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"Seken in every halke and every herne
Particulere sciences for to lerne."
—*Chaucer.*

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In Insecta Scotica when the Degrees of Latitude are given (both in this and preceding volume) for '"' read '′'.

THE SCOTTISH NATURALIST.

VOLUME THE THIRD.

ZOOLOGY.

ILLUSTRATIONS OF ANIMAL REASON.

By W. LAUDER LINDSAY, M.D., F.R.S.E., F.L.S.

FOR the last five years, I have had occasion to study endless books, pamphlets, reports, serials, newspapers, and even MSS., containing anecdotes of Animal Intelligence. My object has been to accumulate trustworthy data—*facts*—on which to base general conclusions as to the nature and range of *Mind in the Lower Animals*. While I have found such anecdotes literally innumerable, only a small proportion is of any real value—for the following reasons :—

1. Many are anonymous.
2. The names of the authorities for others are those of persons utterly "unknown to fame," of whose competency to observe, and of whose accuracy in the description of, *facts*, we know nothing.
3. Others are clad in such a garb that it is impossible to distinguish *fact* from fiction. Ostensibly to render them "interesting"—to attract readers—they are made to assume the form of, and are spoken of as, "Stories,"—a term which suggests at least the idea of fiction.
4. What is obviously the same incident is recorded over and over again, in various guises or disguises, in a succession

of *ad captandum* Christmas or other books—none of which are original—the authors having simply compiled from sources of information themselves second-hand, and probably embellished.

In consequence of the recent writings of Darwin and his school—including Huxley, Hæckel, Lubbock, Tylor, Spencer, Wallace, Houzeau, Müller, Wood, Lyell, and others, on the "Place of Man in Nature," the subject of the Mental Condition of the Lower Animals has acquired a degree of popular, as well as scientific, interest that it never before possessed. Correct conclusions on such a subject can be based only on well observed and well established *facts*; and it has become desirable to accumulate such facts in order that legitimate scientific generalization may be founded thereupon. It is important, therefore, that all incidents illustrative of *Thought or Reason*—of the higher processes of mind—in the lower animals, [wherever such incidents have been properly and at first hand observed, described, and authenticated,] should be placed on record, in works of reference accessible to British Naturalists. I am sure the Editor of the *Scottish Naturalist* will permit me to say, and will agree with me in saying, that to no better purpose can *its* columns be devoted, and that he will gladly give space to anecdotes of such a character.

In the course of my own enquiries, I have been brought into correspondence with the authors of several works on Animal Habits and Character, some of whom have done me the favour to place at my disposal, for publication, original, hitherto unpublished anecdotes illustrative of the possession of *Reason* by the lower animals. I propose, in these columns, offering a series of these "true stories"—

1. Because of their inherent interest: and
2. In order to invite and encourage others to add *their* contributions to such a collection.

For the following five "true anecdotes," as she herself distinctively calls them, I am indebted to Miss K. A. Buist, author of an illustrated work recently published by the well-known firm of Macmillan, of London and Cambridge, on "Birds: their cages and their keep: being a practical manual of Bird-keeping and Bird-rearing." The work in question has been most favourably reviewed in the *Athenæum* and other journals, and is especially to be commended to all of her countrywomen who either now have, or are likely at some future time to

possess, Home Pets of the Cage-bird class. It may give additional interest to, and confidence in, Miss Buist's anecdotes, to mention that she is a daughter of the late Dr. George Buist, of Bombay, and formerly of Cupar-Fife,—long well known in the literary and scientific world of India, England, and Scotland.

Miss Buist wrote me, in October 1874,—"If I can be of the slightest service to you, I should esteem it a pleasure to be so. . . . . I have written out several anecdotes of animal sagacity, never hitherto published, and for the authenticity of which I can personally vouch, thinking they might be of interest to you, to do with as you deem best. If they would be of the least use, I would be very pleased to have them turned to account. . . . I have written them in a very great hurry, and consequently the account in your own words would be far preferable to mine as they now stand." Nevertheless, for obvious reasons, I prefer giving Miss Buist's anecdotes in her *ipsissima verba*—without any sort of "trimming" by a second party.

I.—"A tiny *dog*, belonging to a relative, was a perfect epitome in itself of the marvellous instinct, or "mind in the lower animals" found broadcast in nature. It was a very small, smooth, fawn-coloured terrier, so devotedly attached to his master, and obedient to his slightest wish, that no temptation could suffice to lure him at any time from his duty. Nettle was its owner's inseparable shadow as faithful friend. On one occasion, to test the dog's fidelity, a conspiracy was entered into between the master and a great favourite of Nettle's, to try and tempt Nettle, and prove whether he was or not to be shaken in his trustworthiness. The former, accordingly, leaving his coat and hat in the hall, charged his canine guard to keep it, allowing none to carry off the property; and Nettle, with many intelligent comprehending wags of his tail, calmly settled to that office. Next arrived on the scene Nettle's especial crony, his dear master's dearest friend, and coaxingly caressed the tiny watchman, whistled to him, and tried to inveigle him away with every conceivable bait. But Nettle was true to his post. He watched and wagged and yelped all friendliness and gratitude, yet he would not be moved a hairsbreadth off his charge, so strictly confided to his sagacity. At last a hand was laid on the hat, and Nettle, in agony, dared not bite his dear master's dearest friend as he would a stranger, nor even illuse his property, although to save

it. So he seized upon the brilliant expedient of *jumping* into it himself bodily, whiningly gazing over the brim with fixed vigilance still upon the coat left behind, and beyond his small power, though not will, to take with him there too as security! He would have flown in a fury at any one else, and hurt them considerably, sooner than they should touch his property in charge. His own tempter, however, poor Nettle loved far too well to attempt to injure; he could only maintain his politeness, with his trust itself, by the means so quickly devised and so readily acted upon."

II.—"Another pet of the same master, and of a different kind, was a tame *bullfinch*. This bird also adored his keeper as much as little Nettle did; but his mistress, alas! who shall tell the tale! He could not abide her! The lady was not of an amiable nature, and the bird had discovered the fact instinctively, though to it she was honey and butter and sugar and oil combined, tender, caressing, and the kindest of the kind, all of which Bully ungratefully repaid by fighting her each time she even entered the room where he hung a petted, spoilt favourite. He would extend his wings and hiss at her very approach, however distant, and fly in a rage to try and peck her; but his master! it was absurd to watch the little bird and big bearded man together. Bully languishing in blissful delight—his head on one side—his sweetest notes warbling from his appreciating throat, and letting the master do what he will and how he would too, and at any time, except in his wife's company only, when Bully invariably showed pugnacity again; the sound of her voice—her footfall—was quite enough always to upset its small temper, until at last, scarce unreasonably, the mistress grew to be quite jealous of her feathered rival, and to hate the sight of the bird."

III.—"A third anecdote is of a *cat*, who, I am sure, must have been indulging in "higher education" somewhere, so unlike was he in his ways to the rest of his furry brotherhood. Puss took a wild fancy to the contents of my bird cage, chiefly, I am convinced, because he knew better, and desired to torment a servant girl to whom he was greatly attached. Puss was very big and strong, and the most resolute, tenacious, and pertinacious of fourfooted thieves; the terror of the neighbourhood round on account of his bold plundering raids, having in one season devoured a family of no fewer than eighteen promising young chickens, showing skill and audacity in the

protracted performance worthy of a better cause. On one occasion this cat ascertained that the occupants of the house next door had acquired a nice plump guinea pig on which they set great store; and Puss at once fixed his affections on its immediate transfer instead to the gratification of his own capacious appetite. He seized his opportunity then, and in triumph brought it over the wall—a prey—to be devoured at his own leisure. It was seen and rescued, and restored with the caution to place it in shelter elsewhere during the darkness of night, when its owners were not about efficiently to guard its safety, as Puss had his eyes on it. With many thanks, due precautions were taken to that end, and Puss was baffled for a long time. In vain. Puss was strong in behalf of his own imagined "rights," and not to be baulked by any in the end. He obtained possession the second time at night, deliberately ate it all up outside, and then quietly and unmistakably to prove what had been done, and by whom, brought in the head and claws of the victim and a scrap of fur to identify the lost, and placed them ostentatiously in a prominent place, where they could not fail to he noted. This a positive fact to my sure knowledge, the cat in question being in the house at this moment. As to Puss's penchant to my bird: He was so well fed he could not possibly want the luxury; nevertheless, every time our drawing-room door is opened, there is he to be beheld with resolve and deliberation seated on the door-mat without, all intent attention at the first opportunity of an unguarded moment, or momentary forgetfulness, to snap up or to pounce in and destroy without ruth. He will creep in between the attendant servant's floating dress, and thus hid, as unsuspected, bide his time, rush forward then, and hitherto, I am happy to state, be successfully beaten off, to repeat the performance always "once more." The servant and he are firm friends, and he follows her about the house, as only dogs are supposed to do. On one occasion when she was away visiting her friends awhile, Puss was inconsolable, roaming all over the house yawling ceaselessly till her return, and night by night stretching himself outside her door waiting, and making night hideous with his outcry of disappointed hopes. When she has done anything occasioning him the faintest annoyance, however, he has hit upon the happy expedient of mounting her snowy dresser when her back is turned, and catching the swinging pendulum of her clock till he stops it, out of pure retaliation, and to evince his sovereign

displeasure, having discovered—how, who can say—it vexes her, and puts her out! My birds he had resolved he *would* have, because *she* was resolved he should not. He fretted and pined and grew thin over the delay to the fulfilment of this darling scheme, until one fine day, following her stealthily up, to be only beaten ignominiously down again to his own regions, he awaited her in the kitchen, and flew in a fury to scratch and bite her; he, who never had been known except as the most docile, affectionate, and best tempered of cats! Puss sulked for a considerable while after, refusing to be be comforted or mollified, or friends at all on the subject, and never once forgetting nor foregoing every conceivable opportunity of making occasion to renew his attacks on the forbidden fruit, relying on his guinea pig incident, and others doubtless, for success in the end to crown his patience and perseverance."

IV.—"Some servants were given a picnic by their master and mistress, and for the occasion provisions were permitted them from the house, enough for the party. But the evening before the picnic day, friends unexpectedly dropped into the kitchen, and staying supper, the beef prepared for the meal out of doors the next morning fell short, being consumed, in fact, by the visitors. The cook was at a loss how to repair the damage, without incurring her lady's wrath, and it crossed her mind that if she dressed some bacon, as additional fare in place of the demolished viands previously provided, the breach would be spanned, and nobody a bit the wiser, since its absence would never be even noticed, and the surreptitious festivities of over-night in the servants' hall remain without remark. There was, however, a witness of her proceedings, who must first be hoodwinked, or it might turn traitor in the camp, and betray all of this admirable private management,—Poll, the *Parrot*, in short,—a favoured guest, at dessert only allowed to put in its appearance upstairs, and at other times maintained at free quarters down below. The bird, accordingly, was snugly covered, the frying-pan put over the fire; and soon resounded the sonorous and odorous frizzling and crackle of the culinary operations in question. The gap supplied, the hours revolved, dinner came round, and with it, in due course, Polly's hejira in state to the higher regions for its habitual caresses and attentions there. Behold our charming conversationalist, then, installed in high honour, and respectfully causing silence on the part of the assembled company, on the look out for the favourite to distinguish itself

as usual after its own way. In consequence they heard her feathered majesty begin,—"It hails, and it rains, and—*'tis so dark.*" And over and over again, vouchsafing no modification, and no other remark, throughout the whole of that occasion; master and mistress entirely at a loss in their puzzle to comprehend their pet's wisdom, as to every appearance there existed no occasion for it whatever. Polly was informing its owners, however, unknown to them, of the high life below stairs, of which their own domestics had purposely kept them ignorant, to escape consequences to themselves. Neither master nor mistress ever understood the confidential communication, nor could account for it in any way!—of course not; as might have been expected. The parrot had behaved with exemplary propriety in the kitchen, as all thought there, not observing anything in the least degree; but the change to its more aristocratic haunts, the first sight of its mistress, and the spell was broken on that score,—the words burst forth at once, glibly and reiterated,—"It rains, and it hails, and—*'tis so dark.*" Sententious, solemn, slow, and pausing with measured, deliberate tread, till it came to the last, then it hurled, in quick double knock, the remainder—that convicting accusation:—"*'tis so dark.*" The tale is true, as I can vouch for, having received it, to my belief, at first hand, from one of the participators in the plot itself—an old domestic, who told it with every appearance of speaking the truth, without the least exaggeration."

V.—"Another anecdote is of a pair of *Spaniels*, belonging to a relative of my own, and therefore an authentic narrative, illustrative of animals' wondrous sagacity. One of these dogs was ever in favour, whilst the other was always in disgrace. Beauty was good as gold, and lavished with rewards in accordance; his fellow as systematic a subject, on the other hand, of blows and punishments, which his misconduct called forth so deservingly. Now, for some reason or other, a certain member of the household found cause to suspect Beauty's perfection at all points,—perhaps in his own soul being no particular believer in Infallibility—as the family were all Irish, the dogs inclusive,—and determined to test Beauty. It was closely watched, and on a particular occasion it was clearly convicted of theft, in this wise: It was the hour of lunch, and Beauty's erring companion lay stretched at full length snoozing on the hearth-rug. The door was shut, the windows, long and opening on to the lawn, thrown wide to admit the breeze, and Beauty's secret, lurking spy in

ambush out of sight, to discover what should next occur; and it was this: Beauty with stealthy creep approached the hall door, raised himself on his hind legs, with his fore paws deliberately drew down the bell-wire, till he set it loudly ringing, then a swift scamper, a spring on to the dressed table, a seizure of the meat thereon, and as rapid a retreat to demolish his ill-gotten spoils, and the conclusion—the usual one—that Beauty's fellow received Beauty's thrashing in place of himself, for having stolen what he never took at all. And these tricks actually went on for months; Beauty invariably managing the other should be exclusively punished for his own peccadilloes; and of course as the latter, in his innocence, was always to the fore, and the former, protected by his guilty "conscience," never, it was easy enough to misjudge as to the real culprit each time." *(To be continued.)*

Addition to the List of Shetland Coleoptera.—On turning out some bottles of unset specimens, from Shetland, collected there last July, we find several examples of *Pterostichus oblongo-punctatus*, which were bottled among, and as, *vitreus*. This species must, therefore, be added to the list we furnished to the October number of the *Scottish Naturalist*; and, we now believe, that it is much commoner than *vitreus* in Shetland. This is somewhat remarkable, as there are no fir-trees on the Islands, and, indeed, not a good-sized tree at all; whereas the locality mentioned for *oblongo-punctatus*, by Schaum, is "woods;" and, by Dr. Sharp, "fir-woods."—THOMAS BLACKBURN and C. E. LILLEY, Greenhithe, Kent.

Ivory Gulls at Aberdeen.—On Monday, the 17th November, while hunting among the pools left by the tide, I observed, near Aberdeen Pier, two gulls of a much lighter colour than any of the others, which were flying about. On getting to the top of the pier they were more distinctly seen, coming close to where I stood, exhibiting a want of shyness differing much from the herring and black-headed gulls among which they were. They frequently alighted on the water at the foot of the pier, picking up garbage as it came from the city sewer, which enters the tide at this point, and being thus within about four yards of me there was no difficulty in deciding what they were—viz., the Ivory Gull, *Larus eburneus*. When flying they kept continually emitting a low sound, similar to the squeak of a rat, which became louder if any of the other species came near them. Returning the following morning to the same place, in company with my friend Mr. W. Robb, curator, Marischal College, we were again fortunate in seeing both birds, one of which fell to Mr. Robb's gun. Our time being limited we had to leave without getting a chance of the second one; this, however, we hoped to do the following morning, and were there by daybreak, but failed to see it. Next morning however, the 19th, fortune favoured Mr. Robb, and the second was ours. The first killed bird (which now graces Marischal College Museum) measured 18 inches in length; extent of wings, 37 inches; wing from flexure, 12 inches; tarsus, 1½ inches; the primaries,

secondaries, greater and lesser wing-coverts, and tail, tipped with black; hind neck and scapulars irregularly spotted with black; around the base of the bill and down the throat of a purplish brown colour, interspersed with white. The second bird measured ½ an inch less than the first, and 2½ inches more in extent of wing, and weighed fifteen and a quarter ounces; it was similarly marked to the first, except that the scapulars have but two or three spots of black, and three of the tail feathers want the black tip, and are ½ an inch larger than the others. The bill of both was of a pale blue, tipped with orange yellow, but these colours soon disappear after death. This species has been seldom seen on the East of Scotland, although of frequent occurrence on the West.—GEORGE SIM, Aberdeen.

Lycæna Artaxerxes.—On the 24th of July last, while walking between the villages of Minnihive and Carsphairn, in Kirkcudbrightshire, both Johnstone Watson, Esq. (of the Temple, London), and I, were fortunate enough to box by the roadside over a dozen specimens of this rare butterfly. They were plentiful all along the way, but most so where the road must have been many hundred feet above the sea level.—H. O. FORBES, University of Edinburgh.

Insecta Scotica—Addenda.—Tweed District—*Cymatophora duplaris*, at Dunse. *Anchocelis rufina*, common. *Noctua umbrosa*, Eyemouth and Lauder. *N. conflua*, common. *Xylophasia hepatica*, Eyemouth.—A. KELLY, Lauder, November, 1874.

Orkney District—*Xylophasia rurea*, *Apamea unanimis*.—J. BOSWELL SYME, Balmuto, December, 1874.

Food-plant of Plusia interrogationis.—*Plusia interrogationis* is plentiful on Dogden Moss, and there is not a nettle for miles. There must be something wrong about the stated food-plant, evidently.—A. KELLY, Lauder, November, 1874. [Though nettle is stated to be the food-plant of this *Plusia* in many of the text-books, yet it is quite erroneous, as heather (*Erica* and *Calluna*) is the real food-plant. The larva hibernates in a small condition and feeds up in May and June, when it may be found on the heather. It is green, with paler stripes. Nettle is a favourite food-plant of many other of the *Plusiæ*.—EDITOR *Scottish Naturalist*.]

Lepidopterological Notes.—*Panagra petraria* H.—A few years ago I found this insect here—it had not hitherto been recorded for Perthshire—very abundant, but confined to a limited space. Each year since then I have found it not only in the original locality but in other spots, in which, to the best of my belief, it did not occur when I first discovered it. Some of these places are nearly a mile from the original one. I am thus inclined to think that *P. petraria* must be a comparatively recent colonist in Perthshire, but how it originally arrived it is difficult to guess.

Leptogramma niveana F. (*Scotana* Stph.).—I find this insect among birch trees in one of my woods. The birches are scattered here and there among larches and other trees, but *niveana* I have only found on the side of the wood facing the north. Though I have carefully searched for it in other likely places, both in this neighhourhood and other parts of Perthshire, I have only seen it in the above-mentioned wood and in the neighbourhood of Loch Rannoch, so that it would seem that it is not generally distributed in all birch woods in the county, but that it is very local.—THOMAS MONCREIFFE, Moncreiffe, November, 1874.

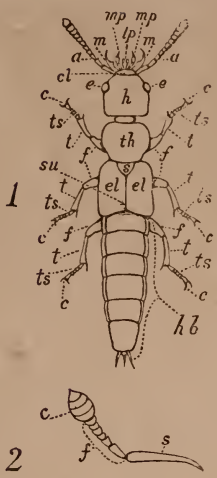
OUTLINE DESCRIPTIONS OF BRITISH COLEOPTERA.

By Rev. T. BLACKBURN, B.A.

I.

THIS paper is the first of a series in which I hope from time to time to furnish in the briefest possible form (for obvious reasons no other form would be suitable to a quarterly magazine), tables of the leading characters of the British *Coleoptera*. By using abbreviations for various constantly recurring words, and attempting no greater fulness of description than will just suffice for easy identification, I expect to bring the work within reasonable limits. The divisions of groups, families, &c., adopted in the tables will often be artificial (*e.g.*, in the first table, relating to "groups," the *Buprestidæ Eucnemidæ*, and *Elateridæ* are characterised separately, instead of unitedly as *Sternoxi;* and in the table of *Feroniidæ*, *Pter. inæqualis* is eliminated from the rest of its genus). The object I have in view, however, is the provision of a ready means of identifying species, not classification. For classification I will, in passing, refer to Dr. Sharp's "Catalogue of British Coleoptera" (E. W. Janson, 28 Museum Street, London, W.C., price one shilling) as the best catalogue procurable. I may also refer to Mr E. C. Rye's "British Beetles" (Lovell, Reeve, & Co., 5 Henrietta Street, Covent Garden, London, W.C., price ten shillings and sixpence) for the general instructions that want of space prevents my supplying as an introduction to my work. As this series of papers will be designed especially for beginners, I pass by, in describing, characters that cannot be detected without dissection, or the aid of the microscope, and select such as can be perceived with an ordinary, or at anyrate with a Coddington, lens; also, I rely as much as possible on characters connected with the upper side of the insects. In the case of a few genera (*Homalota* for instance) the species are too minute and closely allied to be distinguishably characterised in a short space; I shall in such cases merely offer a few general remarks, and refer readers who desire more to monographs of them that have been already published on a larger scale than would be practicable for the pages of a magazine. Finally I must express my obligations to Mr. G. C. Champion for information he has courteously supplied to me on the geographical range of many species.

Below is the fig. of a beetle, showing the relative position of the various parts of the body. This is followed by a Glossary, and a table of the abbreviations to be used. The work proper then commences, and is arranged as follows :—(*a*) Table of the "groups," for ascertaining to which main division of the



Coleoptera a specimen belongs. (*b*) Table of the "families" contained in the first group. (*c*) Table of "genera" in 1st family of 1st group. (*d*) Table of species in 1st genus of 1st family of 1st group. (*e*) Table of species in 2nd genus of 1st family of 1st group, and so on.

Explanation of Figure.—1. A Beetle—*mp*, maxillary palpi; *m*, mandibles (or jaws); *lp*, labial palpi; *a*, antennæ; *e*, eyes; *h*, head; *th*, thorax; *s*, scutellum; *el*, elytra; *hb*, hind body; *f*, femora; *t*, tibiæ; *ts*, tarsi; *c*, claws. N.B.—The wings are folded under the elytra.

2. An Elbowed Antenna—*s*, scape; *f*, funiculus; *c*, club.

GLOSSARY.

Anterior.—Front.

Apex.—The extremity farthest from the middle of the insect.

Aquatic.—Living in the water.

Bilobed.—Cleft into two parts.

Close (when spoken of punctuation).—Having the spaces between the punctures not larger than the space occupied by the separate punctures.

Clypeus.—The front portion of the upper surface of the head.

Cordate (spoken of the thorax).—Abruptly contracted backwards immediately behind the broadest part, but of about equal width in the part just in front of base.

Dentate.—Toothed.

Disc.—The surface, exclusive of the margins.

Dorsal.—Running along the centre longitudinally.

Elongate.—Longer than broad.

Fascia.—A stripe.

Foliated (spoken of antennæ).—Having the terminal joints flat (like leaves), and with a common base.

Fovea.—A short channel.

Glabrous.—Smooth (*i.e.*, without striæ or punctures).

Granulated.—Appearing to be covered with minute tubercles.

Humeral.—Placed at the external corner of the base of the elytra.

Interstice.—A space between punctures or striæ.

Obsolete.—Only faintly to be discerned.
Pectinated.—Comb-like.
Peduncle.—A contracted process joining two parts of the body (as between the thorax and hind body of a wasp).
Penultimate.—Immediately preceding the last.
Posterior.—Behind.
Punctate-striate.—Having striæ in which are punctures.
Pygidium.—Upper surface of the last segment of the hind body.
Reflexed margin.—The under surface of the extreme margin.
Rostrum.—A snout.
Segment.—A division, or joint (spoken of the hind body).
Serrated.—Saw-like.
Sparing (when spoken of punctuation).—Having the spaces between the punctures larger than the spaces occupied by the separate punctures.
Stria.—An impressed line, or long narrow channel.
Subulate.—Like an awl (*i.e.*, with the apex abruptly contracted).
Testaceous.—Of a transparent yellowish colour.
Transverse.—Broader than long.

LOCALITIES.

B.—Great Britain generally (so far E.—England & Wales. [as known).
S.—Scotland.
I.—Ireland.

My information concerning Irish and Welsh localities is very limited. I should be glad of local lists.

N. S. E. W. C. F. M. (printed above the line, *e.g.*, E.s.c.) signify severally, North, South, East, West, Coasts, Fens or marshes, Mountains.

!—A common insect. !!—An abundant insect. The names of the rarest species, some possibly not indigenous, are printed in italics.

N.B.—The figures preceding the locality indicate the length of the insect measured from the base of the antennæ to the apex of the hind body. "l." signifies "line": (a "line" is one-twelfth of an inch). The average length is given, but most species vary more or less in this respect.

ABBREVIATIONS.

Abbrev.—Abbreviated.
Abr.—Abrupt, or abruptly.
Ac.—Acute, or acutely.
Alt.—Alternate, or alternately.
An.—Antennæ.
Ang.—Angle.
Ant.—Anterior, or anteriorly.
Ap.—Apex, or apical.
B.—Black; when prefixed, "blackish," as "b.-r."
Ba.—Base, or basal.
Backw.—Backwards.
Bil.—Bilobed.
Bl.—Blue, or bluish. (See "B.")
Br.—Bright.
Chan.—Channel, or channeled.
Cl.—Club, or clubbed.
Clyp.—Clypeus.
Conc.—Concave.
Cons.—Considerably.

Consp.—Conspicuous, or conspicuously.
Contr.—Contracted.
Conv.—Convex.
Cop.—Coppery.
Cyl.—Cylindric.
Def.—Defined.
Dent.—Dentate.
Dil.—Diluted.
Dist.—Distinct, or distinctly.
Dor.—Dorsal.
E.—Elytra.
El.—Elongate.
Elev.—Elevated.
Ex.—External, or externally.
Exc.—Except.
F.—Femora.
Fasc.—Fascia, or fasciæ.
Forw.—Forwards.
Fov.—Fovea, or foveæ.
Fr.—Front.
Fun.—Funiculus.
Gen.—Generally.
Glab.—Glabrous.
Gr.—Green.
Gran.—Granulated.
H.—Head.
H.-b.—Hind body.
Hi.—Hinder.
Hum.—Humeral.
Impr.—Impression, or impressed.
Impunc.—Impunctate.
In.—Inner.
Ind.—Indistinct, or indistinctly.
Ins.—Insertion.
Int.—Interstice.
Interm.—Intermediate.
Irreg.—Irregular, or irregularly.
J.—Joint, or jointed.
Longi.—Longitudinal.
Mar.—Margin, or margined.
Met.—Metallic.
Mid.—Middle.
Obl.—Oblique.
Obs.—Obsolete, or obsoletely.
Obsc.—Obscure, or obscurely.
Obt.—Obtuse, or obtusely.
Oliv.—Olivaceous.
Out.—Outer.
Pal.—Palpi (maxillary).
Pec.—Pectinated.
Pen.—Penultimate.
Pit.—Pitchy (*i. e.*, of the colour of pitch).
Post.—Posterior, or posteriorly.
Prec.—Preceding.
Prod.—Produced.
P.-s.—Punctate-striate.
Pub.—Pubescent.
Punc.—Puncture, or punctate.
Pyg.—Pygidium.
R.—Red, or reddish. (See "B.")
Rectang.—Rectangular.
R.-m.—Reflexed margin.
Ros.—Rostrum.
Sc.—Scutellum.
Seg.—Segment.
Serr.—Serrated.
Should.—Shoulder.
Spar.—Sparing, or sparingly.
Str.—Stria, or striate.
Sub.—Subulate.
Sut.—Suture.
Tar.—Tarsi.
Test.—Testaceous.
Th.—Thorax.
Tib.—Tibiæ.
Tr.—Transverse, or transversely.
Unic.—Unicolorous.
Unif.—Uniform, or uniformly.
U.-s.—Under side.
Var.—Variety.
Vio.—Violet.
Wh.—White, or whitish. (See "B.")
Yel.—Yellow, or yellowish. ,,

♂—Male.
♀—Female.

TABLE OF GROUPS.

1. E. reaching cons. beyond ins. of 3rd legs 2
   E. not reaching beyond ins. of 3rd legs,—or if a little beyond, an. not with an abr. cl. . . . Brachelytra

2. An. never cl. at ap. Not aquatic. Tar. all 5 j. (easy to count) 3
- - - - -. - -. - - 4 j. (easy to count). An. straight, never cl. Pen. j. of tar. very deeply bil. and much shorter than the prec. together 4
- - - - -. Aquatic . . . . . Hydradephaga
- various 5

3. Ant. tib. dis. notched on in. mar., or sharply spined at ap. Geodephaga
- - plain. Th. more than twice length of h., and acutely prod. at hi. angs. . . . . Elateridæ

4. H. not deeply sunk in th., with 2nd j. of an. much less than ½ length of 3rd, or with eyes notched, or with both . . . . . Longicornes
An. much thickened towards ap., *and* 1st j. of 3rd tar. much longer than the 2 following together . Bruchidæ
Not possessing the characters of either of the 2 prec. . Eupoda

5. Tar. all 5 j. (easy to count). Pal. longer than an. . . 6
- - - - - - -. - not longer than an. 7
- - 4 j. (easy to count). An. elbowed, or ros. prod. as a snout, or both . . . . . Rhyncophora
- various, but with less than 4 js., often not easy to count . 8
3rd tar. 4 j.; rest 5 j. (easy to count) . . . Heteromera

6. 1st j. of 3rd tar. evidently longest . . . Sphæridiadæ
- - - - - not evidently longest . . . Hydrophilidæ

7. 1st and 2nd pairs of legs meeting at ins., 3rd remote from them . . . . . Buprestidæ
- - - - - - not close together. Hi. angs. of th. acutely prod. backw. An. much thickened (or serr.) towards ap. . . . . Eucnemidæ
- - - - - - - - -. - - - - not acutely prod. backw. An. elbowed, with a foliated cl. . . . Lamellicornes
- - - - - - - - -. - - - - - - - - -. - not as in prec. { Malacodermi / Necrophaga }

8. Tar. with 3 broad js. (easy to count). Ins. of an. near other, between the eyes . . . . Endomychidæ
- - - - - - - -. - - - far apart, in fr. of the eyes . Coccinellidæ
- 1 or 2 j. Species very minute . . { Sphæriadæ / Trichopterygidæ }
- 3 j. Species small, but rarely less than ¾ line . Lathridiidæ

TABLE OF FAMILIES OF GEODEPHAGA.

1. Ant. tib. not dist. notched on in. mar. 2
- - dist. notched on in. mar. H.-b. consists of not more than 6 segs. 4
- - - - - - -. - - - more than 6 segs. . . . Brachinidæ

2. Eye longer than first 2 js. of an. together. H. often conc. . 3
   - shorter than first 2 js. of an. together. H. not conc. Carabidæ

3. E. dull, with met. spaces, or *vice versa* . . . Elaphridæ
   E. not met.,—variegated with colours, . . . Cicindelidæ

4. E. covering h.-b. Ex. mar. of ant. tib. not dent. . . 5
   - - -. - - - - - dentate. (Th. joined to h.-b. by a peduncle) . . . . . Scaritidæ
   - leave ap. of of h.-b. exposed . . . . Lebiadæ

5. Ap. j. of pal. not sub. 4 dil. js. in ant. tar. of ♂. Interm. tar. of ♂ gen. dil. . . . . Harpalidæ
   - - - - - -. Less than 4 dil. js. in ant. tar. of ♂ . . 6
   - - - - sub. Ant. tar. of ♂ with 2 dil. js. . . Bembidiadæ

6. Each dil. j. in ant. tar. of ♂ contr. at its base. Dil. js. only 2 . . . . . Trechidæ
   - - - - - - - - - - - -. - - 3 . . . . Feroniidæ
   - - - - - - - - not contr. at its base. Dil. js. 3 . Chlæniidæ

First Family—CICINDELIDÆ. (1 genus.) CICINDELA.

1. E. gr. 2
   E. not gr. 3

2. Th. broadest in fr. Br. gr. Legs cop. Mouth wh. E. with wh. spots (with a b. punc. in ♀). 7 l. B. ! campestris
   Th. cyl. shining dull gr. with cop. gloss. Hum. angs., a spot near mid of mar., and a crescent at ap., of e. obsc. wh. 5 l. E.s. . . . . germanica

3. Ap. of e. pale 4
   - - - not pale. Cop.-b. E. wrinkled and pitted. Hum. angs. and 3 streaks from mar. (the middle one long and w shaped) yel. 8 l. E.s. . . . sylvatica

4. Cop. or oliv. E. with a hum. and ap. crescent, and a broad waved band (whose *ant.* mar. at one end is in a line with *post.* at other) not reaching sut., yel. 7½ l. E.N.C. . . . . hybrida
   ? var. of prec. *Ant.* mar. of tr. band at one end *behind* post. at other. E.S.C. . . . . maritima

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Second Family—ELAPHRIDÆ. (3 genera.)

1. E. with a consp. polished longi. space on each side of sut. Notiophilus
   E. not as in prec. 2

2. H. and th. unif. and thickly punc. . . . Elaphrus
   H. (which is not conc.) and th. not unif. punc. . Blethisa

NOTIOPHILUS.

