, along the Natal coast.

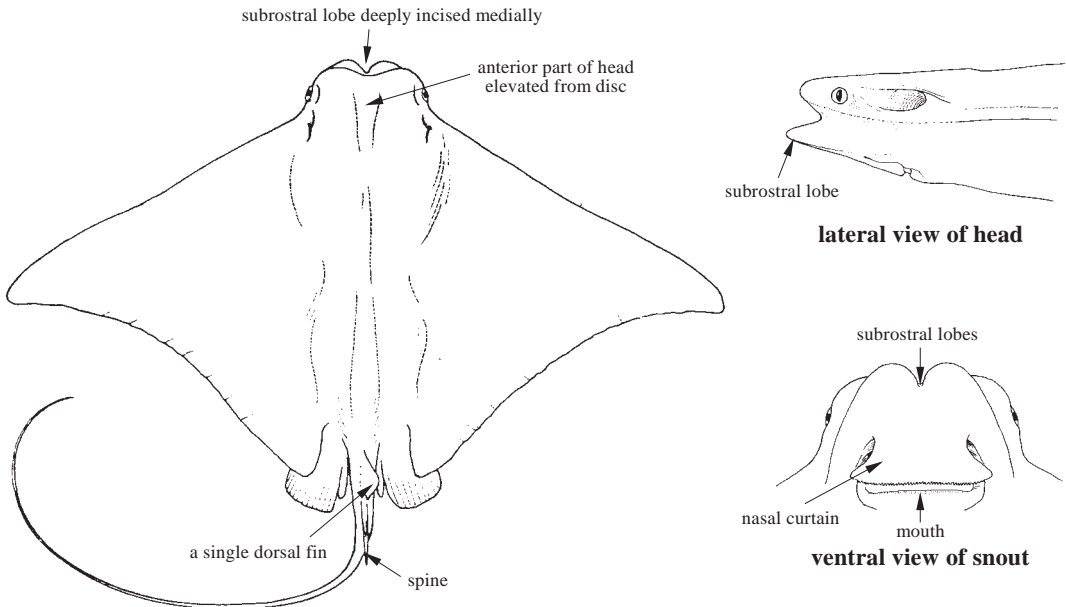


RHINOPTERIDAE

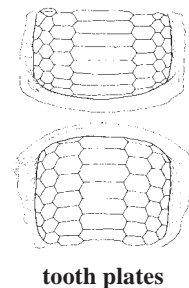
Cownose rays

by B. Séret, Institut de Recherche pour le Développement and Muséum National d'Histoire Naturelle, Paris, France

Diagnostic characters: Medium to large-sized batoids (up to 210 cm disc width), with a broad, **rhombic to lozenge-shaped disc**, distinctly wider than long; **head elevated and distinct** from disc; **snout short and notched medially**; anterior part of pectoral fins forming, in front of head, **a short fleshy subrostral lobe with a deep median notch so that it looks as 2 lobes**. Pectoral fins wing-like with outer corners narrowly angular and somewhat falcate; pelvic fin not divided into anterior and posterior lobes. **Tail slender and whip-like**, its length 1 to 3 times longer than disc, with **a small dorsal fin** on its base, in front of **a single (rarely more) long and serrated sting**; tail base circular in cross-section. Five small gill slits on ventral side. Eyes and spiracles on sides of head. Mouth nearly transverse; no fleshy papillae on floor of mouth; **6 to 9 series (rarely up to 20) of broad, hexagonal, plate-like teeth arranged in pavement, the teeth of the median series much larger than the lateral ones, decreasing in size outwardly**. Nostrils just anterior to mouth and connected to it by a groove, anterior nasal flaps expanded onto internasal space and fused together, forming a large nasal curtain overlapping mouth, its posterior margin fringed. Dorsal side of disc smooth, or more or less prickled with small denticles, mainly on midline, in some species. **Colour:** dorsal side usually uniform brownish, greenish brown, or bronze, sometimes with indistinct pattern of obscure lines; ventral side white.



Habitat, biology, and fisheries: Cownose rays are demersal and semipelagic rays found in coastal waters over the continental shelf and around offshore islands, from shore line to about 30 m depth, also penetrate brackish waters of estuaries and coastal lagoons. They are strong swimmers, flapping rapidly their wing-like pectoral fins; they often swim in small groups, sometimes jumping out of the water, and are likely to migrate long distances. They feed on benthic invertebrates, mainly hard-shelled molluscs (bivalves, gastropods) and crustaceans (crabs, lobsters), which they dislodge with the tip of their pectoral fins and subrostral lobes. All species are ovoviparous, the embryos are nourished with uterine milk when their yolk sacs are resorbed; litters from 2 to 6 pups. They are caught as bycatch with trammel nets, bottom trawls and purse seines. Their meat is eaten fresh, dried-salted or smoked. Some species are displayed in public aquariums.



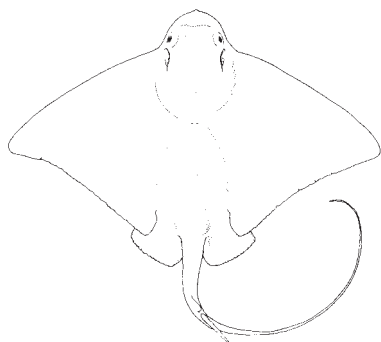
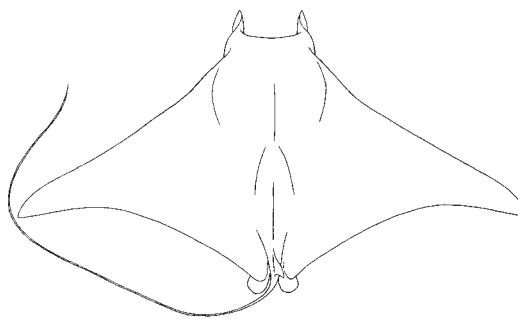
tooth plates

Similar families occurring in the area

Myliobatidae: subrostral lobe not divided medially; 1 single row of broad plate-like teeth on jaws; fleshy papillae on floor of mouth.

Mobulidae: anterior section of pectoral fins form cephalic fins or "horns"; teeth very small, not plate-like; jaws weak, not forming a grinding mill; internal gill arches with large and complex filter plates.

Dasyatidae and Gymnuridae: head not elevated and not distinct from disc; no subrostral lobe; eyes and spiracles on top of head.

**Myliobatidae****Mobulidae****Key to the species of Rhinopteridae occurring in the area**

- 1a. Teeth usually 7 series in each jaw (occasionally 6 or 8) ***Rhinoptera bonasus***
 1b. Teeth usually 9 series in each jaw (occasionally 8 or 10) ***Rhinoptera marginata***

List of the species occurring in the area

The symbol ◆ is given when species accounts are included.

◆ *Rhinoptera bonasus* (Mitchill, 1815).

◆ *Rhinoptera marginata* (Geoffroy St Hilaire, 1817).

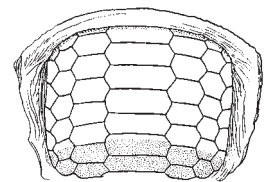
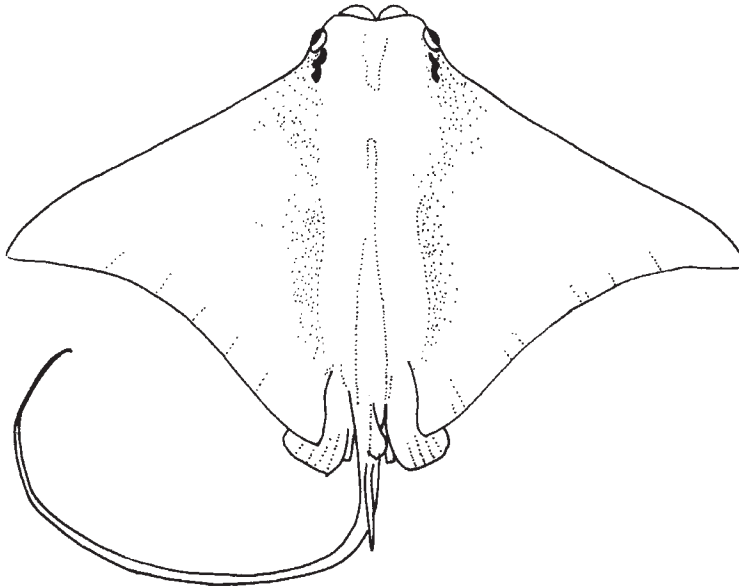
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Rhinoptera bonasus (Mitchill, 1815)

Frequent synonyms / misidentification: None / *Rhinoptera marginata* (Geoffroy St Hilaire, 1817).

FAO names: En – Cownose ray; Fr – Mourine américaine; Sp – Mancha.



tooth plates

Diagnostic characters: Disc rhombic to lozenge-shaped, about twice broader than long, and thick; head elevated and distinct from disc, snout notched with a subrostral fleshy lobe incised medially so that it appears as 2 short lobes. Pectoral fins wing-like, their outer corners narrowly angular and somewhat falcate. Tail slender and whip-like, longer than disc, with a small dorsal fin on its base, in front of a single (rarely more) long, serrated sting. Eye and very large spiracles on side of head. Mouth transverse and almost straight, no fleshy papillae on floor of mouth, usually 9 series (occasionally 8 or 10) of broad, plate-like teeth, those of the median series much larger than the lateral ones, their size decreasing outwardly. Nasal curtain greatly expanded, its posterior margin smooth, fringed or lobed. Dorsal side of disc smooth, sometimes prickly on midbody in large specimens. **Colour:** dorsal side uniform greenish brown to bronze; ventral side white, with dark margins; tail blackish behind sting.

Size: Maximum disc width 91 cm; females mature at 78 cm disc width; size at birth 37 cm disc width.

Habitat, biology, and fisheries: A demersal and semipelagic ray found in coastal waters over the continental shelf and around offshore islands. Feeds on benthic invertebrates, mainly hard-shelled molluscs (bivalves, gastropods) and crustaceans. Viviparous, with litters from 2 to 6 pups. Caught with trammel nets, bottom trawls and purse seines. Its meat is eaten fresh, dried-salted and smoked. Listed as Near Threatened in the IUCN Red List.

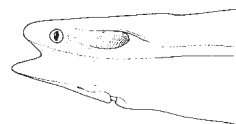
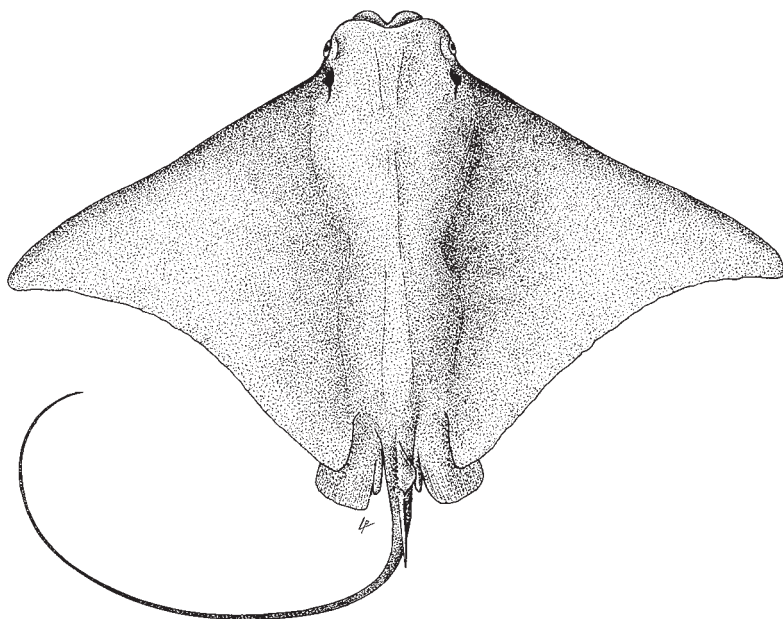
Distribution: In the western Atlantic, from southern New England to northern Argentina, including the Gulf of Mexico, and Cuba. In the eastern central Atlantic, recorded throughout the area, but records may result from misidentifications with *Rhinoptera marginata*. Confirmed records are from Mauritania, Senegal, and Guinea.