1. E. with the ap. dist. paler than the disc . 2
   E. unic. H. consp. punc. near ba. Brassy. Tib. reddish. E. deeply p.-s., the str. failing near the ap. 2¼ l. B. ! . . . . . palustris
   - -. - - - - -. -. The whole legs (especially the ant. ones) r. E. deeply p.-s. throughout. 2½ l. E. rufipes
   - -. - almost impunc. Brassy or b. Tib. gen. b. A more el. species than the prec., less strongly p.-s., the str. failing near the ap. 2½ l. B. ! . . aquaticus
2. 2nd int. beyond the polished space broader than 1st . . 3
   - - - - - - not broader than 1st. First *2* ints. both much broader than the rest. H. narrow. Punc. of str. fine. Brassy. Tib. r. 2⅓ l. B. . . substriatus
3. Only *2nd* int. a *little* broader than the rest. H. broad. Punc. of str. coarse. Brassy. Tib. r. E. with *1* large consp. punc. 2¼ l. B. !! . . . biguttatus
   Very like prec. (? var.) E. with 2 large consp. puncs. E. . . . . quadripunctatus

ELAPHRUS.

1. Tib. more or less test. . . . . .
   - not test. . . . . .
2. Oliv. Tar. br. gr. Unif. and closely punc., exc. a few elev. spaces on the in. ints. E. with 4 rows of faintly impr. pits. 3½ l. B. ! . . . riparius
   Bronzy. Tar. not gr. Spar. and irreg. punc. E. with 4 rows of deeply impr. pits. Th. with a deep chan. forked in fr. 3¾ l. B. ! . . . . cupreus
3. E. much less closely punc. than th. Glossy b., gr., r., or golden. E. with 4 rows of faintly impr. pits. 4¼ l. S.M. . . . . *lapponicus*
   E. punc. much as th. Met. gr. or b. E. with 4 rows of dist. impr. pits. Th. with 2 obl. pits on either side of an irreg. dors. chan. 4¼ l. B. . . uliginosus

BLETHISA.

Dark bronze. Mar. of th. and of the p.-s. e., gen. gr. Third int. with 4 or 5 large pits, fifth with 2. 5 l. B. . . . . multipunctata

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Third Family—CARABIDÆ. (6 genera).

1. Th. not consp. prod. backw. at hi. angs. . . . 2
   Th. consp. prod. backw. at hi. angs. . . . Carabus
2. E. str. Th. not closely punc. over entire surface . . 3
   - -. - closely punc. over entire surface . . Calosoma
   - not str. . . . . Cychrus

3. 5th j. of an. about double length of 4th . . Leistus
- - - - cons. longer than 4th, but much less than double Nebria
- - - - scarcely longer than 4th (E. with consp. pits) . Pelophila

CYCHRUS.

B. The long narrow h., and strongly mar. th. and e. all coarsely gran. E. with traces of 3 elev. lines. 8½ l. B. . . . . rostratus

CARABUS.

1. E. with 3 continuous strongly elev. longi. lines. . . 2
E. without these lines 4
2. Space between the lines simply gran. or wrinkled . . 3
- - - - (the first of which is obs. in the hi. third) occupied by chain-like rows of elev. lines. Brassy. 10 l. B. ! . . . . . granulatus
- - - - occupied by large pits connected into rows by short elev. lines. Brassy. 12 l. B. . . *clathratus*
3. H. and th. cop. E. gr. with a cop. mar. Legs blackish. 8 l. B. . . . . nitens
Rich gr. Mouth, pal., ba. 4 js. of an., and legs, r. 11 l. E.s.c. . . . . *auratus*
4. Th. more or less tr. 5
- as long as broad. Blackish bl. Ap. j. of pal. consp. hatchet-shaped. E. with chain-like rows of elev. lines, 3 of them very consp. 12½ l. E.s.w. . *intricatus*
5. E. with rows of shallow but dist. imprs. . . 7
- without dist. str., imprs., or elev. lines . . 8
- dist. str., with elev. lines, but not dist. imprs. . 6
6. Int. of str. continuous and dist. elev., exc. 4th, 8th, and 12th, which consist of short elev. lines. Colour variable. 12 l. E. . . . . monilis
- - - - but scarcely elev., exc. 4th, 8th, and 12th, which consist of short strongly elev. lines. Colour variable. 9 l. B. . . . . arvensis
- - - much interrupted; 4th, 8th, and 12th more elev. than the rest. Bl.-b. Mar. of th. and e. often vio. 11½ l. B. ! . . . . catenulatus
7. H. and th. bronzy. E. greenish, gran., with 3 chain-like rows of scarcely elev. lines, on each of which is a very dist. row of imprs. 11 l. B. ! . . nemoralis
B., with mar. of th. and e., bl. E. only twice as long as th., covered with close elev. lines, on which are 3 faint rows of imprs. 8 l. E. . . *convexus*
8. Sut. gently elev., especially behind. B. gen. tinged with vio. or gr. E. gran.—the granulation tending to run into lines. 12 l. B. ! . . . violaceus
Sut. flat. Glossy b., tinged with steel bl. Very conv. E. very finely and evenly gran. 12 l. B.M. . glabratus

(To be continued.)

PHYTOLOGY.

NOTES OF A BOTANICAL EXCURSION TO THE BREADALBANE MOUNTAINS, PERTHSHIRE.

By COLONEL DRUMMOND-HAY, C.M.Z.S., and Dr. BUCHANAN WHITE, F.L.S.

IN August last we made a short excursion to Breadalbane, and were successful in finding new localities for some of the rarer alpines. These will, of course, be published in the "Flora of Perthshire," now being prepared by the Perthshire Society of Natural Science; but, in the meantime, we think it may not be amiss to give some notes on our excursion, and to record some of the more interesting species that we found.

Arabis petræa Lamk. This pretty plant has not, we believe, been recorded as a Perthshire species since Lightfoot reported it from Craig Chailleach, where we have never found it. It is abundant on Ben Laoigh. Here we chiefly found the white-flowered form, though a few plants of the purple-flowered occurred. The latter appears to be commoner in the west than in the east of Scotland.

Sagina nivalis Fr. Ben Lawers, in two places. Altitude, 3100-3350 feet.

Arenaria rubella Hook. Cam Creag and Ben Lawers.

Cerastium triviale Link., var. *alpinum* Koch. If this occurs at all in Breadalbane, it is very rare. It seems to be more a plant of the Eastern Grampians, occurring sparingly in Athole, and more commonly in Aberdeen and Forfar shires. It appears to be the mountain equivalent of the lowland var. *holosteoides* Fr.

Rubus saxatilis L. A curious form of this on Ben Laoigh deserves mention. At first we thought we had found *R. arcticus*, but we fear the plant is only *R. saxatilis*, though it had no prostrate barren stems, and otherwise differed from the usual form of the latter. It was not in flower or fruit.

Carduus arvensis L. A curious form of this grows at the base of Ben Lawers. It may be termed var. or form *elegans*, and differs from the usual form by its very spinous leaves, the segments of which are strongly involute; by the arrangement of the flower stalks, which are less umbellate than usual, and rather assume a spike-like appearance—*i.e.*, instead of the lateral flowering stalks attaining nearly the level of the primary one, they are shortened. The colour is of a paler, more yellow-green than in the common plant. It is difficult, however, to describe the difference, though when growing the plant has a striking appearance.

Pyrola minor L. At an altitude of 2,300 feet, on Ben Lawers.

Gentiana nivalis L. Cam Creag, near Craig Chailleach. We do not know if this locality has been recorded before. It was found on Maol nan Tarmachan by Mr. J. B. Balfour; but this appears to be a different station.

Bartsia alpina L. Abundant on Ben Laoigh.

Taxus baccata L. The "Fortingal Yew," whose age, if we err not, has been computed at something like 2,500 years, is still in vigorous health, though but little of the main stem, which once measured 56 ft. in circumference, now remains.

Juncus castaneus Sm. Ben Laoigh, Cam Creag, and Ben Lawers; as usual, sparingly.

J. biglumis L. Cam Creag and Ben Lawers; very local.

Kobresia caricina Willd. Ben Laoigh and Ben Oss; not uncommon. This plant appears to like the spongy ground on wet hillsides, when it grows with *Carex pulicaris* and other small sedges.

Woodsia hyperborea R. Br. Ben Laoigh, etc.

Cystopteris montana Link. Ben Laoigh; sparingly.

We took the altitudes of a great number of plants, and found them at higher elevations than have been recorded for them in this country. These, however, will be published hereafter.

It may be of some interest to give a list of the flowering plants which grow at the top, or within 10 or 12 feet of the top, of Ben Lawers, the highest mountain in Breadalbane, and which attains 3,984 feet. We found there:—*Thalictrum alpinum*, *Draba rupestris*, *Cerastium alpinum*, *Silene acaulis*, *Sagina procumbens* (?), *Cherleria sedoides*, *Alchemilla vulgaris*, *A. alpina*, *Saxifraga nivalis*, *S. oppositifolia*, *S. stellaris*, *S. hypnoides*, *Gnaphalium supinum*, *Achillea millefolium*, *Euphrasia officinalis*,

Rumex acetosa, Polygonum viviparum, Carex rigida, Festuca ovina. Of course, many other species grow 50 or 100 feet lower.

Perth, Dec., 1874.

New Scottish Plants.—During the excursion in August last of the "Scottish Alpine Club" to Braemar, Mr. John Sadler was fortunate enough to discover two flowering plants not previously found in Britain. One of them is a sallow, which has been described by Dr. Boswell Syme under the name of *Salix Sadleri.* It is probably, we understand, a hybrid between *S. reticulata* and *S. lapponum* or *lanata.* The other plant is *Carex frigida* All. It may be briefly described (after Godron) thus:—Male spikelet solitary, blackish, oblong; female spikelets (about 4) dense, cylindrical, at first erect, then drooping, streaked with brown and green, the upper ones approximate and almost sessile, the lower somewhat remote and long stalked. Bracts herbaceous, long-sheathed, nearly reaching the male spikelet. Fertile glumes shorter than the fruit, linear, acute, mucronate, of a black brown with the keel green or reddish. Stigmas three. Fruit glabrous fusiform-trigonous, brown with a green border, insensibly attenuated into a plano-convex beak, which is bifid and ciliate on the margins. Nut brown, long-stalked, elliptic-trigonous and dotted. Leaves bright green, plane, keeled linear acuminate, the edges rough. Stem erect, triquetrous, for the most part smooth. Root stoloniferous. *C. frigida* is a not uncommon alpine species. The finding of these plants in such a compatively well searched locality as Glen Callater, proves that the list of native plants is not yet exhausted. (We may mention that *Carex ornithopoda* Willd. has been found in Derbyshire. It is common on calcareous soils in many parts of Europe.)

Variety of Melampyrum sylvaticum L.—In Blairathole Woods I found a variety of the local *Melampyrum sylvaticum*, which I do not find mentioned. It may be thus described:—*Melampyrum sylvaticum* L., var. *pallidiflora.* Flowers smaller, corolla-mouth less open; corolla pale yellow or whitish, touched with violet (somewhat resembling in colour the corolla of *M. pratense*); bracts shorter and broader. With the common form but much less common.—F. BUCHANAN WHITE.

Anthriscus abortivus Jord.—I have found in a wood, near Perth, one or two plants of what appears to be *Anthriscus abortivus* Jord. This, I believe, is considered a sub-species by Dr. Boswell Syme, who thinks it likely to occur in upland districts. It differs from *Anthriscus sylvestris* by its less divided and paler leaves, and by the absence of the circlet of minute hairs at the base of the fruit. There seems no reason to suppose that it is an escape in the place I found it, except it be its scarceness there.—F. BUCHANAN WHITE.

New British Fungus.—Specimens of *Exidia truncata* Fr., found on lime, have been sent me from Haddingtonshire by Mr Alexander D. Innes, The Gardens, Yester. I am not aware that this species has been previously observed in Britain.—JAMES KEITH, Forres, 7th December, 1874.

Id.—In September last I found, near Forres, in company with the Rev. Messrs. Keith & Fergusson, *Dothidea angelicæ* Fr. on *Angelica sylvestris.* I do not remember having seen any record of this fungus (for whose name I am indebted to Mr. C. B. Plowright) having been previously found in Britain.—F. BUCHANAN WHITE.

Kobresia caricina Willd., in Argyleshire.—Last summer I found this local sedge on a hill in this county, for which I think it has not been previously recorded.—F. BUCHANAN WHITE.

The Botanical Locality Record Club—Report of the Recorder for 1873.—This Club—of which the first report is now before us—was formed "to collect, record, and publish the localities of rare local and other British plants, with the view of ascertaining more correctly the special circumstances as to soil, altitudinal range, &c., attending their geographical distribution, and limiting or favouring their existence." "Moreover, one of the main purposes of the Record Club is to assist in helping on to symmetry and completion that edifice of Topographical Botany, towards which far more than the foundation and the scaffolding has been contributed by one hand alone."

At the formation of the Club we were not quite satisfied as to either its probable utility or indeed of the expediency of publishing the localities of rare and local plants. Now, however, we begin to think that a certain amount (and we hope a good deal) of good work will be done by the Club, and our fears regarding the possible extinction of local species are to a great extent allayed by the regulations as to publication adopted by the Club. "At the end of every year the locality-list shall be arranged and printed, together with notes upon them, and a summary of the season's work. A copy of this Report shall be the right of every member, and some few others, who are eminent botanists, who would not be likely to abuse knowledge of locality; and the chief Botanical Societies and Journals shall have a copy sent them; but none shall be offered for sale to the public, and no member shall be allowed to subscribe for more than one copy."

Further, it appears that in the case of very rare species the locality is only given in general terms, though (we suppose) *any member* who is desirous may get a more definite indication. Another great object of the Club is to form a general herbarium of British plants (of the species recorded—each member recording being bound to verify his record by a specimen of the plant), which, when "worthy of acceptance," shall be presented to the nation. In the meantime the herbarium belongs to the members, and can be inspected by them at any time.

Space will not permit us to enter at greater length into the objects of the Club since we must devote a few words to the Report.

In the summary, the Recorder after alluding to the objects of the Club, points out that lists of the common plants of nine counties (as mentioned in Mr. H. C. Watson's Topographical Botany) are still wanting, while the plants of four others are but very imperfectly recorded. Amongst these we notice Wigtown, Peebles, Selkirk, Stirling, Mull, and Western Ross. He suggests to members who may visit any of these counties the propriety of preparing a list by ticking off on a "London Catalogue" all the species observed—the commonest as well as the rarest—and promises to such lists

a prominent place in future Reports. We have much pleasure in making this request known in hope that it may come under the notice of botanists not yet members of the Club.

The Recorder then alludes to various additions to the County Records, to the General Locality-list, to the list of Re-appearances and Extinctions, and to the list of Aliens, Casuals, and Escapes—all these lists being given in the remaining 22 pages of the Report. We are glad to observe the record of the re-appearance of that very rare British orchid *Cypripedium Calceolus*, which was found in plenty in 1873-74 in two denes in Durham (the names of which "though not withheld are for obvious reasons suppressed") neither of which is the old recorded station for this plant—Castle Eden Dene. "Like *Epipactis*," says one of the discoverers, "the *Cypripedium* seems to lie dormant in shade, and only springs up when the sun gets to the ground" by the cutting down of trees and underwood.

THE EDIBLE WILD FRUITS OF SCOTLAND.

By F. BUCHANAN WHITE, M.D., F.L.S.

DEEP in the hearts of all men, however high may be the culture to which they have attained, or however wrapt they may be in those pursuits—be they politics, or commerce, or literature—which seem farthest removed from all communion with nature—deep in all hearts (often indeed so deep, that seldom or never does it consciously reveal itself) there lurks, I believe, a love of the beauty of things in a wild and free state, unaffected by any human influence. Thus it is that the wild grandeur of the mountains, and the almost monotonous immensity of the sea, are so attractive; and it is doubtless this same feeling which makes it so difficult to effect the civilization—within a few generations at least—of savage tribes.

But, in civilized nations, it is the naturalist—not the mere classifier of species, nor he who gathers together a collection of objects of natural history as he would a collection of postage stamps, coins, or old china, but the true lover of nature—who is the chief inheritor of this love of the wild freshness of the earth's morning, still lingering on the mountain's side, in the depths of the primeval forest, or amidst the waves of ocean. And thus it seems to me that to the naturalist, wild flowers and fruits will always be more beautiful and attractive than all the richest treasures of the garden.

But a comparison should scarcely be made, perhaps, between wild fruits and those which have become subject to man. The whole character of the latter has become changed; the bitter

has been made sweet, and the small large—all freedom has been lost. To a certain extent they are produced in the form and at the time that man decrees; and thus, however much their utility may have been increased, the natural has, to a greater or less extent, been lost. That this is not so to many eyes I am aware, but to the eye of the naturalist and of the artist (and are not these in many respects convertible terms?) it has gone for ever.

The Sloe (*Prunus spinosa* L.) would scarcely (save, perhaps, "to boyish appetites") be considered to merit a place among *edible* wild fruits, and yet, when gathered at the proper time—after the frosts of autumn have lit up the woods—a by no means despicable jelly may be made from the fruit. The blossoms, covering with "radiant sheen" the rough bank or rocky brow where this plant delights to grow, well merit the name of "spring's banner," which has been applied to them. The juice of the fruit is said to make a good marking ink for linen or woollen cloths, the part to be marked being placed on the fruit, and the letters pricked out with a pin. The young leaves dried are a substitute for tea, oftener perhaps used than is generally suspected! In Gaelic the Sloe is called *an-droighionn* and *preas-nan-airneag*.

The Bullace (*P. insititia* L.) This, with its larger, less austere berry, is a rarer plant than the Sloe, to which, in many respects, it is similar. In Scotland, it is said not to extend north of Dumfries. It is, however, apparently wild in Perthshire.

The Gean (*P. avium* L.) is the origin of the garden cherry, and its fruit is too well known to need description. Though Gean (evidently, I think, derived from the French) is given in the manuals as the name of this, it is more especially a Scottish name, and applied to the black-fruited variety. Withering says, "Green Tree in Scotland," apparently having taken up the name wrongly.

The Bird-cherry, or Hag-berry (*P. padus* L.), can scarcely be considered to produce an edible fruit, though, according to Lightfoot, it was used in Scotland for flavouring wine or brandy. The Swedes are said to use the blossoms for a similar purpose. Of all our wild trees, none is more worthy of admiration than this when in full flower, and its long snowy racemes, melodious with the hum of the wild bees, hanging over some murmuring

brook, while under its slender branches the wild hyacinth and pale primrose grow side by side.

The CLOUD-BERRY, or Averon (*Rubus chamæmorus* L.) High up on the mountain side, where the bog-mosses grow in cushions of green, red, and yellow, flourishes the little mountain bramble. The flowers are large and white, and are followed in about six weeks by the large berries, at first red and opaque, then yellow and semi-transparent. The taste of the fruit is very peculiar, and (to my idea, at least) not very pleasant when uncooked; but when preserved, either as jam or jelly, it is very agreeable and much sought after. Should a frost come at the time of flowering—end of May and June—(not unfrequent at the high altitudes which this plant affects), the blossoms are unproductive: this is doubtless the reason why one often sees acres of the plant without a single berry. In the north of Europe also, the fruit is much used, and so is the Arctic Bramble *(Rubus arcticus)*, which is, however, more nearly related to the following species. The Arctic Bramble, which has pink blossoms, has been reported as growing on Ben-y-Ghloe, but has not been recently, if ever, found there.

The STONE BRAMBLE (*R. saxatilis*), or Roebuck Berry. This is another plant of the same genus, descending, however, to a lower elevation, and preferring the banks of subalpine streams and subalpine woods. The barren branches are long and trailing, but the fertile ones are shorter, and bear a few whitish blossoms, followed in due time by the berries, consisting of two or three scarlet drupes. In no place does the Stone Bramble show to greater advantage than when growing among the rounded pebbles on the banks of a Highland stream, the leafy shoots trailing among the stones, and the bright scarlet clusters of berries shining forth against the green and grey background. The fruit is of a peculiar acid flavour, and has been made into a by no means despicable jam—so my friend, Mr. J. M'Farlane, reports from experience. In Russia it is fermented with honey.

The RASPBERRY *(R. Idæus)*, another plant of the same family, needs no description, and appears to be truly wild in many woods and on some mountain sides.

The BRAMBLE *(R. fruticosus)* is equally well known, but its fruit is not nearly so appreciated. It is a much more handsome plant than the last-mentioned, and when trailing over some rock or rugged bank, its tinted leaves and snowy blossoms—sometimes rose-tinted—and green, red, and purple-black berries,

make a picture that has often tempted the artist to linger awhile. The berries are often eaten, and afford a good jelly. Withering says that "they do not eat amiss with wine, and are rendered more palatable by being mixed with the juice of sloes." In many parts, the country people say that after the end of September Brambles are not eatable, as they then become the property of the devil—probably, I suppose, for the reason that they are often touched by the frost in October.

The Dew-berry *(R. cæsius)* is somewhat similar to the Bramble, but is a rarer plant in Scotland.

The Wild Strawberry (*Fragaria vesca* L.). This is another of the wild fruits which requires no further mention than the name. The berries are sometimes white, and have then a (perhaps imaginary) finer flavour.

The Scotch Rose (*Rosa spinosissima* L.), the Downy-leaved Rose *(R. villosa)*, the Sweet Briar or Eglantine *(R. rubiginosa)*, and the Dog-rose *(R. canina)*, have all a more or less edible fruit. The hip or fruit has a different flavour in each species, and in preparing them for use the rough prickly inside must of course be removed. In the north of Europe they are mixed with wine, but may also be made into a jelly with sugar. In some parts of Russia a spirit is extracted from the flowers, and they are also preserved with honey and sugar. The hips of the Scotch Rose are purple-black, and have a pleasant sub-acid flavour. With their juice silk and muslin may be dyed of a peach colour, and with the addition of alum, a deep violet. Of the other species, the fruit of *R. villosa* is the most palatable, and that of the Sweet Briar the least so. The latter plant is said to be a doubtful native of Scotland; but, in Perthshire at least, it seems to have some claim to be considered indigenous. Thus speaks old Gerarde of the Dog-rose:—"It were to small purpose to use many words in the description thereof; for even children with great delight eat the berries thereof when they be ripe, make chains and other pretty gewgawes of the fruit; cookes and gentlewomen make tarts and such like dishes, for pleasure thereof; and therefore this shall suffice for the description."

The Crab-apple *(Pyrus malus L.)* has scarcely an edible fruit in a wild condition, the juice being so very acid. It is the origin of the cultivated apple.

The Rowan, or Mountain Ash (*P. aucuparia* L.). There is perhaps no indigenous tree that adds greater beauty to a moun-

tain wood in September or October than the Rowan, with its glowing vermillion berries, seen against a bright blue sky. In former times, and even not so very long ago, the tree was reputed sacred, and a sovereign charm against witchcraft. The berries may be used in various ways, but chiefly for making a jelly which is eaten with venison or mutton ; the flavour of this jelly is very peculiar. Lightfoot says that in Jura the juice is used as an acid for punch, and that in some places the highlanders distil a very good spirit from the berries. According to Evelyn, ale and beer used to be brewed from them, and was a common and "incomparable drink" in Wales ; while Withering reports that the berries, dried and ground, make wholesome bread. In Strathspey, on May Day (the ancient Beltane), the sheep used to, and perhaps may yet, be made to pass through a hoop of Rowan wood.

The White Beam (*Pyrus aria* L.) is rather rare in a wild state, and scarcely merits notice as an edible fruit-bearer save that the berries have, in the neighbourhood of Perth and elsewhere, unaccountably acquired the name of mulberries (a fruit entirely unlike the pomes of the White Beam), and are so called by persons who should know better.

All the above-named plants belong to the *Rosaceæ;* the next order producing esculent wild fruits is the *Grossulariaceæ*, but few of them have more than a doubtful claim to be considered indigenous in Scotland.

The Red Currant (*Ribes rubrum* L.), Mountain Currant (*R. alpinum* L.), Black Currant (*R. nigrum* L.), and the Gooseberry (*R. grossularia* L.), are the plants belonging to this order that are included in the British list, but they are more often found in a naturalized than in a really wild condition. Whatever may be said for the others, *R. alpinum* is not usually considered wild in Scotland ; and as the fruit is scarcely, from its insipidity, worth eating, we need not consider it further at present. The other species are too well known to need description. We may, however, note that the young leaves of the Black Currant "tinge spirits so as to resemble brandy," and that the "seeds of Gooseberries—washed, dried, roasted, and ground—are a good substitute for coffee."

The Elder, or Bour-tree (*Sambucus nigra* L.), is a well-known plant, but so far north as this it appears to be doubtfully indigenous, though common enough in many woods and hedges. Several parts of the plant have been, and one of them still is,

used. From the purplish-black berries a wine is made, by no means despicable when mulled; and from the same part a preparation for colds, etc., is also prepared. The flowers are made into wine also, and the cluster of flower buds is said to make a delicious pickle to eat with mutton. Tea, even (which cannot, however, be recommended), has been made from the dried flowers. It is said not to be prudent to sleep under the shade of the tree, from its narcotic properties.

The Crow-berry (*Empetrum nigrum* L.) is one of those plants which clothe our mountain sides in great abundance, and whose very name brings to the memory of the naturalist many pleasant days on the hills, when the watery berries have been eagerly sought for, to allay the thirst that a too eager pursuit of his treasures—be they animal or vegetable—under the broiling sun, has induced. In this country the berries are always purple-black, but in North America they are often purple, and in South America red. I was at one time rather puzzled to account for the name of the Crow-berry, for, though both the berry and the crow are of the same colour, yet that did not seem a sufficient reason why the *Empetrum* should be called Crow-berry. My friend, Mr. J. W. H. Traill, however, told me that he once saw a lot of hoodie-crows feeding on the berries, and that fact, I think, explains the name. I was not aware till recently that a jam could be made from Crow-berries, but it seems that they are not very unfrequently so used. To my idea, the taste of this jam is not agreeable. In large quantities the berries are said to occasion headache. In Iceland and Norway, a kind of wine is made from them. With alum, the berries dye a dark purple.

We now come to the genus *Vaccinium*, of which all the British species produce an edible fruit. As the fruit in each species has different qualities, it will be well to consider them in detail.

The Blaeberry (*Vaccinium myrtillus* L.). I imagine that few people would declare the fruit of this plant to be neither agreeable nor wholesome, and yet that is the judgment that the great botanist, Sir J. E. Smith, "*dignissimus Linnæi hæres*," pronounced upon them. Dr. Johnston delivers a different opinion—"good plucked from the bush, better when eaten with cream in the manner of strawberries." They also make good jam or jelly, which last the highlanders are said to flavour with whisky. The Blaeberry is one of the few wild fruits that are

brought into the market, and in some places a considerable amount of money is made by those who gather them for sale. A variety with white berries is sometimes found, and has been observed in woods between Dunkeld and Blair-Athol by one of the Dukes of Athol.

The Great Bilberry (*V. uliginosum* L.). This is a much rarer plant than the last, and is almost confined to the higher mountains. The black berries have not much flavour, and in large quantities are said to cause giddiness.

The Red Whortle-berry, or Idæan Vine (*V. vitis-idæa* L.). Of late years especially, these berries, which in North Scotland are called Cran-berries (the true Cran-berry, *V. oxycoccos*, being scarcely known), have come into such extensive use for making a capital jelly or jam, that large quantities have been imported from Norway, and meet with a ready sale. The chief supply of Scotch-grown berries comes from the woods north of the Grampians, where the dark shining evergreen leaves and clusters of bright red berries make a beautiful carpet to the birch and pine woods in autumn, as do the white rose-tinted flowers in early summer.

The Cran-berry (*V. oxycoccos* L.), with its delicate wiry stems creeping over the many coloured bog-mosses, its bright rose-coloured petals so curiously rolled back, and the purplish-red and spotted berries, can scarcely be esteemed a common plant in Scotland, though in a few favoured spots it grows in great abundance. Yet there is scarcely a mountain side, I believe, where it does not grow, and where a close search will not be rewarded. The berries have a peculiar flavour, much esteemed by many people, and disliked by others. They are especially used for making tarts, but it is chiefly with American Cran-berries—which, though larger and finer looking fruit, are yet inferior in flavour—that these are made. In some parts of the south of Scotland and north of England, Cran-berries grow in sufficient abundance as to allow of their being brought to market. The cultivation of this plant has been recommended, and it is said that a bed five feet square ought to yield one quart of fruit—a profitable and easy method of cultivating land otherwise of little use.

(To be continued.)

INSECTA SCOTICA.

THE LEPIDOPTERA OF SCOTLAND.

(Continued from Vol. II., p. 376.)

EDITED BY F. BUCHANAN WHITE, M.D., F.L.S.

PISI L. Common. Pascual, ericetal, nemoral. Ascends to 1400 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray Sutherland Orkney ♂
WEST. Solway Clyde Argyle West-Ross ♂

LAT. 54°40″-59°10″. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June. LARVA. August-October. FOOD-PLANT. Broom and low plants.

OLERACEA L. Abundant. Agrestal, nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♂ o o
WEST. Solway Clyde Argyle West-Ross o

LAT. 54°40″-57°50″. RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June. LARVA. August, September. FOOD PLANT. Low plants.

DISSIMILIS Knoch. (1781); *suasa* Bkh. (1792). Not common. Pascual.

DISTRIBUTION—EAST. ♂ o o o o o o o
WEST. Solway [Clyde] o o o

LAT. 54°40″-[56°]. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. June. LARVA. August, September. FOOD-PLANT. Low plants.

H. trifolii Rott. (1776) = *chenopodii* F. (1787) has been reported from Forth, Dee, and Clyde, but is a very doubtful Scottish species.

DENTINA Esp. Common. Nemoral. Ascends to 1300 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀♀
Orkney o
WEST. Solway Clyde Argyle ♀ ♀

LAT. 54°40″-59°10″. RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. September-May. FOOD-PLANT. Low plants (roots).

GLAUCA Hb. Not common. Nemoral, ericetal. Ascends to 1200 (?2000) feet.

DISTRIBUTION—EAST. ♀♀ Forth Tay Dee Moray [Sutherland] o o
WEST. ♀♀ Clyde Argyle ♀ o

LAT. 55°-50°58″. RANGE IN EUROPE. Northern and central. TYPE. Septentriono-central. TYPE IN BRITAIN. Scottish.

TIME OF APPEARANCE—IMAGO. June. LARVA. July, August. FOOD-PLANT. Sallow, etc.

PROTEA Bkh. Common. Nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay Moray ♀ o o
WEST. Solway Clyde ♀ ♀ o

LAT. 54°40″-57°40″. RANGE IN EUROPE. Central and South-western; S. Sweden, &c. TYPE. Central. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. September. LARVA. June. FOOD-PLANT. Oak.

ADUSTA Esp. Abundant in highlands; not uncommon in lowlands. Nemoral. Ascends to 1300 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray Sutherland Orkney ♂♂
WEST. Solway Clyde Argyle ♂♂ o

LAT. 54°40″-59°10″. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. August-April. FOOD-PLANT. Low plants.

APLECTA Gn.

ADVENA F. Not common. Pascual.

DISTRIBUTION—EAST. ♂ Forth Tay o o o o o
WEST. Solway Clyde o o o

LAT. 54°40″-56°30″. RANGE IN EUROPE. Northern and central. TYPE. Centro-septentrional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. August-September (?May). FOOD-PLANT. Low plants.

TINCTA Brahm. Common in highlands; rarer in lowlands. Nemoral. Ascends to 1200 feet.

DISTRIBUTION—EAST. ♂ ♂ Tay Dee Moray [Sutherland] o o
WEST. ♂ Clyde Argyle ♂ ♂

LAT. 55°40″-57°50″. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. September-May. FOOD-PLANT. Birch and low plants.

NEBULOSA Hufn. Not very common. Nemoral.

DISTRIBUTION—EAST. Tweed ♂ Tay ♂ Moray o o o
WEST. Solway Clyde Argyle o o

LAT. 54°40″-57°40″. RANGE IN EUROPE. Central. TYPE. Central. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. September-May. FOOD-PLANT. Low plants.

OCCULTA L. Not common. Nemoral.

DISTRIBUTION—EAST. ♀ Tweed Forth Tay Dee Moray [Sutherland] o o
WEST. ♀ Clyde Argyle ♀ ♀

LAT. 55°50″-59°. RANGE IN EUROPE. East-central; S. Sweden, &c. TYPE. Centro-oriental. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. July, August. LARVA. September-May. FOOD-PLANT. Low plants.

Highland specimens are usually much blacker than lowland ones.

PRASINA F. (1787); *herbida* Hb. (1798). Not common. Nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay Dee ♀ o o o
WEST. Solway Clyde ♀ o o

LAT. 54°40″-57°10″. RANGE IN EUROPE. Central; South Scandinavia, &c. TYPE. Central. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. August-May. FOOD-PLANT. Low plants.

POLIA Tr.

[FLAVICINCTA F. Rare.

DISTRIBUTION—EAST. o o Tay o Moray o o o
WEST. o o o o o

LAT. 56°30″-57°30″. RANGE IN EUROPE. Central (Sweden?). TYPE. Central. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. August, September. LARVA. May-July. FOOD-PLANT. Low plants.

A doubtful Scottish species.

(To be continued.)

THE COLEOPTERA OF SCOTLAND.

(Continued from Vol. II., p. 384.)

EDITED BY D. SHARP, M.B.

LATHROBIUM Kr.