Rhinoptera marginata (Geoffroy St Hilaire, 1817)

Frequent synonyms / misidentification: *Rhinoptera peli* Bleeker, 1863.

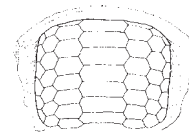
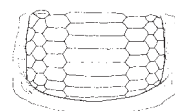
FAO names: **En** – Lusitanian cownose ray; **Fr** – Mourine lusitanienne; **Sp** – Gavián lusitánico.



lateral view of head



ventral view of snout



tooth plates

Diagnostic characters: Disc rhombic to lozenge-shaped, about twice broader than long, and thick; head elevated and distinct from disc, snout notched with a subrostral fleshy lobe incised medially so that it appears as 2 short lobes. Pectoral fins wing-like, their outer corners narrowly angular and somewhat falcate. Tail slender and whip-like, longer than disc, with a small dorsal fin on its base, in front of a single (rarely more) long, serrated sting. Eye and very large spiracles on side of head. Mouth transverse and almost straight, no fleshy papillae on floor of mouth, usually 7 series (occasionally 6 or 8) of broad, plate-like teeth, those of the median series much larger than the lateral ones, their size decreasing outwardly. Nasal curtain greatly expanded, its posterior margin smooth, fringed or lobed. Dorsal side of disc smooth, sometimes prickly on midbody in large specimens. **Colour:** dorsal side uniform greenish brown to bronze; ventral side white, with a rosy cast and with dark margins, mainly along the outer pectoral corners; tail blackish behind sting.

Size: Maximum disc width 200 cm.

Habitat, biology, and fisheries: A demersal and semipelagic ray found in coastal waters over the continental shelf and around offshore isands, from shore line to about 30 m depth, on soft bottoms. Locally abundant. Feeds on benthic invertebrates, mainly hard-shelled molluscs (bivalves, gastropods) and crustaceans. Viviparous. Caught with trammel nets, bottom trawls and purse seines. Its meat is eaten fresh, dried-salted or smoked. Listed as Near Threatened in the IUCN Red List.

Distribution: In the eastern Atlantic, from Portugal to Gulf of Guinea, also in the Mediterranean Sea.



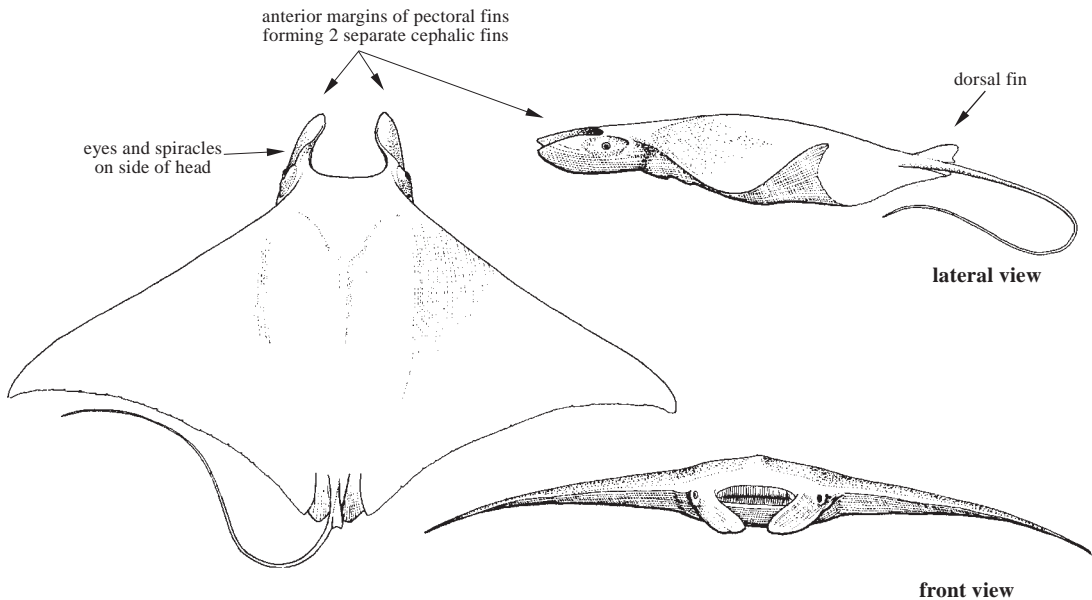
MOBULIDAE

Devil rays, mantas

by G. Nortarbartolo di Sciarra, TETHYS, Milano, Italy and

B. Séret, Institut de Recherche pour le Développement and Muséum National d'Histoire Naturelle, Paris, France

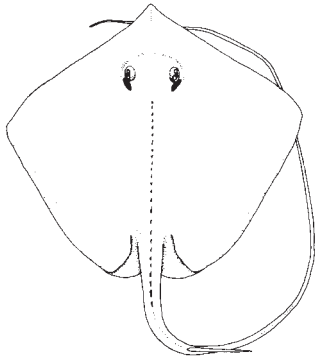
Diagnostic characters: Batoids of very large size, disc width of over 7 m in some species (*Manta* spp.). Body strongly depressed, with head, trunk, and broadly expanded pectoral fins forming a broad rhomboid disc. Disc much broader than long. Tail distinctly demarcated from disc. **Anterior margins of pectoral fins forming 2 separate cephalic fins that are separated from remainder of fins, project over front of head, and when unfolded are orientated vertically.** Head broad and slightly elevated but distinct from trunk. **Eyes and spiracles on sides of head.** Mouth subterminal to terminal and straight. **Teeth are minute** and arranged in many series in lower or both jaws. Anterior lobe of nostril greatly expanded to form well-developed nasal curtain that is complete across broad symphysis, and either entire or finely fringed along posterior margin; no papillae in mouth. No caudal fin, but **small dorsal fin on base of tail**; long serrated spine (or spines) present on tail in some species, lacking in others. Pelvic fins moderately narrow and extend little beyond posterior margin of pectoral fins. Skin naked or more or less rough with prickles or small tubercles. **Colour:** upper surface of body and outer surfaces of cephalic fins varying from grey to reddish or olivaceous brown to black; lower surface of body and inner surfaces of cephalic fins white to yellowish or light grey, often with irregular demarcation lines between differently coloured areas or dusky patches.



Habitat, biology, and fisheries: Devil rays occur in tropical and warm-temperate waters of all oceans, over continental and insular shelves. They are pelagic and highly migratory, swimming in surface waters by flapping their wing-like pectoral fins. All species are viviparous without placentae and feed on larger zooplanktonic organisms and small schooling fish. They have specialized branchial plates or lamellae that trap planktonic organisms and small fishes when water leaves pharynx over the gill surfaces. None of the species of devil rays occurring in the eastern central Atlantic is sufficiently abundant to be considered of significant commercial interest. However, some are regularly caught and are esteemed because of their large size and the good quality of their flesh, marketed mainly dried-salted. Worldwide, some species are important for ecotourism.

Similar families occurring in the area

Dasyatidae and Gymnuridae: eyes and spiracles on top of head; anterior margin of pectoral fins continuous along sides of head, which is not marked off from body.



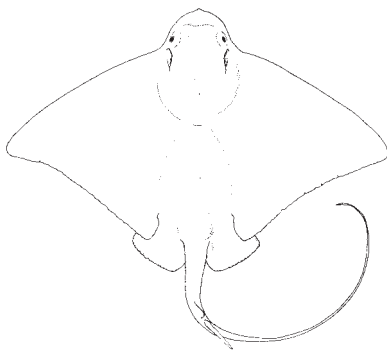
Dasyatiidae



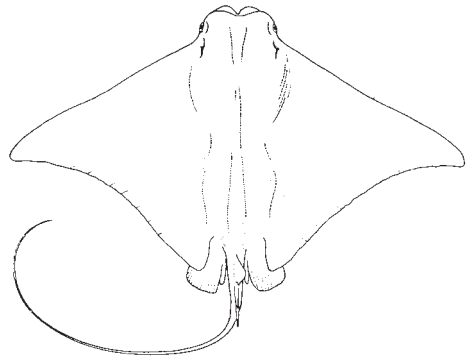
Gymnuridae

Myliobatidae and Rhinopteridae: anterior portions of pectoral fins forming projecting subrostral lobes, either single (Myliobatidae) or medially incised (Rhinopteridae); teeth plate-like and in 1 to 9 series.

Other batoid families: lack serrated tail spine; tail is stout to moderately slender. No other family has the typical cephalic fins of the devil rays.



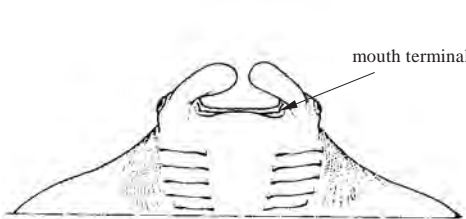
Myliobatidae



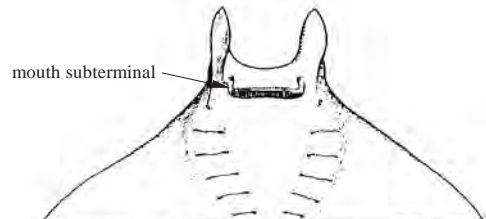
Rhinopteridae

Key to the species of Mobulidae occurring in the area

- 1a. Mouth terminal, extending across front of head; teeth on lower jaw only; head width greater than 20% of disc width (Fig. 1a) ***Manta birostris***
- 1b. Mouth subterminal; teeth present in both jaws; head width less than 17% of disc width (Fig. 1b) → 2



a) *Manta birostris*



b) *Mobula*

Fig. 1 ventral view of cephalic region

- 2a. Branchial filter plates fused at tips *Mobula tarapacana*
 2b. Branchial filter plates separate at tips → 3
- 3a. Spine at base of tail *Mobula japonica*
 3b. No spine at base of tail → 4
- 4a. Mean lower tooth band length smaller than 55% of mouth width *Mobula rochebrunei*
 4b. Mean lower tooth band length greater than 70% of mouth width *Mobula thurstoni*

List of species occurring in the area

The symbol ♠ is given when species accounts are included.

- ♠ *Manta birostris* (Walbaum, 1792).
 ♠ *Mobula japonica* (Müller and Henle, 1841).
 ♠ *Mobula rochebrunei* (Vaillant, 1879).
 ♠ *Mobula tarapacana* (Philippi, 1892).
 ♠ *Mobula thurstoni* (Lloyd, 1908).

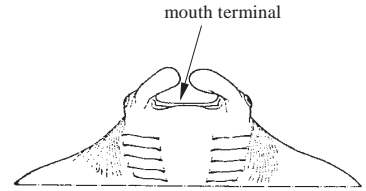
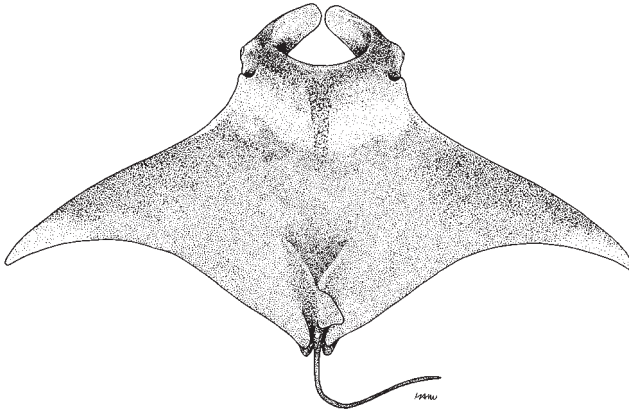
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***Manta birostris* (Walbaum, 1792)**

En – Giant manta; **Fr** – Mante géante; **Sp** – Manta gigante.

World's largest ray, with maximum size 800 cm disc width and 3 000 kg in weight. Pelagic in tropical coastal and oceanic waters. Thought to be worldwide but records from other oceans may represent separate species. Recorded from Madeira south to tropical West Africa. Dorsal coloration varies from reddish brown to black, with small spots and blotches occasionally present; ventrally white, with grey blotches sometimes present. Serrated spines normally absent. Ovoviviparous; size at birth 120 cm disc width. Food consists of zooplankton, small pelagic crustaceans, and ray-finned fishes. Rarely caught; meat from pectoral fins is salted and dried. Ranked as Vulnerable on the IUCN Red List.

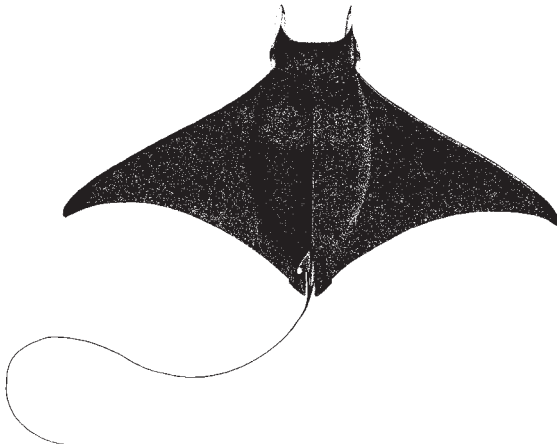


ventral view of cephalic region

***Mobula japonica* (Müller and Henle, 1841)**

En – Spinetail mobula; **Fr** – Diable aiguillat; **Sp** – Manta de aguijón.

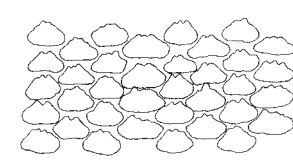
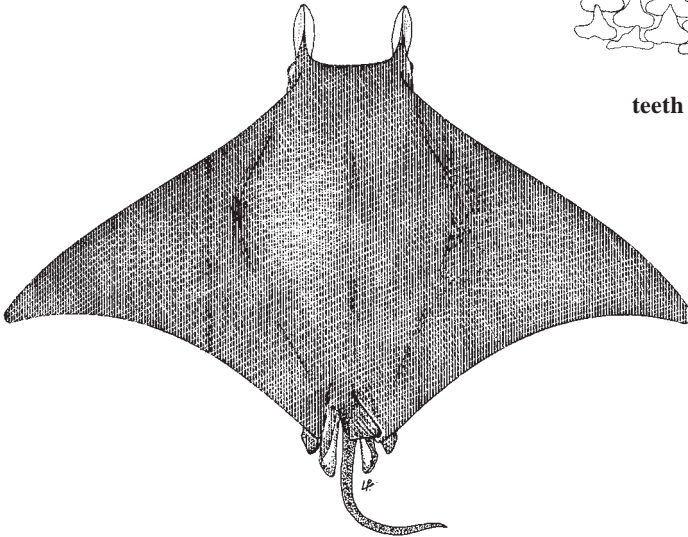
Medium-large ray, with caudal spine, sexually mature at a disc width greater than 2 m, and growing to a disc width greater than 3 m. Circumtropical, but also found in warm temperate waters. Known from tropical West Africa, Côte d'Ivoire. Tail very long, wire-like, with a prominent line of white denticles on each side. Branchial filter plates separate at tips; terminal lobes of plates lanceolate. Colour dark bluish on back, occasionally with a lighter crescent-shaped shade on "shoulders"; apex of dorsal fin white. Ventral side white. Ovoviviparous; size at birth about 85 cm disc width. Feeds on swarming planktonic crustaceans (Euphausiids) and small fishes. Ranked as Near Threatened by the IUCN Red List. The species *Mobula mobular* was recently synonymized with *M. japonica* by Poortvliet *et al.*, 1915, based on mitochondrial and nuclear DNA sequencing.



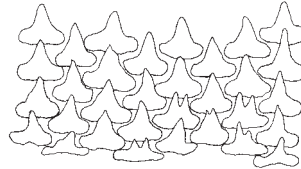
Mobula rochebrunei (Vaillant 1879)

En – Lesser Guianan devil ray; **Fr** – Petit diable de Guinée; **Sp** – Diablito de Guinea.

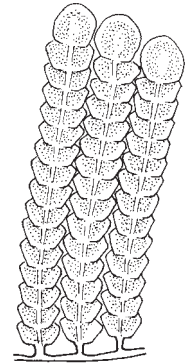
A small-sized devil ray without caudal spine, with a maximum recorded disc width of around 1.3 m. Found in the coastal waters off tropical West Africa. Base of tail laterally compressed. Tooth bands less than 50% of mouth width. Coloration dark bluish on the dorsal side. Ovoviviparous; size at birth about 55 cm disc width. Feeds on zooplankton and small schooling fishes. Ranked as Vulnerable on the IUCN Red List. Specimens frequently misidentified as a separate species, *Mobula hypostoma*, but these all represent *M. rochebrunei*.



adult female



adult male
teeth of lower jaw



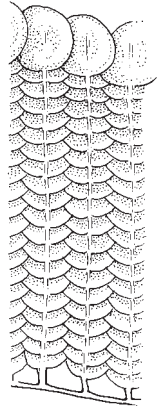
branchial filter
plates



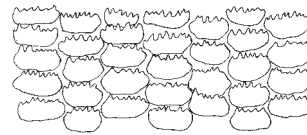
***Mobula tarapacana* (Philippi, 1892)**

En – Chilean devil ray; **Fr** – Mante chilienne; **Sp** – Manta cornuda.

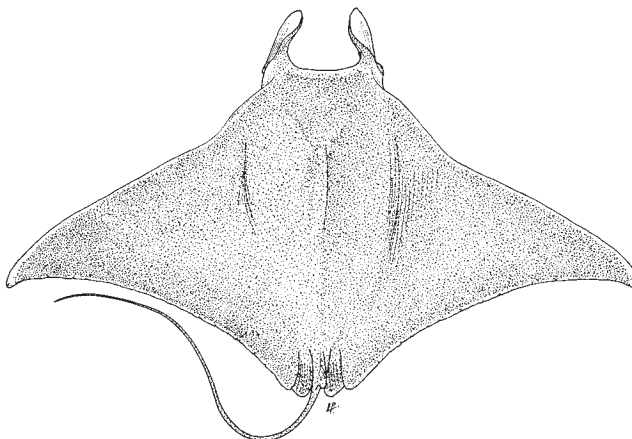
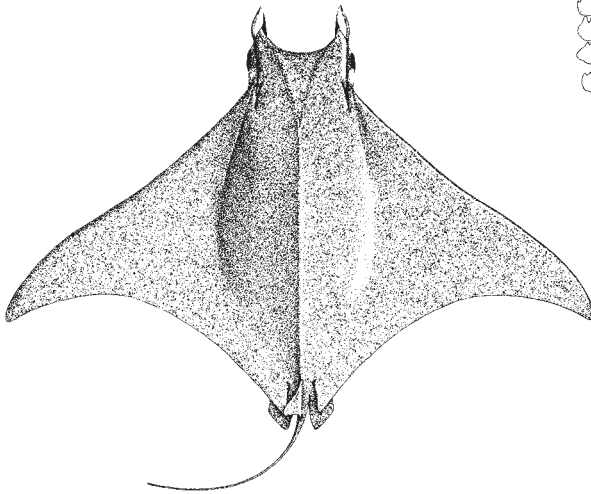
Large devil ray, with maximum size 370 cm disc width, without serrated spine at the base of the tail. Pelagic in coastal and occasionally oceanic waters. Widespread in tropical waters (described originally from off Chile). Recorded from the Cape Verde Islands south to tropical West Africa (described as *M. coilloti* from West Africa). Dorsal coloration brown to olivaceous green; ventrally white on anterior half and grey posteriorly (both portions clearly distinct, with irregular demarcation line). Densely covered with minute denticles. Ovoviviparous, with only 1 pup per litter; size at birth about 105 cm disc width. Food consists of zooplankton, small pelagic crustaceans, and small schooling fishes.



branchial filter plates



teeth of lower jaw



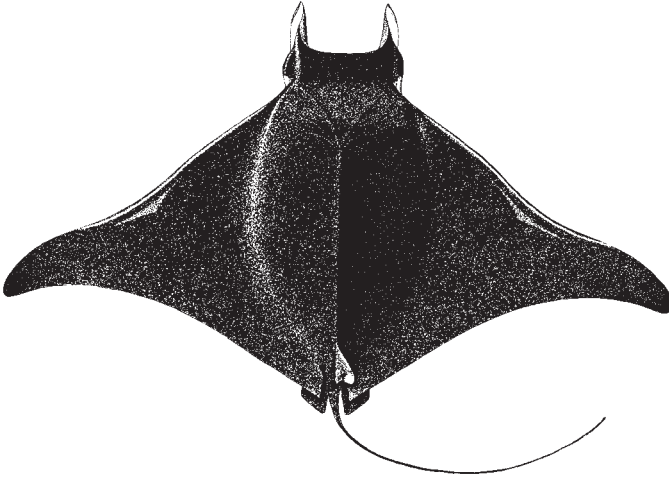
dorsal view



Mobula thurstoni (Lloyd 1908)

En – Smoothtail mobula; **Fr** – Mante-vampire; **Sp** – Diablo chapasangre.

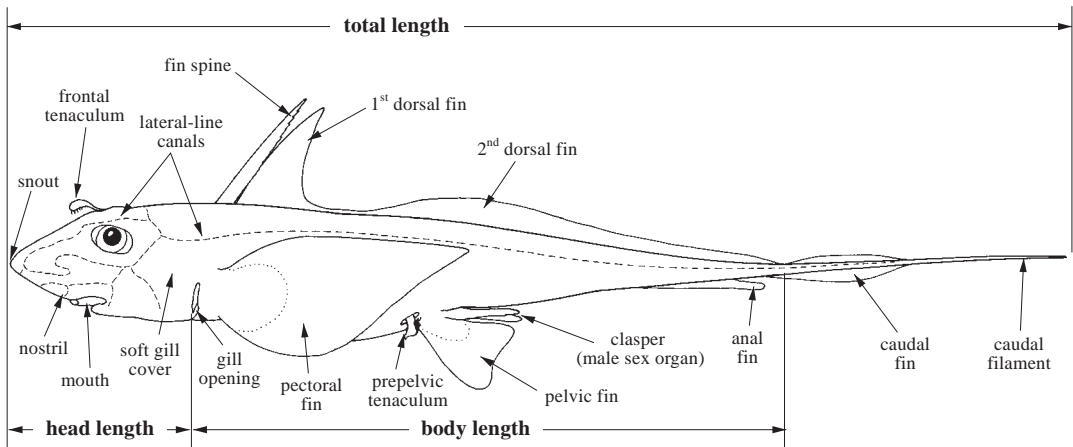
Medium-sized devil ray, reaching 2.2 m in disc width, without caudal sting. Probably circumtropical. Known to occur off tropical West Africa (often recorded as *M. lucasana*). Base of tail dorsally depressed. Prominent double curvature of anterior margin of pectoral fins. Tooth bands length greater than 70% of mouth width. Colour dark bluish on back; apex of dorsal fin white. Ventral side white. Ovoviviparous; size at birth 65 to 85 cm disc width. Known to feed on swarming planktonic crustaceans. Ranked as Near Threatened by the IUCN Red List.



CHIMAERAS

by D.A. Didier, Department of Biology, Millersville University, Millersville, PA, USA

TECHNICAL TERMS AND MEASUREMENTS



GENERAL REMARKS

The chimaeroids are shark-like fishes characterized by large heads and elongate bodies that taper to a whip-like tail. In overall body shape they resemble grenadiers (*Macrouridae*), but they are true cartilaginous fishes (*Chondrichthyes*) with no bony skeleton, fin rays or scales. Many new species have been discovered and currently there are 48; 47 in Didier *et al.* (2012) and *Chimaera carophila* described by Kemper *et al.* (2015). Although closely related to sharks, skates and rays, the chimaeroid fishes exhibit some striking morphological differences. In particular, chimaeroids have rubbery skin devoid of denticles, although tiny denticles are present on the dorsal surface of the head and body in hatchlings, and a fleshy operculum covering the 4 gill opening on each side of the head with a single gill opening present anterior to the base of each pectoral fin; no spiracle is present. The mouth is small, ventral, and connected to the nostrils by a pair of deep grooves that channel water from the nostrils to the mouth. The teeth are formed into 3 pairs of non-replaceable hypermineralized tooth plates, 2 pairs in the upper jaw and 1 pair in the lower jaw, which protrude from the mouth like rodent's incisors suggesting the common names ratfish or rabbitfish for some of the species. Other species are also commonly called spookfish or ghostshark because of their remarkable spectral appearance. The pectoral fins of chimaeras are broad and wing-like and serve to propel the fish through the water by a flapping motion. All chimaeroids have 2 dorsal fins, the first erectile, preceded by a stout and often poisonous spine, the second long and spineless. The tail is elongate and tapering, typically ending in a long terminal filament and bearing a caudal fin with dorsal and ventral lobes that are unequal in size (externally heterocercal) or nearly equal in size (diphycercal). The lateral-line canals on the head, body and tail, are superficially prominent, in many species appearing as open grooves, sometimes with large dilations on the snout.