BRUNNIPES Fab. Lowland. In marshes. Common.
DISTRIBUTION—EAST. ♀♀ Forth ♀♀ ♀♀ Moray o o o
WEST. Solway ♀♀ o o o

BOREALE Hoch. Lowland.
DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

ELONGATUM Lin. Lowland. In marshes. Common.
DISTRIBUTION—EAST. ♀♀ Forth Tay ♀♀ Moray o o o
WEST. Solway o o o

FULVIPENNE Grav. Lowland, highland. Common.
DISTRIBUTION—EAST. ♀♀ Forth ♀♀ ♀♀ Moray o o Shetland
WEST. Solway ♀♀ o o o

MULTIPUNCTUM Grav. Lowland. Rare.
DISTRIBUTION—EAST. Tweed o o o o o o o
WEST. Solway ♀♀ Argyle o o

QUADRATUM Payk. Lowland. Rare.
DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

TERMINATUM Grav. Amongst sphagnum. Common.
DISTRIBUTION—EAST. ♀♀ Forth Tay ♀♀ ♀♀ o o o
WEST. Solway ♀♀ o o o

ATRIPALPE Scriba. Lowland. Very rare.
DISTRIBUTION—East. o Forth o o o o o o
WEST. Solway o o o o

PUNCTATUM Zett. Very rare.
DISTRIBUTION—EAST. Tweed o o o o o o o
WEST. o o o o o
"Shingle near Preston bridge." R. Hislop.

FILIFORME Grav. Rare.
DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o
"Dalkeith, Duddingstone, Cramond." Murray. I do not feel quite sure that Murray's reference would be correct.—D. S.

LONGULUM Grav. Lowland. Scarce.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway ♀ Argyle o o

ANGUSTICOLLE Lac. Riparial. Rare.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway ♀ o o o

CRYPTOBIUM Kr.

FRACTICORNE Payk. Amongst sphagnum. Common.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway ♀ o o o

STILICUS Kr.

RUFIPES Germ. Lowland. Rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

AFFINIS Er. Lowland. Not common.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway o o o o

ORBICULATUS Payk. Lowland. Local.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway o o o o

SCOPÆUS Kr.

ERICHSONI Kol. Riparial. Rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

LITHOCHARIS Kr.

DILUTA Er. Very rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

The only specimen of this insect that has, as yet, been recorded as found in Britain, was taken by me on the banks of the Cairn.—D. S.

OCHRACEA Grav. Lowland. In vegetable refuse. Not common.

DISTRIBUTION—EAST. Tweed Forth ○ Dee Moray o o o
WEST. ○ ○ o o o

OBSOLETA Nord. Lowland. Very rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

MELANOCEPHALA Fab. Lowland. Rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

SUNIUS Kr.

ANGUSTATUS Payk. Lowland. Not common.

DISTRIBUTION—EAST. Tweed Forth Tay o o o o o
WEST. Solway ○ o o o

Obs.—The *Sunius brunneus*, recorded by Murray as occurring in Kinross-shire, would probably be a pale variety of this species.—D. S.

PÆDERUS Kr.

FUSCIPES Curt. Very local.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

Taken in abundance by W. Lennox at Caerlaverock. *Pæderus littoralis* has been stated to occur near Edinburgh, but probably this is a mistake.

EVÆSTHETUS Kr.

SCABER Grav. Lowland. Rare.

DISTRIBUTION—EAST. ○ Forth o o o o o o
WEST. Solway o o o o

LÆVIUSCULUS Man. Lowland. Local.

DISTRIBUTION—EAST. Tweed Tay o o o o o o
WEST. Solway o o o o

RUFICAPILLUS Lac. Lowland. Very local.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

DIANOUS Kr.

CÆRULESCENS Gyll. In moss by streams and waterfalls.

DISTRIBUTION—EAST. Tweed Forth Tay Dee o o o o
WEST. Solway Clyde o o o

STENUS Kr.

BIGUTTATUS L.

"South of Scotland." Murray.

GUTTULA Müll. Riparial. Common.

DISTRIBUTION—EAST. Tweed Forth Tay Dee ♀ o o o
WEST. Solway ♀ o o o

BIMACULATUS Lowland. Rare.

DISTRIBUTION—EAST. Tweed o o [Dee] o o o o
WEST. Solway o o o o

JUNO Fab. Lowland. Abundant.

DISTRIBUTION—EAST. Tweed Forth ♀ ♀ Moray o o o
WEST. Solway ♀ o o o

FOVEIVENTRIS Fair. Lowland. Abundant.

DISTRIBUTION—EAST. Tweed Forth Tay ♀ ♀ o o o
WEST. Solway ♀ o o o

CINERASCENS Er. Lowland. Rare.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. Solway o o o o

INCANUS Er. Riparial. Rare.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. Solway o o o o

MELANOPUS Marsh. Lowland. Rare.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

CANALICULATUS Gyll. Lowland. Scarce.

DISTRIBUTION—EAST. ♀ Forth o o o o o o
WEST. Solway Clyde o o o

PUSILLUS Steph. Not common.

DISTRIBUTION—EAST. Tweed Forth Tay Dee o o o o
WEST. Solway o o o o

EXIGUUS Er. Rare.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. Solway o o o o

SPECULATOR Lac. Lowland. Common.

DISTRIBUTION—EAST. Tweed Forth Tay ♀ ♀ o o o
WEST. Solway Clyde o o o o

ROGERI Kr. Lowland, highland.

DISTRIBUTION—EAST. ♀ Forth Tay ♀ Moray o o o
WEST. ♀ ♀ o o o

GUYNEMERI Duval. In moss by streams and waterfalls. Local.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway Clyde o o o

LUSTRATOR Er. Very rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o o

CARBONARIUS Gyll. In marshes. Very rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

FUSCIPES Grav. Lowland. Rare.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. Solway o o o o

DECLARATUS Er. Lowland. Common.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway ♀ o o o

CRASSIVENTRIS Th. Lowland. Local.

DISTRIBUTION—EAST. ♀ Forth Tay o o o o o
WEST. Solway ♀ o o o

UNICOLOR Er. Lowland. Common.

DISTRIBUTION—EAST. ♀ Forth Tay Dee ♀ o o Shetland
WEST. Solway ♀ o o o

[NIGRITULUS Gyll. Doubtful as Scottish.

"South of Scotland. Rev. W. Little."—Murray Cat.

BINOTATUS Ljun. Scarce.

DISTRIBUTION—EAST. Tweed forth o o o o o o
WEST. ♀ o o o o

PUBESCENS Steph. Not common.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway o o o o

PALLITARSIS Steph. Local.

DISTRIBUTION—EAST. ♀ Forth Tay Dee o o o o
WEST. Solway o o o o

A variety *S. niveus*, Fauv., much smaller than the usual form, is not uncommon in the Solway district.—D. S.

BIFOVEOLATUS Gyll. Common.

DISTRIBUTION—EAST. Tweed Forth ♀ ♀ ♀ o o o
WEST. Solway Clyde o o o

BREVICORNIS Th. Lowland, highland.

DISTRIBUTION—EAST. o o o Dee Moray o o Shetland
WEST. Solway Clyde o o o

PICIPENNIS Er. Lowland. Very rare.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

RUSTICUS Er. Lowland. Common.

DISTRIBUTION—EAST. Tweed Forth Tay Dee o o o o
WEST. Solway ♀ o o o

TEMPESTIVUS Er. Lowland. Common.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o Shetland
WEST. Solway ♀ ♀ o o

IMPRESSIPENNIS Duv. Common.

DISTRIBUTION—EAST. ♀ Forth Tay ♀ Moray o o Shetland
WEST. Solway ♀ o o o

GENICULATUS Grav. Lowland, highland. Scarce.

DISTRIBUTION—EAST. o o o Dee Moray o o o
WEST. Solway Clyde. o o o

FLAVIPES Steph. Local.

DISTRIBUTION—East. o o Tay o o o o o
West. ♀ o o o o

CICINDELOIDES Grav. Lowland. Rare.

DISTRIBUTION—East. o o o o o o o o
WEST. Solway o o o o

SIMILIS Herbst. Lowland. Common.

DISTRIBUTION—East. ♀ Forth Tay ♀ Moray o o o
West. ♀ Clyde o o o

TARSALIS Ljun. Lowland. Abundant.

DISTRIBUTION—East. Tweed Forth Tay ♀ Moray o o o
West. Solway o o o o

PAGANUS Er. Lowland. Local.

DISTRIBUTION—East. Tweed Forth Tay o o o o o
West. Solway Clyde o o o

LATIFRONS Er. Lowland. Local.

DISTRIBUTION—East. ♀ Forth Tay o o o o o
West. Solway ♀ o o o

GLACIALIS Heer. Alpine. Very rare.

DISTRIBUTION—East. o o o Dee o o o o
West. o o o o o

BLEDIUS Kr.

SPECTABILIS Kr. Maritime. Very local.

DISTRIBUTION—East. o Forth o o o o o o
West. Solway o o o o

SUBTERRANEUS Er. Riparial. Common.

DISTRIBUTION—East. Tweed Forth ♀ ♀ Moray o o Shetland
West. Solway Clyde o o o

PALLIPES Grav. Riparial. Local.

DISTRIBUTION—East. o o o o o o o o
West. Solway o o o o

FUSCIPES Rye. Maritime. Very local.

DISTRIBUTION—East. o Forth o o o o o o
West. o o o o o

ARENARIUS Payk. Maritime. Very local.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

FRACTICORNIS Payk. Very rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

Found by Mr. W. Lennon, near Dumfries.—D. S.

OPACUS Block. Lowland. Rare.

DISTRIBUTION—EAST. Tweed o o o o o o o
WEST. Solway o o o o

ATRICAPILLUS Germ. Rare. (? Maritime.)

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

Found near Dumfries by Mr. W. Lennon.—D. S.

PLATYSTETHUS Kr.

ARENARIUS Fourc. In dung. Abundant.

DISTRIBUTION—EAST. ♀ Forth Tay Dee Moray ♀ ♀ Shetland
WEST. Solway ♀ ♀ ♀ ♀

OXYTELUS Kr.

RUGOSUS Fab. Abundant.

DISTRIBUTION—EAST. Forth Tay ♀ Moray ♀ ♀ Shetland
WEST. Solway ♀ ♀ ♀ ♀

LAQUEATUS Marsh. Common.

DISTRIBUTION—EAST. ♀ Forth Tay ♀ Moray o o o
WEST. Solway ♀ o o o

SCULPTUS Grav. In dung. Common.

DISTRIBUTION—EAST. Tweed Forth Tay Dee ♀ o o o
WEST. Solway ♀ o o o

SCULPTURATUS Grav. Abundant.

DISTRIBUTION—EAST. ♀ Forth Tay ♀ Moray o o Shetland
WEST. Solway Clyde o o o

MARITIMUS Th. Maritime. Local.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. o o o o o

(To be continued.)

GEOLOGY.

ON CLAYS CONTAINING OPHIOLEPIS GRACILIS AND OTHER ORGANIC REMAINS, WITH NOTES ON RECENT GEOLOGICAL FORMATIONS NEAR ST. ANDREWS.

BY ROBERT WALKER, F.G.S.E.

ON the East Coast of Scotland the Glacial deposits are fairly represented in the Boulder and Brick Clay series. The latter is distributed here and there along the lowlands, in the main at no great distance from the sea, but it is sometimes met with at a considerable height above it.

Although these clay beds have been worked for years at several places, as yet comparatively few organic remains appear to have been found in them. Taken in all, the record they have furnished of the animal and plant life of the land and sea at the period of their deposition, is on the whole a rather meagre one; as far as it goes, however, it is of considerable scientific importance. No doubt this is made more prominent than it would otherwise be from the comparison we are apt to institute between the scant remains yielded by these deposits, and the rich fossiliferous contents of the clays on the west coast of Scotland. Thus, if we take the shells as one of the leading features of these formations, we find that the west coast beds have afforded about 234 species, while those on the east coast have produced about sixty species. This is exclusive of the Caithness shells, which are stated to be from boulder clay. The same thing is observable in the case of the other invertebrate animals: they are all more numerous in the west coast deposits, than in those of the east.

There may be various reasons brought forward to account for this discrepancy. The main cause appears to me to be that the brick clay, of the east of Fife at any rate, is an older member of the Glacial series, than the shell-bearing clay of the west coast, and I consider that it occupies the same

position in that series as the brick clay at Kilchattan, in the Clyde basin, described by Professor Geikie,* who says that this red brick clay sometimes dwindles down to only a few inches in thickness, but is almost always found between the shell-clay and the hard-till. Round the whole of the coast of Bute and on the Cowal shores, the invariable layer of fine, stoneless, and unfossiliferous clay is intercalated between the shell-bearing bed and the coarse, stiff boulder clay. The absence of shells is not less singular: after not a little inquiry, I have been unable to ascertain the discovery in it of a single organism.

Of the shells found in those clays on both sides of Scotland, a number are boreal or arctic species, but some of them are also southern forms. The former have now either moved out to the deeper water of the ocean, or migrated further north, according as each finds an environment most suited to its nature. All the other species are still living in the surrounding seas: a few of these may have altered somewhat in size, or in the thickness or thinness of shell; otherwise they are unchanged since the close of the Glacial period.

On the east coast, shells have been met with, although rarely, in brick clay at Tyrie, near Kinghorn; with this exception, shells may be said to be unknown in any of the brick clays along the coast, from the Tay to the Tweed—the Elie clay containing shells is a different formation. Beyond the Tay they have been found in clay at Errol, at Montrose sparingly, in Aberdeenshire, and in several places farther north.

In 1863 Professor Allman† obtained a star-fish from a brick clay near Dunbar; he named this new species *Ophiolepis gracilis*, and described it at a meeting of the Royal Society of Edinburgh. Shortly after this, specimens of the same species were found in brick clay at Seafield, near St. Andrews. I directed attention to these in the "Annals and Magazine of Natural History," January 1864. Dr. Howden has also procured this star-fish from clay near Montrose. Since 1864 although star-fish have turned up now and again in the Seafield clay, it was not until recently that they could be said to be at all numerous. Last autumn the workmen in digging the clay at a depth of about eleven feet from the surface and some thirty feet above the sea, struck upon a part of it where there was a thin parting of sand that contained these star-fishes in consider-

* Glacial Drift of Scotland. † Proceedings Royal Society, Edin., Vol. 5.

able abundance. They were not generally distributed over the exposed surface of the clay, but lay in shallow depressions in it, very closely huddled together, in most cases the one overlying the other. Although plentiful enough, yet, from the crowding and the facility with which they split and broke in pieces when the clay was lifted, one part adhering to the upper layer and another to the lower, it was impossible, except in rare instances, to get anything but a confused heap of fragments. Through the attention of Mr. G. Blair, the intelligent foreman of the work, a few of the specimens were secured in a better condition than they would otherwise have been.

The examples procured differed somewhat in size: in the largest the disk is about three-eighths of an inch in diameter, each ray is about two inches in length, and when they could be traced, it was found that they were perfect to the minute points. From this it may be inferred that the animals were hurriedly killed; whether this was caused by a sudden irruption of fresh water, as has been suggested, or by some physical change of the sea itself, is not easy to determine; at any rate they had evidently been quickly covered up by the clay after death, without being long exposed or tossed about in the water.

Through the kindness of Mr. Wilson, I have received specimens of this star-fish, that were found in the brick clay at Brighton, near Cupar Fife. The clay at this place is from one hundred and thirty to one hundred and thirty-five feet above the sea. The Seafield clay, as well as all the other brick clays in the neighbourhood, appears to be lying immediately above the boulder clay. They all trend down the low ground toward the estuary of the Eden. Before reaching this the Seafield clay runs under another clay of a bluish colour, containing a considerable number of littoral and other shells, which, as far as I have seen, are all living on the coast at the present time. The bivalves have both shells adherent, and in exactly the same position they had in the mud, when the animals were alive. At the beach the top of this clay is about eighteen inches above high water mark; it is overlaid by a deposit of loamy-looking material about thirty inches in thickness; on the top of this is a stratified layer of sand and gravel about fifteen inches thick, above which is a deposit of fine sand about three feet in thickness. From the blue clay have also been obtained bones of a large ox, horns

and bones of a large deer, and from the lower part of it trunks of oak trees have been dug. The contents of the deposit, as well as its position, indicate pretty clearly that it is of a similar age to the lower Carse clays, that have numerous long-buried peat beds and trunks of prostrate trees—the remains of the ancient forests that flourished in the Carses, when the land stood many feet above its present level. The blue or shell clay extends away seaward, as far at least as low water mark. At this point it is in near contact with a bed of peat that some years ago was occasionally exposed to view at extreme low water, and also during storms, when pretty large pieces of it were thrown ashore on the sands. These I used to examine closely for remains of insects. From the action of the sea, combined with a change of the current of the Eden, all the peat within reach of the water is now either washed away or covered up with sand and mud.

This is not a solitary instance of peat being found within tide mark. It is well known that beds of peat, containing trunks and branches of large trees, occur at numerous places along the coasts of Scotland, England and other countries, not only between tide mark, but often stretching away, far out under the sea. From the frequency with which submerged peat and forest beds have been discovered by the dredge, soundings, and otherwise, along the bottom of the German Ocean and English Channel, and the number of bones of land animals that are now and again brought up from these areas, many eminent geologists are of opinion that almost the whole bed of the North Sea and English Channel, was slowly upraised into dry land after the deposition of the Glacial clays, and that about this period the connection between the British island and the continent was once more completed. A continental condition of Britain in recent times, geologically speaking, was one of the able speculations of the late Professor Forbes,* mainly arrived at from the study of the distribution of the present flora and fauna of Europe. He pointed out, that as nearly all our indigenous animals, and the greater part of our plants were derived from the Germanic regions of the continent, a union of the two countries was absolutely necessary to allow of the migration of these plants and animals over the elevated bed of the sea.

When the bed of the German Ocean thus stood above

* Memoirs of the Geological Survey Vol. I.

the level of the sea, Mr. Austen * considered that the Rhine would then flow down what has again become the bed of that sea, being joined in its course by the Thames, the Tweed, the Tay, and other lesser streams, the whole forming a magnificent river that poured its waters into the Northern Ocean beyond the British isles, and that along the banks of this great river lived and died the extinct animals whose bones, as we have already seen, are still brought up from this submerged land.

No great elevation would be necessary to lay bare the bed of the German Ocean, which is nowhere so deep as Loch Lomond, and still less would suffice to lay dry the English Channel. Mr. J. Geikie † considers that an uprise of little more than three hundred feet would accomplish this purpose, and that about one hundred feet more would unite every little island round our coast with the mainland, and the mainland with the continent. There would still, however, be a pretty broad space of water between this upraised land and Norway towards the mouth of the Baltic. Of this upheaved land by and bye animals and plants began to take possession, and large forests and other forms of vegetation grew and decayed for ages, their remains forming the submarine beds of peat, and wasted trunks of trees still lying on the bottom of the sea.

At the period when Britain was last united to the continent, snow and glaciers continued to hold possession of all the uplands, and the climate was still severe. The summers were perhaps somewhat warmer than at present, and a much greater extent of the country would be exempt from the sea air, and its depressing influence on the growth of timber. This will account for the growth of forests in former times on some of what are now the most exposed parts of our coast, as well as on the outlying islands, that are now quite destitute of trees. But the evidence furnished by the trunks of large trees found in the peat of these islands, shows clearly enough that formerly trees had grown their luxuriantly. The growth of the trees, the formation of thick peat beds, the gradual elevation of the bottom of the German Ocean into dry land, and its subsequent submergence, makes a long draft on time.

It will be observed, if in this brief sketch we have succeeded in intelligibly and correctly explaining the phenomena presented by the submerged forests, peat mosses, and mammalian

* Quarterly Journal, Geological Society, Vol. 7. † Great Ice Age.

bones, that all the great physical changes of land and sea necessary to account for their present position, took place subsequent to the deposition of the glacial or brick clay, and before the Carse or shell clay, containing mammalian bones, above referred to, was laid down.

To carry the matter still further down toward our own time, it may be stated that this blue shell clay extends across the estuary of the Eden, where it is seen on the opposite side stretching away under Tentsmuir; whether it crosses the whole muir or not, is scarcely determinable, but the same clay, apparently, is seen on the other side not far from Tayport. Of course Tentsmuir, embracing the whole accumulation of that great sand plain, has been heaped together since the Carse or shell clay and its superimposed beds of loam and gravel were formed. This of itself might take a long time. At any rate, after vegetation commenced to grow on its surface, beds of thin peat have formed here and there on it. At one place facing the estuary of the Eden a bed of peat occurs, which has been long quite dry, from nine to ten inches in thickness. This peat does not seem to me to have resulted so much from the growth of the common bog moss, as from the decay of other marsh plants, that had long carried on a struggling and stunted existence on the surface. At what rate peat would form on this sterile and sandy waste, it might be hazardous to venture more than a conjecture. Bearing in mind, however, the nature of the ground, and the class of plants it is capable of supporting, we would perhaps not be over-estimating the rate at which it would accumulate, if we suppose one eighth of an inch in thickness to have formed in a century; should this be a fair approximation to the time required for the purpose; then Tentsmuir must have remained much in its present condition for a long time.

St. Andrews, 1 March, 1875.

THE AURIFEROUS QUARTZITES OF SCOTLAND.

By W. LAUDER LINDSAY, M.D., F.R.S.E., F.L.S.

SINCE the year 1861, I have, over and over again, both abroad and at home, and in various forms, given public expression to my opinion, that certain districts in Scotland *not only contain auriferous drift,* but auriferous quartzites.* The

* I use the term *Drift* rather than *Alluvium*, because (1) it is shorter; and (2) it is more comprehensive; while (3) there is, even in modern geological works of the first class, great confusion between these terms and the

year in question was a notable one in the history of the British colony of New Zealand, and especially of the Scotch Province of Otago, in so far as it saw the first of a series of gold discoveries, the result of which has been that, up to March, 1874, Otago alone has exported no less than £12,762,892 worth of native gold, nearly one-half the total gold export from New Zealand (£25,273,379 worth) up to that date.† It so happens that I had a share in the development of the gold fields, both of the South and North Islands of New Zealand, having made a reconnaisance survey of the Tuapeka gold field in the Province of Otago, and the Coromandel, or Thames, gold field in the Province of Auckland, long prior to their examination by the staff of the Geological Surveys of Otago or New Zealand. It was while surveying the Tuapeka gold-field, between October and December, 1861, that I formed a strong opinion regarding the auriferous character of the whole Lower Silurian area of Scotland.

In 1861, while in Otago, having been invited by the Colonists to address them in public, on the subject of the natural resources of their Province, I gave a lecture in Dunedin in December of that year, on "The Place and Power of Natural History in Colonization; with special reference to Otago." Under the head of "The *Geology* of Otago," and of its auriferous rocks, I called attention to my belief that "They are identical with the rocks . . . of the Grampians and other parts of Scotland." . . .‡ "Years or cycles of years will probably elapse before your alluvial deposits are exhausted; after which the perhaps even richer, original *quartzites* will fall to be searched for and operated on." (2d edition, p. 12).

materials they represent, in relation to their containing nuggety or granular gold. According to Geologists, *Drift* is the older formation, and involves the idea of extensive denudation, in great measure at least, by *ice* action; while *Alluvium* is newer, more recently formed, mainly or exclusively by *water* action, the result of the assortment of the older drift.

† These figures are taken from pp. 95 and 37 of "The Official Handbook of New Zealand," by the Honourable Julius Vogel, Premier of the colony (London, 1875.) But the larger sum represents "alluvial" gold exclusively; while it is stated at p. 60 that the total gold exports from New Zealand, up to the end of 1872, had been of the value of £26,084,260.

‡ The said Lecture was published as a pamphlet by, and for behoof of, "The Young Men's Christian Association" of Dunedin in January, 1862. The quotation is taken from p. 12 of the pamphlet in question. Inasmuch, however, as—having been printed after I had left Otago, and without correction of the proofs by myself, it contained many typographical errors—a second edition was published in Edinburgh, in July, 1863.

In 1862, having returned to this country, I stated to the "British Association" at Cambridge, that "The auriferous resources of *Otago* are only beginning to be developed, and will only be fully developed in the course of many years, by the addition of *Quartz-mining* and others of the skilled branches of Gold-mining, to the shallow or alluvial digging to which the miners' operations are at present mainly confined. This implies a greater concentration of attention than at present on the auriferous *quartzites*, from which the drift or alluvial gold has originally been derived; the working whereof, should these quartzites exist to any extent, is much more likely to yield a steadily remunerative employment, and a permanent and valuable source of revenue than the said alluvial digging (p. 2)." Of the Coromandel gold field (Auckland) I reported—"The auriferous *quartzites* are frequently developed to an extent as yet unknown in Otago (p. 1)." . . . "The Coromandel slates are characterised by their prominent and numerous *Quartz*-reefs, consisting of auriferous quartzites" (p. 2). . . . I adverted also to "The scarcity of the auriferous drifts and the abundance of the parent *quartzites*" (p. 2); and summed up, "that while there is at Coromandel a very limited and insignificant field for alluvial digging, there is ample scope for *Quartz* mining" (p. 3). . . . "that slates similar to those of Coromandel, with associated auriferous *quartzites*, will be found to occur over a comparatively large area of the Province of Auckland; . . . and that new gold-fields remain to be discovered in that Province"* (p. 3).

In 1863, in a "Special Programme" of a Conversazione of the Royal Society of Edinburgh (in February), descriptive of a series of Geological exhibits which I had collected in New Zealand in 1861, I drew attention to the "Gold-fields of Otago, characterized by their Alluvial deposits or Drifts," and the "Gold field of Coromandel (Auckland), characterized by its *Quartz*-reefs;" pointing out the "general resemblance of the auriferous slates of Otago to the metamorphic slates (of Lower Silurian age) of the Scottish Grampians;" and deducing therefrom the "probable

* These quotations are from two Papers on (1) The Geology of the Gold-fields of Otago, N. Z.; and (2) The Geology of the Gold-fields of Auckland, N. Z.; published in "The Proceedings of the Geological Section of the British Association at Cambridge," in October, 1862: Reprints of 4 pp. (Otago) and 3 pp. (Auckland).

diffusion of Gold in Silurian slates, and their derived Drifts or alluvium in Scotland."

In reference to these opinions, the late Mr. George Anderson of Inverness, Solicitor, one of the authors of the well known and excellent "Guide to the Highlands"—the best of all our Highland guide books—who was geological critic or correspondent of the "Inverness Courier"—wrote me (of date January 17, 1863): "I quite agree with you that if our Highland rocks are not rich in gold, they are at any rate of much the same geological era that the deposits abounding in that metal are elsewhere, and hence they are worthy of the greatest study. I expect to have an article for the "Courier" of next week on the subject, calling on our local explorers to be on the outlook."

In 1865, still referring to the gold-fields of New Zealand, I stated to the Royal Geological Society of Ireland, that "I have not (since 1861) seen reason to alter any of my opinions, or modify the results or records of my personal observations. On the contrary, the mining experience of the last two years has only served to confirm the predictions or assertions I ventured to make while on the spot." . . . . "The parallelism between the auriferous slates of Otago and Scotland is remarkable. I was struck with it while in Otago, and I have since traced and proved it by a personal examination of the Highlands of Dumfries, Lanark, Peebles and Perth shires. The Leadhills district, may for instance be said to be a second edition of Tuapeka . . . . Gold is procurable under precisely similar circumstances, though in smaller amount." . . . "I have a high opinion of the auriferous richness of these Coromandel *Quartzites*, and of the yield they will give when science is properly applied to the extraction of their wealth; and I may make the same remark in regard to the auriferous *Quartzites* of Otago and Nelson." The newspaper report (of date January 11, 1865) of the same memoir quotes me as of opinion in regard to *Otago*, that "Gold occurs in *Quartz*, which is associated with metamorphic slates similar to those of Scotland. . . . Quartz reefing has not yet been undertaken; but from the richness of the washings, it is probable that the regular *Quartz-mining* will be highly productive."

In 1867, I reported to the "British Association" at Dundee, that "there are indications (if they do not always amount to proofs) of the existence *in Scotland* of auriferous *Quartzites*—of Gold *in*

situ—as well as of auriferous drifts and alluvial Gold."* I repeated this opinion to the Edinburgh Geological Society;† adding of the Leadhills district, "there is no present local evidence of the existence of auriferous Quartzites" (p. 108). . . . "Hitherto there have been few well authenticated discoveries of Gold-quartzites of any extent *in situ* in Scotland. But this is simply, I believe, because they have not been *systematically looked for.* That they occur is rendered at least probable by the fact of the frequent discovery of Nuggets with the *Matrix* adherent: while in all old historical references to the working of Gold in Scotland, "Gold mines" are spoken of—a phrase which, though an ambiguous and comprehensive one, leaves open the question whether *Quartz*-reefs and Reef-crushing were not known about Bulmer's time" (p. 113).

In 1868, I repeated many or most of these statements to the Royal Geological Society of Ireland.‡

In 1869, I made a number of statements that had special reference to what might be expected at the *Sutherland* diggings. A newspaper report of a paper on "The Sutherland gold-diggings of 1869," presented to the Edinburgh Geological Society in November 1869, stated that "operations were confined simply to surface washing, *Quartz mining* not having been permitted . . . . although he was certain that there was gold *in situ.*"‖ In the earlier parts of the year, and prior to my visit to Kildonan (in August 1869), I had expressed "no doubt as to the existence of *gold-quartz* in Sutherland, as well as in many other parts of Scotland; for all my experience of gold fields goes to show that gold-drift is usually superjacent to, or in the proximity of, gold-rocks *in situ.*"¶ . . . . "There are the indications usual in gold-fields of the presence

*In a paper on "The Gold fields of Scotland," published in its "Report" for 1868: Transactions of the sections, p. 65. This paragraph also appears in a reprint of the same paper in the "Mining Journal" of March 13, 1869, with the addendum: "*Gold in its Matrix* has been apparently found at least in Leadhills, Tweeddale, and Breadalbane."

† In a paper on "The Gold and Gold-fields of Scotland," read in November 1867, and published in its Transactions in 1868 (Vol. 1, p. 107).

‡In a paper on "the Goldfields of Scotland," written in 1867, presented in 1868, and published in the "Journal" of the Society in 1869, (vol. 2, new series: pp. 178, 180, 186).

‖ "Scotsman" of November 19, 1869.

¶ Article on "More Gold-fields in Scotland," in the "Northern Ensign" of June 17, 1869.

of auriferous *quartzites*. These indications are such as to justify a careful search for *gold in the matrix*."* . . . . "*Quartz mining* has not been permitted, though the occasional discovery, unlooked for, of fragments of auriferous *quartz*, as as well the granular or angular character of the gold, point to the probable existence of *gold in situ*. . . . . Such is the confidence of the diggers themselves in the auriferous character of the drifts and *quartzites*, that they are ready to embark capital in proper mining operations."†

In 1870, at the Perthshire Society of Natural Science, I made reference to "*gold in situ in its matrix* in the *Quartzites*, which penetrate the schists of the Breadalbane and other Highland districts" (p. 39). I mentioned several isolated finds of *gold-quartz*, as well as of nuggets, as "of importance in reference to the existence not only of auriferous drifts, but of auriferous *quartzites* in the Highlands of Perthshire" (p. 44). ‡

And, lastly, so lately as the beginning of 1874, I re-asserted that "there is good ground for encouragement in the search for auriferous *Quartzites* throughout the Silurian area of Scotland § (p. 13), and that "auriferous *Quartzites*, containing a much larger per centage of gold [than those of Bute, according to Mr. Cameron, which contained ½ oz. per ton] will probably be found in Scotland, as they have been found in other auriferous countries, *when properly looked for* (p. 7). . . . The general result of my own observation and inquiry on this subject is that auriferous *Quartzites*, are to be looked for throughout the whole Silurian area of Scotland" (p. 12).

Now it has so happened that, while the correctness of my opinions has been far more than verified as regards both the auriferous quartzites and drift of New Zealand) as may be seen by reference to the "Official Handbook of New Zealand," published at the beginning of the present year); and while the now well-known Sutherland gold diggings of 1869 bore me out in all my anticipations regarding drift gold in Scotland, it is only lately

* Article on "The Gold-field and Gold-diggings of Kildonan," in the "Northern Ensign" of September 16, 1869.

† Paper on "The Sutherland Gold-diggings, as a scientific and social experiment," presented to the British Association at Exeter in 1869, and reported at length in the "Northern Ensign" for January 13, 1870.

‡ Presented in January, 1870, and published in the Society's Proceedings for that year.

§ In an article on "Recent Gold Discoveries in Scotland," in the "Perthshire Constitutional" of February 18, 1874: Reprint of 15 pp.

that anything like a good illustration has offered itself of the correctness of my views as to the *Auriferous Quartzites of Scotland.* In 1872, however, a lump of gold-bearing quartz was found near the lead-mining village of Wanlockhead, Lanarkshire, by a lead-miner, still resident there—Andrew Gemmell. His discovery was not made public till the autumn of 1873, when a fragment of the specimen in question was exhibited at the "Society of Inquiry" in Thornhill, Dumfries-shire, by my old and worthy friend, Dr. Grierson, well known as the benevolent founder of "the Grierson Museum" there; and the find was reported in "Nature," as well as in the Edinburgh and other newspapers. In September, 1873, I had a written communication from Dr. Grierson regarding it; and this was the beginning of a correspondence not yet closed, which has only within the last few weeks given me at all full and satisfactory information concerning the circumstances of Gemmell's discovery.

The mass of gold-quartz alluded to was found on the side of the public road, and was, unfortunately, broken up into at least seven fragments, which subsequently found their way into the hands of five different owners. I have not myself had an opportunity of examining any of the pieces, seeing that Dr. Grierson's specimen, which he expressed himself willing to send me for examination, was, with other specimens, borrowed by the proprietor of two of the fragments, and has not been returned. It is probable, however, that all interested may have a speedy opportunity of inspecting "the Gemmell Quartzite" for themselves, inasmuch as I understand there is a prospect of the re-pieced mass being placed in the Museum of Science and Art, Edinburgh.