Chimaeroids are predatory, often eating hard foods that they crush with their tooth plates. Their diet consists primarily of benthic invertebrates including bivalves, gastropods, various crustaceans, polychaetes, and echinoderms. They also eat other fishes including chimaeroids. These fishes are entirely marine and have their greatest diversity in deep waters of the shelf and slope in temperate waters, generally at depths greater than 500 m up to 3 000 m; however, most species occur between 200 and 2 000 m. Species of chimaeroid fishes are distributed in all of the world's oceans from the arctic and subantarctic to the tropics where they are deep-water slope inhabitants. They tend to occur on or near the bottom, none are known to be oceanic, and most occur near continental landmasses or off oceanic islands and on the slopes of seamounts and underwater ridges. Some species are locally migratory and congregate inshore for spawning, and many species tend to segregate into unisexual groups that are additionally separated by age. Several species are known from a very widespread geographic range, sometimes throughout an ocean basin spanning the northern and southern hemisphere, while other species appear to be more restricted in their range both vertically and horizontally; however, data on the geographic distribution of most species is based primarily on fishing records and more comprehensive sampling in deep waters will be needed to establish a complete picture of the geographic range for most species.

All chimaeroid fishes are oviparous. Males possess elaborate copulatory organs (claspers) extending from their pelvic fins that they use to transfer sperm into the female oviducts. Males also possess 2 additional organs used in copulation. Unique to chimaeroids is the club-like frontal tenaculum armed with multiple rows of denticles that emerges from the top of the head in sexually mature males. It has been observed that the frontal tenaculum is used to grasp the posterior edge of the pectoral fin of the female to aid in positioning the male during copulation. Additionally, a pair of blade-like prepelvic tenaculae typically armed with a row of spinous denticles, are located in pouches anterior to the pelvic fins. These also aid in anchoring the male during copulation. Sperm storage has been observed in 1 species, and is likely to occur in all species. Females deposit 2 large egg capsules, 1 from each oviduct, each of which contains a single egg. The egg capsules are generally spindle-shaped, sometimes with broad lateral web-like flanges that vary in size and shape depending on the species. Egg capsules are laid in pairs on the bottom and the embryos may take from 6 to 9 months to develop. Embryological studies of *Callorhynchus milii* indicate that development averages 24 to 34 weeks (6.25 to 8.5 months) and is dependent upon temperature (Lyon *et al.*, 2011). The hatchlings are formed like miniature adults. Mature chimaeroids range in size from 40 to over 100 cm in total length and sexual maturity in males and females usually occurs at 35 to 40 cm body length. Very little is known about reproduction and development in chimaeroids and egg capsules and embryos have not been collected for most species.

The chimaeroid fauna of the eastern central Atlantic is relatively diverse with all 3 families, all 6 genera and a total of 8 species represented. Increased fishing in deep waters in this region indicates that species of chimaeroids may be more abundant and/or geographically widespread within this region than previously reported. In the eastern central Atlantic chimaeras are primarily taken in bottom trawls, but also in pelagic trawls, by the offshore trawling fleets. One species, *Callorhynchus capensis*, is used fresh or frozen for human consumption, and other species may be processed for oil and fishmeal. The liver of chimaeras yields a fine-quality oil of use for lubricating machinery. Species of chimaeroids may be inadvertently subjected to overexploitation from fisheries due to poor understanding of probable biological constraints such as low abundance, long lives, and low fecundity.

KEY TO FAMILIES OCCURRING IN THE AREA

- 1a. Snout blunt and fleshy (Fig. 1), slightly pointed at the tip; body tapering to whip-like tail; lateral-line canals on the snout expanded with large dilations; branched pelvic claspers bearing fleshy denticulate lobes at the tips **Chimaeridae**
- 1b. Snout elongate with elaborate proboscis extending anterior to mouth → 2
- 2a. Hoe-shaped snout extending forward from the head (Fig. 2); heterocercal tail; large anal fin precedes caudal; pelvic claspers in males unbranched, lacking a fleshy denticulate tip **Callorhynchidae**
- 2b. Elongate, spear-shaped snout extending forward from the head (Fig. 3); pelvic claspers unbranched, slender rods with denticulate bulbous tip **Rhinochimaeridae**

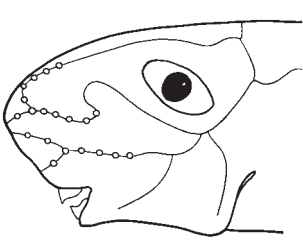


Fig. 1 Chimaeridae

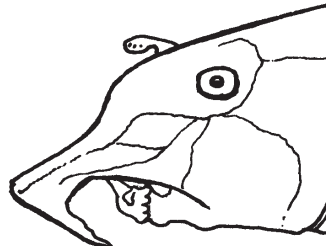


Fig. 2 Callorhynchidae

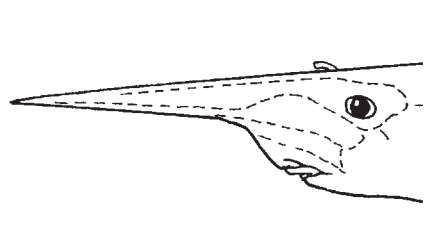




Fig. 3 Rhinochimaeridae

LIST OF FAMILIES AND SPECIES OCCURRING IN THE AREA


The symbol  is given when species accounts are included.

CALLORHINCHIDAE: Elephant fishes

 *Callorhinchus capensis* Duméril, 1865.

RHINOCHIMAERIDAE: Longnose chimaeras

 *Harriotta raleighana* Goode and Bean, 1895.


 *Harriotta haeckeli* Karrer, 1972.


 *Neoharriotta pinnata* (Schnakenbeck, 1929).

 *Rhinochimaera atlantica* Holt and Byrne, 1909.

CHIMAERIDAE: Shortnose chimaeras

 *Chimaera monstrosa* Linnaeus, 1758.

 *Hydrolagus affinis* (de Brito Capello, 1868).

 *Hydrolagus mirabilis* (Collett, 1904).

 *Hydrolagus pallidus* Hardy and Stehmann, 1990.

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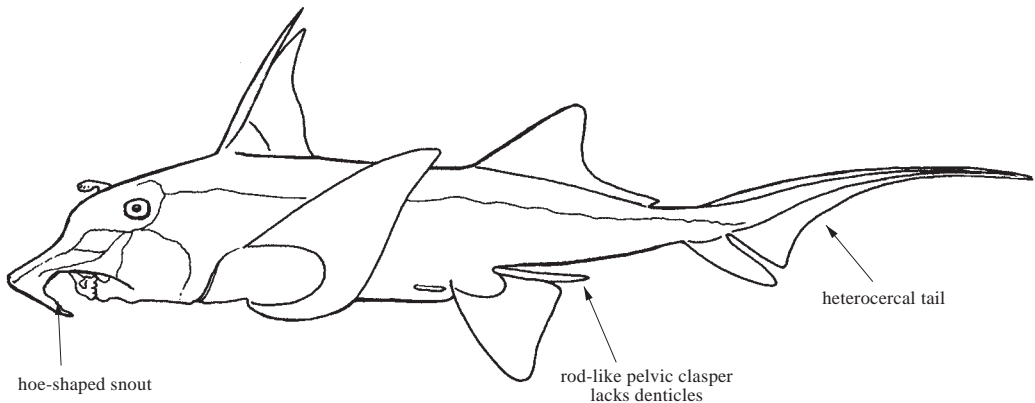
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Order CHIMAERIFORMES

CALLORHYNCHIDAE

Elephant fishes

by D.A. Didier, Department of Biology, Millersville University, Millersville, PA, USA

Callorhynchus capensis Duméril, 1865**Frequent synonyms / misidentifications:** *Callorhynchus capensis* Duméril, 1865 / None.**FAO names:** En – Cape elephantfish; Fr – Masca du cap; Sp – Pejegallo del cabo.

rod-like pelvic clasper

Diagnostic characters: Medium-sized shark-like fishes (adults generally 60 to 100 cm total length) with **prominent hoe-shaped snout** that is supported by a stiff cartilaginous rod with fleshy flap of tissue at the anterior end located anteroventral to the eye. **Body somewhat elongate with round, torpedo-shaped, trunk**, tapering rapidly to a **short caudal peduncle and heterocercal tail** (no dorsal caudal lobe is present) with a very small distal filament. **Eyes relatively small**, lateral-line canals appear as narrow raised channels visible on the body surface, not open grooves. **Skin smooth and firm**. Gills covered by a fleshy operculum with only a **single gill opening present anterior to pectoral fins; no spiracle present**. Mouth small, ventral, connected to nostrils by deep grooves. **Teeth in the form of 3 pairs of non-replaceable tooth plates** with 2 pairs in the upper jaw, and a single pair in the lower jaw. **Tooth plates appear as robust crushing plates with patches of dense hypermineralized tissue appearing as broad ridges and bumps on the surface**. Fins dark with fin webs supported by cartilaginous rays (ceratotrichia). **Large anal fin** is present, separated from ventral lobe of caudal fin by a deep notch and usually a small space. First dorsal fin taller than width of base, posterior edge falcate, preceded by a stout **spine, much longer than leading ray of the first dorsal fin**. Spine with serrations along the anterior edge and 2 rows of small serrations along the distal half of the posterior edge. **Second dorsal fin not elongate, taller anteriorly**, sloping to a low, evenly tall fin posteriorly; **height of the anterior portion 5 times that of the posterior portion**. Pectoral fins elongate, triangular shape, pelvic fins squared along the distal edge. Males with simple scrolled pelvic claspers lacking fleshy lobes and denticulations. Adult males with bulbous **frontal tenaculum** that rests in a pouch atop the head anterior to eyes, **not deeply curved with very short stout denticles on the distal bulb**; prepelvic tenaculæ hidden in pouches anterior to the pelvic fins consist of a flat cartilaginous blade, the fleshy portion with flat multi-cusped denticles on the surface with no large denticles along the medial edge, and a small cartilaginous tube-like structure lacking denticles; **pelvic claspers unbranched, scrolled tube-like structures lacking denticles and fleshy bulbous tip**. Females with rudimentary prepelvic pouches. **Colour:** silvery, with dark brown markings on the head and trunk with dark saddle-like bands along the dorsal surface of the trunk.

Similar families occurring in the area

This family is distinguished from all other chimaeroids by a prominent hoe-shaped snout and heterocercal tail. Silvery colour with black saddle-like bands along the dorsal side of the trunk and dark blotches on the head and trunk, as well as the presence of unbranched tube-like claspers lacking fleshy denticulate tips in males, further distinguishes members of this family from all other families of chimaeroids.

Size: Maximum total length up to 120 cm.

Habitat, biology, and fisheries: Typically inhabits coastal waters of the continental shelf from near shore to depths of about 250 m, with seasonal migration to deeper waters at the shelf edge and upper slope. Ranging to depths of 374 m with a maximum depth range of up to 600 m. Appear to prefer muddy, sandy, or rubble bottoms where they feed primarily on benthic invertebrates and small fish, often preferring mollusks. Sexual maturity is reached at 3 to 4 years of age, or at about 40 cm body length. All species are oviparous with females depositing pairs of large, ovoid egg capsules with a fan-like lateral flange surrounding a hollow spindle-shaped central chamber in which the embryo develops. Commercially fished in nearshore fisheries using set gillnets or trawls, but may also be caught in beach seines and using lines, the method preferred in recreational fisheries. The firm, white flesh of this fish is highly prized and the commercial catch is generally distributed and utilized locally.