Gemmell's own account of the matter, as contained in a letter to me of date February 10, 1875, is the following:—"About the lump of gold-quartz that I found in 1872. . . . I have no bits of quartz of the same lump now. I never knew of any being found here as large. It would be about 10 lbs. weight, and mixed with gold all through, less or more. When I found it, I broke it all up into smaller pieces. A number of gentlemen got a piece of it; and one gentleman has got a number of the pieces from the other gentlemen, and is going to take a model of it." Mr. Stewart, of Wanlockhead, states—also in a letter to me of same date:—"Regarding a piece of auriferous quartz found by Andrew Gemmell in this

district a few years ago, I may state that just now I have not in my possession any of the pieces, and Gemmell informs me he has none left. Mr. Dudgeon of Cargen, near Dumfries, was gathering all the pieces he could borrow to have the stone made up as near the original as possible, to have a cast taken of it."

So many finds of gold in Scotland have been reported in the newspapers, which have turned out to be false reports—to have been discoveries only of glittering, yellow, gold-like minerals, such as Iron Pyrites or Mica; so many of these reports have I myself investigated and found to be untrustworthy, that it is important to establish, once for all, the genuineness or authenticity of the Gemmell Quartzite, and its discovery.

1. There can be no doubt that it is auriferous quartz; for, in the first place, it was found by a Wanlockhead lead-miner, who is as familiar with gold as he is with lead. The official "Memoirs of the Geological Survey of Scotland," tell us that "for more than three centuries gold has been collected in small quantities from the *Alluvia* of the streams in the Leadhills and Wanlockhead district."* All the lead-miners of the district are thus hereditarily, as well as by individual experience, gold-diggers; and I have had occasion repeatedly to point out elsewhere that the unpretentious, but practical gold-digger is a much better judge of gold, in at least its topographical relations, than the professional geologist or mineralogist. I am not aware of a single gold-field that has been discovered and developed by a professed scientific man: in other words, I know no exception to the rule that, throughout the world, gold-fields, gold-diggings, and gold-mines, have been found out and worked successfully by uneducated, plain, unassuming men, with strong opinions of their own, the physical strength necessary for prospecting, washing and mining, and the determination requisite for following up or out an object. So far as Scotland is concerned, while it was an Australian gold-miner—albeit a native of Helmsdale—Robert Nelson Gilchrist, that discovered and developed the auriferous riches of Sutherland in 1869, and who paved the way therefore for the finding of what deserves to be called in his honour, "The Gilchrist *Nugget*," it was a Scottish lead-miner, Andrew Gemmell, who in 1872, as a culmination to a whole series of previous gold finds in the same important lead-mining district of Crauford Moor, met with the largest mass of aurifer-

* Explanation of Sheet 15: Edinburgh, 1871, p. 43.

ous quartz that has ever been reported as met with in Scotland, and which is equally appropriately to be designated "The Gemmell *Quartzite*." These two specimens indeed, the Gilchrist Nugget, at present in the possession of the Duke of Sutherland, and the Gemmell Quartzite, presently belonging nominally and apparently to the Duke of Buccleuch, are excellent types of the two different or main forms in which native gold occurs in Scotland, viz., *in waterworn fragments and in the matrix.*

I believe, therefore, Gemmell to be a perfectly good judge of gold and of gold-quartz. But his assertion as to his lump of quartz being infiltrated with gold is borne out or confirmed by the testimony of *(a)* Mr. T. B. Stewart, Manager of the Lead Works at Wanlockhead; *(b)* Dr. Wilson of Wanlockhead; *(c)* Dr. Grierson of Thornhill; and *(d)* last, though not least, by a thoroughly competent and experienced Geologist and Mineralogist, Professor Harkness of Cork, who tells me he saw* one of Gemmell's fragments—a companion fragment to Dr. Grierson's —in the cabinet of Mr. Dudgeon of Cargen (Dumfries-shire).

2. Nor can there be any doubt as to Gemmell's having found his Quartzite where it is stated to have been found—his own evidence being supported by that of Mr. Stewart, Dr. Wilson, and Dr. Grierson. Dr. Wilson says there can be "little doubt as to Andrew Gemmell's finding a large piece of gold-quartz, weighing . . . nearly 10 lbs.:" and that "Gemmell is always most successful in finding gold, and is one of the most respectable and trustworthy men in the place."† He is, therefore, no myth, and his word can be depended upon.

3. But there is a flaw in the evidence, as to the said Quartzite belonging to the rocks of Wanlockhead, in so far as the mass was found loose, by itself, on the side of a public road; and it has been impossible to trace it to any of the quartz-veins *in situ* in the subjacent or surrounding Silurian slates. Dr. Wilson reports that "as to its being native to Wanlockhead, there are conflicting opinions amongst the miners."‡ That it does belong to the rocks of the district admits of little doubt: but it is most desirable to supply this missing link in the chain of evidence by perseverance in the local search for gold in the rocks *in situ*.

4. One of the strongest arguments in favour of the Gemmell Quartzite being a genuine product of the district, is the fact

* In letter of date February 10, 1875. † Letter dated 11th January, 1875.
‡ Letter dated January 11, 1875.

that it is not the first, but only the largest, piece of auriferous quartz that has been found about Wanlockhead or Leadhills, even by Gemmell himself. The latter writes me—"There is gold to be found here in all the glens, less or more, in small particles, and sometimes (the gold-grains are) attached to small pieces of quartz. I believe all the grains to be found come from gold-reefs. I never knew of any (gold-quartz) being found here as large." * Dr. Wilson remarks of Gemmell, "according to his own account, he has often found gold in quartz at Wanlockhead. At Leadhills it is found frequently;" though it is not quite clear whether the latter sentence refers to quartz-gold or nuggety-gold. "He, with other residents, assures me that both gold in quartz and in nuggets is found here (Wanlockhead)." Mr. Stewart tells me that "some small pieces of quartz and gold connected have been found from time to time in this district, but nothing equal in the least degree to Gemmell's specimen, which was as large as a man's two hands." † And lastly, Mr. Noble of the Hopetoun Arms Hotel, Leadhills, who was the means of procuring me samples of stream gold from that locality in 1863, informs me, "I do not know of any gold specimen in the meantime in the rock. I believe it has been got in that way about Leadhills." It is proper here to mention also that, in the reign of Queen Elizabeth, an English adventurer, George Bowes, "is said to have sunk a shaft, and discovered a small *vein of gold* at Wanlockhead;" ‡ while, in the time of King James V., pieces of gold of 30 ounce weight were found in the same neighbourhood "*mixed with the spar, some with keel,* and some with brimstone." §

But this discovery of Gemmell's, though by far the most important, is not the only recent instance of the finding of gold-quartz, or of quartz associated with gold nuggets, in Scotland. Gold was found in quartz—that is gold in its matrix—as well as nuggets with adherent or intermixed quartz, in Kildonan in 1869; of which I saw several specimens myself in the hands of the diggers.‖ I then reported that I had seen "not a

* Letter dated February 10, 1875. † Letter dated February 10, 1875.

‡ "The search for Scottish Gold in olden times," Part III., by Mr. R. S. Fittis of Perth, in the "Perthshire Constitutional" of March 30, 1874.

§ Ibid, Part II., March 23, 1874.

‖ Article on "The Goldfield and Gold-diggings of Kildonan," in the "Northern Ensign" of September 16, 1869.

few instructive samples of gold in the matrix," collected mostly in the Suisgill stream.* Dr. T. R. Rutherford, formerly of Helmsdale (and now of Kilmote, Loth, near Golspie, Sutherlandshire), writes me, of date Feb. 27, 1875: "It is quite true that I have a small piece of quartz with gold in it, found either at Suisgill or Kildonan, but I really cannot say which. I understand Mr. M'Hardy, superintendent of police, Dornoch, has also a small bit found at Suisgill." Dr Bryce, of Glasgow, is reported to have stated at the Liverpool meeting of the British Association in 1870,† that on crushing the *granite* of the Suisgill burn, and washing the *debris*, "grains of gold were found in every specimen. A similar result came about on crushing and washing specimens of the *Mica Slate*, but the gold was less abundant." Again, in the *granite* of the upper parts of the valleys of the Errick and Nairn rivers (Inverness-shire), "gold was found in considerable quantity" still, according to Dr. Bryce. I am indebted to Sir Alexander Anderson of Blelack, formerly Lord Provost of Aberdeen—as factor for Lord Saltoun—for the following letter, dated Feb. 22, 1875: "Sir Alexander Anderson begs to send Dr. Lindsay an Assay of a quantity of quartz-rock from Kinnaird Head, obtained for Lord Saltoun some years ago. The rock dips toward the sea. My Lord was advised, that if the search were to be prosecuted, gold was most likely to be found where the quartz joined other strata."

Assay Office and Ore Floors, Hatton Garden,
London, E.C., May 21st (1869).

CERTIFICATE OF ASSAY FOR LORD SALTOUN.

"We have crushed, mixed, and carefully assayed the parcel of quartz-rock from Aberdeenshire, and find the following to be the result:—

"1 qr. 12 lbs. nett contain a distinct but very minute trace of gold—under 12 grains per ton of 20 cwt. of quartz."

(Signed) JOHNSON, MATTHEY, & Co.

And, lastly, in an article on "Recent Gold Discoveries in Scotland," in the "Perthshire Constitutional" of February 18, 1874, I quoted a full circumstantial account, by the finder himself, of the discovery of *auriferous quartz* in Bute.

* Article on "Gold Prospecting in Helmsdale," in the "Northern Ensign" of September 23, 1869.

† According to the "Northern Ensign" of September 29, 1870.

ZOOLOGY.

ILLUSTRATIONS OF ANIMAL REASON.

(Continued from p. 8.)

By W. LAUDER LINDSAY, M.D., F.R.S.E., F.L.S.

IN December 1873, I was favoured with the following communication from William Chambers, LL.D., proprietor of, and a frequent contributor to, "Chambers's Journal."

"I am requested by the Baroness Burdett-Coutts* to draw your attention to a very interesting and true anecdote illustrative of the affection of a white barn-door *Cock*, which, on the death and burial of a favourite hen (the hen having died naturally), laid itself down on the little grave, and was there found dead one morning. The incident is rather remarkable, as the Cock is not usually deemed a very sentimental animal. The anecdote is verified by Mrs. Brown, the companion of Lady Burdett-Coutts, and has been given in the *Animal World*."

In reply to a query as to the authenticity of certain anecdotes of animal sagacity, recorded in Chambers's Journal, Dr. Chambers gave me, at the same time, the following assurance :—

"All the statements regarding the intelligence and affectionate qualities of "Donald," in the story of a *Donkey*, are quite true. . . . . In the article on animals, I introduced an anecdote about *Cats*, which I heard told by Dr. Carpenter† as occurring in connection with his own house. I likewise introduced the anecdotes about *Rats* in Hertfordshire, as related

* Whose efforts on behalf of, and interest in, the lower animals, have long been well known in connection with the proceedings of the Ladies' branch of the Royal Society for the Prevention of Cruelty to Animals, of which she is President.

† Presumably W. B. Carpenter, M.D., F.R.S., Registrar of the University of London; and formerly President of the British Association for the Advancement of Science.

to me by my sister, Mrs. Wills, at Shenards, near Welwyn, in that county, last summer."

In July 1871, the late Sir Henry Holland* thus addressed me: "I cannot feel satisfied without writing a few lines to thank you for the very valuable Treatise on 'The Physiology and Pathology of Mind in the Lower Animals.' . . . I am one of those who do not object to the word 'Mind' thus applied, as you will see, I think, in an article I wrote for the *Edinburgh Review* of January last, on the 3 vols. of M. Laugas, having relation to this and other kindred subjects. You will observe in this article (written on a voyage to and from Jamaica last autumn), that I especially allude to the *Sense of Fun* in the higher animals, as a striking demonstration of the relation of their faculties to those of man. I do not perceive that you include this in your Enumeration, but it undoubtedly ought to have place there."

It is quite the case that I have not yet published all the material I have collected in proof of the possession by other animals, as well as man, of a *Sense of Fun or Humour*. Such proofs, if not very abundant, are at least convincing. They are to be found for instance, in those very "*practical jokes*," which certain animals play, not only upon each other, but upon man himself.

In August 1871, I had the following letter from Dr. Humphreys Storer of Boston, Massachusetts, formerly Professor of Obstetrics and Medical Jurisprudence in Harvard University, Cambridge, Mass.

"I have been much gratified by reading your paper in the 'British and Foreign Medico-Chirurgical Review,' on 'Insanity in the Lower Animals,' and feel prompted to send you an anecdote relating to a favourite Newfoundland *Dog* of my own, which, on account of his size, I was compelled to destroy, a few years since, at the age of 13½ years. I relate this to show you that dogs do not always want the faculty of *speech*, to make themselves fully *understood*. My dog 'Tiger'—a splendid fellow weighing over 90 lbs.—was a great favourite with my whole family, and consequently was allowed, for several years, to do pretty much as he pleased. Upon removing my residence to another portion of the city, the new house was fitted up with some more costly furniture, requiring more care in its preservation than we had been accustomed to bestow upon the old.

* The well-known author of "Chapters on Mental Physiology," "Medical Notes and Reflections," and other works.

It was thought advisable, therefore, that 'Tiger' should no longer be allowed to sleep upon the parlour sofas, but should rest himself upon the carpets instead. He *understood our wishes* perfectly, and for more than a year he was never known to have mounted the forbidden spots. Entering the parlour one morning, I found him crouched upon a sofa. Surprised upon seeing him there, I sharply cried out, 'Tiger! what do you mean?' He at once slowly opened his eyes, and, very carefully moving from the sofa, stood upon three legs, holding up the other for me to examine. Looking at the foot, I found a small nail or brad deeply embedded in its fleshy portion. Not being able to remove it with my hand, I muzzled him, and assisted by my son, was able, with considerable force, to withdraw it with a pair of forceps. He immediately put his foot to the carpet, and after *trying* it a few moments, and satisfying himself that he was relieved, his gratitude was unbounded. He leaped upon my shoulders, licked my face, and seemed *delirious with joy*. Could any human being have acted more intelligently to *attract attention?* Did not his *actions*—much more than any *words* could—convey his *sense of obligation?*"

Interesting as this incident is, it is far from being so exceptional as it may appear. It is, in fact, only one of many incidents of a similar kind, of which I have notes, illustrative of the fact that certain animals, in their distress, *seek surgical or medical aid from man;* and deriving benefit from his assistance, they display their gratitude in the only way in which they can show their sense of benefit.

In July 1871, Dr. Brown of Rochester, Kent, wrote me:—

"I have just read your article in the 'British and Foreign Medico-Chirurgical Review' for July (on 'Insanity in the Lower animals.') I am much pleased with it. I have long advocated the possession of *Mind* by the Lower animals. I will give you a case of *Suicide* by a *Dog*, occuring at Upnor, near Rochester. The dog had been given away. It returned and was sent off again. Next morning it came to the house and was again driven off. This *broke the dog's heart*; for the animal immediately went to the river side, and entering the water *held his head under* until drowned. . . . . If you try to kill a cock-roach on a stair-case, the judgment displayed by the insect is thoroughly human. . . . . Those that deny *Reason* to *Insects* because of the want of a *Cerebrum* proper, forget that *nervous matter*, before it is much differentiated into

special organs, may contain *every nervous faculty*. . . . In the 'British Medical Journal' for 1866 (May 19, p. 519) is published a paper by me, 'Do true *in*sentient animals exist? (Unzer's question)."

The most interesting of Dr. Brown's observations is that which refers to *Suicide*. The case he gives is a typical one, exhibitive of *intention* to destroy life, from a sense of *weariness of life*. Such instances are not uncommon; but it is desirable their recorded number should be multiplied, because the possibility or fact of Suicide by other animals than man is still denied or disputed by very eminent authorities. For instance Miss Frances Power Cobbe of London—whose knowledge of the lower animals, and especially the Dog, is exhibited in her admirable articles on the "Consciousness of Dogs," in the Quarterly Review for October 1872, and on "Dogs whom I have met," in the Cornhill Magazine for December, 1872—remarked to me, in a letter dated December 1873:—

"With respect to the *Suicides* of Dogs, to which she sees Dr. Lindsay refers as an accepted fact, Miss Cobbe has carried on a little friendly controversy with Mr. Charles Darwin and some other friends, and remains still *un*satisfied that we possess demonstrative evidence of the fact, though many stories seem to indicate something of the kind."

In July, 1871, the late Professor Day of St. Andrews asked me by letter: "Have you seen the article on the Tasmanian Devil* (noticed in yesterday's 'Spectator'†), which seems to exist in a state of *Chronic Insanity?*" The Professor's ingenious suggestion of *Insanity* as accounting for the *ferocity*, or untamability, of the Tasmanian Devil, is worthy of the attention of Zoologists in connection with a similar condition in many other animals. My own impression, however, is that, though Insanity of the same type as that of man is common among other animals, it will be difficult, if not impossible, to establish it in such cases as that of the Tasmanian Dasyure.

Some years ago, Dr. Murray Lindsay of Derby, gave me the following particulars, illustrative of the Individuality and Idiosyncrasies of a favourite Skye Terrier, now dead, bearing the curious name of "Mum"; many of whose performances or peculiarities I have myself witnessed:—

* *Dasyurus Ursinus*—a marsupial—otherwise known as the Ursine Dasyure or Ursine *Opossum*. † Of date July 9, 1871.

"I. The girl, Johanna, who helped in our house, was so fond of the dog and had so high an opinion of his intelligence or sagacity, that she used to declared he was 'no dog,' but something higher. His affection for Johanna was very strong. She used to feed him, and pet him, and admired him, and the admiration was mutual. When he could see (for he subsequently became blind) he used to go to the ward door in the morning and *wait* for her to accompany her over to the house. And, poor dog! when he became *blind*, if Johanna went outside the grounds for a walk with the children, he knew it quite well, and sat *howling* on the door step till she returned. When he could see, he used to accompany them in their walks. His *affection*, too, for Mr. M'Curley was very strong, much stronger than it ever was for me, even stronger than it was for Annie, who loved the dog. In presence of Mr. M'C. the dog was unusually *bold* and *defiant*, and showed his *cunning*, *discrimination*, and *judgment*. When Mr. M'C. came to see us, the dog would venture into the drawing-room, where, as a rule, it was not allowed, and it would refuse to leave the room, lying under Mr. M'C.'s chair, and showing his teeth if an attempt was made to dislodge him. Or he would place himself on the mat at the drawing-room door, acting as Cerberus, and refusing to let any one into, or out of, the room where Mr. M'C. was."

"II. He exhibited a love of, and powers of discrimination in, *music*. He appeared to like *lively*, cheerful-sounding music, and showed his *appreciation* and *delight* by wagging his tail, and in other *expressive* ways. He had a great *aversion* to sad, doleful, slow, and sacred music; but his objection was not, I think, so much to its being *slow*, as to dull, depressing music of a plaintive character. When I whistled or sang the 'Old Hundred,' he would invariably raise his head, stretch his neck, and howl. He also disliked the chapel bell ringing, and howled at that. He was never taught to like or dislike music; it was his natural character. As far as my memory serves me, he did not like discordant sounds, and appeared to like lively, cheerful music, whether vocal or instrumental."

"III. He also exhibited *jealousy* occasionally. If the babies or children were petted, he now and then insisted on being recognised as a pet too, and would come and rub up against you, or jump up in your lap, when the child was being petted."

"IV. In connection with Mr. M'Curley, I ought to have

mentioned that his strongest affection was shown to Mr. M'C., for this reason no doubt, that Mr. M'C. one day, when out walking near Hanwell, had to carry "Mum" home a good distance, as the dog had a severe *Epileptic* fit, and Mr. M'C. thought it would have died. The dog's *gratitude* to Mr. M'C. when he got home was something wonderful, and from that time his affection for Mr. M'C. was extreme, more so than for any one else."

"V. I may mention that when I had "Mum" at Wells (Somersetshire), he had his first *Epileptic* fit, which I witnessed, in the garden there. He suddenly fell down, was convulsed, then rallied a little, got up, reeled and staggered, and ran round, describing a circle. I waited, he got better, and I did not require to carry him home. There was an interval of seven or eight years between the first and second Epileptic fit. When first seized with the fit, I thought he had been poisoned, and that he had taken some poisonous article in the garden."

"VI. "Mum" was far more intelligent than a Microcephalic *Idiot*-girl of seventeen I had (as a patient) at Hanwell, whose *brain* was remarkably small, and weighed only 13 ozs."

The following short disquisition was sent me some years ago by a busy Surgeon, harassed with the cares and worries of a large practice, who yet, like the late Sir Benjamin Brodie, finds time for, and takes obvious pleasure in, "Psychological Enquiries*" of the most abstruse kind.

PSYCHOLOGICAL NOTES.

"Where are we to draw the boundary line between man and the brute? Nowhere that we can see, short of the point at which the creature becomes endowed with the high gift of *knowing God*, of feeling his *accountability* to Him, of desiring *communion* with Him. This gift may be latent in low, degraded races, and the endowment may appear in action in many and varied forms; but with *improvable* reason it is ever *potentially* present. By improvable reason we mean the faculty of comprehending *abstract* ideas. Writers have held that *Will* distinguishes man from the brute, when this is shown in selection with *approval* or *conscience*. Does that quality distinguish man from the lower animals? We train a dog by chastisement and

*This is the title of a couple of well-known volumes by the late Sir Benjamin C. Brodie, the first London surgeon of his day; which volumes had reached a third edition in 1862.

kindness, and he learns to distinguish *right and wrong* within the range of his capabilities. *Abstract* right and wrong he cannot reason upon; but right and wrong, so far as his master has taught him and he has learned, are known and acted on. He makes *selection.* He makes selection with approval, for when he does right he is satisfied, when wrong afraid. This knowledge becomes hereditary, selection with approval becoming more and more easy, wrong selection causing deeper dissatisfaction or increased terror, as the fact of wrong becomes more and more clear to the creature's mind. *Conscience* has become more sensitive. The dog (many other animals come under the same category) is then capable of being trained to a sense of *responsibility* to his master, whom he knows, fears and loves. Man is capable of being trained to know, fear and love an *unseen Being* as his Master."

"A recent writer says:—"We identify *conscience* with the remains of the *Pneuma* in fallen man. The Pneuma and *Psyche*, spirit and mind, are thus distinguished and separated; the former the Divine breath; the latter, *reason.* The one is peculiar to man, the other is not denied to the lower animals, or at least only by those who fear to acknowledge any relationship between the 'Lord of Creation' and the inferior creatures."

If *we* are right, this view is wrong, for we hold that conscience does exist in the lower animals. They have conscience towards the higher creature man, and also conscience towards each other. Observation shows that many creatures of the same species, and not a few of different species, perform *kind* actions towards other creatures; actions which are not performed by all individuals of the species to which they belong. These actions indicate clearly *choice* of one kind of action rather than another, this choice made with a *consciousness* of using *means* to accomplish an end, that end being the safety and happiness of a fellow. In what do such actions differ from those of like kind performed by man towards man? There is conscience or choice with approval in both cases. So far as we can see, there is *self-consciousness* in the brute as well as in man: the difference is one of *degree*, not of kind. We hold then that conscience is a quality inherent in all living beings possessing a brain sufficiently developed to enable them to remember and reason on facts; which quality enables the creature possessing it to choose a course of action with approval."

In giving expression to the foregoing opinions regarding the

Psychical Differentiation of man from other animals, the Surgeon in question has attempted an "operation" of the most difficult kind, one that has perplexed, and will continue to puzzle, the most powerful Human intellects. It is obvious that the use of such a criterion of distinction as the knowledge of the God of the Christian—that is of the English Bible—must relegate to the category of Brutes, many thousands of Human Beings! On the other hand, he will find it difficult in the extreme so to define such terms as *Conscience*, *Consciousness*, *Self-consciousness*, *Pneuma* and *Psyche*, *Reason*, *Abstract ideas*, and *Potentiality*, as to include all men in one category, and place all other animals in a second!

(To be continued.)

Captures of Lepidoptera near Edinburgh, in 1874.—The following are amongst the better species that I captured during the past year in this neighbourhood. The weather was frequently unfavourable, and I myself was so busy with other things, that I could only really "get out" for a couple of days, else much more might have been done. *Lycæna Artaxerxes*—Common at the end of June, on the low undercliff near the shore between Pettycur and Burntisland, Fife. Seems to frequent Geranium sanguineum. Some of my series have the red marks, on the border of the wings on the upper side, as well marked as in specimens of the true Agestis taken on the chalk downs of Kent and Hants. *Macaria liturata*—In fir woods at W. Linton; middle of June. *Emmelesia alchemillata*—Two specimens on Blackford Hill, near Edinburgh, on June 26. *Emmelesia albulata*—Common in marshy ground near W. Linton, where Rhinanthus cristagalli (its food plant) grows. Middle of June. *Eupithecia helveticata*—One specimen by beating, near Blackford Hill, June 12. *Eupithecia centaureata*—Pettycur, Fife, June 27. *Melanippe tristata*—W. Linton, June. *Mamestra furva*—Larvæ not uncommon under stones on Arthur's Seat. Imago bred, July 15. *Plusia bractea*—One specimen in the Botanic Gardens, July 10. *Botys fuscalis*—Occurs with Emmelesia albulata. *Oncocera ahenella*—Common on hills at Pettycur, end of June. These Scotch specimens are larger, brighter, and more distinctly marked than those from the S. of England. *Tortrix icterana*—One specimen at Pettycur, June 27. *Mixodia Schulziana*—Common on heath amongst fir woods. W. Linton; middle of June. *Halonota scutulana*—Marshy ground near W. Linton, June 15. *Calosetia nigromaculana*—Near Pettycur, end of June. *Lozopera stramineana*—Common at Pettycur, June 27.—W. A. Forbes, S. Castle St., Edinburgh.

Lepidoptera of Scotland—Addendum.—*Hadena glauca* occurs in the Tweed district.—A. Kelly, Lauder.

Little Gull.—An immature specimen of the Little Gull, *Larus minutus*, was shot by Mr. Arthur Robb, near Aberdeen, on Saturday, 12th Dec. He observed three others at the same time.—G. Sim, Aberdeen, Dec. 1874.

OUTLINE DESCRIPTIONS OF BRITISH COLEOPTERA.

(Continued from p. 17.)

By Rev. T. BLACKBURN, B.A.

[As it is possible that some readers of the "Scottish Naturalist" who would like to make use of the "tables" in the "Outline descriptions of British Beetles," may not be sufficiently familiar with the dichotomous system, it may be of advantage to describe the process that should be gone through in order to arrive at the name of a species. For this purpose we will *take an example*, and suppose that a collector is endeavouring to identify by the descriptions—say a specimen of *Cychrus rostratus*. He will act as follows :—

1st. He will turn to the "Table of Groups" (p. 13), in order to discover to which *main division* of the Coleoptera his specimen belongs. In this table, under the figure 1 (on the *left* hand side of the page), beetles are divided into two classes; one containing species whose elytra reach considerably beyond the insertion of the 3rd (or hind) legs; the other, species in which the elytra are much shortened. Finding his specimen to belong to the *first* of these classes, he will be referred (by the figure 2 on the *right* hand side of the page) to the place where there is a *separation into classes* of the species whose elytra reach considerably beyond the insertion of the 3rd legs. (This will be where the figure 2 occurs on the *left* hand side of the page). There they are split into the following divisions, viz.—(*a*) those, none of which have the antennæ clubbed, which are not aquatic, and which have tarsi easily seen to consist of five joints; (*b*) those having the antennæ not clubbed, not being aquatic, and having tarsi easily seen to consist of four joints; (*c*) aquatic species; (*d*) a residuum not possessing *all* the characters of any one of the *other* divisions under the figure 2. By comparison of the specimen under enquiry with the characters of these several groups, it is seen to belong to the *first* of them, against which, on the *right* hand side of the page, is set the figure 3. Turning to the line where the figure 3 occurs, on the *left* of the page, it will be seen that the species attributed to that number are divided into two groups—one having the anterior tibiæ *simple*, the other having them either notched on the inner side or with a spine at the apex. As the specimen will be found to have a

strong spine at the apex of the anterior tibiæ, it will be referred to the *Geodephaga*.

The student will now turn to the "Table of families of *Geodephaga*" (p. 14), to ascertain to which of those families his specimen belongs. Against the figure "1" on the *left* of the page, there are three divisions characterised. The absence of a distinct notch on the anterior tibiæ will refer his specimen to the *first* of these, against which "2" is set on the *right*. Referring to "2" on the *left*, he will find the species composing that class divided into two groups, distinguished by the length of the eye, as compared with the length of the basal two joints of the antennæ together. The eye of the specimen in question being *shorter* than the basal two joints of the antennæ, it will be referred to the *Carabidæ*.

Next, the table headed "*Carabidæ*" (p. 16) must be referred to, to determine what *genus* the specimen belongs to. Under the figure "1" on the *left* of the page it will be referred (by the form of the base of the thorax) to the figure "2" on the *right*. Consequently the student will look where "2" occurs on the *left*, and, observing that the elytra of his specimen are not striated, he will decide that it belongs to the genus *Cychrus*.

Finally, he will turn to the table headed "*Cychrus*" (p. 17), and, finding that his specimen answers to the description of the single species, he will decide that it is *Cychrus rostratus*. If the genus contained more than one species, he would go through the same process (to determine which *species* it belonged to) that he had previously gone through to discover its *group*, its *family*, and its *genus*.

It is necessary, in concluding these remarks, to draw attention to the necessity of *observing accurately the slightest point mentioned*, as any failure in doing so might lead the observer far wrong indeed; and it may just be added that, after a little practice, the collector will carry the characters in his mind sufficiently to render it unnecessary for him, in *most* cases, to do more than turn at once to the table of species in a genus.]

CALOSOMA.

Blackish, E. shining, gr., p.-s., with smooth elev. ints. A row of puncs. on the 4th, 8th, and 12th ints. 12½ l. E^{s}. *sycophanta*

Shining gr. E. p.-s., with flattish ints., which are tr. wrinkled, the 4th, 8th, and 12th with a row of consp. punes. Legs and an. bl. 7½ l. E. I. . . inquisitor

NEBRIA.

1. E. not unic. 2
- unic. 3

2. B. Disc of th., mar. of e., an., pal., and legs, pale. 7 l. E.$^{c.}$ (Yorkshire) . . . . . livida

Test. E. with 2 irreg. tr. fasc., joined by longi. lines, b. 9 l. E.$^{w.c.}$ . . . . . complanata

3. B. An., pal., tib., and tar., r. E. consp. p.-s. Th. very tr., almost as wide at ba. as in fr. 5 l. B ! ! . brevicollis

B. or reddish. An. and legs more slender and long than in prec., an. darker Str. of e. almost impunc. Th. strongly contr. behind. 4¾ l. B.$^{M.}$ . . Gyllenhalli

LEISTUS.

1. Th. bl. b. or blackish. Mouth, an. legs, and pal., test. . 2

- - - - -. Fem. pitchy or b. Rest of limbs (which are very long and slender) dusky r. Th. very tr. E. strongly p.-s. 4¼ l. E. ! . . . spinibarbis

- r. 3

2. H. and e. bluish b. or r. Th. twice as broad as long. E. short, very strongly p. s., the in. ints. dist. elev. Th. without a consp. r. mar. 3½ l. B. . fulvibarbi

H. and e. consp. bl. Th. longer than in prec. E. longer and more parallel, less strongly p.-s., ints. less elev. Th. with a consp. r. mar. 3½ l. B.$^{M.}$ . . *montanus*

3. Unic., varying from pale to deep r. E. deeply and unif. p.-s. Hi. angs. of th. sharp. 3 l. E. ! . ferrugineus

H. b. E. r., with ap. (and sometimes ba.) b. E. p.-s., the p.-s. failing at sides and ap. Hi. angs. of th. obt. 3 l. B. . . . . rufescens

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Fourth Family—SCARITIDÆ. (2 genera).

Fr. of clyp. simple. Sides of th. not strongly rounded. Red. . . . . Clivina

- - - with 2 or 3 teeth. Sides of th. strongly rounded. Brassy. . . . . Dyschirius

CLIVINA.

Unic. but varying from r. to r-b. H., pal., an., and legs, often paler. Back of h. almost impunc. E. strongly p.-s. 2¾ l. B. ! . . . . fosso

Very like prec. (? var.). H. and th. consp. darker than e. H. clearly punc. behind. E. often with a dark blotch. 2¼ l. B. . . . . collaris

DYSCHIRIUS.

1. Clyp. prod. into 3 teeth in fr. 2
   - - - 2 teeth only in fr. 3

2. E. dist. p.-s. Th. strongly rounded. Legs reddish. R.-m. of e. carried round ba. Ant. tib. with 2 well def. ext. teeth. E. el.-oval. 2 l. B.[c.] . . thoracicus
   Very like prec. E. more deeply str. Str. impunc. E. oval. 1¾ l. E.[N.E.C.] . . . . *obscurus*

3. Striation of e. reaches ap. Ant. tib. only obs. toothed on ext. mar. 4
   - - - - -. - - acutely toothed on ext. mar. . . . 7
   - - - fails near ap. Brassy b. Legs and an. r. Th. round. E. oval, p.-s. in fr. Ant. tib. with a strong ext. tooth. 1¼ l. B. . . . . globosus

4. R.-m. of e. not carried round ba. 5
   - - - carried round ba. Th. el, E. cyl., strongly p.-s. Mouth, an., and legs reddish. 1¾ l. E.[sc.] . *extensus*

5. Str. of e. not dist. punc. throughout. In. ap. spine of ant. tib. clearly shorter than outer. E. oblong oval. Mouth, legs, and an., reddish. 6
   - - - dist. punc. throughout. Ap. spines of ant. tib. about equal. Th. el. E. narrow with sub-parallel sides. 2 l. B.[c.] . . . . . politus

6. Str. of e. unif. deep, and impunc. in hi. *half.* Int. elev. 2¼ l. B.[c.] . . . . . impunctipennis
   Str. of e. not deep, and fainter near mar., punc. exc. in hi. *third.* 2¼ l. B.[N.C.] . . . . nitidus

7. R.-m. of e. not dist. carried round ba. Legs and an. dusky 8
   - - - dist. round ba. Crown strongly wrinkled, E. not broader than th., cyl., deeply p.-s. Clyp., mouth, an. and legs r. 1⅓ l. E.[c.] . . *angustatus*

8. E. cyl., deeply p.-s. in fr. fainter behind. Str. unif. punc. to behind mid. Out. teeth on ant. tib. both well def. 2 l. B.[c.] . . . . salinus
   E. oblong oval, deeply p.-s. nearly to ap. Str. more faintly punc. *from* mid. Only *lower* ext. tooth on ant. tib. well def. 1½ l. E. . . . æneus

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Fifth Family—BRACHINIDÆ (1 genus) Brachinus.