Distribution: Southern African endemic from Natal to Namibia. Not common in the eastern central Atlantic, occurring only rarely off northern Namibia.



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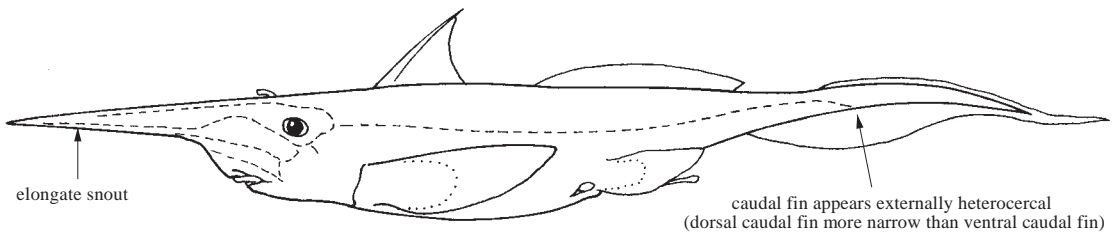
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RHINOCHIMAERIDAE

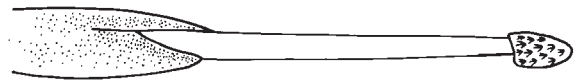
Longnose chimaeras, spookfishes

by D.A. Didier, Department of Biology, Millersville University, Millersville, PA, USA

Diagnostic characters: Medium- to large-sized shark-like fishes (adults typically 70 to 150 cm total length) with **large head, elongate spear-like snout, and somewhat compressed, elongate bodies with tail tapering to an elongate filament**. Eyes prominent, bright green in fresh specimens. Long, fleshy snout extends anterior to head tapering to a blunt point. **Skin smooth**, often deciduous, flaking off in patches after capture. **Lateral-line canals appear as open grooves** on the head and sides of body. Gills covered by a fleshy operculum with only **a single gill opening present anterior to pectoral fins; no spiracle present**. Mouth small, ventral, connected to nostrils by deep grooves. **Teeth in the form of 3 pairs of non-replaceable tooth plates** with 2 pairs in the upper jaw, and a single pair in the lower jaw. **Tooth plates appear as smooth shearing blades or robust with patches of dense hypermineralized tissue that appears as ridges and bumps on the surface**. Pectoral and pelvic fins broad, somewhat ovoid in shape, with delicate external fin webs supported by cartilaginous rays (ceratotrichia). Two dorsal fins, the first erectile, preceded by an elongate, serrate spine; the second elongate and spineless. **Tail diphycercal, appearing externally heterocercal; caudal fin with narrow dorsal lobe and large ventral lobe**. Adult males with bulbous, denticulate frontal tenaculum that rests in a pouch atop the head anterior to eyes; prepelvic tenaculæ blade-like with large denticles along the medial edge, hidden in pouches anterior to the pelvic fins; and **slender, rod-like pelvic claspers** extending from pelvic fins with small, fleshy denticulate tip. **Colour:** slate grey, chocolate or purplish brown, or grey-brown, often lighter or white ventrally, without distinct colour pattern.



Habitat, biology, and fisheries: These fishes generally inhabit deep waters and are usually found at depths around 1 000 to over 2 000 m. They appear to live over muddy bottoms where they primarily feed on a variety of benthic invertebrates as well as other fishes. Most species reach sexual maturity at about 40 cm body length, females generally larger than males. All species are oviparous. Females lay pairs of eggs encased in an ovoid egg capsule with fan-like lateral flange that surrounds an ovoid hollow central chamber that has slight lateral indentations in the centre. Due to their deep-water habitat they have been poorly studied and almost nothing is known of their biology and reproduction. At present they are of minimal interest to fisheries and are primarily caught as bycatch in bottom trawl fisheries and may be utilized for fishmeal or other fish products.



rod-like pelvic clasper

Similar families occurring in the area

This family is distinguished from all other families of chimaeroids by an elongate, pointed snout. The presence of slender rod-like claspers with small bulbous, denticulate tips in males also characterizes members of this family.

Key to the species of Rhinochimaeridae occurring in the area (note: depending on condition of specimens, it may not be possible to key very small juveniles to species)

- 1a. Anal fin present (Fig. 1a); eyes large; eye diameter less than 10 times in head length, usually 4 to 8 times in head length; body colour an even slate grey, not white ventrally; intact spine exceeds height of first dorsal fin; distal margin of dorsal caudal fin smooth in adults ***Neoharriotta pinnata***
- 1b. Anal fin absent (Fig. 1b) → 2

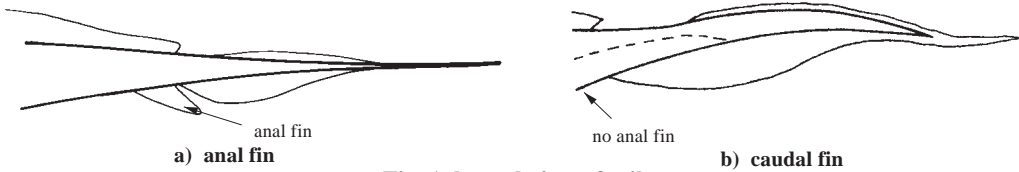


Fig. 1 lateral view of tails

- 2a. Snout elongate, broad at base, tapering to a very slender and stiff narrow, pointed distal tip; distal tip not fleshy, often with bumps and tubercles; eyes large, eye diameter less than 10 times in head length, usually 6 to 9 times in head length; dorsal-fin spine equal to or longer than height of first dorsal fin; body colour brown to greyish, white ventrally ***Harriotta raleighana***
- 2b. Snout elongate and fleshy, eyes small, eye diameter more than 10 times in head length; dorsal-fin spine nearly equal to or less than height of first dorsal fin → 3
- 3a. Snout elongate and fleshy, tapering from broadest point at head; eye is small, eye diameter 11 to 15 times in head length (usually 11 or 12); dorsal-fin spine deeply curved and significantly shorter than height of first dorsal fin; snout appears relatively short with head length always less than body length (head length greater than 3 times in total length); body colour an even brown or purplish brown ***Harriotta haeckeli***
- 3b. Snout elongate and fleshy, spear-shaped, broadest at midlength; eye is small, eye diameter more than 10 times in head length, ranging from 12 to 20 times in head length; snout appears relatively long with head length nearly equal to body length (head length usually less than 3 times in total length); dorsal-fin spines nearly equal to, or slightly less than height of first dorsal fin; distal margin of dorsal caudal fin in adults with paired tubercles (Fig. 2), large in males, just visible in females; tooth plates appear as smooth shearing blades, usually black in colour; body colour a uniform pale brown or grey, often whitish ventrally and on head ***Rhinochimaera atlantica***

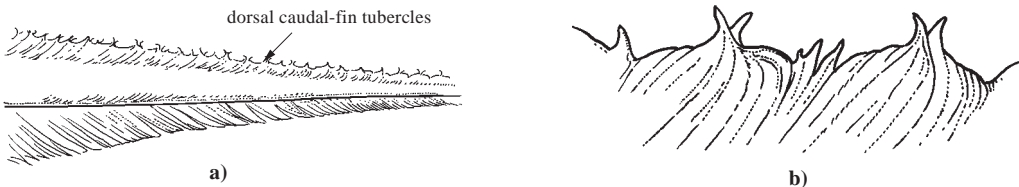







Fig. 2 caudal tubercles

List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Harriotta haeckeli* Karrer, 1972.
-  *Harriotta raleighana* Goode and Bean, 1895.
-  *Neoharriotta pinnata* (Schnakenbeck, 1929).
-  *Rhinochimaera atlantica* Holt and Byrne, 1909.

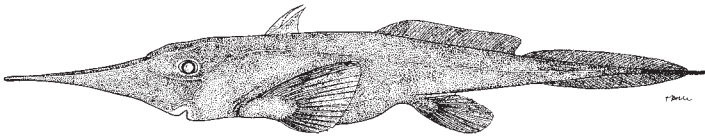
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***Harriotta haeckeli* Karrer, 1972**

En – Smallspine spookfish.

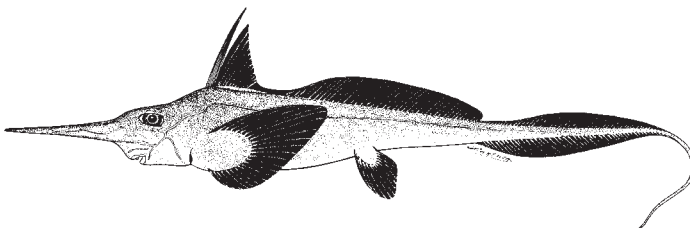
A medium-bodied rhinochimaerid that attains a maximum total length of about 72 cm and maximum body length of about 31 cm. Known from only a small number of specimens, nothing is known of the biology and habits of this species. Not known to be commercially fished, although may occasionally be caught in deep-water trawls. This species has a spotty distribution worldwide and is known from off Greenland in the northern Atlantic, off New Zealand in the southern Pacific, and off Morocco, Western Sahara and the Canary Islands in the eastern central Atlantic. Typically inhabiting deep-water slopes and troughs this species occurs at depths ranging from 1 114 to 2 603 m, and may occur more widely and in greater numbers at depths greater than 2 000 m.



***Harriotta raleighana* Goode and Bean, 1895**

En – Pacific narrownose chimaera.

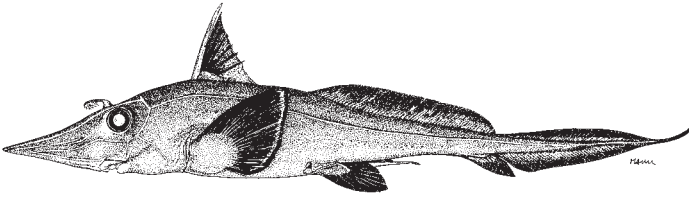
A medium-bodied rhinochimaerid, typically about 70 to 90 cm in total length (including tail filament) and 30 to 35 cm body length, with a maximum total length of 120 cm. Although seemingly common, little is known of the biology and habits of this species. Not known to be utilized commercially, but may be caught as bycatch in deep-water trawls. Apparently global in its distribution, this species is reported throughout both the Atlantic and Pacific where it typically occurs at the shelf edge and on deep-water slopes at depths ranging from 500 to 2 600 m. Currently known only from the Canary Islands in the eastern central Atlantic, this species may be more widespread in this region.



***Neoharriotta pinnata* (Schnakenbeck, 1929)**

En – Sicklefin chimaera.

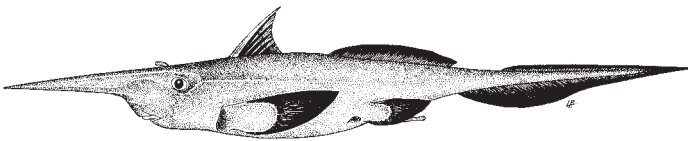
A large-bodied rhinochimaerid, usually measuring about 100 cm total length, with maximum total length of 127 cm and maximum body length of about 60 cm. Almost nothing is known of biology and habits. Not known to be utilized commercially but likely is collected as bycatch in trawls. Range is widespread off the western coast of Africa from Namibia to Western Sahara. Typically found at the edge of the shelf and slope in depths ranging from 200 to 622 m.



***Rhinochimaera atlantica* Holt and Byrne, 1909**

En – Straightnose rabbitfish; **Fr** – Chimère à nez mou; **Sp** – Narigón sierra.

A large-bodied rhinochimaerid with a maximum total length of 150 cm and maximum body length of 65 cm. Not known to be part of the commercial catch in this region, but may occasionally be caught as bycatch in bottom trawls. Typically found at depths greater than 1 000 m, ranging from 500 to 1 800 m depth. Range is widespread in the Atlantic, most common in the North Atlantic, and also found off the western coast of South Africa to Cape Town. Currently reported from Mauritania, Senegal, Gambia, and Namibia in the eastern central Atlantic, but may be more widespread in this region.