1. U.-s. of h.-b. dusky. H., th., pal., and legs, r. An. r., often marked with b. 2
   U.-s., h., th., pal. and an., clear r. E. bl., with ba. of sut. r., scarcely str. 2-3 l. E.[s.] . . . *sclopeta*

2. E. bl., spar. punc., dist. str., with elev. ints. 2½-4 l. E. crepitans
E. bl., rarely marked with r., punc., scarcely str., ints. flat. 2-3 l. E.[N.] . . . . . *explodens*

Sixth Family—LEBIADÆ. (12 genera).

1. Ba. j. of an. not longer than h. Th. very tr. and but little contr. behind 2
- - - - - - - - -. - el., much narrower than h., narrowest in fr. . . . . Odacantha
- - - - - - - - -. - not as in either of prec. . . 3
- - - - longer than h. . . . . Drypta
2. Th. br. r. . . . . Lebia
- not br. r. . . . . Masoreus
3. Pen. j. of an. tar. bil. and larger than 3rd. Claws simple Aetophorus
- - - - - - - - - -. Claws toothed . . . Demetrias
- - - - - not as in prec. H. and th. closely and unif. punc. 4
- - - - - - - - - -. - - - not closely and unif. punc. . 5
4. Ap. j. of pal. thickest behind the mid. . . Cymindis
- - - - - in fr. . . . . Polystichus
5. An. entirely pale . . . . . Dromius
- not entirely pale. Claws toothed . . . 6
- - - -. - untoothed . . . . . Lionychus
6. Mentum toothed . . . . . Metabletus
- untoothed . . . . . Blechrus

DRYPTA.

Pub., punc. H., th., and e. br. bl. Mouth, pal., legs, and an., yel. Ba. of an. partly b. E. str. 3¾ l. E.[S.] dentata

POLYSTICHUS.

Pub. punc. R. Legs, and a large dorsal mark on each of the e., paler. E. p.-s. 4 l. E.[C.] . . vittatus

ODACANTHA.

H. and th. br. gr. An. dusky, pale at ba. Legs test.; knees and tar. dusky. E. reddish test. with blackish ap., very faintly p.-s. 3 l. E.[F.] . melanura

AETOPHORUS.

H. b. Th. r. An., pal., legs, and e., test. E. faintly p.-s., with a b. cloud forked in fr. on the sut., and marked with b. on the mar. Breast b. 2½ l. E.[F.] imperialis

Demetrias.

R.-test., with the h.-b., and the sut., more or less clouded with fuscous. U.-s. test. E. faintly p.-s. Claws with 1 tooth. 2 l. E.$^{f.c.}$ . . . monostigma

Very like the prec.. The e. vary in the fuscous clouding (it is sometimes absent). Breast. b. Claws with 3 teeth. 2½ l. E. ! . . . . atricapillus

Drominus.

1. Hi. half, at least, of u.-s. of h.-b. b. Th. tr. (E. gently str.) 2

   - - - - - - - - - - not tr. (Mouth, pal., legs, and an., pale.) 4

   H.-b. reddish beneath ; often rather darker near ap. . . 6

2. E. with well def. markings. (Mouth, pal., legs, and an., pale.) 3

   - unic., blackish r. H. dark. Th. reddish with paler mar. Sides of E. very parallel. 3 l. E . . meridionalis

3. Hi. angs. of th. very obt. H. b. Th. r. E. b., each with 2 large pale spots, the ant. spot not reaching mar. of E. 2½ l. B. ! . . quadrimaculatus

   Very like prec. Smaller. Hi. angs. of th. hardly obt. Ant. pale spot on e. touches the mar. 1¾ l. E. . quadrisignatus

4. E. not unif. blackish r. (H. b. Th. reddish. E. gently str.) 5

   - unif. pit. Very like *meridionalis*. An. longer and stouter. E. longer, with less parallel sides. 3 l. B. ! agilis

5. E. b., each with 2 well def. pale spots, of which the hi. is smallest. The ant. spot sometimes fills ba. 1¾ l. B. ! . . . . . quadrinotatus

   - pale in fr., dark behind ; often an obsc. pale spot near ap. ; or unif. brown ; or sut. entirely dark. 1⅝ l. B.$^{c.}$ . . . . . nigriventris

6. Legs, pal., and an. pale. E. with dist. markings. (H.-b. Th. r.) 7

   - - - - -. - with no dist. markings. (H. and th. reddish.) 8

   Pal. dark brown. H. b. Th. r., about as broad as long. Legs and an. test. E. pale, often darker near sut. 1½ l. B. ! . . . . melanocephalus

7. A pale cloud at ba. of each of the obs. str. e. The in. mars. of these pale marks meet on sc. and run very obl. apart backw. Rest of e. dark, exc. round ap. of sut. 1¾ l. E.$^{s.c.}$ . . . . vectensis

   Very like prec. An. longer. Th. more el. E. longer and more parallel. In edges of pale clouds on fr. of e. more parallel. Ap. of e. entirely pale 1¾ l. E.$^{r.}$ sigma

8. E. pale, dusky on sut. and behind. H. and th. about equally long and broad. E. parallel, dist. p.-s 1¾ l. B. ! . . . . . linearis

Very like prec. H. consp. longer and narrower than th. E. broadest behind, obs. str. 2 l. E.[r.] . longiceps

Blechrus, Metabletus, and Lionychus.

1. E. with pale spots 2
- b., very ind. p.-s., without a dist. impr. on the disc . 3
- brassy brown, faintly but dist. p.-s., a consp. impr. on the disc of each. An., pal. and legs, blackish. 1¾ l. B. ! . . . . . M. foveola

2. E. brown brass, obs. str., with a pale hum. spot; r.-m. pale. H. and th. b. An. dark, with ba. j. gen. r. Legs r., fem. dark. 2 l. E. . . M. obscuro-guttatus

Shining b. Ba. j. of an. r. E. dist. str. on disc., each with a pale hum. and ap. spot, that at ap. often obs. 1¾ l. E.[s.c.] . . . . . L. quadrillum

3. B. Tib., and often ba. j. of an., reddish. Th. very tr., shorter than h. 1¼ l. E. . . M. truncatellus

-. Th. not strongly tr., about length of h. 1 l. E. ! B. maurus

Lebia.

1. E. unic. gr. or bl., p.-s., ints. punc. H. gr. or bl., punc. Th. r. An., tar., and pal., dusky . . . 2

E. b., with a pale spot. Mouth, an., th., and legs, r. . 3

E. r.-yel., with b. marks forming a +. H. b., punc. Th. r. Sc. b. Legs r. Knees and tar. dusky. Breast b. An. dusky, ba. js. r. 3 l. B. . crux-minor

2. Breast and sc. b. Fem. and tib. partly b. Ba. j. of an. r. 3¼ l. E. . . . . cyanocephala
- fem., tib., sc., and ba. js. of an. r. Ints. less dist. punc. than in the prec. 3¼ l. B. . . chlorocephala

3. The spot on e. ap. H. r. Breast b. E. faintly p.-s. Ints. obs. punc. 2¼ l. E.[s.] . . . *hæmorrhoidalis*
- - - - hum. H. b. Breast r. E. strongly str. Ints. almost glab. 2½ l. E. . . . . *turcica*

Cymindis.

H. b. An. pal. and legs r. H spar. punc. Th. r., spar. punc. on. disc, thickly on sides. E. b., deeply str.; with mar., & hum spot, r.; ints. spar. punc. 4¾ l. E. axillaris

H. and th. pit.. deeply and unif. punc. E. pit., ba. r., finely p.-s., ints. thickly and deeply punc. An. pal. and legs r. 4¼ l. B.[M.] . . . vaporariorum

Masoreus.

Reddish, much clouded with fuscous. Mouth, pal, an. and legs r. E. finely p.-s., ints. glab. 2½ l. E.[s.c.] Wetterhali

Seventh Family—CHLÆNIIDÆ. (7 genera).

1. An. set. with long stout bristles. Th. and e. not pub. Loricera
   Not with the 2 characters of the prec. Th. and e. pub. 2
   - - - - - - - -. Not pub. Th. broadest at ba. . Oödes
   - - - - - - - -. - -. - not broadest at ba. . . . 4
2. Ap. j. of pal. consp. hatchet-shaped. (Eyes prominent). Panagæus
   - - - - not consp. hatchet-shaped . . . 3
3. Th. very much contr. behind, dull pale r. . . Callistus
   - not as in prec. . . . . Chlænius
4. H. and th. unif. punc. Ap. j. of pal. hatchet shaped . Licinus
   - - - not dist. punc. Ap. j. of pal. not hatchet shaped Badister

Loricera.

Brassy gr., rarely reddish. Pal. tib. and tar. r. E. p.-s., with 3 consp. imprs. on the 3rd int. 3¾ l. B. ! pilicornis

Panagæus.

B. Th. strongly tr. E. each with 2 very broad, tr., r. fasc. (not reaching the sut.) often joined on the mar. 3¼ l. E.[F.] . . . . crux-major

Very like the prec.; smaller, & with th. not tr. 2¾ l. E.[S.] quadripustulatus

Callistus.

H. bl. or gr. Th. and pal. r. E. r.-yel; shoulds., and 2 bands (1st. not reaching sut.) joined on mar. of e., b. Legs test., marked with b. An. r. at ba. 3¼ l. E.[S.] . . . . . lunatus

Chlænius.

1. E. unic. gr. (H. and th. cop. or gr.) 2
   Th., e., legs, and an., unic., dull b. H. brighter. Th. much punc. E. str., ints punc. 5 l. E. I.[F.] . *holosericeus*
   - gr. E. gr., with yel. mar. and ap. Mouth, pal., an. and legs, yel. E. finely str., ints. punc. 5 l. E. vestitus
2. Th. broadest *at* mid., hi. angs. very obt. No more than 1st j. of an. r. Legs r., often more or less pit. 5 l. B. ! . . . . . nigricornis
   - - *in fr. of* mid., its hi. angs. hardly obt. Pal. and ba. 3 js. of an. r. Legs r., often more or less brown. 5 l. E.[S.C.] . . . . *Schranki*

Oödes.

B. H. and th. smooth. Th. very massive. E. finely p.-s., str. not reaching ba. 4¼ l. E.[F.] . helopioides

(To be continued.)

PHYTOLOGY.

THE EDIBLE WILD FRUITS OF SCOTLAND.

By F. BUCHANAN WHITE, M.D., F.L.S.

(Continued from p. 28.)

THE remaining plants which have any claim to be included among those that produce in this country edible wild fruits aspire more or less to the dignity of forest trees. Most notable of these are the graceful Beech and the sturdy Oak—often indeed termed the king of the forest—but we would rather bestow that title on the Scots Fir. Let the Oak—noble tree that it is—hold sway over the forests of the south; but of all the trees in Scotland's woods the native Pine is the undoubted chief. See him standing amidst the crags of a rocky hill on a glowing summer day, his thick and blue-green crown shining out clear against the glorious azure sky, and his sturdy and rugged stem planted firmly amongst the cold grey rocks, and lighting them up with its warm redness; or see him dead, but still a king, stretching aloft his gaunt and whitened limbs through the weird-like mists which roll down the corries, and trail, like the funeral procession of some hero of old, along the mountain side.

But to proceed with the proper subject of this paper.

The Beech *(Fagus sylvatica* L.*)*. Though not a native, the Beech is yet so extensively planted in our woods, and is withal so beautiful a tree, that I think it should not be passed by without notice. Though we "of the north countrie" do not know the Beech in its full glory, yet we have sufficiently large specimens to be able to appreciate the combination of strength and gracefulness that is exhibited by this tree. Its smooth and polished stem, its spreading branches, here spiring up towards heaven, there feathering in sweeping curves towards the ground, and its delicate foliage, which, especially in spring, is unsurpassed for colour and texture, all unite to make the Beech a

most picturesque and lovable tree. Nor has it been left unsung by the poets. Thus Wordsworth—

> "Huge trunks! and each particular trunk a growth
> Of intertwisted fibres, serpentine
> Upcoiling, and invet'rately involved."

But especially have the poets referred to the smooth and silvery bark, which almost seems made on purpose to tempt the love-sick swain to inscribe thereon his mistress's name. And this is no recent practice, for the old poets, even Virgil and Ovid, allude to the practice in their days,

> "—— Crescent illæ; crescetis amores."
> "As the letters of our names increase, so may our love;"

referring to the increase of size in the letters as the bark of the tree grows. The same idea is expressed by Ovid, and in later times by Thomson and others.

The fruit or beech-mast, when eaten raw, is said to produce giddiness and headache, but dried and ground makes a wholesome bread. Sometimes the nuts have been used as a substitute for coffee, and the oil therein contained has been eaten instead of butter, and also burnt in lamps. Many animals are very fond of the mast.

The wood is used for various purposes; though not very lasting when exposed to the air, it is exceedingly durable under water, and is therefore employed for making piles for bridges.

The Oak (*Quercus robur* L.); *An Darroch* in Gaelic. Celebrated a tree as the Oak is, it is only by courtesy that we can admit it among those bearing *edible* wild fruit. In cases of famine it is possible that the acorns (as the fruit of this tree are called) may be serviceable, and it has even been recommended to use them as coffee, or fresh like chestnuts, or ground and made into bread. The acorns produced by some other species of Oak, are far more palatable, and are actually used as food in Italy, North America, and elsewhere.

To enter into an account of all the other uses of the Oak would occupy too much time. No tree has been perhaps more celebrated both in verse and prose, but we in Scotland are scarcely qualified, from our local experience, to appreciate fully the tree, regarding which even Cowper the poet wrote—

> It seems idolatry with some excuse,
> When our forefather Druids in their Oaks
> Imagined sanctity.

Some Oak trees have trunks from 60 to 100 feet in length and 70 feet in girth near the base, and contain 1,000 cubic feet of timber. There are, I think, no great number now of really wild Oaks in Scotland (at least in the north), though formerly they were abundant.

The Hazel (*Corylus avellana* L.); Gaelic, *An Caltain.* Both the tree (of which there are several cultivated varieties) and its nuts are too well known to need description. The tree has, however, a reputation of another sort, for from its twigs were wont to be made divining rods, by the occult virtue of which it was supposed that not only subterranean treasure, minerals, and water might be detected, but those guilty of murders and other crimes pointed out. In the Highlands, it is said, this tree is considered one of ill omen, but two nuts naturally united together—a kind of vegetable Siamese twins—are considered to be an amulet of great power.

The kernels of the nuts are, as is well known, very palatable, and are sometimes converted into flower and made into biscuits. The wood is useful for making charcoal and other purposes.

The Yew (*Taxas baccata*); Gaelic, *An t'iuchar.* This tree, so interesting in many respects, ought perhaps scarcely to be included among those producing edible fruits, for though the beautiful red berries, contrasting so well with the sombre green foliage, are edible, they are neither very palatable nor of any use as an article of food. Yews are now rarely met with in this country in a wild state, though that they were at one time more numerous in that condition the Gaelic names of several places testify. Perthshire has the credit of having the remains of what was once one of the largest, and at the same time one of the oldest Yew trees in Britain. I mean of course the Fortingal Yew. In Pennant's time the trunk of this tree, which is still alive and vigorous, but in a disjointed condition, measured 56 feet in circumference. Its age has been computed at 2500 years. Just for a moment think of the events which have happened in this and other countries since this venerable tree put up its first seed-leaves. Possibly if it could speak it might enlighten us regarding the origin and object of the mysterious cups and rings that the ancient inhabitants of this country carved upon so many stones; it might tell us when and how that ancient people were driven away or absorbed by the race which now occupies the Highlands; it might make clear all the ancient mythology of the land, and tell us about the worship of those gods, Bel and Annat and Neth—whose names

vox et præterea nihil—names and nothing else—still remain in the land; it might tell us of the old Romans, who doubtless often rested under its spreading branches and gazed in admiration on its immense stem; it might tell us when the dark shades of Paganism were dispersed by the light of the new and true faith, and when reversing the usual order of things, the churchyard was made round the Yew, and not the Yew planted in the church-yard; it might tell us—but enough! Twenty-five centuries have passed over the head of this venerable tree; the suns of twenty-five hundred summers have warmed its old branches, and the snows of twenty-five hundred winters have there found a resting place.

The Juniper (*Juniperus communis* L.); Gaelic, *An t'aiteal.* In some parts of our Highlands, the Juniper is a common plant. The berries are not much used now in this country, I believe; but formerly they were sometimes collected and exported for flavouring Gin or Juniper water. (It may not be out of place to allude to the origin of the word "Gin," which is said to be a contraction of "Geneva," and that again a corruption of Genevre, the French for a Juniper-berry.) This liquid is properly a malt liquor, distilled a second time with the addition of Juniper-berries. Formerly these were added to the malt in grinding, but now they are said to be omitted entirely, and oil of turpentine used instead. In past ages (and more recently in Norway and Sweden) sprays of juniper were used for strewing over floors instead of rushes, on account of their fragrancy, and also from being supposed to promote sleep, as well as from being efficacious in driving away domestic insects. In Germany the berries are bruised in sauce and eaten with the pork of the wild-boar, while in Lapland the inhabitants drink infusions of the berries, after the manner of tea—a custom not altogether unknown in Scotland within the last hundred years, and even recommended as a more wholesome beverage than that obtained from the Chinese plant! Moreover it is said that a pleasant diuretic liquor may be obtained from the bruised berries. One or two ripe berries will not be found unpalatable.

These, then, are all of what can in any degree be considered edible wild fruits in Scotland.

NOTE ON SOME RECENTLY DESCRIBED SCOTTISH FUNGI.

FOR the last fifty years or longer Scotland seems to have always had at least one good student of mycology. Pre-eminent among these were Johnstone, Carmichael, Jerdon, and, the greatest of all, Greville. Each of these has made known to us the Fungi of a more or less wide district, and left behind them indelible records of their industry and research. Still there remains a great deal to be yet discovered among the Fungi of Scotland, and that searchers are not wanting is very apparent from an analysis of a paper on British Fungi, published by Messrs. Berkeley & Broome, in the January number of the *Annals and Magazine of Natural History*. In this paper somewhere about 100 new British Fungi are noticed, and of these more than half the number were found in Scotland, besides a few others found almost simultaneously in England and Scotland. In addition to these some other new Scottish Fungi have been recorded in the columns of our own (*vide* the interesting "List of the Fungi of Morayshire" and other notes, by the Rev. J. Keith and others) and other Magazines. Altogether, this may be considered as a very encouraging state of matters, and none the less so when we find that it is chiefly to the energy of four botanists that these discoveries are due, and that the district in which they have been made is comparatively a small one, and included in five counties—Forfar, Kincardine, Aberdeen, Banff, and Moray. The chief discoverers are the Rev. J. Stevenson (Glamis), Rev. M. Anderson (Menmuir), Rev. J. Fergusson (Fern, late of New Pitsligo), and the Rev. J. Keith (Forres). Though in the paper referred to the localities of the new species are given (by a not unnatural mistake) as the districts where the respective discoverers reside, yet we understand that while in some cases these are the correct localities, in others the plants were found in quite another part (even 50 or 60 miles distant) of the district we have indicated. This, however, is a matter of little importance at present, and will, no doubt, be rectified when the Floras of the various parts of the district are published. One thing is evident and that is, that we in other parts of Scotland must begin to show a little more activity, unless we wish our friends in the north-east to carry off all the honours of mycological research.

The following are the species mentioned (and their finders): those with * were new to science. By the Rev. T. Stevenson:—*Agaricus (Omphalia) philonotis* Lasch.; *A. (Entoloma) resutus* Fr.; *A. (Hytholoma) silaceus* P.; **A. (Collybia) Stevensoni* B. and Br.; **Cantharellus Stevensoni* B. and Br.; **Lentinus scoticus* B. and Br.; *Polyporus floccopus* Rostk.; *P. trabeus* Fr.; *P. callosus* Fr.; **P. collabefactus* B. and Br.; **P. blepharistoma* B. and Br.; **Hydnum Stevensoni* B. and Br.; **Radulum epileucum* B. and Br.; *Grandinia crustosa* P.; **Kneiffia subgelatinosa* B. and Br.; **Leptothyrium pictum* B. and Br.; **Peronospora interstitialis* B. and Br.; **P. rufibasis* B. and Br.; **Cylindrosporium rhabdospora* B. and Br.; *Septoria hyperici* Desm.; *S. stachydis* Desm.; **Helotium sublateritium* B. and Br.; *Eustegia arundinacea* Fr. (Mr. Stevenson has also found the following, which however had previously occurred elsewhere in Britain:—*Polyporus Rennyi* B. and Br.; *Protomyces menyanthes* De By.; and *Peziza ciborium* Fr.) By the Rev. M. Anderson:—*Radulum tomentosum* Fr.; **Penicillium megalosporom* B. and Br.; **Puccinia Andersoni* B.

and Br. ; *P. senecionis* Lib. ; * *Uromyces concomitans* B. and Br. ; *Protomyces macrosporus* Ung. ; *Helotium tuba* Fr., v. *ochracea*. By the Rev. J. Fergusson :—*Agaricus (Lepiota) cinnabarinus* Fr. ; *Hyphelia rosea* Fr. ; * *Cylindrosporium niveum* B. and Br. ; * *Puccinia Fergussoni* B. and Br. (on *Viola palustris*) ; * *P. tripolii* B. and Br. (on *Aster tripolium*) ; *Protomyces microsporus* Ung. (on *Ranunculus Ficaria*) ; * *P. chrysosplenii* B. and Br. (on *Chrysosplenium oppositifolium*) ; * *P. Fergussoni* B. and Br. (on *Myosotis*) ; *Peziza rubella* P. ; * *Helotium melleum* B. and Br. ; * *Psilopezia myrothecioides* B. and Br. ; * *Patellaria Fergussoni* B. and Br. By the Rev. J. Keith (Forres) :—*Boletus sulfureus* Fr. ; * *Polyporus Keithii* B. and Br. ; * *Radulum deglubens* B. and Br. ; *Cortinarius traganus* Fr., var. *finitimus* Weinm. ; *Hysterium arundinaceum* Schr., var. *gramineum*. Other Scottish species mentioned, with or without special indication of the finders, are :—*Agaricus (Hebeloma) Bongardii* Weinm. (Culbin sandhills—G. Norman) ; * *Radulum corallinum* B. and Br. ; * *Leptostroma glechomatis* B. and Br. ; *Peziza fusispora* B., var. *scotica* Raben. (Berwick—Dr. Johnstone ; more recently by the Rev. Messrs. Anderson and Ferguson) ; and *P. strobilina* Fr. *Vibrissea Margarita* Buchanan White, described in this magazine (*Scottish Naturalist* ii. 218), is also mentioned in the list.—F. Buchanan White.

A SCOTTISH CRYPTOGAMIC SOCIETY AND FUNGUS SHOW.

At the Fungus Show, held last September in Aberdeen, there was a committee appointed (as we intimated at the time) to organize a Scottish Cryptogamic Society. This committee consisted of Professors Dickie, Nicol, and Ogilvie, the Rev. Messrs. Anderson, Fergusson, and Stevenson, and Dr. Buchanan White (convener). It is now proposed to have a meeting on April 16th, at 2 p.m., in the Rooms of the Perthshire Society of Natural Science, St. Ann's Lane, Perth, to formally inaugurate the Society, adopt a Constitution, and elect office-bearers, as well as make some of the necessary arrangements for the Show to be held in Perth in September next. We trust that as many of those interested in Cryptogamic Botany as possible will attend this meeting, and that those who cannot attend will intimate their desire to become original members to any member of the above committee before the day of meeting, as it is desirable that the Society should have a good start. Many persons may, however, reasonably object to become members without knowing what the objects of the Society are, and to what the proposed laws bind the members. Space does not permit us to give here the proposed Constitution in full (and besides everyone desiring to become a member will receive a printed copy of the laws when adopted) ; but we may mention that the objects of the Society is the promotion of Cryptogamic Botany by (1st) mutual assistance, and (2d) an Annual Conference and Show (especially of Fungi) ; and that while it is hoped that the annual Show (which will be held each year in a different town) will defray most of the expenses of the Society, the annual subscription (if it be necessary to levy one at all) will not exceed

2s. 6d. from each member per annum. From original members no entry money will be required. Ladies can be members.

We shall be glad to hear as soon as possible from any one desirous of joining the Society.

Potamogeton polygonifolius, var. linearis Syme M.S., in Roxburghshire.—This peculiar long-leaved variety (some of the linear submerged leaves are upwards of two feet in length), recently determined by Dr. Syme, grows plentifully in an old pond near Kelso.* As far as I am aware, Galway and Killarney in Ireland are the only other British localities where it has been found hitherto. Dr. Syme says, "It differs from both *P. sparganifolius* and *P. variifolius* (the two species which it most resembles) in having the stem *unbranched, i.e.*, there are no side shoots without flowers, and having nothing but submerged leaves, and the peduncles and flowers quite similar to those of ordinary *polygonifolius.*" I may here mention that *P. nitens* Web. is plentiful in the Tweed in this neighbourhood. It differs somewhat in appearance from the Tay plant, to judge from a dried specimen belonging to Mr W. B. Boyd, which had been gathered by Mr. J. Sim in the Tay at Perth Bridge, by having the leaves *more wavy* and *broader*, and often quite glossy, as if they were varnished. There is a much "drawn" (caused, I believe, by the rapidity of the current) form of *P. perfoliatus*, growing plentifully in the dam above Selkirk, near Philipshaugh Saw-Mill, which has a general resemblance to the Tweed form of *P. nitens.* The following remark about *P. nitens* is from the "Students' Flora"—"Foreign specimens (authentically named) approach *P. perfoliatus.*"—ANDREW BROTHERSTON, Kelso.

Ulleriore, a Water-Weed.—"Moreover, Moray contains a lake of fresh water denominated Spynie, greatly frequented by swans, in which is a certain uncommon herb with which the swans are greatly allured; we call it 'the ulleriore'; it is moreover of this kind, that when it hath fully established its roots, it spreads itself so widely that, in my memory, it hath extended its basis so far as to have rendered five miles of the lake itself of Spynie, where salmon formerly abounded, altogether shallow." The above is a translation given in the "Agricultural Survey of the Province of Moray," from the History of Scotland of John Leslie, Bishop of Ross, 1578. I do not find any reference to the quotation in Mr. Gordon's "Collectanea for a Flora of Moray" of 1839 (where however Spynie is frequently mentioned), nor is there anything in the list that I can fix upon or suggest as the plant meant.—F. M. WEBB, in *Journal of Botany.*

[Can any of our readers throw a light on the subject?—ED. *Sc. Nat.*]

CORRECTION:—*Breadalbane Plants*—Sc. Nat. iii. p. 19.—The altitude attained by *Pyrola minor* on Ben Lawers is 3,300, and not 2,300 as inadvertently stated. *Anthriscus abortivus.*—*l.c.*, p. 20.—I was wrong in announcing that I had found this, as I have since shown a specimen to Dr. Boswell Syme, who tells me that the variety recorded is not referable to *Anthriscus abortivus* Jord., which is much more markedly different from *A. sylvestris.*—F. BUCHANAN WHITE.

* *P. obtusifolius* M. and K. grows in the same pond.

Bryological Notes.—The investigation of the Bryology of the north-east of Scotland has been prosecuted with much vigour and success during the past year. New men are rising up and doing excellent work in places hitherto almost or totally unexplored. For example, Mr. James Grant of Lossiemouth, who is so well known in connection with the fossils of the Elgin Sandstone, and who has lately found an apparently new and remarkable fossil reptile in his neighbourhood, spent some time last summer among the mosses about Tomintoul, in Banffshire, where mountain limestone forms so large a proportion of the geological formation. Mr. Grant directed special attention to such mosses as might be expected to occur in a region of this character, and his short stay there has been prolific of good results. In several places he found *Seligeria pusilla*, a moss always difficult to find because of its minuteness, and always interesting because of its comparative rarity, there being few counties in Scotland in which it has hitherto been observed. In the same quarter Mr. Grant detected a yet rarer species, viz., *Anodus Donianus*, which is even more diminutive, and more easily overlooked owing to its more scattered, almost gregarious, habit of growth. As in the "Scottish Naturalist" (II., 173), I had indicated the probability of *Anacalypta latifolia* growing in the Tomintoul district, I was delighted to receive from Mr. Grant very fine specimens of this species which he had gathered there. In Scotland the localities for this plant are being rapidly increased. In addition to Mr. Grant's, Dr. Buchanan White and Mr. Roy of Aberdeen found another in Glentilt last summer. Among Mr. Grant's Tomintoul gatherings we were glad to see specimens of *Thuidium abietinum* and of genuine *Brachythecium salebrosum*. This latter has hitherto been so much confounded with *B. Mildeanum* and *B. glareosum* that the old stations given for it are almost always unreliable. It may be mentioned that, while about Tomintoul, Mr. Grant made *Trichostomum glaucescens* a special object of search, but did not succeed in finding it; but as there are already three stations for it in the north-east of Scotland, I cannot think it can be confined to these.—J. Fergusson, Fern, by Brechin.

Botanico-Geology.—In the part recently issued of the Edinburgh Botanical Society's Transactions (Vol. XII., Part I.), is an account of an excursion to Clova by Professors Balfour and Geikie, in which some remarks are made by the latter on the mineralogy of the rocks on which certain of the rarer alpines occur. It was thought that there might prove to be some special conditions in the mineralogical constituents of the rocks, whereby it might appear why these plants (*Oxytropis campestris*, *Lychnis alpina*, &c.) are so very local in their British distribution. It was found, however, that there was nothing by which this could be accounted for in that respect; and it is suggested that the cause is more probably a meteorological one—the situation, altitude, and breadth of the Grampian range affording in that district the conditions necessary for the survival of these plants, which find their proper home in the Alps and in the Arctic regions. A good suggestion is thrown out, viz., that botanists in this country should do as some of the Scandinavian botanists are doing, namely, examine the contents of our older peat-mosses for the remains of northern plants no longer living in this country. We daresay insect-remains may also be found.—F. Buchanan White.

INSECTA SCOTICA.

THE LEPIDOPTERA OF SCOTLAND.

(Continued from p. 32.)

EDITED BY F. BUCHANAN WHITE, M.D., F.L.S.

CHI L. Common. Agrestal, nemoral. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ♀ o
WEST. Solway Clyde ♀ West-Ross ♀

LAT. 54°40″-57°50″. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. August-September. LARVA. April-June. FOOD-PLANT. Shrubs and low plants.

The ab. *olivacea* Stph. (front-wings more or less infuscated with greyish-olive) is reported from Forth and Tay, but its headquarters are the north of England.

HECATERA Gn.

SERENA F. Not common. Agrestal.

DISTRIBUTION—EAST. Tweed Forth Tay o o o o o
WEST. ♀ ♀ o o o

LAT. 55°30″-56°30″. RANGE IN EUROPE. Central and southern. TYPE. Centro-meridional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. May-August. FOOD-PLANT. Low plants.

DIANTHŒCIA Boisd.

NANA Roth. (1776); *conspersa* Esp. (1788?). Not uncommon. Agrestal, pascual.

DISTRIBUTION—EAST. ♀ Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde ♀ o o

LAT. 54°40″-57°40″. RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. July-September. FOOD-PLANT. Campion *(Silene* and *Lychnis.)*

CUCUBALI Fuessl. Not uncommon. Agrestal, pascual, palustral.

DISTRIBUTION—EAST. Tweed Forth Tay ♀♀ Moray ♀♀ o o
WEST. Solway Clyde ♀♀ West-Ross o

LAT. 54°40″-57°40″. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June. LARVA. July-September. FOOD-PLANT. Campion *(Silene* and *Lychnis).*

CAPSINCOLA Hb. Common. Agrestal and pascual.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀♀ [Orkney] o
WEST. Solway Clyde ♀♀ ♀♀ o

LAT. 54°40″-[59°10″.] RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. July-September. FOOD-PLANT. Campion *(Silene* and *Lychnis).*

CARPOPHAGA Bkh. Not common. Agrestal and pascual.

DISTRIBUTION—EAST. ♀♀ Forth Tay ♀♀ o o o o
WEST. Solway Clyde ♀♀ o o

LAT. 54°40″-56°30″. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE.—IMAGO. June, July. LARVA. August, September. FOOD-PLANT. Campion *(Silene* and *Lychnis).* Some of the Scottish specimens are much darker than the English form.

EPUNDA Dupon.

LUTULENTA Bkh. Rare or local. Pascual and agrestal.