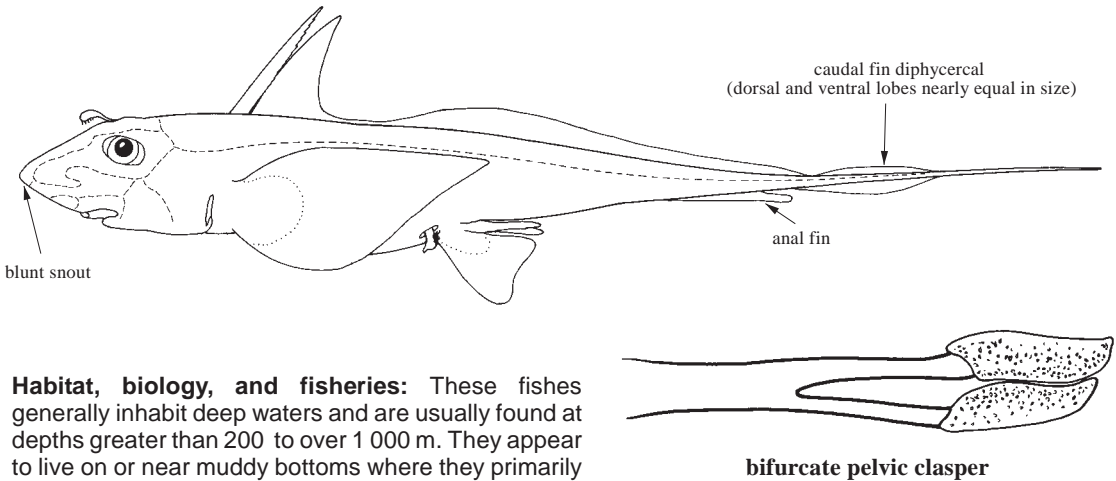


CHIMAERIDAE

Shortnose chimaeras, ratfishes, rabbitfishes, ghost sharks

by D.A. Didier, Department of Biology, Millersville University, Millersville, PA, USAA

Diagnostic characters: Medium to large shark-like fishes with **large head, blunt snout, and somewhat compressed, elongate bodies with tail tapering to an elongate filament.** Adults range from medium-bodied (maximum of 75 cm total length) to massive (10 to 150 cm total length) in size. Eyes large and prominent, bright green in fresh specimens. Snout fleshy and bluntly pointed at the tip. **Skin smooth,** often deciduous, flaking off in patches after capture. Gills covered by a fleshy operculum with only **a single gill opening present anterior to pectoral fins; no spiracle present.** Mouth small, ventral, connected to nostrils by deep grooves. **Teeth in the form of three pairs of non-replaceable tooth plates** with two pairs in the upper jaw, and a single pair in the lower jaw. Tooth plates robust with patches of dense hypermineralized tissue that appears as ridges and bumps on the surface. Pectoral and pelvic fins broad with delicate external fin webs supported by cartilaginous rays (ceratotrichia). **Lateral-line canals appear as open grooves on the head and sides of body; canals on the snout with large dilations.** Two dorsal fins, the first erectile, preceded by an elongate, serrate spine that in some species is toxic; the second elongate and spineless. Tail diphycercal with dorsal and ventral caudal-fin lobes of nearly equal size (diphycercal). Adult males with bulbous, denticulate frontal tenaculum that rests in a pouch atop the head anterior to eyes; prepelvic tenaculae blade-like with large denticles along the medial edge, hidden in pouches anterior to the pectoral fins; and **pelvic claspers bifurcate or appearing externally tripartite** with fleshy, denticulate tips. **Colour:** pale to dark brown, darker dorsally, lighter or white ventrally, usually without distinct colour pattern, although a few species are characterized by white or brown markings on the head and trunk.



Habitat, biology, and fisheries: These fishes generally inhabit deep waters and are usually found at depths greater than 200 to over 1 000 m. They appear to live on or near muddy bottoms where they primarily feed on a variety of benthic invertebrates as well as other fishes. Most species reach sexual maturity at about 40 cm body length, females generally larger than males. All species are oviparous. Females lay pairs of spindle-shaped eggs, lacking a fan-like lateral flange, that are deposited on the bottom. At present they are of minimal interest to fisheries and are primarily caught as bycatch in bottom trawl fisheries and may be utilized for fishmeal and other fish products. Some related species in the Pacific are being commercially fished and the commercial potential of species in the Atlantic is being explored.

Similar families occurring in the area

This family is easily distinguished from all other families of chimaeroids by a blunt snout and lateral-line canals on the snout with large dilations.

Key to the species of Chimaeridae occurring in the area (note: depending on condition of specimens, it may not be possible to key very small juveniles to species)

- 1a. Anal fin present (Fig. 1a), separated from ventral caudal fin by a deep notch; body colour silvery, sometimes bluish or greenish, with distinct pattern of reddish brown spots and undulating stripes on the head and trunk, pale ventrally ***Chimaera monstrosa***
- 1b. Anal fin absent (Fig. 1b); origin of ventral caudal fin a narrow, fleshy lobe along base of tail → 2



Fig. 1 lateral view of tail

- 2a. Large-bodied fish, massive in size, total length nears or exceeds 100 cm; second dorsal fin elongate with straight distal margin; colour an even black or purplish black or pale bluish grey → 3
- 2b. Small-bodied, slender fish, maximum total length about 80 cm; colour uniform pale brown, black or greyish, sometimes lighter ventrally, fins dark → 4
- 3a. Colour a uniform black or purplish black; eye is relatively small, eye diameter is greater than 5 times in head length ***Hydrolagus affinis***
- 3b. Colour a uniform grey or bluish grey, often pale around mouth; eye is relatively large, eye diameter always less than 5 times in head length, usually 4 times in head length ***Hydrolagus pallidus***
- 4a. Colour pale brown, grey, or sometimes blackish, usually lighter ventrally, fins dark; second dorsal fin indented in middle; pectoral and pelvic fins appear broad and rounded ***Hydrolagus mirabilis***
- 4b. Colour uniform dark brown or black; second dorsal fin not indented, nearly uniform height along its length; pectoral and pelvic fins appear relatively long and slender, pointed at distal end ***Hydrolagus sp.***

List of species occurring in the area

The symbol ← is given when species accounts are included.

- ← *Chimaera monstrosa* Linnaeus, 1758.
- ← *Hydrolagus affinis* (de Brito Capello, 1868).
- ← *Hydrolagus mirabilis* (Collett, 1904).
- ← *Hydrolagus pallidus* Hardy and Stehmann, 1990.
- Hydrolagus sp.* (presently known from a few specimens off Gabon; species status and identification is uncertain and more data and specimens are needed).

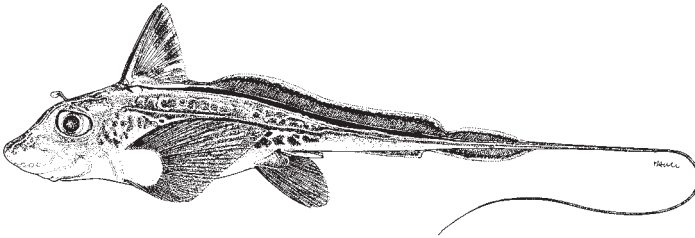
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***Chimaera monstrosa* Linnaeus, 1758**

En – Rabbit fish; **Fr** – Chimère commune; **Sp** – Quimera.

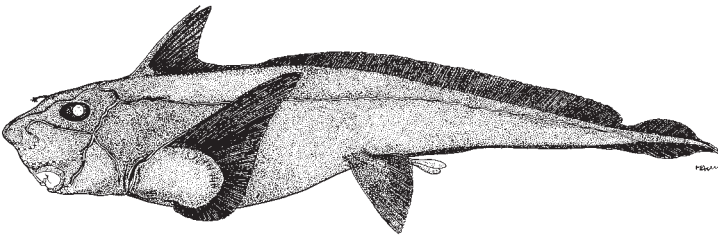
A medium-bodied chimaerid that reaches a maximum total length of up to 150 cm including the elongate tail filament, maximum body length is about 50 cm. Not known to be targeted in any commercial fishery or used for human consumption; however, may be caught as bycatch in bottom trawls and processed for oil or fishmeal. A benthopelagic species known to occur at depths ranging from 50 to 1 663 m, but most abundant between 500 and 800 m. Widespread and apparently abundant throughout the northeastern Atlantic and Mediterranean, reported from Morocco and Madeira in the eastern central Atlantic.



***Hydrolagus affinis* (de Brito Capello, 1868)**

En – Smalleyed rabbitfish; **Sp** – Quimera ojo chico.

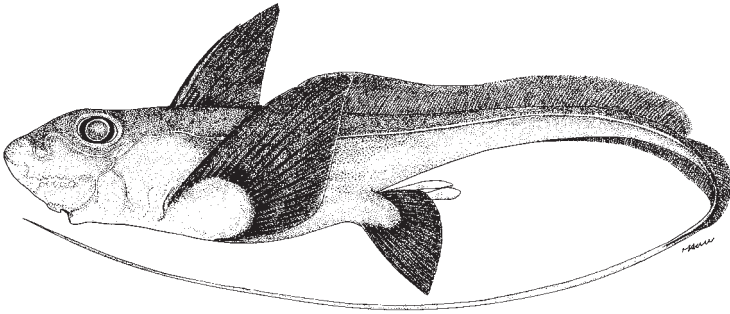
A large species of chimaerid with massive head and trunk. Maximum total length is 129 cm without elongate tail filament, maximum body length is 92 cm. Not known to be commercially fished, although may occasionally be caught in deep-water trawls or longlines. Inhabits deep-water slopes and plains at depths ranging from 300 to 2 500 m, generally occurring in waters near or below 1 000 m. Occurs throughout the northern Atlantic. In the eastern central Atlantic this species is known from the Canary Islands with 1 specimen recently collected from off Namibia. Recent collections from the southern Atlantic indicate this species may in fact be widespread in deep waters throughout the Atlantic.



***Hydrolagus mirabilis* (Collett, 1904)**

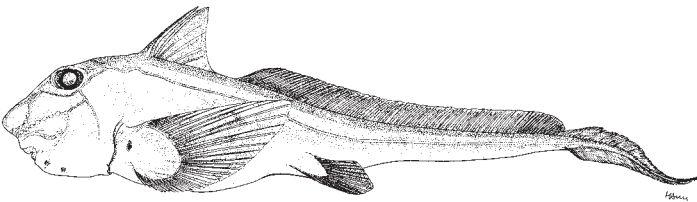
En – Large-eyed rabbitfish; **Sp** – Quimera ojón.

Small-bodied form with maximum total length of about 75 cm and maximum body length of about 35 cm. Almost nothing is known of biology and habits. Not known to be part of any commercial catch, although may be caught as bycatch in deep-water trawls. Typically a deep-water shelf and slope dweller occurring at depths ranging from 617 to 1 245 m, but generally found at depths greater than 800 m. Distributed widely throughout both sides of the North Atlantic, and in the Gulf of Mexico and Caribbean as far south as Suriname in the western Atlantic. Currently reported from Morocco, Western Sahara, and Mauritania in the eastern central Atlantic, but may also be found off Gabon and Guinea Bissau.



***Hydrolagus pallidus* Hardy and Stehmann, 1990**

A large species of *Hydrolagus* with massive head and trunk ranging in size from 83 to 111 cm total length and 56 to 73 cm body length. This species may sometimes be mistaken for *Hydrolagus affinis* due to the very similar overall appearance and overlapping range of these 2 species; however, *H. pallidus* is distinctive in its pale colour and much larger eye. Not known to be commercially harvested or utilized, but may occasionally be caught as bycatch in deep-water trawls and longlines. Typically found on deep-water slopes and plains at depth of 1 200 to 2 075 m, this species was previously known only from the northeastern Atlantic. Recently collected from the Canary Islands, this species may have a wider distribution in deep waters in the eastern central Atlantic.