DISTRIBUTION—EAST. ♀♀ [Tay] Dee Moray o o o
WEST. ♀♀ ♀♀ o o o

LAT. 57°57″-57°40″. RANGE IN EUROPE. Britain, Germany, France, Switzerland, &c. TYPE. Central. TYPE IN BRITAIN. British (?)

TIME OF APPEARANCE—IMAGO. September, October. LARVA. October-May. FOOD-PLANT. Low plants.

NIGRA Hw. Local. Pascual, agrestal, nemoral.

DISTRIBUTION—EAST. ♂ ♂ Tay Dee Moray ○ ○ ○
WEST. Solway [Clyde] ♂ ♂ ○

LAT. 54°40″-57°40″. RANGE IN EUROPE. Britain; central and southern Germany; France, Switzerland, and South Europe. TYPE. Occidento-meridional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. September, October. LARVA. October-June. FOOD-PLANT. Low plants.

VIMINALIS F. Local. Nemoral. Ascends to about 1000 feet.

DISTRIBUTION—EAST. ♂ Forth Tay ○ ○ ○ ○ ○
WEST. ♂ Clyde ♂ ○ ○

LAT. 55°40″-56°40″. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. July, August. LARVA. May, June. FOOD-PLANT. Willow.

The var. *obscura* Stdg. (very much darker) is reported from north England, and occurs in Perthshire as an aberration.

MISELIA Stph.

OXYACANTHÆ Hb. Common. Agrestal and nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♂ ○ ○
WEST. Solway Clyde ♂ ○ ○

LAT. 54°40″-57°40″. RANGE IN EUROPE. Central (South Sweden, &c.) TYPE. Central. TYPE IN BRITAIN. British.

TIME OF APPEARANCE.—IMAGO. September-October. LARVA. May, June. FOOD-PLANT. Sloe and hawthorn.

A dark, almost unicolorous variety (*Capucina* Mill.) occurs in England, but I have not seen Scottish specimens of it.

DICHONIA Hb.

APRILINA L. Common. Nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ○ ○ ○
WEST. Solway Clyde ♂ ♂ ○

LAT. 54°40″-57°40″. RANGE IN EUROPE. East-central (to South Sweden). TYPE. Central. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. September, October. LARVA. June. FOOD-PLANT. Oak.

PHLOGOPHORA Ochsen.

METICULOSA L. Not uncommon. Agrestal and pascual.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀♀
Orkney ♀♀
WEST. Solway Clyde Argyle ♀♀ ♀♀

LAT. 54°40″-59°10″. RANGE IN EUROPE. Southern and central (to S. Sweden). TYPE. Meridiono-central. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. September-June (two broods?). LARVA. July-April. FOOD-PLANT. Low plants.

EUPLEXIA Stph.

LUCIPARA L. Locally common. Nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀♀
Orkney ♀♀
WEST. Solway Clyde Argyle ♀♀ ♀♀

LAT. 54°40″-59°10″. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. September, October. FOOD-PLANT. Low plants, bracken, &c.

AMPHIPYRIDÆ.

AMPHIPYRA Ochsen.

TRAGOPOGINIS L. Common. Hortensal and agrestal.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀♀ o o
WEST. Solway Clyde ♀♀ ♀♀ o

LAT. 54°40″-57°40″. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. August, September. LARVA. April-June. FOOD-PLANT. Low plants.

A. pyramidea L. ought, from its European distribution, to occur.

(To be continued.)

THE COLEOPTERA OF SCOTLAND.

(Continued from p. 40.)

EDITED BY D. SHARP, M.B.

NITIDULUS Grav. Abundant.

DISTRIBUTION—EAST. Tweed Forth Tay Dee ♀ o o o
WEST. Solway Clyde ♀ o o

COMPLANATUS Er. Not common.

DISTRIBUTION—EAST. ♀ Forth o o o o o o
WEST. Solway Clyde o o o

TETRACARINATUS Block. Lowland, highland. Abundant.

DISTRIBUTION—EAST. ♀ ♀ ♀ Dee Moray ♀ ♀ ♀
WEST. Solway Clyde ♀ ♀ ♀

FAIRMAIREI Pand. Very rare (?).

DISTRIBUTION—EAST. o o o Dee o o o o
WEST. o o o o o

HAPLODERUS Kr.

CÆLATUS Grav. Lowland. Rare.

DISTRIBUTION—EAST. o Forth Tay o o o o o
WEST. o o o o o

ANCYROPHORUS Kr.

OMALINUS Er. Riparial. Common.

DISTRIBUTION—EAST. ♀ Forth ♀ ♀ o o o
WEST. Solway ♀ o o o

LONGIPENNIS Fair. Riparial. Not common.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway ♀ o o o

TROGOPHLŒUS Kr.

ARCUATUS Steph. Riparial. Local.

DISTRIBUTION—EAST. Tweed o o o o o o o
WEST. Solway o o o o

BILINEATUS Steph. Lowland. Common.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway ♀ o o o

ELONGATULUS Er. Lowland.

DISTRIBUTION—EAST. o Forth o o o o o o o
WEST. Solway o o o o

FULIGINOSUS Grav. Lowland. Rare.

DISTRIBUTION—EAST. Tweed o o o o o o o
WEST. Solway o o o o

CORTICINUS Grav. Lowland.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

PUSILLUS Grav. Lowland. Not common.

DISTRIBUTION—EAST. Tweed Forth ♀ Dee ♀ o o o
WEST. Solway ♀ o o o

TENELLUS Er. Riparial. Rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

THINOBIUS Kr.

MAJOR Kr. Riparial. Very rare.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o o o o o

LONGIPENNIS Heer. Riparial. Common.

DISTRIBUTION—EAST. Tweed Forth Tay ♀ Moray o o o
WEST. Solway ♀ o o o

BRUNNEIPENNIS Kr. Riparial. Very rare.

DISTRIBUTION—East. o o Tay o o o o o
West. o o o o o

LINEARIS Kr. Riparial. Scarce.

DISTRIBUTION—EAST. ♀ Forth Tay o o o o o
WEST. Solway ♀ o o o

SYNTOMIUM Kr.

ÆNEUM Müll. Lowland. Not common.

DISTRIBUTION—EAST. Tweed Forth ♀ Dee Moray o o o
WEST. Solway ♀ o o o

COPROPHILUS Kr.

STRIATULUS Fab. Lowland. Scarce.

DISTRIBUTION—EAST. Tweed Forth ♀ Dee ♀ o o o
WEST. Solway ♀ o o o

DELEASTER Kr.

DICHROUS Grav. Riparial. Very rare.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. Solway o o o o

The Scottish specimens of this species differ considerably from those found near London.—D.S.

ANTHOPHAGUS Redt.

ALPINUS Payk. Highland, alpine. Local.

DISTRIBUTION—EAST. Tweed o Tay Dee o o o o
WEST. o ♀ o o o

TESTACEUS Grav. Lowland. Common.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway Clyde o o o

GEODROMICUS Redt.

NIGRITA Müll. Near streams and waterfalls. Local.

DISTRIBUTION—EAST. Tweed ♀ ♀ Dee Moray o o o
WEST. Solway ♀ o o o

GLOBULICOLLIS Mann. Highland, alpine. Rare.

DISTRIBUTION—EAST. o o Tay Dee Moray o o o
WEST. o Clyde o o o

LESTEVA Kr.

LONGÆLITRATA Gæze. Lowland, highland. Abundant.

DISTRIBUTION—EAST. ♀ Forth Tay Dee Moray ♀ ♀ Shetland
WEST. Solway Clyde ♀ ♀ ♀

SHARPI Rye. Highland. Local.

DISTRIBUTION—EAST. o Forth Tay Dee Moray o o o
WEST. Solway Clyde o o o

PUCESCENS Mann. In moss about streams and waterfalls. Scarce.

DISTRIBUTION—EAST. Tweed ♀ Tay Dee Moray o o Shetland
WEST. Solway Clyde o o o

PUNCTATA Er. Lowland. Not common.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway ♀ o o o

MUSCORUM Duv. Lowland. Rare.

DISTRIBUTION—EAST. o o o o Moray o o o
WEST. Solway Clyde o o o

ACIDOTA Kr.

CRENATA Fab. Lowland, highland, alpine. Local.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway o o o o

CRUENTATA Mann. Lowland. Very rare.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway o o o o

OLOPHRUM Kr.

PICEUM Gyll. Lowland, highland. Common in wet moss.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o Shetland
WEST. Solway ♀ o o o

FUSCUM Grav. Lowland. Local.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. Solway o o o o

CONSIMILE Gyll. Highland. Very local.

DISTRIBUTION—EAST. o o o Dee o o o o
WEST. o o o o o

LATHRIMÆUM Kr.

ATROCEPHALUM Gyll. Not common.

DISTRIBUTION—EAST. Tweed Forth ♀ Dee ♀ o o o
WEST. ♀ ♀ o o o

UNICOLOR Stph. Common.

DISTRIBUTION—EAST. Tweed Forth ♀ Dee Moray o o o
WEST. Solway ♀ o o o

(To be continued.)

ZOOLOGY.

ANIMAL PSYCHOSIS.

By the Rev. J. Wardrop.

LOOKING on the psychological manifestations of animals and of man, we are at once struck by the intense similarity of the two series. We have to go far and wide over the field of man's mental nature before we find in him anything that we wholly miss in his dog. Between the Asiatic and his elephant, where is the difference? What do we discern in the two-legged member of the pair that is quite exclusively a prerogative of humanity—except, perhaps, the matter of dominion or a certain mere superiority in adroitness and craft, which dominion and superiority are themselves sometimes made sufficiently questionable?

This similarity extends to the material organism by which the mental series in both cases is ministered to or from which it arises, as the case may be. The question then presents itself, is there really any specific uninterchangeable difference between the two classes of phenomena? Or, allowing there may be some difference in degree, are the kinds of powers, competent to the two orders of life, identical? The question, always interesting on the ground of mystery, has of late become urgent on the ground of scientific needs. In its settlement, the interests of the most thorough-going of biological theories—the evolution-theory of life—are held to be in a very serious manner implicated. And, to those, who, from the facts of consciousness, experience, and revelation, maintain the existence of a dual substantial nature in man—a material and mental, and an immaterial and immortal, the question places additional points of truth at stake, and, in proportion, presents more elements of interest; for if the psychological manifestations of the lower animals are of the same nature with those of man, then it would

seem to be necessary to allow to them also the possession of an immaterial and immortal soul as the subject or source of these manifestations; inasmuch as we could hardly, while holding the actions to be of the same kind, deny the agents in their production to be of the same kind too. We could not maintain the substances to be different, while we were obliged to allow the qualities to be the same. Agassiz accordingly argues for the existence in animals of such a soul. And it is long since theologians have speculated on the possibility of meeting their four-footed friends in heaven.

Such is something of the question before us—a question not more extensive in range of application and interest than it is difficult of definite solution. The great savan and sceptic of Rotterdam, M. Bayle, who in his Historical Dictionary is led to touch on this subject almost *passim*, says in one place, "Of all physical subjects there is none more abstruse or perplexing than the soul of brutes" (vol. viii. 273, English edition). In another place, he says, "The actions of beasts are perhaps one of the most profound abysses which our reason can exercise itself upon; and I am surprised that so few people perceive it" (vol. ii. 647). Sir B. Brodie says, "There are few more interesting subjects of inquiry than that of the moral and intellectual qualities of animals; yet there are few of which we know so little."

Plato and Aristotle have both recorded the dictum, that astonishment is the commencement of philosophy (Theaet. and Met. 1, 2, 9). And so it has been found here. The mystery of the animal soul has called into exercise the wits of philosophy for two and a half thousand years. Failing in one hand, it has always been taken up afresh by another. Those philosophers who have looked into the abyss, however, are more numerous than those who have discovered that it was very deep, and far more numerous still than those who have made any well-managed attempt to reach the bottom.

There are only three general views that can possibly be taken of the question. And it will be found historically that they have all, with various subordinate modifications, been espoused and advocated. Each system of philosophy, in fact, has been characterised, amongst its other distinctive marks, by one or other of these views in reference to the animal soul. Comparative psychology is at least as old as comparative anatomy. The possible views are these. It may be held, *first*, that animals have a rational soul like man—the difference being

only in the *degree* of its powers. It may be held, *second*, that animals have a soul specifically different from the human—say a soul sensitive only, and not rational. Or, *third*, it may be held that animals have no soul at all, that their actions are the result of their organisation—that, in short, they are machines. These three exhaust the possible views that are throughout distinct.

The first—the rational soul view, was the first in history. And we shall find that a modification of it through an admixture of the third, or machine view, is also the last, being the prevailing one at present. The Pythagoreans held this view. It was involved in their system of transmigration of souls. Many pre-Socratic philosophers, not of their school, also held it. The Platonists as a body did the same.

The second view was represented by the Aristotelians. They held the animal soul to be sensitive, not rational, and, therefore, specifically different from the human. The Cynics and Stoics inclined to this side. And the schoolmen felt the Aristotelian influence here as in other things.

The third—the automaton view—seems to have originated with a Spanish physician, Gomez Pereira, about the middle of the sixteenth century, half a century before Descartes was born. But it was the French philosopher who reasoned it out, and left it as a dogmatic legacy to the new school of philosophy of which he was the master. This view easily held its own against the Aristotelian. The Aristotelians, in defending their position against the Platonists, urged that rationality was only an appearance on the part of animals. In reality, they had a sensitive soul only. Yes, said the Cartesians, that is true as against the Platonists; but we have the same right to urge against you—the Aristotelians—that sensitiveness in animals is only an appearance. In reality, they have no more sensation than reason. Both are an appearance alike, and on like grounds. Animals are mere machines. All their apparent manifestations of mind are of a kind with those actions we perform without the help of our minds at all, through the "disposition of the organs," and "the flow of the animal spirits." Thus the rival sects waged the war. The battle was hottest in the seventeenth century when Cartesianism was fresh and prevalent; and it raged from one end of Europe to the other.

Meanwhile, the vagaries of individual opinion were many and sufficiently wild. In hot anti-Cartesian zeal a papal nuncio, called Rovavius, wrote a book to prove that animals not only

have reason, but use it better than man. Some might be inclined to think that this book was no mean evidence of the position which it advocated, though in a somewhat different way than its author intended. The old essayist, Montaigne, expresses his fancies on the subject characteristically thus :— "Presumption is our natural and original infirmity. The most wretched and frail of all creatures is man, and yet withal the proudest. He sees and feels himself lodged here in the dirt and nastiness of the world; yet, in his imagination he soars above the moon, and casts the sky under his feet. By the vanity of this same imagination he makes himself equal with God, withdraws and separates himself from the crowd of other creatures, carves for the animals his brethren and companions, and distributes such a portion of faculty and force to them as he sees fit. How does he know, by the strength of his understanding, the internal and secret motives of the animals? From what comparison betwixt them and us does he infer them to be so stupid as he thinks them? When I play with my cat, who knows whether puss is not more diverted with me than I am with puss? The defect which hinders the communion between us and them, why is it not as bad for us as for them? It is yet to determine where the fault is that we do not understand them any more than they do us. For this very reason they may reckon us beasts as we do them" (Essays, 2 p., 157-8). But the most curious of all opinions respecting the understanding of beasts is that advanced by Père Bongeant, a Jesuit, in a work entitled "Philosophical Amusements on the Language of Beasts." In this book he contends "that each animal is inhabited by a separate and distinct devil; that not only this was the case with respect to cats, which have long been known to be very favourite residences of familiar spirits, but that a peculiar devil swam with every turbot, grazed with every ox, soared with every lark, dived with every duck, and was roasted with every chicken" (S. Smith, 239-40). Borri, an Italian "Chymist, Empiric, and Heretic," as Bayle calls him, held also that the souls of animals were an emanation of the evil angels. It must have been out of sheer despair over an impracticable subject, that it was thus handed over to the devil. If this disposal of their case could be considered injurious or insulting, the animals have had their revenge, and that at the hands of no meaner advocates than the great Grotius, the greater Sir I. Newton, and Lord Brougham. These three, with lesser satellites, have

all maintained that God Himself is the moving principle of the animal. (Newton, Query 31st; Bayle, 8. 770; Sir H. Holland, p. 217). This opinion, which probably was as much the issue of despair as the one it seems to avenge, rouses the indignation of Sydney Smith, who says, "To talk of God being the soul of brutes is the worst and most profane degradations of Divine power." He thinks that men are jealous of any shreds of mind belonging to their animal rivals, when they thus ascribe their actions to some eternal principle. "In the name of common sense," he says, "what have men to fear from allowing to beasts their miserable and contemptible pittance of faculties?" This jealousy if it ever existed has disappeared, and men are again magnanimous. The view that has taken possession of the field during this generation, being espoused by most great names in science if not in philosophy, and bidding fair to subdue all things to itself, is, whatever else it may be, positively or negatively, not one that is niggardly in its concessions to the brutes. Sydney Smith, when lecturing before the Royal Institution on the faculties of animals, began with these words. "I. confess I treat on this subject with some degree of apprehension and reluctance; because I should be very sorry to do injustice to the poor brutes who have no professors to revenge their cause by lecturing on *our* faculties; and at the same time I know there is a very strong anthropical party, who view all eulogiums on the brute creation with a very considerable degree of suspicion, and look upon every compliment which is paid to the ape as high treason to the dignity of man." The times are changed. The poor brutes "have many professors now to lecture on *our* faculties in their interest." Instead of a "strong anthropical party" who scruple to grant the poor brutes anything, there is a strong anthropological party who will not scruple to grant them everything.

The opinion which scientists now generally espouse is, so far, the Platonist, the first opinion with which philosophy began the course of its evolution, viz., that the mental manifestations of men and animals are of the same kind, and that there is no essential mental distinction, phenomenal or substantial, between the two orders of being. But this opinion also combines in its explanations the principle of the third or Cartesian view. By recent researches, both physiological and psychological, at the hands specially of three investigators, who represent so many successive stages in the advancing development of the subject—

Marshall Hall, Dr. Carpenter, and Dr. Laycock, the first establishing on a scientific basis the fact of reflex action, the second, extending the automatic principle to the region of sensation, and the third, extending its operations still farther to that region of action, the organ of which is the brain—by these researches, it has been, once for all, made out that automatism is a character pervading large spheres of both animal and human action ; it has been established that there is automatic action not only of the nervous organism, but of the psychological powers themselves, which are found, for their outward results, not to require always a conscious, intelligent regulation, but in much that they do to act perfectly machinewise. Such investigations, so far from requiring us to set aside the principle of the Cartesian view as an explanation of the animal soul, plainly set it on a sure basis of physiological and psychological science ; and require us to hold by it. The case accordingly has now come to this, that no sooner is the principle of automatism, established and corrected by facts and extended by analogy, applied to its task of fathoming the abyss of the animal soul than it shows itself to be a fathoming line, the like of which we have never seen before. No clue ever adhibited to the mystery has had such effect. Animals, indeed, are not unconscious, unintelligent automata, as Descartes would call them; but they are automata notwithstanding—automata conscious, and sensitive, and rational too.

It was well that these researches and results on automatism were at hand at the juncture. Of late, as already noticed, the evolutionist had been attracted to the animal soul by more than astonishment at its mystery. His phlosophy here commenced from another side. He needed those researches to help him over the great gulf that he found yawning, both in popular and scientific opinion, between the animal and human souls. Hitherto, if any doctrinal system found a certain opinion on the animal soul at all essential to its wants, it was theological orthodoxy. The Cartesian view, *e.g.* seemed to get rid of certain theological difficulties that other views raised or failed to evade. Now, it is the doctrine of continuity that gives interest to that question. To a continuous evolution of living beings it is held to be essential that no such wide gulf exist between animals and man, as a thorough going non-identity of their psychological characters would be. Hence, the wide attention given to the psychological character of animals—an

attention which has been rewarded by there being found, it is thought, ample reason for maintaining that there is no essential difference between the two orders of souls. The popular opinion that there is such a difference is now little more than a superstition, Mr. D. Spalding tells us, though perhaps too sanguinely. Continuity is thus preserved.

Whatever may be thought of the right of this view to permanence as a true or exhaustive interpretation of the facts, there is this hopeful feature in the matter, that it is the real character of the facts of the case, the psychical actions, so called, of animals that is being made the subject of investigation. There has been often theorising on the essential nature of the psychical principle in them, which was mere working in the dark so long as the facts—*i.e.*, the actions—were not made the foundation of inference. If ever we are to determine the true nature of the moving principle in the brute, it can only be after we have detected the real nature of the movements which it is capable of causing. The true nature of the effects may be expected to indicate the true nature of the cause.

The wide general view, that the animal and human souls are identical, phenomenally and substantially, is consistent with various, and indeed conflicting subordinate opinions. It is the general ground of two such opposing views as the following. *First*, in the words of Mr. Huxley—"The actions of animals are the result of their physical organisation. . . . . They are machines, one part of which (the nervous system) not only sets the rest in motion and co-ordinates its movements in relation with changes in surrounding bodies, but is provided with special apparatus, the function of which is calling into existence these states of consciousness which are termed sensations, emotions, and ideas;" as to which states of consciousness he adds, "there is no evidence that it is they that cause these molecular changes which give rise to muscular motion." (F. Rev., No. 132 p. 574-5.) So that this view, which Mr. Huxley also extends to man, is exactly as Mr. D. Spalding (in Nat. 10, 520) has described it. "Not only the reflex action of animals, but also all the conscious, so-called voluntary actions of men—those, viz., that we perform for the first time, and, as we say, with a conscious end in view, are purely automatic; that is, that consciousness, while it accompanies the workings of the animal machine never stands in a causal relation to any movements whatever; that no move-

ment ever was the result of a state of consciousness ; that every movement is the result of physical antecedents, which, being present, the movement must of necessity follow ; and that in this physical chain there is no break whatever." In this view the identity of the two souls is retained at the expense, it will be seen, of putting man's soul in the same predicament as the animal's, of being merely the idle spectator of the automatic action of the organism. *Second*, the view once thus expressed by Dr. Carpenter, "Notwithstanding the evidences of rationality which many of the lower animals present, and the manifestations which they display of emotions that are similar to our own, there is no ground to believe that they have any of that controlling power over their psychical operations that we possess ; on the contrary, all observation seems to lead to the conclusion, that they are under the complete domination of the ideas and emotions by which they are for the time possessed, and have no power either of repressing those by a forcible act of will, or of turning the attention by a like effort into another channel. In this respect then, their condition resembles that of the dreamer, the somnambule, or the insane patient, in all of whom this voluntary control is suspended, and who (when their minds are susceptible of external impressions) may be so played-upon by the suggestion of ideas, that any respondent action consistent with the habitual mental state of the individual may be evoked by an appropriate stimulus" (H. Phys. 672-3, 4th ed.). Both of these opinions, it will be seen, build on automatism; but their difference lies in this, that Mr. Huxley offers as his theory, automatic action of the organism alone without the efficient interference either voluntarily or automatically of an intelligent principle. Dr. Carpenter offers as his, automatic action of the organism, and automatic action of an intelligent principle likewise.

(To be continued.)

ILLUSTRATIONS OF ANIMAL REASON.

(Continued from p. 64.)

By W. LAUDER LINDSAY, M.D., F.R.S.E., F.L.S.

THE "Illustrations of Animal Reason" given in the last number of the *Scottish Naturalist* have called forth sundry friendly comments or criticisms, of a kind that is acceptable

and valuable as exposing the weak points of the common run of anecdotes of animal sagacity and its perversions. The Editor of a certain Quarterly—devoted to Mental Science—himself an eminent Psychologist—takes exception to the case of *Suicide* described by Dr. Brown of Rochester (p. 59), regarding it as a mere "story," without proof positive—from the eye-witnesses of the dog's death—that the said death was *deliberate and voluntary*. He suggested that the person, or persons, who had actually seen the dog drown itself, should forthwith be "interviewed," and all the facts of the case recorded, in order to enable others to draw their own conclusions. I communicated these difficulties in the acceptance of his apparent facts and his personal conclusions, to Dr. Brown, with this result,—that his case at once collapsed as one of proven or provable Suicide. It is still *possible* that the dog did commit suicide, but there is nothing like *proof* that it did so. Dr. Brown's own account (of date April 7, 1875) of his further inquiry—for it appeared that he had not himself been an eye-witness—is as follows: and it is instructive as illustrating the danger of accepting any evidence, on such subjects, that is not direct and personal, as well as the the tendency to the *substitution of inferences for facts*:—

"The owner of the dog 'Bruce,' of Upnor, has just been to my house, and has supplied me with the following facts. The case breaks down; for it seems to be one of effort to obtain relief by cool water, exhaustion accidentally causing drowning.

"*Case of the dog 'Bruce' that drowned itself at Upnor, in March or April, about eight years ago.*—Mother of the dog, spotted white and brown, and used for hunting rabbits. Father, a water-dog (retriever or something of that sort). 'Bruce' had red eyes, and was rather ferocious, not allowing any one to touch him except his mistress; body white, with long silvery hair; head and ears brown. Owner, Mr. Hone, of the 'King's Arms Inn,' Upnor. 'Bruce' was a puppy at this house. Mr. Hone removed to Frindsbury. 'Bruce' did not like this, and showed attachment to the Upnor house, nevertheless resided with his master. Mr. Hone's brother took the 'King's Arms' after Mr. Hone left Upnor. The dog usually disliked water, because it was thrown into the water when young.

"*Mode of Bruce's death.*—A supper was given, and a sucking pig eaten. 'Bruce' ate some of the pig, and was supposed to have got a bone in his throat, or to have eaten poison. There was no certain knowledge on this subject. For eight days the

dog suffered, vomiting, and eating nothing, but fed on gruel with a spoon by his mistress—who was extremely fond of him. Frequently 'Bruce' would dip his head in a pail of water, and let the water run into his throat and out again so as to cool it, not being able to drink properly. He became nearly blind. The last night, his mistress sat up all night to attend to him, and to prevent him from tearing about and injuring the paint-work. At five a.m. she let him out of doors, when he went over to the 'King's Arms' at Upnor, and howled or cried. The master's brother heard him but did not open the door, fearing the dog because of his illness; for the people said that he was mad and ought to be drowned. The dog went to the river's side at six a.m., walked out into the river, and lay down on the shore with his head inclined in the water. The mistress thinks that he was too weak to get up, and so got drowned. She disbelieves in suicide.

"The witnesses were Hobbs (now alive) and Roemer (dead), of Upnor, watermen or lightermen, who were in a lighter at the time, close by. The dog was submerged for three weeks. The witness thinks that the dog wished to cool its throat as it had done in the pail of water. The witness, aged forty years at the present time, related these facts to me."

Here is another instance of a much more public kind, in which the proof of alleged Suicide breaks down at once on strict inquiry. There are probably few readers of current popular British literature who are unacquainted with a racy volume, descriptive of a yacht voyage in northern seas, by the present Governor-general of Canada, the first edition of which appeared some years ago.* At page 32 of the said work he gives the following account of the *Suicide of a cock*:—"A very melancholy occurrence took place. I had observed for some days past, as we proceeded north, and the nights became shorter, that a cock we had shipped at Stornoway had become quite *bewildered* on the subject of that meteorological phenomenon called the dawn of day. In fact I doubt whether he ever *slept* for more than five minutes at a stretch without waking up in a state of *nervous agitation*, lest it should be cock-crow. At last, when night ceased altogether, his consti-

* "Letters from High Latitudes; an account of a yacht voyage to Iceland, Jan Mayen, and Spitzbergen;" by the Earl of Dufferin (then Lord Dufferin). Fifth editition, illustrated, post 8vo. London, 1875.

tution could no longer bear the shock. He crowed once or twice sarcastically, then went *melancholy mad.* Finally, taking a calenture, he cackled lowly (probably of green fields), and leaping overboard, *drowned himself.*"

Regarding the story as an illustration of doubtful authenticity, involving on the one hand a doubt as to the facts, and on the other as to their interpretation, and desirous of ascertaining the kind and amount of credence to be attached to the incident as narrated, I ventured to appeal to the distinguished author himself, explaining my object. The result was the following characteristic reply, which reads like the record of the incident itself, and the celebrated dog-latin speech the noble yachtsman delivered in Reykjavik—all three probably to be regarded as mainly or merely playful *jeux d'esprit.* Writing in November 1873, from Government House, Ottawa, Lower Canada, the Earl's private secretary remarks:—"The Earl of Dufferin desires me to acknowledge the receipt of your letter . . . and in reply to inform you that the incident related in 'High Latitudes,' of the cock committing suicide, is so far strictly true that the poor animal was drowned overboard without the intervention of human agency. But he perhaps is hardly prepared to support the literal statement by scientific reasons. May be, if the cock had been saved, he would have declared that it was a gust of wind, or a higher wave than usual, that carried him from his nautical perch. But as the body of the deceased was never recovered, and he left no papers to disclose his intention, Lord Dufferin is afraid it must be admitted, that perhaps a coroner's inquest properly conducted would have brought in a more open verdict!"

Though the fact of deliberate suicide was "not proven" in the foregoing case, it is still quite as possible, as in the Upnor dog, that suicide was committed. At all events, the mental perturbation produced by continuous daylight is quite probable, inasmuch as I can myself vouch, from personal experience, for its disquieting effects in Iceland in the month of June. In Reykjavik, the capital, I found, for instance, etiquette visits as commonly paid at midnight—literally by daylight (however much such an expression may appear to be an Irish "Bull")—as at mid-day: and the want of any means of creating artificial darkness during the night in my bedroom utterly prevented sleep on my part. In connection with the defects of the records of the incidents relating to the Upnor dog and

Stornoway cock, I would direct the attention of readers to the desirability of collecting and publishing all properly certified instances of *deliberation or intention in self-destruction by animals.*

The Editor of another Quarterly, devoted to Natural History, himself a well-known Naturalist, remarked that the only thing singular in the case of the *dog* "Mum" (p. 61) is its name. He asserted that he himself had seen *Epilepsy* in a Dog; and that the mental qualities described in "Mum's" case are common to dogs in general, as well as to other animals. Now there are other kinds of "fits" in dogs than those of an Epileptic character, and only the experienced scientific Veterinarian, or the Physician who has had a special experience of this class of motor nervous diseases, can be trusted to distinguish between real and spurious Epilepsy. In "Mum" the Epilepsy was vouched for by a Physician whose experience of that disease in man possibly far transcends that of any one of our best Veterinarians in other animals. Again, it is among the main objects of these "Illustrations" to shew, on the one hand, how difficult it is to obtain well-authenticated instances of the exercise of pure Reason in the lower animals, and on the other, to point out the value of cases that are properly established. My object is to exemplify the influence of common reason in the common incidents or affairs of animal life. It is not enough for an objector to say—this or that mental quality is "common." It does not follow that the alleged possession of any given mental aptitude has been established as a fact—generally accepted as such. It is desirable to prove its commonness, as well as the significance of its commonness, and to explain its common operation; in reference to which a single well-observed and properly recorded case, with its analysis, is worth endless mere unsupported assertions—affirmative or negative. The Editor in question is probably quite unprepared to explain, in the case of "Mum," for example, how it, being blind, knew when or whether a particular person was in its vicinity; a circumstance I have myself observed in the case of an old blind cat, though I do not profess myself able to explain it. It may be that hearing, or smell, or some additional sense, of which we know nothing (albeit our Editor friend appeared to regard such phenomena as too "common" to deserve record), leads to or is the basis of this species of discrimination in animals. But the subject is as interesting and as much an unsolved problem as is Way-finding

over unknown ground by the dog, horse, ass, and other animals. The discussion of this circumstance alone in "Mum's" case—the power of distinguishing personal identity without the aid of vision—would require a long article to itself; but the following additional points of interest arise—all under the very first section of "Mum's" biography:—

(1) Its boldness when it felt itself supported by a friend: a kind of adaptation to circumstances—or behaviour according to external conditions, that is quite common in various animals, though the *modus operandi* of their judgment or feeling in such change of conduct has not been analysed nor explained.

(2) Its knowledge of right and wrong—at least of what was forbidden and permitted—or, in other words, the basis of a *moral sense*, which, though quite common in well-trained dogs, is one of the mental or moral qualities that are denied to the lower animals by theological and other bigots.

(3) Errors of judgment and temper, which strike at the very root of the absurd, popular, and theological conceptions of so-called "unerring" instinct.

(4) The eccentricities of affection in animals, as illustrating choice and caprice,—peculiarities which, though common, too frequently defy all attempts at rational explanation, any more than do human vagaries of a similar kind.

In short, to analyse properly the mental phenomena illustrated in so simple and "common" a zoo-biography as that of "Mum" would require a large amount of space, insofar as such an analysis might be made the basis of whole chapters on such subjects, as (1) the moral sense and moral responsibility; (2) temper and temperament; (3) jealousy and other passions; (4) gratitude and other virtues; (5) the diseases common to man with other animals; (6) the comparative intelligence of man and other animals; (7) expression or language; (8) perception of musical harmony or discord; (9) individuality; and so forth.

It so happens that the following fuller particulars have been sent me relating to the dog "Mum:" details that are even more interesting than those first recorded—the narrator, in the present case, being the dog's mistress, Mrs. Murray Lindsay of Mickleover, by Derby.

"When my father was in the habit of coming home at a

certain hour daily, some time before, in expectation of his coming, 'Mum' would lie near the sitting-room door, nose resting on fore paws, ears erect intently listening, and would run occasionally to the window upon hearing a passing footstep, looking anxiously up and down the street. When the expected knock came, he would bark and run to and fro in the utmost impatience. The door being opened he would welcome his friend with most extravagant signs of delight, run to the place where my father's slippers were kept, and if he found it locked, would bark and scratch at the door till it was unfastened for him, seize a slipper, carry it in his mouth and place it at my father's feet, then return and fetch its fellow, being unable to carry both at once, as I have often seen him try to do.