INDEX OF SCIENTIFIC AND VERNACULAR NAMES

Explanation of the System

Italics : Valid scientific names (double entry by genera and species)

Italics : Synonyms, misidentifications and subspecies (double entry by genera and species)

ROMAN : Family names

ROMAN : Scientific names of divisions, classes, subclasses, orders, suborders and subfamilies

Roman : FAO names

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Basking shark	1130,1238	<i>birostris, Manta</i>	1437
Basking sharks	1129,1238	Biscuit skate.	1393
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<i>Bathyraja hesperaficana</i>	1344,1388	<i>bistriata, Haliotis</i>	950
<i>Bathyraja richardsoni</i>	1344,1395	Bittersweet clams.	700
<i>Bathyraja smithii</i>	1344,1395	Black dogfish	1185
<i>batis, Dipturus</i>	1344,1396	Black dogfishes	1179
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<i>bauchotae, Torpedo</i>	1375	Blackened monodont	965
<i>baxteri, Etmopterus</i>	1185	Blackfin gulper shark	1178
Beaded turret	985	Blackmouth catshark	1261
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<i>belcheri, Pitar</i>	875	<i>blochii, Acroteriobatus</i>	1359-1360
Berberecho acostillado	782	<i>blochii, Rhinobatos</i>	1360
Berberecho boquiabierto	787	Blonde ray	1398
Berberecho común.	784	Blue shark.	1288,1323
Berberecho congoliño	785	Blue sharks	1287
Berberecho de Nicklès.	788	Blue skate	1396
Berberecho de Noruega	789	Blue stingray	1412
Berberecho kaman.	783	Bluntnose guitarfish	1360
Berberecho mofat	781	Bluntnose sixgill shark.	1149
Berberecho serrulado	789	Blurred smooth lanternshark	1186
Berberecho verde	788	Boca roja	1058
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<i>bernardii, Galatea</i>	844	<i>Bolinus brandaris</i>	1053
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<i>bifasciatus, Murex</i>	1061	Bonnet shells	1028

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<i>borealis, Phacoides</i>	770	Buccin du Cap	1068
<i>bornii, Gari</i>	850	Buccin fusoi�de	1068
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<i>Bostrycapulus aculeatus</i>	1005	Buccin s�enestre	1070
<i>Bostrycapulus calyptraeiformis</i>	1005	BUCCINIDAE	922,1064,1071,1075
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<i>Bostrycapulus tegulicius</i>	1005	Bulia miran	1077
<i>bourgeoisii, Murex</i>	1062	Bull ray	1429
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<i>brachyura, Raja</i>	1398	<i>Bullia miran</i>	1077
<i>brachyurus, Carcharhinus</i>	1299	<i>Bullia polita</i>	1077
<i>brachyurus, Etmopterus cf.</i>	1186	<i>Bullia sulcata</i>	1077
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<i>Bractechlamys nodulifera</i>	741	BULLIDAE	916,1086
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Bramble sharks	1152	Bullie miran	1077
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<i>bubonius, Strombus</i>	998	<i>Bursa corrugata</i>	1027
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Bucarde aiguillonn�e	786	<i>Bursa corrugata ponderosa</i>	1027
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Bucarde de Nickl�es	788	<i>Bursa ponderosa</i>	1027
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<i>byssinus, Conus pulcher</i>	1110	<i>campechiensis, Pholas</i>	900
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<i>Cabestana cutacea africana</i>	1039	Cañabota gata	1151
<i>Cabestana cutacea cutacea</i>	1039	Cañabota gris	1149
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<i>Murex moquinianus</i>	1062	<i>Mytilus edulis diegensis</i>	715
<i>Murex pomiformis</i>	1056	<i>Mytilus edulis</i> var. <i>galloprovincialis</i>	715
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<i>ropan</i> , <i>Lithophaga</i>	713	<i>rugosa</i>, <i>Bolma</i>	974
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<i>rosarium</i>, <i>Hexaplex</i>	1055-1056,1061	<i>rugosa</i> , <i>Haliotis</i>	950
<i>rosarium</i> , <i>Phyllonotus</i>	1056	<i>rugosa</i> , <i>Morio</i>	1034
<i>rosarium</i> , <i>Trunculariopsis</i>	1056	<i>rugosa</i> , <i>Standella</i>	799
<i>rosea</i> , <i>Gibbula</i>	970	Rugose bonnet	1034
<i>rosea</i>, <i>Hyotissa</i>	756	Rugose donax	836
<i>rosea</i> , <i>Marginella</i>	1104	Rugose mactra	799

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Scyliorhinus cervigoni **1263,1266**
Scyliorhinus stellaris **1256,1263,1266**

<i>Scymnodon obscurus</i>	1199	<i>senilis, Arca</i>	695
<i>Scymnodon ringens</i>	1197	<i>senilis, Senilia</i>	695
<i>Scymnodon squamulosus</i>	1199	<i>septentrionalis, Myxine glutinosa</i> var.	1120
<i>Scymnorhinus licha</i>	1210	<i>serra, Donax</i>	837
Sea hares	910	<i>serrata, Petricola</i>	893
Sea slugs	910	<i>serrulata, Fulvia</i>	789
Sebastian's marginella	1105	<i>serrulatum, Europicardium</i>	789
<i>sebastiani, Marginella</i>	1105	<i>serrulatum, Trachycardium</i>	788
<i>seguenzae, Charonia</i>	1041	<i>serrulatum, Trachycardium (Dallocardia)</i>	789
Selachii	1126	<i>setigera, Arca</i>	694
Sémélé de Lamy	854	Sevengill sharks	1145
<i>Semele lamyi</i>	854	<i>sexcostatus, Murex</i>	1054
<i>Semele obliqua</i>	854	Seychelles gulper shark	1178
<i>Semele purpurascens</i>	854	<i>seychellorum, Centrophorus</i>	1178
Semeles	853	Sharks	1442
SEMELIDAE	675,817,851, 853	Sharpnose sevengill shark	1148
<i>Semicassis granulata</i>	1033	Sharpnose sharks	1287
<i>Semicassis saburon</i>	1032	Sharptooth houndshark	1283
<i>Semicassis undulata</i>	1033	Shield slot limpet	956
<i>Semifusus morio</i>	1080	Shiny marginella	1104
<i>semigranosa, Bursa</i>	1027	Shiny mussel	718
<i>seminuda, Atrina</i>	722	Short razor clams	855
<i>semistriatus, Donax</i>	842-843	Shortfin mako	1129,1245
Senegal ark	691	Shortnose chimaeras	1452
Senegal nerite	977	Shortnose spurdog	1162
<i>senegalense, Laevicardium oblongum</i>	789	Shortspine spurdog	1163
<i>senegalensis, Anadara</i>	691	<i>shubnikovi, Oxynotus</i>	1203
<i>senegalensis, Arca</i>	691	<i>siamensis, Conus</i>	1110
<i>senegalensis, Cardita</i>	775	<i>siamensis, Conus pulcher</i>	1110
<i>senegalensis, Cymbium</i>	1094	Sicklefin chimaera	1451
<i>senegalensis, Dendostrea</i>	756,765	Sifonaria del Cabo	1115
<i>senegalensis, Jesonia</i>	775	Sifonaria peine	1115
<i>senegalensis, Lutraria</i>	800-801	<i>Sigaretus concavus</i>	1025
<i>senegalensis, Macoma</i>	825	Sigarita concava	1025
<i>senegalensis, Murex</i>	1061	<i>signatus, Carcharhinus</i>	1288,1317
<i>senegalensis, Nerita</i>	977	<i>signatus, Hypoprion</i>	1317
<i>senegalensis, Ostrea</i>	756,765	<i>sikamea, Crassostrea</i>	761
<i>senegalensis, Potiarca</i>	691	<i>siliqua, Ensis</i>	811
<i>senegalensis, Siratus</i>	1061	Silky shark	1288,1303,1311
<i>senegalensis, Spondylus</i>	745-746	<i>simoniana, Afrocominella capensis</i>	1068
Senegalese cowry-helmet	1034	<i>simulans, Venus</i>	885
Senegalese otter shell	801	<i>sinensis, Calyptraea</i>	1007
<i>senegalica, Cassis</i>	1034	<i>Sinucultellus atlanticus</i>	815
<i>senegalica, Cypraecassis</i>	1034	<i>Sinum</i>	1015
Senegambian tellin	822	<i>Sinum concavum</i>	1025
<i>senegambiensis, Laciolina</i>	822	<i>Sinupharus africanus</i>	813,815
<i>senegambiensis, Tellina</i>	822	Siphonaire du Cap	1115
<i>Senilia senilis</i>	695	Siphonaire mouret	1115
<i>senilis, Anadara</i>	695	<i>Siphonaria adansonii</i>	1115

<i>Siphonaria algesirae</i>	1115	<i>Solemya togata</i>	687
<i>Siphonaria capensis</i>	1115	Solémye méditerranéenne	687
<i>Siphonaria grisea</i>	1115	SOLEMYIDAE	674, 685
<i>Siphonaria lineolata</i>	1115	<i>Solen gladius</i>	806
<i>Siphonaria pectinata</i>	1115	<i>Solen guinaicus</i>	805
SIPHONARIIDAE	914,930,952,1004, 1113	<i>Solen guineensis</i>	805
<i>Siratus senegalensis</i>	1061	<i>Solen guinensis</i>	805
Sixgill sharks	1145	<i>Solen marginatus</i>	806
Skates	1339-1340,1379,1442	<i>Solen minor</i>	811
Sleeper sharks	1189	<i>Solen rotundatus</i>	806
Slipper shells	1003	<i>Solen tenuis</i>	813
Sloping venus	890	<i>Solen vagina</i>	806
Slot limpets	952	SOLENIDAE	676, 803 ,807,855
Slugs	910	<i>Solenocurtus antiquatus</i>	859
Small-eyed ray	1400	<i>Solenocurtus strigillatus</i>	859
Small-tooth stingray	1419	<i>solida, Calyptraea</i>	1006
Smalleyed rabbitfish	1455	Solrayo	1225
Smallspine spookfish	1450	Solrayo ojigrande	1226
Smallspotted catshark	1262	Sombrero africano	1006
Smalltooth sand tiger	1225	Sombrero chino	1007
Smalltooth sawfish	1351	SOMNIOSIDAE	1152,1155,1165,1180, 1189 , 1200,1207,1290
<i>smithii, Bathyraja</i>	1344, 1395	<i>Somniosus</i>	1189,1198
<i>smithii, Leptocharias</i>	1269	<i>Somniosus bauchotae</i>	1198
Smooth butterfly ray	1423	<i>Somniosus longus</i>	1198
Smooth callista	869	<i>Somniosus rostratus</i>	1198
Smooth donax	842	<i>souliei, Cymbium</i>	1090
Smooth dosinia	887	<i>sowerbiana, Volvarina</i>	1105
Smooth false donax	841	<i>sowerbianum, Marginella</i>	1105
Smooth freshwater stingray	1419	<i>spadicea, Glycymeris</i>	703
Smooth hammerhead	1335	Sparkling dwarf olive	1099
Smooth lanternshark	1188	<i>speciosa, Haliotis</i>	949
Smooth mactra	795	<i>spectabilis, Hinnites</i>	737
Smooth scallop	742	Spengler's mactra	802
Smooth-hound	1279	<i>spengleri, Schizodesma</i>	802
Smoothback angelshark	1217	<i>spengleri, Scissodesma</i>	802
Smoothback skate	1403	<i>spengleri, Spisula</i>	802
Smoothed ark	697	<i>Sphaerocardium paucicostatum</i>	786
Smoothhounds	1272	<i>Sphaeronassa mutabilis</i>	1078
Smoothtail mobula	1440	<i>Sphyrna couardi</i>	1331
Snails	910	<i>Sphyrna diplana</i>	1331
Snowy mactra	794	<i>Sphyrna lewini</i>	1129,1327-1328, 1331 ,1333-1336
Solécurre africain	857	<i>Sphyrna mokarran</i>	1328,1331- 1333 ,1335
Solécurre rétréci	859	<i>Sphyrna tudes</i>	1333
Solécurre rose	859	<i>Sphyrna zygaena</i>	1331- 1335 -1336
SOLECURTIDAE	676,808,817,846, 855	SPHYRNIDAE	1126,1129,1273,1289, 1327
<i>Solecuretus afroccidentalis</i>	857	Sphyrnids	1127
<i>Solecuretus angulatus</i>	858	<i>spinax, Etmopterus</i>	1184
<i>Solecuretus strigillatus</i>	857, 859	Spindle conchs	1081
<i>Solemya mediterranea</i>	687	Spineback guitarfish	1363

Spined dogfish	1155	<i>squalida</i> , <i>Tellina</i>	827
Spined pygmy shark	1212	SQUALIDAE	1129,1152, 1155 ,1165,1180, 1190,1200,1207,1290
Spinetail mobula	1437	SQUALIFORMES	1129,1155
<i>spinifera</i> , <i>Patella</i>	946	<i>Squaliolus</i>	1165,1180,1190
Spinner shark	1301	<i>Squaliolus laticaudus</i>	1212
<i>spinosa</i> , <i>Cassis</i>	1031	SQUALOMORPHII	1126
Spiny butterfly ray	1422	<i>Squalus</i>	1163
Spiny cockle	786	<i>Squalus acanthias</i>	1130, 1159
Spiny dogfish	1155,1159	<i>Squalus acutipinnis</i>	1162
Spiny file shell	753	<i>Squalus blainville</i>	1161 -1163
Spiny slipper shells	1005	<i>Squalus blainvillei</i>	1161
<i>Spisula spengleri</i>	802	<i>Squalus blainvillii</i>	1161
<i>Spisula striatella</i>	794	<i>Squalus fernandinus</i>	1161
<i>Spisula subtruncata</i>	802	<i>Squalus megalops</i>	1162 -1163
<i>Spisula triangula</i>	802	<i>Squalus mitsukurii</i>	1161- 1163
Spondyle guron	745	<i>squamosa</i> , <i>Lima</i>	753
Spondyle pied-d'âne	746	<i>squamosa</i> , <i>Nucella</i>	1062
SPONDYLIDAE	672,731, 743 ,749	<i>squamosa</i> , <i>Purpura</i>	1062
<i>Spondylus gaederopus</i>	745- 746	Squamosose rock shell	1062
<i>Spondylus inermis</i>	745	<i>squamosus</i> , <i>Centrophorus</i>	1173
<i>Spondylus powelli</i>	745	<i>squamosus</i> , <i>Lepidorhinus</i>	1173
<i>Spondylus senegalensis</i>	745 -746	<i>squamulosus</i> , <i>Zameus</i>	1199
Spookfishes	1447	<i>Squatina aculeata</i>	1216 -1217,1219
Spoon limpet	941	<i>Squatina angelus</i>	1218
Spoon oyster	756	<i>Squatina laevis</i>	1218
Spotted eagle ray	1427	<i>Squatina oculata</i>	1216- 1217
Spotted ray	1401	<i>Squatina squatina</i>	1218
Spotted spurdog	1130	<i>Squatina vulgaris</i>	1218
<i>spurca sanctaehelenae</i> , <i>Cypraea</i>	1013	<i>squatina</i>, <i>Squatina</i>	1218
<i>spurca</i> , <i>Cypraea</i>	1013	SQUATINIDAE	1126,1153,1156,1166,1180,1190, 1201,1207, 1213 ,1290
<i>spurca</i>, <i>Erosaria</i>	1013	SQUATINIFORMES	1213
Spurdogs	1155	<i>Standella nivea</i>	794
<i>spurius</i> , <i>Conus</i>	1110	<i>Standella rugosa</i>	799
Squale bouclé	1152	Starry smoothhound	1278
Squale grogneur velouté	1199	STEGOSTOMATIDAE	1129
Squale liche	1210	<i>stellae</i> , <i>Petricola</i>	893
Squale nain	1212	<i>stellaris</i> , <i>Scyliorhinus</i>	1256, 1263 ,1266
Squale pygmée	1211	<i>stellata</i> , <i>Glycymeris</i>	705
Squale savate	1174	<i>Stenocista gambiensis</i>	698- 699
Squale-chagrin à longue dorsale	1171	<i>stentina</i> , <i>Lopha</i>	766
Squale-chagrin commun	1170	<i>stentina</i> , <i>Ostrea</i>	766
Squale-chagrin de l'Atlantique	1173	<i>stentina</i> , <i>Ostreola</i>	766
Squale-chagrin quelvacho	1172	<i>stercoraria</i> , <i>Cypraea</i>	1012
Squale-grogneur commun	1197	<i>stercoraria</i> , <i>Trona</i>	1012
Squale-savate à long nez	1177	<i>stercoraria</i> , <i>Zoila</i>	1012
Squale-savate rude	1175	<i>stigmosa</i> , <i>Barbatia</i>	697
Squale-savate-lutin	1176	Stingrays	1340,1404
Squalelet dentu	1212	<i>straeleni</i> , <i>Raja</i>	1393
Squalelet féroce	1211		

Straightnose rabbitfish	1451	<i>tabidus</i> , <i>Monteiroconus</i>	1112
<i>Stramonita haemastoma</i>	1058	<i>taeniata</i> , <i>Fissurella</i>	955
<i>Stramonita haemastoma floridana</i>	1058	<i>Taeniura grabata</i>	1417
<i>striata</i> , <i>Columbella rustica</i> var.	1073-1074	Tagal d'Adanson	858
<i>striata</i>, <i>Littorina</i>	997	Tagelo de Adanson	858
<i>striata</i> , <i>Melaraphe</i>	997	<i>Tagelus adansonii</i>	695,805, 858
<i>striata</i> , <i>Nodilittorina</i>	997	Taiwan gulper shark	1172
Striate periwinkle	997	<i>talienwhanensis</i> , <i>Crassostrea</i>	761
<i>striatella</i> , <i>Mactra</i>	794	<i>Talona explanata</i>	901
<i>striatella</i> , <i>Spisula</i>	794	Talona pholad	901
<i>striatula</i>, <i>Chamelea</i>	886	<i>Talparia lurida</i>	1013
<i>striatula</i> , <i>Chamelea gallina</i>	886	Tankerville's cardita	774
<i>striatula</i> , <i>Venus</i>	886	<i>tankervillei</i> , <i>Cardita</i>	774
<i>strigilatus</i>, <i>Solecurtus</i>	857, 859	<i>tankervillii</i> , <i>Cardiocardita</i>	774
<i>strigillatus</i> , <i>Solenocurtus</i>	859	<i>tankervillii</i>, <i>Cardites</i>	692,694, 774 ,789
<i>strigosa</i> , <i>Peronaea</i>	823	<i>Tapes aureus</i>	888
<i>strigosa</i>, <i>Tellina</i>	823	<i>Tapes decussatus</i>	876
<i>strigosus</i> , <i>Jujubinus</i>	963	<i>Tapes durus</i>	880
<i>Striostrea denticulata</i>	764	<i>Tapes rhomboides</i>	888
<i>Striostrea margaritacea</i>	764	<i>Tapes texturatus</i>	888
<i>Striostrea prismatica</i>	764	<i>tarapacana</i>, <i>Mobula</i>	1439
Striped false limpet	1115	<i>tarentina</i> , <i>Avicula</i>	728
Strombe d'Afrique occidentale	998	<i>tarentina</i> , <i>Patella</i>	939
STROMBIDAE	915, 998 ,1000	Taupe bleu	1245
<i>Strombus (Afristrombus) latus</i>	998	<i>taurus</i>, <i>Carcharias</i>	1126,1130,1220, 1223
<i>Strombus bubonius</i>	998	<i>taurus</i> , <i>Eugomphodus</i>	1223
<i>Strombus latus</i>	998	<i>taurus</i> , <i>Odontaspis</i>	1223
<i>stultorum</i>, <i>Mactra</i>	796	Tawny sharks	1251
<i>stultorum</i> , <i>Modiolus</i>	718	<i>tecta</i> , <i>Natica</i>	1025
<i>subaurita</i> , <i>Melania</i>	992	<i>tecta</i>, <i>Tectonatica</i>	1025
<i>subglobosa</i> , <i>Anadara</i>	691	<i>Tectarius</i>	997
<i>subrosalina</i> , <i>Ventricoloidea</i>	884	<i>Tectonatica tecta</i>	1025
<i>subrosalina</i>, <i>Venus (s.l.)</i>	884	<i>tegulicius</i> , <i>Bostrycapulus</i>	1005
<i>subtruncata</i>, <i>Spisula</i>	802	Telina de Senegambia	822
Subtruncate surf clam	802	Telina delgada	823
<i>succinctum</i> , <i>Triton</i>	1042	Telina delicada	829
<i>sulcata</i> , <i>Bullia</i>	1077	Telina encarnada	827
<i>sulcata</i> , <i>Cardita</i>	775	Telina estuche	821
<i>sulcatus</i> , <i>Cantharus</i>	1067	Telina frágil	824
<i>sulin</i> , <i>Crepidula</i>	1008	Telina hermosa	828
Sundial shells	910	Telina matadoa	825
Sunset clams	846	Telina papiracea	824
<i>supercilius</i>, <i>Alopias</i>	1129, 1235 -1236	Telina plana	828
<i>supertexta</i> , <i>Haliotis</i>	950	Tellerina	842
Swamp-ceriths	988	<i>Tellina capsicum</i>	821
Swollen venus	874	<i>Tellina chudeaui</i>	827
T		<i>Tellina incarnata</i>	827
Tabid cone	1112	<i>Tellina listeri</i>	822
<i>tabidus</i>, <i>Conus</i>	1112	<i>Tellina madagascariensis</i>	821

<i>Tellina nymphalis</i>	826	<i>Thais trinitatensis</i>	1060
<i>Tellina papyracea</i>	906	<i>Thaisella coronata</i>	1059-1060
<i>Tellina planata</i>	828	<i>Thaisella forbesii</i>	1058
<i>Tellina planata afroccidentalis</i>	828	<i>Thericium atratum</i>	980
<i>Tellina pulchella</i>	828	THIARIDAE	917,978,989-990
<i>Tellina senegambiensis</i>	822	Thick monodont	971
<i>Tellina squalida</i>	827	Thick-spined murex	1062
<i>Tellina strigosa</i>	823	Thin tellin	823
<i>Tellina tenuis</i>	829	<i>thomasi</i> , <i>Ostrea</i>	756
Telline aplatie	828	Thornback ray	1399
Telline de Sénégalie	822	Thorny oysters	743
Telline délicate	829	<i>Thovana campechiensis</i>	900
Telline étui	821	Thracia clams	904
Telline gentille	828	<i>Thracia papyracea</i>	906
Telline jaunâtre	823	<i>Thracia phaseolina</i>	906
Telline papier	824	<i>Thracia pubescens</i>	906
Telline pourpre	827	<i>Thracia villosiuscula</i>	906
<i>Tellinella pulchella</i>	828	Thracie faséole	906
TELLINIDAE	668,677,816,830,851,853	Thracie veloutée	906
Tellins	816	THRACIIDAE	674,904
<i>teneriffae</i> , <i>Patella</i>	939	Thresher	1236
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This multivolume field guide covers the species of interest to fisheries of the major resource groups exploited in the Eastern Central Atlantic. The area of coverage includes FAO fishing area 34 and part of 47. The marine resource groups included are bivalves, gastropods, chitons, cephalopods, stomatopods, shrimps, lobsters, crabs, hagfishes, sharks, batoid fishes, chimaeras, bony fishes and sea turtles. The introductory chapter outlines the environmental, ecological, and biogeographical factors influencing the marine biota, and the basic components of the fisheries in the Eastern Central Atlantic. Within the field guide, the sections on the resource groups are arranged phylogenetically according to higher taxonomic levels such as class, order, and family. Each resource group is introduced by general remarks on the group, an illustrated section on technical terms and measurements, and a key or guide to orders or families. Each family generally has an account summarizing family diagnostic characters, biological and fisheries information, notes on similar families occurring in the area, a key to species, a checklist of species, and a short list of relevant literature. Families that are less important to fisheries include an abbreviated family account and no detailed species information. Species in the important families are treated in detail (arranged alphabetically by genus and species) and include the species name, frequent synonyms and names of similar species, an illustration, FAO common name(s), diagnostic characters, biology and fisheries information, notes on geographical distribution, and a distribution map. For less important species, abbreviated accounts are used. Generally this includes the species name, FAO common name(s), an illustration, a distribution map, and notes on biology, fisheries, and distribution. Each volume concludes with its own index of scientific and common names.



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