"He also proved himself a most *conscientious* dog; for if any of us placed on the corner of the table a piece of sugar or biscuit, for which he would eagerly beg, telling him it was 'on trust,' he would not take it until told by the *giver* that it was 'paid for,' although he might be encouraged and even coaxed to do so by another person; and if we knocked the piece of sugar or biscuit, by pretended accident, on to the carpet he would not touch it without leave of the giver. He had a strong objection to taking meals in the kitchen, and would eat the same food in the dining-room he had refused below. He knew the sound of his tub when being prepared for his washing, and at the sight of turned up sleeves, or the mention of the words 'Tub, Mum!' would hide himself for an hour or two.

"In our walks in any place in which he had once found a cat, he would *always* know the spot again, and would hunt for pussy the next time we passed that way. Although he displayed so strong an affection for his two beloved friends, and was affectionate to all but beggars and shabby people, still he always recognised the *authority* of his mistress, and would not appear at ease to do their bidding without at first, in his dumb way, obtaining her permission. For instance, if invited by them to go for a run, he would sit down before her, looking wistfully up into her face, giving at the same time a kind of impatient stamp with his fore feet, and a low plaintive whine, and when told by her he might 'go,' would trot off quite happy in his mind.

"Poor 'Mum' died at length of some painful disease, and upon his mistress going to see him in his last moments, recognised her voice at once, stood up for a caress, wagged his tail

as the only sign of affection he had strength to bestow, and in a few minutes after breathed his last.

"He was never taught any of his odd tricks and ways (for he had many more than I can relate), but acquired them merely through his powers of observation, having noticed that they gave rise to amusement; and when laughed at, or given a pat of encouragement, he would repeat them."

Dr. Murray Lindsay characterises the foregoing as a "faithful account," bringing out, "very well and clearly," certain features of the dog's character, such as those relating to obedience, discipline, discrimination, knowledge of right and wrong, and *dread of water*. The latter was the result of his "having once jumped on green weeds, floating on the top of a pond, which he mistook for grass, when he found, to his disgust and surprise, that he got a ducking." In short, it had received one of those practical lessons of experience of which the lower animals, no less than man, profit, and which are serviceable in the regulation of future conduct.

Dr. Brown, of Rochester, lays it down (in a letter of April, 1875) as a proposition, which I would commend to the attention of zoologists, and comparative physiologists or psychologists, that "wherever *Eyes* are found, we know that there is conscious mind." He is also of opinion that "the higher animals possess moral nature like man. This is seen in qualities like gratitude. . . . . The difference between man and the dog lies in the presence of the instinct of super-nature, and the existence of abstract notions (or ideas), in man." As to moral nature, he is right; as to feeling, or perception of the supernatural, and the formation of abstract ideas, I believe him to be, in common with hosts of other people—including all classes of philosophers so-called—wrong. The same gentleman also sent me what he calls, "A tale of *Insanity* in a Cat;" one that is, however, singularly inconclusive :—

"My brother, John Don Brown, of Rochester, obtained a cat, not quite full-grown, last year (1874) in the autumn. The cat did not take to the family, and hid itself in a cellar. It lived in the basement for about a month or six weeks, concealing itself in a disused chimney, coming out at night to partake of food placed in a saucer for it in the cellar. A large dose of prussic acid was mixed in the saucer at last, and the cat died on the spot, unable to reach the chimney. The rushing about of the

cat in the first instance, with the persistent concealment afterwards, shows mental perversion, whether of instinct or of reason; in either case Insanity."

There is, however, no proof here of anything more than the alarm, perhaps suspiciousness, so commonly exhibited by cats when removed to strange quarters, their old associations of locality having been suddenly and ruthlessly severed or broken up.

On the subject of *Insanity* in the lower animals, Dr. Edwards Crisp, of London, who has for a long series of years distinguished himself by his attention to, and knowledge of, the diseases of domestic and menagerie animals, wrote me as follows in June, 1871 :—"As regards the question respecting the *mental aberration* of the lower animals, if such a term be allowable, I can give you but little information, although the subject is one that I have often thought about; but up to the present time I have been unable to meet with a tangible example. Our domestic animals, as you know, exhibit peculiarities of *temper*, and some are unusually *savage* and *unruly;* and so with some foreign animals in *confinement;* but whether this is due to an abnormal condition of *brain* it is difficult to say.

"'Chunie,' the great Elephant at Exeter Change, was said to be *mad;* but then he had a decayed *tooth* that caused the *excitement*—so it was inferred; and I have known other examples of a similar kind. I am sorry that my information is so meagre."

Professor Cobbold, also of London, our leading—and it may indeed be said, our only—British authority on Entozoa in man and other animals as a cause of disease, informed me (in a letter of December 11, 1872) that, "It is not likely that Veterinarians have recorded *as such* any case of genuine *Lunacy* in animals from Entozoa : nevertheless it is well known that these parasites frequently give rise to severe cerebral disturbance. It is probable that some of their recorded cases might be with justice described as *maniacal.*"

(To be continued.)

Carabus nitens.—I have to notice, on 10th March, the capture of the rare beetle *Carabus nitens.* At the same place this beetle was first discovered in Kincardineshire by myself about the year 1847—that is twenty-eight years ago.—JAMES TAYLOR, Clashfarquhar, Aberdeen, 17th April, 1875.

OUTLINE DESCRIPTIONS OF BRITISH COLEOPTERA.

(Continued from p. 72.)

By Rev. T. BLACKBURN, B.A.

Licinus.

B. Th. very tr. E. finely p.-s., ints. with large puncs.; the alt. ints. elev. Winged. 6¾ l. E.s. . silphoides

-. - hardly tr. E. finely p.-s.; ints. punc., flat. Th. shining, much more deeply punc. than e. Wingless. 5 l. E.s. . . . . depressus

Badister.

1. Th., legs, and ba. and ap. of an., clear r. H. b. E. r., with ap. and a broad tr. fasc. (not reaching sut., varying in size, but at least leaving a r. spot near ap. of sut.) b. 2

H., th. and e., dusky 3

2. Breast with the sides r. Th. shorter, and hardly broader, than h. 3¾ l. E. . . . . unipustulatus

- b. Th. not shorter, and cons. broader, than h. 3 l. B.! . . . . . bipustulatus

3. Mar. of th., and mar. and sut. of e., pale. E. with a pale hum. spot. Legs, and ba. and ap. of an., pale. Th. hardly tr. E. str. 2 l. E. . . . sodalis

Fuscous b. Mar. of th., extreme ba. and ap. of an., r-m. of e., and legs, sometimes pale. Th. tr. E. str. 2¾ l. E.s. I.s. . . . . peltatus

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Eighth Family—FERONIIDÆ. (13 genera).

1. Claws dent. Ap. j. of labial pal. forms a thick cl. . Taphria

- -. - - - - - does not form a dist. cl. . . 2

- not dent. An. with 3d j. more than twice length of 4th Sphodrus

- - -. - - - - not more than twice as long as 4th . 3

2. Th. consp. narrower at ba. than in fr. . . . Pristonychus

- not consp. narrower at ba. than in fr. . . Calathus

3. Ant. tib. much dil. from ba. of notch to ap. of tib. . 4

- - *not* much dil. from ba. of notch to ap. of tib. . 6

4. - - with 1 spine at ap. on in. side. Th. tr. and widest at ba. . . . . Amara (part)

- - - - - - - - -. - not as in prec., but very tr. An. and pal. r. . . . . Amara (part)

- - - - - - - - - -. - not tr. An. and pal. r. E. not dist. str. . . . . Miscodera

- - - - - - - - - -. - - -. - - - -. - dist. str., but not dist punc. . . . . Platyderus

- - - - - - - - - -. - - -. - - - -. - - p.-s. Th. narrowest at ba. . . . . Stomis

- - - - - - - - - - -. - - -. - - - -. - - - -. - - in fr. Pt. inæqualis
- - - - - - - - - - -. An. and pal. dusky. Th. contr. at ba. 5
- - - *2* well def. spines at ap. on in. side. . . Zabrus
5. E. dist. str., gen. with a shortened str. near ba. of sut. Pterostichus
- only obs. str., without the shortened str. . . Broscus
6. Th. dist. narrower than e. . - . . Anchomenus
- scarcely narrower than e. . . . . Olisthopus

BROSCUS.

B. Pal. and an. reddish towards ap. H. punc. Th. joined to e. by a peduncle. E. el., parallel, obs. p.-s. 8 l. B.$^{c.}$! . . . . . cephalotes

MISCODERA.

Shining brassy. Pal., an. and legs, r. Th. globose, joined to e. by a peduncle. E. obs. p.-s., sides rounded. 2¾ l. B. $^{N.M.}$ . . . . . arctica

SPHODRUS.

Dull b. An. paler towards ap. Th. contr. at ba. E. finely p.-s. 10 l. B. . . . . leucophthalmus

PRISTONYCHUS.

Obsc. bl. b. rather shining. An. and pal. gen. brown. Th. hardly tr. E. str.; str. finely punc. Interm. tib. bent. 7 l. B. . . . . subcyaneus

CALATHUS.

1. A row of consp. imprs. on 3d and 5th str. of e. Th. rectang. at ba. H., th. and e., b. 1st j. of an. r. Legs r. or blackish. E. str., the str. gen. punc. 4½ l. B. ! . . . . . cisteloides
No dist. rows of imprs. on e. Th. sharply rectang. at ba. 2
- - - - - - -. Ba. angs. of th. rounded off or obt. . . 3
2. Th. dist. contr. at ba.; with, at most, a very narrow yel. mar. B. An. pal. and legs yel. E. deeply str. 4 l. B.$^{c.}$ . . . . . flavipes
- hardly contr. at ba., with a dist. yel. mar. A broad, brown b. insect. An., pal. and legs, yel. E. finely str. 4 l. B. . . . . fuscus
3. E. and disc. of th. unic., or nearly so. An. wholly pale. 4
H. b. An. th. and legs, vary from pale r. to b. E. pit., often with a r. mar., finely str., ints. flat. (When disc. of th. is b. the an. are dusky. This var. is *nubigena*. Halid). 3 l. B. ! ! . . melanocephalus
4. Ba. of th. dist. broader than fr. An., pal. and legs, test. 5
- - - not dist. broader than fr. Pit. An., pal. and legs, dusky r. E. finely str. 3½ l, B. . . piceus
5. Th. broadest in fr. of mid., b., with a yel. mar. H. b. E. b., very finely str. 3 l. E.$^{N.}$ S. . . micropterus

- - *at*, or *behind*, mid. H., th. and e. reddish. Rarely pit., with mar. of th. and of e. paler. E. finely str. 3 l. B.[c.]! . . . . mollis

TAPHRIA.

Blackish, shining. Mouth, pal., an., and legs, test. Th. tr., as broad at ba. as in fr. E. strongly str. 3¾ l. B. . . . . nivalis

ANCHOMENUS.

1. H. and th. br. gr. Ba. of an. and legs test. E. test.; a greenish cloud behind. Th. el.; hi. angs. obt. E. str. 3¼ l. B. ! . . . . prasinus

Not as prec. Hi. angs. of th. sharply def., not obt. . . 2

- - -. - - - - extremely obt. 3

2. Brown b. An., pal., and legs test. Th. gently tr.; mar. narrow. E. str.; ints. flat; mar. often pale. 3½ l. B. ! ! . . . . albipes

- -. - - - - brown. Th. el.; mar. narrow. E. p.-s.; ints. elev. 2½ l. E. I. . . . . oblongus

B. Th. very tr.; mar. broad. E. deeply str.; ints. elev. 5¼ l. B. ! . . . . junceus

3. E. with a row of 4 to 7 large consp. pits. on 3d int. . . 4

E. not with a row of consp. pits. on 3d int. . . . 5

4. Entirely cop. b. Th. twice as wide as long. E. rather uneven, parallel, finely str. 2½ l. E.[N.] . quadripunctatus

Met. H. and th. gr. E. cop.; mar. gr. An., pal., and legs, dusky. Th. very tr. E. finely p.-s.; ap. pointed *(Colour varies)*. 4 l. E. . . sexpunctatus

Very like prec. Gen. unic. cop. Th. only slightly tr. E. not pointed at ap. Often with a gr. mar. 3¼ l. B.[N.] . . . . . ericeti

5. H., th., and e., br. gr. Mar. of e. yel. An. and pal. dusky. Legs dusky; tib. test. Th. tr. E. finely str.; ints. elev. 4½ l. B. . . . marginatus

Not as the prec. An. with 3d j. pub. 9

- - - -. - - - - smooth, as 2d 6

6. Fifth str. of e. forms a consp. fov. near ap. B. Ba. of an., r.-m. of e., and legs, gen. reddish. Th. hardly tr. E. str. 3¼ l. B. . . . atratus

- - - - simple. The str. deeper, and ints. more elev., near ap. 7

- - - - -. - - and ints. unif. throughout . . . 8

7. Obsc. gr. (or b., *mœstus* Duf.). Th. tr. E. rather deeply p.-s.; ints. somewhat conv. in fr. 3¾ l. B. ! . . . . . viduus

Very like prec. Th. more tr. E. very finely p.-s.; ints. quite flat in fr. 3½ l. E. . . . versutus

8. H. and th. gr. E. cop. Tib. and ba. j. of an. pale. 3 or 4 dist. puncs. on 3d int. of e. 3½ l. B. ! parumpunctatus
Very like prec. Unic. cop. Ba. j. of an. hardly pale. 5 dist. puncs. on 3d int. of e. 3¾ l. E. . *gracilipes*
Reddish or pit. An., pal., and legs, pale r. H. much contr. behind. 3 dist. puncs. on 3d int. of e. 5 l. E.S. . . . . *livens*

9. Th. not el., its sides dist. rounded. Legs quite b. . . 10
- - - - - - -. - more or less reddish or test. . . . 11
- el., its sides little rounded. E. very finely str. . . 12

10. B. Th. slightly tr. E. widest behind, very finely and unif. str.; ints. flat throughout. 2¾ l. E. . scitulus
Very like prec. E. narrower and more parallel. The str. deepen a little, and the ints. are not quite so flat close to ap. 2¾ l. B. . . . gracilis

11. Dusky, with a gr. gloss. Ba. of an., legs, and r.-m. of e., brown. Th. dist. tr. E. rather broad, with gently rounded sides, finely str. 3 l. B. . micans
Very like *micans*. Th. more tr. and less contr. at ba. E. *brown* (not gr.), and much more el., with more parallel sides. 2¾ l. B. . . . piceus
A stoutly built species. Th. hardly tr. H. and th. b. E. reddish or b. (not gr.). Legs and ba. of an. reddish b. E. broad and not parallel, rather strongly str. 3 l. B. ! ! . . . fuliginosus

12. H. and th. pit. b. E. pit. brown. Ba. j. of an. and legs dark brown. 3 l. B. . . . puellus
Very like prec. Mar. (at least) of th. test. E. brown, darker near sut. Ba. of an. and legs test. 3 l. E.F. . . . . Thoreyi

Olisthopus.

Brassy brown. An., pal., and legs, test. Th. tr. E. dist. str.; the str. obs. punc.; ints. flat. 3 l. B. . rotundatus

Stomis.

Pit. An., pal., and legs, r. Th. el., much contr. in fr. of ba. E. el., narrow, strongly p.-s.; ints. flat. 3 l. B. . . . . pumicatus

Platyderus.

Rusty r. Th. almost square, gently contr. towards ba. E. moderately str.; ints. flat. 3 l. E. . . ruficollis

Pterostichus.

1. An elev. keel on 1st j. of an. (Species vary in colour—met. gr. cop., bl. or b. An. dusky. Legs pit. or r.) . 2
1st j. of an. simple. Ba. angs. of th. rounded off, ill def. . 3
- - - - -. - - - - well def., not rounded off . . . 4

2. Ba., and gen. 2nd, j. of an. test. H. punc. Th. tr., narrower than e. E. broad, widest *behind* mid., str., ints. gently elev. About *10* hairs on in. mar. of post. tib. 5½ l. B. ! . . . cupreus

Very like prec. Brighter. H. impunc. E. narrow, widest *at* mid. About *6* hairs on in. mar. of post. tib. 5 l. B. . . . . versicolor

Only u.-s. of ba. js. of an. test. H. and th. cop.; e. br. gr. (H., th. and e. rarely unic.) Th. tr., hardly narrower than e. E. broad, deeply str.; Ints. slightly elev. 5¾ l. E. . . . . dimidiatus

An. b. Th. slightly tr. E. el., parallel, deeply str.; ints. flat in fr., but less so behind. 5¾ l. B. . . lepidus

3. No large pits on e. Sc. small. B. Legs often r. Th. tr. E. el., widest *at* mid., str., ints. ind. elev., 1 punc. on 3rd. 7¼ l. B. ! ! . . . madidus

Very like prec. Shorter. E. less parallel, widest *behind* mid.; ints. dist. elev., 3 dist. puncs. on 3d. 6 l. B.M. . . . . æthiops

3 large pits on 3rd int. of e. Sc. dist. Deep b. Th. tr. E. el., parallel, finely p.-s., str. fainter on sides. 6½ l. E.F. . . . . *aterrimus*

4. E. wider than ba. of th. An. pale r. Pal. and legs r. H., th. and e. pit. No abbrev. str. near sc. E. consp. p.-s. 2¾ l. E.C. . . . . inæqualis

- - - - - -. - dusky. An abbrev. str. near sc. Less than 3¾ l. 5

- - - - - -. - -. - - - - -. More than 3¾ l. . . 6

- not dist. wider than ba. of th. An abbrev. str. near sc. B. An. and pal. r. at ap. Th. tr., widest near mid., with 2 equal ba. fov. on each side. E. str., str. not dist. punc. Ints. flat (exc. 7th at ba.); no puncs. on 3rd. 9 l. B. . . . striola

- hardly wider than ba. of th. No abbrev. str. B. Legs, and ba. of an., reddish. Th. tr. E. deeply str.; ints. elev. 3 l. B. . . . vernalis

5. Th. hardly tr., punc. on u.-s., contr. only *in fr. of* ba., punc. *across* ba. B. Legs r. E. p.-s., faintly at sides. 2¾ l. B. ! . . . . strenuus

- - -, impunc. on u.-s., contr. from mid. nearly *to* ba., ba, angs. obs. punc. B. Tib. reddish. E. p.-s. 2½ l. B. ! . . . . diligens

- gently tr., punc. on u.-s., contr. from mid. to ba., ba. angs. punc. B. Legs reddish. E. p.-s. 3 l. B. . minor

6. No consp. pits on E. Legs dusky. More than 6 l. . . 7

- - - - -. - -. Less than 6 l. E. with hardly elev. ints. . 9

- - - - -. Pit. Legs r. An. & pal. dull r. Th. hardly tr., contr. at ba. E. long & flat, str., ints. hardly elev. 5½ l. E. . . . . picimanus

Consp. pits on 3rd int. of e. Brassy b. Legs pit. Th. very tr., its elev. mar. dist. widest at ba. E. el., parallel, str.; str. obs. punc. in ♂, dist. in ♀. Ints. gently elev. in ♂, flat in ♀. 5 l. B.[M.] . . vitreus

-------. Gr.-b. Pal., tib. and tar., reddish. Th. gently tr., its elev. mar. hardly wider at ba. E. short, dist. broadest behind mid., simply str.; ints. gently elev. 5 l. B.[M.] . . . oblongopunctatus

7. B. Th. contr. from mid. *to* ba., punc. at ba. E. str.; ints. elev. 8

-. - - suddenly *in fr. of* ba., the ba. impunc. E. str.; ints. elev. An elev. keel under ap. seg. of h.-b. in ♂. 7 l. E.[N.] . . . parumpunctatus

8. Winged. Th. not tr. An elev. keel under ap. seg. of h.-b. in ♂. 9 l. B.! . . . . niger

Wingless. Th. dist. tr. Ap. seg. of h.-b. in ♂ simple. 8 l. B.!! . . . . . vulgaris

9. Th. tr., ba. angs. prod. laterally in a small tooth. Str. of e. not punc. A short keel under ap. seg. of h.-b. in ♂. 4½ l. B.!! . . . . nigrita

Very like prec. Th. hardly tr.; ba. angs. sharp, but not prod. Sut. prod. at ap. A fov. under ap. seg. of h.-b. in ♂. 5 l. E. . . . anthracinus

Very like nigrita. Legs brown. Str. of e. punc. U.-s. of last seg. of h.-b. brown, even in both sexes. 4¼ l. E. . . . . gracilis

Amara.

1. Th. dist. contr. behind mid. (1 or 2 fov. at ba. on each side) 2

- not (or hardly) contr. behind mid. (fov. as above) . . 5

2. Hi. tib. of ♂ pub. on in. side. 2 dist. imprs. on fr. of h. 3

- - - - with only a few long hairs. Interm. tib. of ♂ with tubercles. Two deep pits on fr. of h. (Blackish r.; legs and an. often r. E. dist. p.-s.) . . 4

3. Pale brown. Very broad. Th. twice as wide as long, punc. at ba., with 2 shallow fov. E. consp. str., the str. moderately punc. 4¼ l. B. . . . fulva

Pit. r. Pal., legs. and an. r. Narrow. Th. not so tr. as in prec., punc. at ba., with two deep fov. E. consp. p.-s. in fr., obs. behind. 3½ l. B.! . apricaria

4. Width of th. more than 1½ length. Th. cons. wider in fr. than at ba., widest *at* mid. E. short, not parallel. 5¾ l. B.! . . . . spinipes

Very like prec. Th. less closely punc. at ba., widest *in fr. of* mid. E. long and parallel 5½ l. B.[C.] convexiuscula

Width of th. less than 1½ length. Fr. of th. hardly wider than ba. E. long, parallel. Vars. often r. 4½ l. S^m. . . . . *alpina*

5. H., th., e., and legs of a reddish tone. Only a few long hairs on hi. tib. of ♂ (exc. consularis). An. (exc. quenseli) unic. reddish. 6

\- - and e. greenish. Legs gen. dusky. Hi. tib. of ♂ densely pub. on in. side. An. not unic. reddish. . . 13

6. Str. of e. not (or moderately) punc. . . . 7

\- - - very strongly punc. Hi. tib. of ♂ densely pub. on in. side. H. very wide. Width of th. dist. less than twice length. 3¾ l. B. . . consularis

7. Mar. of th. (exc. at ant. angs.) unif. narrow. Js. of an. moderately stout. . . . , . . 8

Mar. of th. growing wider backw. Ap. of an. gen. dusky, the js. el., thin. Th. nearly twice as wide as long, dist. punc. at ba., with deep fov., its ant. angs. strongly prod. E. very finely p.-s. 3½ l. S.^M. . . . . *quenselii*

8. More than 3⅜ ls. 9

Less than 3⅜ ls. 11

9. Width of th. dist. less than twice length. . 10*i*

Th. quite twice as wide as long. Th. mod. punc. at ba., ba. fov. deep. E. clearly p.-s. 4¼ l. E. . *ingenua*

10. Ba. of th. finely punc. Eyes very prominent. E. finely str., the str. faintly punc. 3¾ l. E. . *fusca*

Ba. of th. coarsely punc. E. strongly str., the str. dist. punc. 4½ l. B. . . . . *patricia*

11. Less than 2¼ lines. 12

More than 2¼ lines. Th. strongly punc. across ba., not much contr. in fr., its ant. angs. ill def. E. wider than th., str., the str. consp. punc. in fr. 2¾ l. B. . . . . bifrons

\- - - -. - not punc. all across ba., much contr. in fr., its ant. angs. well def. E. not wider than th., str., str. not much punc. A broad insect. 3 l. B. . rufocincta

12. H., th., and e. nearly b. Th. almost twice as wide as long, punc. at ba., not much contr. in fr., its ant. angs. ill def. Js. of an. almost tr. E. dist. p.-s. 2 l. E.^s.c. . . . . *infima*

13. Ap. spine of ant. tib. 3 pronged. Tib., and ba. of an., r. 14

\- - - - - simple. Legs dusky. Ba. 3 js. of an. test. . 15

\- - - - - -. - -. Only ba. *2* js. of an. test. . . . 17

\- - - - - -. - -. Not more than ba. j. of an. test. Gr. b. Th. hardly punc. at ba. E. finely str., deeper at ap. Str. obs. punc. in fr. 3¼ l. B . lunicollis

- - - - - -. -, ba. 3 js. of an., and ba. of 4th, yel. B., or gr. b. Eyes rather conv. Ant. angs. of th. sharp and well def. E. str. Str. gen. ind. punc. $2\frac{3}{4}$ l. B. ! ! . . . . . familiaris

Very like prec. Greener. Eyes *extremely* conv. Ant. angs. of th. rounded off and ind. $2\frac{1}{8}$ l. B. lucida

14. Brassy. Ba. of th. impunc. E. very dist. p.-s. 4 l. E.s.c. . . . . strenua

-. - - - more or less punc. E. str., str. obs. punc. 3 l. B. ! . . . . . plebeia

15. Size from $2\frac{3}{4}$ to $4\frac{1}{2}$ l. Interm. tib. of ♂ pub. on in. side. 2 consp. puncs. under each side of ap. seg. of h.-b. in ♂ and ♀. E. as broad in mid. as at ba. . . 16

- - - - - -. - - - - with only a few long hairs. Puncs. on ap. seg. of h.-b., 1 in ♂, 2 in ♀. E. wider at ba. than mid., str., str. obs. punc. Sut. very much elev. Th. impunc. at ba. *Brassy* gr., tib. pale. $3\frac{1}{2}$ l. B. ! . . . . . trivialis

- - - - - -. - - - - - - - - - -. - - - - - - 1 in ♂ and ♀. E as wide at mid. as ba., str., str. ind punc. Th. more or less punc. at ba. Obsc. gr. Tib. pale. A row of large puncs. on mar. of e. consp. interrupted near fr. Ant. angs. of th. strongly prod. $3\frac{1}{4}$ l. B. . . . communis

Very like prec. Row of puncs. on mar. of e. entire. Ant. angs. of th. less def. A broader species. $3\frac{1}{4}$ l. E ! S. (?) . . . . . continua

More than $4\frac{1}{2}$ ls. Interm. tib. of ♂ with only a few long hairs. Puncs. on ap. seg. of h.-b., 1 in ♂, 2 in ♀. E. as wide in mid. as at ba.; dist. p.-s. Th. impunc. at ba. Brassy gr. Legs b. A wide insect. $4\frac{3}{4}$ l. B. . . . . acuminata

Less than $2\frac{3}{4}$ ls. Tib. and ap. of h.-b. as in prec. Th. gen. impunc., with 2 *deep* fov. E. finely but dist. p.-s. Legs blackish or dusky r. $2\frac{1}{2}$ l. B. . . tibialis

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Turtle Dove in Aberdeenshire.—A pair of Turtle Doves (*Columba Turtur*) were seen frequenting a field of newly sown turnips at Bridgend, Fyvie, and one was shot on May 27th.—George Sim, Gourdas, Fyvie, June 9, 1875.

Aromia moschata.—I do not know whether the fact that I have taken several larvæ of *Aromia moschata* from a dead willow tree in this neighbourhood (Haddingtonshire) is of any interest, but, as the insect is not mentioned as an inhabitant of Scotland in the only list I have by me—"Murray's" one rather out of date—I venture to send you this notice, in case you should consider it worthy of publication in the *Scottish Naturalist*. —A. Buchan Hepburn, Smeaton Hepburn, Prestonkirk, June, 1875.

GEOLOGY.

THE EARN VALLEY.

(THIRD PAPER.)

THE DRON BEDS AND DUNNING BORINGS.

By F. SMITH.

IF according to Sir W. Thomson, one hundred millions of years approximately represents the time during which the world has existed under conditions similar to those that now obtain, then the Earn Valley has been conforming to its present configuration for at least half of this period, or for fifty millions of years.

In a former paper we endeavoured to show by what means certain modifications had been effected in the Earn Valley within comparatively modern times. Our fifty millions of years possibly take us back to the elevation of the Ochils, or to the age of the Old Red Sandstone, when the valley first began to be; and the other moiety may or may not take us back somewhere near to that unapproachable and awful Beginning. Whatever the world's age may be—and he is but an apology for a geologist who is illiberal in his admissions of time—no human being will ever, I trust, attempt to limit its number of years, either by means of profoundly abstruse theory, or by more profoundly abstruse guessing, for Time is labouring, and has ever been labouring, to destroy even the monuments of his own past being, and twenty times our hundred millions is as likely as it to be true.

> Who soars towards infinite things
> From mundane habitations, must
> Uplift himself on finite wings
> That will not fail to rest in dust.

There is a probability that the site of the Ochils was a line of volcanic disturbance for a long period. One can learn more of the possibility of this state of things in a scramble up or down any of the Ochil burns, than by any amount of book-shelf

lore or dictation. The wonderful way in which dense masses of stratified rocks are broken up and turned aside by erupted material can in no way be realized excepting by that of observation.

To assert without due deliberation that any patch of rocks is of such or such an age, or was deposited or erupted under these or those conditions, is to be at least irreverent. To declare upon them at all, even after careful scrutiny, is serious enough. One's own opinions, nursed up within one's self, may be very self-satisfying, but it is perhaps a duty to submit such opinions—at least upon subjects in the Natural world—to the scrutiny of one's fellow-men, though often the result is mortifying to our vanity; and yet how seldom do we hesitate to put our opinions to the test.

I have thought seriously about certain beds in the Earn Valley, and have certain beliefs in connection with them, but that they will be accepted as at all admissible I am not at all sure. My endeavour has been to place these beds in their exact chronological position, and in this endeavour I have been inadvertently led to associate them with Dunning of intemperate coal-boring notoriety. Hugh Miller says—"Old Red Sandstone," p. 198,—"The Sandstones of Strathearn and the Carse of Gowrie yield their plates and scales of Holoptychius, the most abundant fossil of the Upper Old Red." Taking this cue, I have searched among the sandstones of the Earn for something indicative of their age, but have been quite unsuccessful. I obtained a fine scale and some appendages of Holoptychius from Clashbennie, in the Carse of Gowrie. Nevertheless my first acquaintance with these rocks increased my belief in their asserted age, for their lithological character bore a generally universal contrast to the New Red Sandstone area around Liverpool, which I had previously carefully examined; and I have now full faith that these rocks are indeed Old Red. From Auchterarder to Abernethy on the south, and all along the north side of the valley for the same distance, I have seen nothing to belie this belief except at Dron. These said beds took me altogether by surprise. Their very aspect spoke of something new; that on the first day's exploration appeared in the shape of a small ganoid scale and one or two conchiferous shells.

The beds are situated at East Dron, and are best exposed about 50 yards south of the mill, where they form a cliff at the side of the burn, 16 or 20 feet in height, capped by Boulder Clay.

From this point they may be traced westward for a quarter of a mile, and up the burn of Balmanno Hill for about one-fifth of a mile, when an outcrop of trap puts an end to them. Balmanno Hill rises to 721 feet; the point of contact of the beds with the trap is perhaps 100 feet above Dron mill, and this mill is about 60 feet above sea-level. Eastward they may be traced beyond the kirk for a short distance, where they form the bed of the burn and then disappear. They are well seen at the back of the mill, and I doubt not the knoll, upon which the kirk and the whole of East Dron is situated, is composed of these rocks. I could not define their exact boundary, either eastward, westward, or to the south; but that they are local may be inferred from the fact that to the west a bright red Old Red Sandstone is quarried at about a mile distant; and to the east, to within as short a distance, the Old Red Sandstone of the Carse of Gowrie approaches; and the traps of Moncreiffe Hill are a sure indication of its limit on the north. There is no possibility that they are rocks likely to dip under the Old Red. The beds have only a slight dip into the valley, but form a synclinal curve, dipping from east and west at an angle of about 25°.

Lithologically the beds are argillo-calcareous unstratified sandstones, calcareous shales, several thin seams of bituminous shale, and bands of a pale grey close-grained cuboidal limestone. I would here beg to thank Sir Thomas Moncreiffe for kindly calling my attention to the beds.

On the first visit, February 1874, I hesitated to pronounce upon them, but expressed to Dr. Buchanan White an opinion that they were Carboniferous. This opinion has been strengthened by subsequent visits, and I am now as persuaded as I generally dare to be about anything, of their authenticity.

I have since learned that Dron is somewhat classic ground, that it has been before visited by several eminent geologists, and perhaps even described by one of whom it would be quite irreverent not to speak with the greatest respect, the late Rev. Dr. Anderson of Newburgh, author of "Course of Creation," "Geology of Scotland," "Dura Den," &c. I have in several ways seen that Dr. Anderson did visit Dron. The first evidence was two fragments of stone that I saw in the collection at Rossie Priory, which I felt sure were from Dron. No locality was assigned to them, but one was marked "cypris," the fragment being full of those

minute crustaceans. The other was not labelled, but contained several of the commonest shells of the Dron beds. Curiously, a few days since, when Dr. Anderson, of Kinnoull, kindly showed me some fossils of the late Doctor's collecting, I was struck with the identity of the writing attached to those, and the word "cypris," on the Rossie specimen. I had particularly noticed the latter writing. Other evidence of Dr. Anderson's acquaintance with Dron, I think, may be seen on the late Doctor's geological map in the beautiful monograph of Dura Den, where the colour representing the Old Red Sandstone is carried to within a short distance of Dron, when the paper is left white. This is curiously suggestive. The Rev. John Anderson, D.D., of Kinnoull, informs me that he distinctly remembers the visits of his father, the late Rev. Dr. Anderson, of Newburgh, to Dron—on one occasion accompanied by the celebrated microscopist, Dr. Quekett—and of the Dr.'s assertion that some of the beds appeared in part to be composed of the remains of the minute crustacean *cypris*, and that he was sure the late Dr. had brought the beds into notice somewhere.

In a letter, dated 10th April, 1875, to Dr. Buchanan White, Dr. Lauder Lindsay writes as follows: "It is several years since I visited the glen and collected a suite of its fossils. At the time I was puzzled by their character occurring in the Old Red Sandstone area of Strathearn, and I thought of drawing up an account of the locality and its produce for one of the geological societies or journals. But . . . . Mr. Sadler sent me a cutting from an old Fifeshire newspaper containing Dr. Anderson's views. My present conclusion is that Dron is a patch of *carboniferous* strata, cut off from the Fife coal-fields by the Ochils."

The fossils of Dron are not, so far as I have been able to discover, very numerous in species nor in very good preservation, but Cyprididæ abound in many of the layers. "Fossil forms, under the generic names of *Cypris*, *Cypridea*, *Cyprudina*, *Cyprella*, and *Cypridella*, occur in all rocks from the Lower Coal-measures upwards" (Page's "Handbook of Geological Terms"). If this be correct, it gives a strong Carboniferous feature to these beds, seeing that they must in that case be more modern than the Old Red. *Cypridina* occurs in supposed Upper Devonian of Saxony and Nassau, but Professor Page believes this to be the base of the Carboniferous.

There are in Fife 2000 feet of Lower Carboniferous rocks, consisting in their lower series of "a vast thickness of whitish fine-grained sandstones, bituminous shales, a few thin seams of coal, mussel-bands or shell-limestone, ironstones, and fresh-water limestones abounding in cyprides" (Page). The Geological Survey's Memoirs give the following as the Lower Carboniferous series of south of England—near Bristol on Avon: "Lower series enclosing many alternations of limestones and shales, the former often black, brown, yellowish, sometimes impure, and in one part charged with fish remains and cyprides in abundance—500 feet." I believe several of the bands at Dron would yield fish remains in tolerable abundance could they be properly worked, for minute teeth and scales are scattered through the material; and on one occasion I exhumed, in very mouldering condition, what would, I doubt not, otherwise have been an almost perfect specimen. The isolated scales represent the ganoid and, I believe, placoid orders; one of them greatly resembles Holyptychius. There was, however, a fragment of jaw, showing six teeth of what was thought to be the *fish*-dentition of the sauroid fish Rhizodus. The more common shells bear an estuary aspect, but imperfect specimens of Spirifer were obtained. A shale-slab bore a vegetable impression, and another showed small, but well defined, ripple-marks.

This, thus far, is the list of fossils from Dron, important or unimportant as they may be judged to be. I concluded, from the lithological character of the beds, that they were not Old Red, and I now, from this small group of fossils and their geological and geographical position, believe them to be Lower Carboniferous. Cyprides are found in most rocks above Old Red Sandstone, but Rhizodus is a carboniferous genus. The immediate neighbourhood of the Old Red Sandstone suggests an almost impossibility of this being Upper Carboniferous, seeing that 2000 feet of Lower Carboniferous and 200 feet of Mountain Limestone exist in Fife, and should, in that case, exist underneath, whilst Upper Carboniferous itself is 2500 feet in thickness. There is, moreover, an absence of the fossils that one might expect in the Upper series. That these rocks are Lower Carboniferous a good deal affirms, while little or nothing negatives this view. On seeing the very imperfect fossils, Mr. Somervail, of the Edinburgh Geological Society, suggested that they possibly bear some anomalous characters, and that the beds may be found to be passage-beds between Old Red and

Carboniferous. More will be reported of the fosslls, I trust, in the next issue of the *Scottish Naturalist.*

The isolation of the Dron beds is at least curious, and perhaps even a little perplexing, when one finds it necessary to cross the Ochils and to reach Mid-Lothian before a similar rock appears, unless, as I have for some time suspected, the beds through which the bore has lately passed at Dunning are identical with them. Even though such should be the case, it is still curious that the depth of the valley should contain Carboniferous rocks, whilst the high lands on either side exhibit undoubted Old Red Sandstone. One can just imagine a great anticlinal curve bringing the Fife rocks right over the hills into the valley, whence they may have extended one can never tell whither; but *that* one item, *denudation*, has performed a wondrous work during our "fifty millions" of years. Or, we may perhaps imagine a series of local changes, so that now a lake or an estuary deposited the cypris and fish-beds, and now a sub-marine accumulation entombed the *spiriferæ.* This latter theory is, I think, less likely than that of greater continuity and subsequent denudation. In this denudation, wherever a synclinal curve carried the upper beds low down, there they might perchance be left. Whether the Dron beds are of local deposition or local protection, they are worthy of the greatest consideration. They are a volume of no common interest in the wonderful history of the past. They are an evidence, at the very feet of volcanic hills, of quiet lakes, or widely spreading estuaries, reposing for unnumbered thousands of years, and of briny waters that usurped the places of lakes and rivers, to be for still another giant stride of time the recorder of a chapter in the mundane history. The Carboniferous era must have witnessed conditions that have no parallel in the present world—conditions that have had no equals in any subsequent period in the peculiar distribution of land and water, of widely-spreading estuaries and shallow seas, of swamp and verdant woodland, moorland and lake, not once and for aye, but coming and going, now with one state of things and now another, shifting through decades of centuries like the scenes in a panorama. The joy, sweetest and deepest, to be derived from any geological expedition is that of the association of long-lost times, and scenes, and conditions, and existences, with our poor human efforts. Why men should scorn to indulge in anything imaginative, and declare that such weaknesses are a sure sign of the absence of

"science," I could never understand. I believe that science should fill us brimful of poetry, for poetry reads, in a loftier manner, everything superhuman, and those who dare not indulge in such "useless" reveries are the veriest slaves to the science, and all their "knappings of chuckie stanes" but the ticking of a clock or the clicking of type in the compositor's stick—mechanical indices of something else. The spirit of the Geological Record is as superior to its words and sentences as the soul is to the body; and the feeling of reverence cannot be too deep, as one turns the pages so sublimely written by an omnipotent Creator. The geologist who feels at the cliff as the stone-breaker feels at his trade is no fortunate brother. The response in the following beautiful lines should ring for ever round the earnest hammer:—

> "What sea, receding from what former world,
> Consigned these tribes to stony sepulchres?
> Bewilder'd sage! proclaim thy wisdom folly,
> And where thy Reason fails let Faith begin:
> The rocks have sacred secrets of their own,
> That teach the wise humility and praise."*

As I have before hinted, I have for some time believed that the rocks of Dunning may be equivalent to those of Dron. It can be no great marvel to find Carboniferous rocks at Dunning if such exist at Dron; but it would be somewhat startling to find that Dunning possessed "Upper" Carboniferous, since Dron possesses "Lower," the more so when one has found undoubted Old Red on every hand, within easy distance of Dunning.

If the Dunning explorers had been assured that they were cutting through genuine Carboniferous rocks they would doubtless have gone on all the merrier, notwithstanding Geology's assertion that there is a difference between "upper" and "lower" coal-measures, and that the latter contains, over the hills, only a "few thin seams of coal," a great many such layers as those of Dron, and is, altogether, 2,000 feet in thickness. "It is reported," says Hugh Miller, in his "Old Red Sandstone," "by Dr. Anderson of Newburgh, that a fruitless and expensive search after coal has lately been instituted in the Old Red Sandstone beds which traverse Strathearn and the Carse of Gowrie, in the belief that they belong, not to the Old, but to the *New* Red Sandstone." The following is from a recent "Perthshire Constitutional": "The first experiments we know of were

* Dr. John Anderson.

made about forty-five years ago, near the Newton of Pitcairns, about two miles from Dunning station. This effort was made by means of a public subscription, raised through the instrumentality of the inhabitants of the district; but although there was a bore of between 200 and 250 feet, there were no indications of the existence of the coveted mineral. Undaunted by this failure, another effort was made in the same locality a few years later, with the same unhappy result. Our readers are pretty familiar with the recent attempts at Auchterarder, where, disregarding the opinions of those best able to judge, the promoters persisted in boring to a considerable depth without meeting with the slightest encouragement."

Better for Strathearn to satiate its mania for ruinous boring upon this lower Coal-measure theory, for there is then the excuse that possibly a "thin seam" somewhere within the 2000 feet might be struck. The New Red Sandstone idea is a forlorn hope, if the Dron beds are carboniferous, as they assuredly are. The mania has sent pulverised specimens of Old Red Sandstone to learned professors, who have returned the same with the assurance that they are "almost identical with New Red Sandstone," under similar circumstances. Other "proofs" have been adduced by "practical" men, from the fact that iron exists in boulder clays and trap, &c., that finds its way into the valley drains. Others have "tasted water" and have found therein a sure index to abundance of tantalizing coal. Operations by the "divining rod" surely have been kept close. There never was a more *wilful* boring than that of Auchterarder, within a stone's-throw of *such* a quarry. Dunning is a little dignified even after the third venture, if its rocks are Lower Coal-measures; but if it plants its bore on another spot, within a good mile or so of the other three situations, all dignity is gone for ever.

Whether the Dunning beds bear a Carboniferous aspect some may judge better than I. The following represents the register down to 132 feet, and is from the "Perthshire Constitutional": "Surface earth, 1 foot; brown, soft, 3 feet; clay, 1 foot, 6 inches; brown stone, 5 feet; freestone, 14 feet, 5 inches; white freestone, 8 feet, 3 inches; white freestone, hard, 1 foot, 5 inches; soft white freestone, 11 feet, 10 inches; do., with brown partings, 8 feet, 4 inches; soft white freestone, 1 foot, 10 inches; do., 3 feet, 4 inches; bands, brown, soft, 1 foot, 11 inches; light freestone, 5 feet, 7 inches; brown freestone, 1 foot, 5

inches; do., 3 feet, 2 inches; do., hard, 6 feet, 8 inches; brown blaes, 1 foot, 6 inches; white freestone, with partings, 2 feet, 5 inches; strong freestone, 4 feet, 10 inches; white freestone, hard, 1 foot, 10 inches; strong white freestone, 4 feet, 2 inches; do., very light and hard, 2 feet, 3 inches; do., soft, 2 feet, 2 inches; do., soft, 2 feet, 6 inches. The other depths were all freestone—white." The terms, I presume, are local.

Two samples—the last from the Dunning bore—were several weeks ago brought to me; the depth was then over 200 feet. One was of a reddish colour, the other very pale; both contained mica and answered to the test for lime, and were what any of the cypris or shell-beds of Dron might be from a bore.

If I were asked whether coal exists on the Duncrub estates, I should answer somewhat as follows:—Lower Carboniferous rocks exist at Dron. Lower Carboniferous rocks serially occnr immediately above Old Red Sandstone. Old Red Sandstone exists within a short distance of Dron. It is, I believe, Old Red Sandstone at Auchterarder. It is Old Red Sandstone high up Invermay glen. It is this same rock on the north side of the valley. If anything exists at Dunning more modern than Old Red Sandstone, it is Lower Carboniferous. There are several thin seams of coal to 2,000 feet of this in Fife. A local patch is not likely to prove an exception to this. Even were there hopes of a workable seam, its area would be very limited. I have worked at Dron with my hammer, and it has taught me what 60 fathoms' boring at £9 per week hints at.

I was this twelfth day of June informed by a gentleman, whom I considered a good authority, that several seams of coal had been passed through at Dunning on the previous Thursday, one of which was 2½ feet in thickness, &c. This so astonished me that I took the first train to Forteviot, and was on my way to the bore to verify this report when I met one of the residents of the district, who informed me that 300 feet had been passed; and that the week previous operations had been given over; and the man added, "no coal whatever has been found." But I am assured that "coal" has been passed through, and that boring operations may be recommenced.

PHYTOLOGY.

REMARKS UPON "NOTES OF AN EXCURSION TO BREADALBANE" (Sc. Nat., III., p. 18).

By J. H. BALFOUR, M.D., F.R.S., Professor of Botany in the University of Edinburgh.

SEVERAL of the localities of alpine plants mentioned in the report of your botanical excursion to Breadalbane along with Colonel Drummond Hay are not new. I send you the following remarks :—

Sagina nivalis was found for the first time by me on Ben Lawers on 25th August, 1847. I have since gathered it in several places on Ben Lawers, also on Creag na Caillich; and on Benean (Stobinain), one of the tops of Ben More, on 11th August, 1864.

Alsine rubella has been found on Ben Lawers, Creag na Caillich, and Cam Chreag, by myself and party.

Gentiana nivalis was gathered for the first time by my son on Cam Chreag in October, 1872. It was in seed, and the seed taken at that time germinated in the Botanic Garden. At that time Cam Chreag was supposed to be a continuation of the mountain called Meal-nan-Tarmachan, which we ascended also. We ascertained afterwards that the hill visited by us was called Cam Chreag. Since that time we have gathered the plant in flower in that locality, where it is abundant. I have also gathered *Gentiana nivalis* on Creag na Caillich.

Bartsia alpina grows on Meal Ghyrdy, and on Meal Uachdar, and the mountains near it, far up the Lochay. I have gathered the plant in both localities.

Kobresia caricina (Elyna caricina) was gathered on Ben Lawers as well as on a hill called Creag Luigh, in the upper part of Glenlyon, near a station for *Cystopteris montana*. (The mountain you call Ben Laoigh is probably another hill. I do not know where it is ; I fancy not far from Tyndrum.) We have also in the Herbarium fine specimens from Creag na Caillich.

On October 2, 1872, the following plants were recorded by our party on the actual summit of Ben Lawers:—*Saxifraga cernua*, on a rock on the cairn; *Draba rupestris; Alsine rubella; Gnapholium supinum; Carex rigida; Cerastium alpinum; Cerastium latifolium; Festuca ovina vivipara; Alchemilla alpina; Saxifraga stellaris; Saxifraga oppositifolia; Hieracium alpinum; Leontodon Taraxacum; Cladonia uncialis, &c.*

I think that your *Sagina procumbens?* is probably another species of the genus—possibly *S. saxatilis.*

Cam Chreag is a very productive hill. I have examined it several times. *Draba rupestris* grows also on Benean.

Edinburgh, 15th April, 1875.

[In our "Notes" we never intended that the localities indicated should be supposed to be "new" ones for all the plants mentioned. Every botanist who visits Ben Lawers must know that *Sagina nivalis* is one of the many plants added to our lists by the ever energetic Professor Balfour. Ben Laoigh is south-west of Tyndrum; *Kobresia* grows in several places in that district. The "*Sagina procumbens?*" is probably a form of *S. saxatilis.*—F. B. W. W.]

ON SOME VARIETIES OF THE PRIMROSE FOUND IN FIFESHIRE.

The common primrose, *Primula vulgaris*, is generally distributed on the grassy banks that flank the many streamlets with which the county abounds, and where they are much admired, not only for the sweetness and beauty of their flowers, but also from their being associated with a sunny sky, as the heralds of spring, as the poet thus expresses—

Welcome thou again, love-listening primrose.

The cowslip, *Primula veris*, although widely distributed over the county, is more localised. On the light sandy soil near Elie it lends, when in flower, a yellow covering over the grass, extending to great distances. In woods and dens throughout the inland parts of the county it is also met with.

Our indigenous Primulas attracted the attention of the old florists, who admitted them among florist flowers under the names of primroses and polyanthuses, which were held by them in great esteem. The differential representation of extended or contracted individual organs, together with the various shades of colours, as they raised large diversities from seed, displayed to them an epitome of nature—unity in diversity—diversity in unity.

We had occasion to notice among our Primulas several differential appearances, when during a very limited period we were working up the

"Flora of Fife and Kinross" for Ballingall's "Shores of Fife," published in 1872. One differential appearance, not only common among our indigenous Primulas, but also inherent among the many varieties, even when placed under cultivation, is the position of the anthers in the throat or tube of the corolla, and this appears to regulate the length of the globose stigma, as when the anthers fill up the throat of the corolla, the stigma is placed below them, but when the anthers are placed further down (hidden), the globular stigma is elevated into the mouth of the corolla, which was described by the florist when he assumed the position of a judge, as "a worthless pin-eyed thing." One feature presented by the primrose, is that the scape is one-flowered, as distinguished from the cowslip, which has a scape umbellate with the flowers drooping. We not unfrequently meet with the one-flowered scape, and the umbellate or many-flowered scape, on the same plant. We noticed this diversity in connection with a circular unbroken outline of the corolla, which was also conspicuous at a distance in consequence of the darker yellow colour it displayed among the pale yellow of its associates growing in the deep wooded ravine known as Kiel's Den; the flowers were one inch in diameter. On placing this variety under cultivation, where it still retains its peculiarities, many seedlings were raised of brown and purple colours, shades of yellow predominating. They also varied in form from the parent plant by presenting the combined scapes on the individual plant, as in the parent, with flowers of larger size, while the large majority presented flowers singly on a scape, as in the common primrose, which many of the seedlings thus raised resembled. We selected two plants of the latter, which seed freely, from which we have raised a goodly number of seedlings, with flowers measuring 1⅝ inches in diameter, differing in shades of yellow to that of white, and the edge of the corolla being a little fringed or entirely smooth. In order to shorten the number of names, I purpose designating this combination the "Louisa" group, (in commemoration of a labourer in the domain of science), being a representation combining the umbel, or many-flowered scape, with the one-flowered scape, in connection with an enlargement of the floral umbel, and where the limbs of the corolla spread into an entire circle.

In the "Flora of Fife and Kinross" the following notice also occurs: "Collected from Kiel's Den, a group of three plants with the tubular calyx cut up into linear segments." These plants in no way differed from the common group of primroses among which they were growing, excepting that the entire calyx or floral leaves were represented by detached segments, resembling, in some examples, bracts. This group also seeds freely, and the seed, by a succession of sowings, has produced a very great number of varieties in colour of flowers, from dark purple to white, including orange and various shades of yellow; the greater number being plants flowering with scapes bearing one flower, while on other plants they have scapes with an umbel of flowers. Another peculiarity among this group of seedlings is where the calyx is represented by forms of what may be termed cauline leaves, in place of the bracteate divisions of the calyx, as in the parent plant. This extension of bracts into foliated envelopes is observed also in *Plantago major* and *Plantago maritima*, of which Fife furnished us examples. Another form of this group of plants, where the bracteate form predominates, is where the scape bears an umbel of flowers,

the corolla being cleft down part of the throat nearly to the anthers, from above which rises the style, and the limb of the corolla being deeply cut on the outer edge, spreads out into heart shaped divisions; this combination I purpose to designate the "Bracteate" group, producing so great diversity in colour and form.

We further notice from the "Flora" already quoted—"In an old wood where cowslips were abundant, far removed from primroses, seven dissimilar plants were noticed: four plants being similar to what is frequently known in Fife as the Oxlip; and two had flowers of less size, of a cowslip yellow." Similar forms as here represented were collected near the summit of Kelly Law, Dunbarnie Links, and Kincraig Point, the only difference being that the flowers were pure white. Of this group we have not collected much seed, but what we have sown has produced several orange and other varieties, and one hose-in-hose, where the entire calyx, being represented by a a coloured corolla, was so designated by the old florists. This combination, which embraces many varieties, we purpose to designate the "Oxlip" group, although individually among so many small differences I am unable to determine the individual Oxlip where the scape bears flowers in umbels. There are three varieties which may form a separate group, as there are many grown under cultivation, namely, the hose-in-hose, which I have not yet seeded, which may be designated by the "Duplex" group in reference to the divaricate corolla. I received notice from Mr. Luke of Elie of a duplex primrose growing wild among other primroses on the Links there. I failed to find it that season, but found it the following year. I also received a plant with duplex brown coloured flowers from Mr. Petheram, who found it by the side of a stream; and also from Miss Petheram a duplex form of the common cowslip, who collected it on the Links at Lundin; while a short time after Miss Jeffrey found a plant growing on the Home Park at Largo. —C. Howie, Largo, Fife, April, 1875.

Bryological Notes.—Dicranum montanum Hedw. found in Scotland.—In November last year, I took advantage of my being at Blairgowrie to visit the Den of Craighall, in order that I might form for myself some idea of the botany of that justly celebrated place. The Den may be called a magnificent cañon, one of the finest in Scotland, very similar to the Den of Airlie in its geological character and general appearance, but scarcely so grand or extensive. A place like this, and which includes among its flowering plants several important species, chief among which is *Polygonatum verticillatum*, might well be expected to furnish many of the most interesting of the lower forms of vegetation; and as nobody had previously paid much attention to the cryptogams there, I, in company with the Rev. W. Herdman of Rattray, started for the Den with good expectations. Although we had only three or four hours to spare, and the day was so bitterly cold and stormy that everything was frozen out of its normal aspect, and botanizing had to be carried on with gloved hands, our expectations were more than fulfilled. We selected the east or left bank of the river for exploration, and while passing onwards from Rattray towards Craighall, through the cultivated fields below Bonnyton, I gathered the golden summer-spores of *Melamspora*

euphorbiæ in great abundance, and for the first time in my life. This fungus is said in "Cooke's Handbook" to be common. It may be so in England; but many a day, in winter and in summer, I had previously searched the north east of Scotland for it in vain. Advancing onwards through pasture lands I observed very fine specimens of *Hypnum patientiæ* Lind., a moss common enough in some districts, but totally absent from others; while on the dykes were fair supplies of *Orthotrichum saxatile* Wood; *Ptychomitrium polyphyllum*, and *Grimmia trichophylla*. Within the Craighall grounds, about a quarter of a mile or so below the house, and close to the carriage drive on the right hand, there is a wettish broken clay bank, which was covered with the beautiful red cups of *Peziza trechispora*, a fungus, we believe, only recently discovered to be Scottish; and close by this, careful search brought to light *Puccinia chrysosplenii*. This has been regarded hitherto as one of the great British rarities, but there are now several localities in the north-east of Scotland in which it has been detected. On and about the same bank there are also two rather important mosses, viz., *Bartramia calcarea*, var. *major*, indicating the presence of lime in a greater or less degree, and *Dicranella Schreberi*. This latter is almost unknown between the Tay and the Dee, and every station in which it has been met with deserves to be carefully noted. Further on, as we passed by a most tempting-looking burnside, we came upon *Phlebia merismioides*, which we had seen before only in the neighbourhood of Forres. It is not so beautiful nor so rare as *Phlebia radiata*. We here gathered *Peziza tuba*, *Polyporus nidulans*, *P. amorphus*, and last of all *Psilopeziza myrothecioides* B. and Br., a new species figured in the Annals of Natural History, and first gathered by ourselves in Banffshire. This burnside seemed full of rarities, but we had no more time to devote to it, so we hurried on past the house to have a glimpse of the real rocks. At the north base of the rock on which Craighall House is perched, the vegetation at once assumes a distinct sub-alpine character. Somewhat unexpectedly we came upon large masses of *Saxifraga hypnoides*, a plant remarkably abundant and variable on the Clova mountains, but a great stranger below 700 or 800 feet. On the Buchan coast I have met with it in several places within a few yards of the tide mark, but on that cold coast still more alpine plants such as *Saxifraga oppositifolia* may be seen. In Forfarshire *Saxifraga hypnoides* occurs in the Den of Airlie, and I have met with it still more to the south, but not at so low an altitude. Associated with it here at Craighall are two mosses and a Jungermannia, usually met with only on the hills, viz., *Bartramia gracilis* Floerke, *Encalypta ciliata*, and *Jungermannia trichophylla*. A little farther on, the rocks in slope, height, and exposure, are all that could be desired; but they want that shade, and moisture, and soft character which is so essential to the existence and luxuriance of cryptogamic plants. Huge masses of *Madotheca platyphyila*, *Metzgeria pubescens*, and *M. furcata*, *Anomodon viticulosa*, *Homalothecium sericeum*, *Antitrichia curtipendula*, *Cynodontium Bruntoni*, and other mosses and Jungermanniæ of the baser sort made me feel rather disappointed. Further on a hasty and fruitless search of a yard or two of the river for *Cinclidotus fontinaloides* deepened the disappointment. And so as my time was up we abandoned botanizing for the day. Loth to depart, I thought I might just have a look at the trees, which I had hitherto very much neglected, and so turned to the nearest. I observed a somewhat peculiar dark green patch at its base. It bore the aspect

of *Weissia cirrhata*, but I had my suspicions, for I had found *Weissia cirrhata* growing almost always in roundish tufts. I turned my lens upon the plant, and found the apex of the leaf and the back of the nerve distinctly serrated, and knew that I had found *Dicranum flagellare* or *Dicranum montanum*. It afterwards proved to be the latter, new to Scotland, and found in a second British locality. If such good things are found in less than four hours, and in only a morsel of Craighall Den, how much may be expected when the whole Den is subjected to a patient and thorough exploration. Remarkably little attention has as yet been paid to the cryptogams along the course of the Ericht, and not only Craighall Den, but the Dens of Drimmie and Kingseat must contain many rarities.—J. FERGUSSON, The Manse, Fern, Brechin.

Ulleriore, of Spynie Loch, Elginshire.—A notice, or query, regarding this plant, and of similar import to that in the *Scottish Naturalist* p. 79, was sent to *Loudon's Magazine of Natural History*, 1831, vol. iv., p. 188. No information was given in reply. In the notice will be found an extract, in Latin, from Bishop Leslie, where the plant is called Olorina. Why it was translated Ulleriore, in the survey of the province of Moray, is not known. *Typha latifolia* was suggested as likely to have been the plant meant by the Bishop. It was once abundant in the Loch of Spynie. An inroad of the sea at the time of the Moray floods (1829), almost killed it out. It again revived and spread its roots, when some years afterwards the flow of the tide was excluded; but now it has almost disappeared, with the beautiful lake itself, through the progress of agriculture. *Scirpus lacustris*, *Arundo phragmites*, *Sparganium ramosum*, *Potamogetons*, &c., were also frequent in and around the same extensive sheet of water.—G. GORDON, Birnie, Elgin, April 1875.

Peziza stevensoni.—In the notice of "Recently Described Scottish Fungi" in our last number, this fungus, discovered by the Rev. J. Stevenson, was accidentally omitted.

THE CRYPTOGAMIC SOCIETY OF SCOTLAND.

IN accordance with the notice given in April last (Scot. Nat. III. 78), a meeting was held at Perth on April 16th, and attended by botanists from various parts of Scotland. Dr. Buchanan White, convener of the committee, occupied the chair, and after the report of the committee had been received and a Constitution adopted, a Society under the title of the "Cryptogamic Society of Scotland" was founded, and the following office-bearers elected:—

President—Sir T. MONCREIFFE, of Moncreiffe, Bart., President of the Perthshire Society of Natural Science.

Vice-President—GEO. DICKIE, M.D., F.L.S., Professor of Botany, University of Aberdeen.

Secretary—F. BUCHANAN WHITE, M.D., F.L.S., Editor of *Scottish Naturalist.*

Treasurer—Rev. J. STEVENSON, M.A., Glamis, Forfarshire.

Members of Council—

Rev. J. FERGUSSON, M.A., Fern, near Brechin, Forfarshire.
Rev. M. ANDERSON, M.A., Menmuir, Forfarshire (or after July, St. Andrews, Fife).
Rev. J. KEITH, M.A., Forres.
J. ROY, Secretary of the Natural History Society, Aberdeen.
Colonel DRUMMOND HAY, C.M.Z.S., of Seggieden, Perthshire.
G. OGILVIE, M.D., Professor of Institutes of Medicine, University of Aberdeen.
C. HOWIE, Secretary of the Largo Naturalists' Field Club, Largo, Fife.

Botanists who may wish to see the Laws of the Society may obtain a copy by applying to us.

At a Council Meeting held immediately aferwards—the President in the chair—it was determined that the Annual Meeting should be held this year at Perth, at the end of September. The programme of arrangements for that meeting (as far as they have been made) will be found on the wrapper (pp. 3 and 4).

We may mention that several of the most distinguished English mycologists have already intimated their intention to attend the meeting; and that the date of the most important of the Fungus Shows in the south, viz., the Hereford Fungus Foray, has been fixed so that the two Shows will not interfere with each other. We trust that all our friends, in every direction, will help to make the Meeting and Show successful and interesting in every way.

VARIOUS NOTES.

WE have received a "Guide to Belfast and the adjacent Counties," by the Belfast Naturalists' Field Club. This little volume was originally got up as a contribution from the Field Club, to add to the interest of the British Association Meeting at Belfast last year, but though that of course was only a temporary meeting, yet the "Guide" contains a considerable amount of information which renders it of permanent value. It contains sketches of the various departments of the local natural history, as well as articles on the history, antiquities, agriculture, etc., of the district, and is illustrated by 46 plates. Considering the proximity of that part of Ireland to Scotland, the book will be found to contain a good deal to interest a Scottish Naturalist, while to those who visit the locality it will be of great service. Similar societies in other districts might do well to follow the example of the Belfast Field Club, and get up similar handy "Guides" for their own localities.

INSECTA SCOTICA.

THE LEPIDOPTERA OF SCOTLAND.

(Continued from p. 84.)

EDITED BY F. BUCHANAN WHITE, M.D., F.L.S.

MANIA Tr.

MAURA L. Not common. Agrestal.

DISTRIBUTION—EAST. Tweed Forth Tay o o o o o
WEST. Solway Clyde o o o

LAT. 54°40′-56°30′. RANGE IN EUROPE. Southern and central. TYPE. Meridiono-central. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. July, August. LARVA. September-May. FOOD-PLANT. Low plants, &c.

NÆNIA Stph.

TYPICA L. Common. Agrestal. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♂ o o
WEST. Solway Clyde Argyle West-Ross o

LAT. 54°40′-57°40′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. September-May. FOOD-PLANT. Trees and low plants.

SCOLIOPTERYGIDÆ.

SCOLIOPTERYX Germ.

LIBATRIX L. Common. Nemoral and riparial.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway Clyde ♂ ♂ o

LAT. 54°40′-57°40′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. August-June. LARVA. June, July. FOOD-PLANT. Willow.

XYLINIDÆ.

XYLOCAMPA Gn.

AREOLA Esp. (1789); *lithoriza* Bhk. (1792). Rare. Nemoral.

DISTRIBUTION—EAST. ♀ ♀ ♀ o o o o o
WEST. Solway Clyde ♀ West-Ross o

LAT. 54°50′-57°50′. RANGE IN EUROPE. Western. TYPE. Occidental. TYPE IN BRITAIN. English.

TIME OF APPEARANCE.—IMAGO. March, April. LARVA. June-August. FOOD-PLANT. Honeysuckle.

CHLOANTHA Boisd.

SOLIDAGINIS Hb. Not common or local. Nemoral. Ascends to 1200 feet.

DISTRIBUTION—EAST. ♀ Tay Dee Moray [Sutherland] o o
WEST. [Solway] Clyde ♀ ♀ o

LAT. 55°40′-57°40′. RANGE IN EUROPE. Northern and central. TYPE. Septentriono-central. TYPE IN BRITAIN. Scottish (?).

TIME OF APPEARANCE.—IMAGO. August, September. LARVA. June. FOOD-PLANT. Blaeberry *(Vaccinium)*.

CALOCAMPA Stph.

VETUSTA Hb. Not uncommon. Agrestal and nemoral.

DISTRIBUTION—EAST. ♀ Forth Tay Dee Moray ♀ o o
WEST. ♀ Clyde Argyle West-Ross ♀

LAT. 55°50′-57°40′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE.—IMAGO. September-June. LARVA. May-July. FOOD-PLANT. Low plants.

EXOLETA L. Common. Agrestal and nemoral. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ○ ○
WEST. Solway Clyde ♀ ♀ ♀

LAT. 54°40′-57°40′. RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE.—IMAGO. September-June. LARVA. May-July. FOOD-PLANT. Low plants.

XYLINA Ochsen.

ORNITOPUS Rott. (1776); *rhizolitha* F. (1787). Rare. Nemoral.

DISTRIBUTION.—EAST. Tweed ♀ ♀ ♀ Moray ○ ○ ○
WEST. [Solway] ♀ ○ ○ ○

LAT. 55°30′-57°40′. RANGE IN EUROPE. Central (South Sweden). TYPE. Central. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. September-April. LARVA. May, June. FOOD-PLANT. Oak.

X. semibrunnea and X. petrificata have been reported from Solway, but corroboration is desirable. They might, from their European and British distribution be expected to occur.

ASTEROSCOPUS Boisd.

NUBECULOSA Esp. Rare and local. Altitude about 700 feet.

DISTRIBUTION—EAST. ○ ○ Tay ○ ○ ○ ○ ○
WEST. ○ ○ ○ ○ ○

LAT. 56°40′. RANGE IN EUROPE. Germany, &c. TYPE Septentriono-central. TYPE IN BRITAIN. Scottish.

TIME OF APPEARANCE—IMAGO. March, April. LARVA. May, June. FOOD-PLANT. Birch.

A. sphinx Hufn. (1767; *cassinia* Hb.) has been reported from Solway.

CUCULLIA Schrk.

CHAMOMILLÆ Schiff. Not common (or overlooked) Agrestal.

DISTRIBUTION—EAST. [Tweed] Forth Tay ○ ○ ○ ○ ○
WEST. ♀ Clyde ○ ○ ○

LAT. 55°50′-56°30′. RANGE IN EUROPE. Central and southern. TYPE. Centro-meridional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. April-June. LARVA. May-July. FOOD-PLANT. Wild Chamomile *(Matricaria)*, &c.

UMBRATICA L. Common. Agrestal.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde ♀ West-Ross o

LAT. 54°40′-57°50′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June. Larva. July-September. FOOD-PLANT. Sowthistles (*Sonchus*) and Lettuce.

PLUSIIDÆ

ABROSTOLA Ochsen.

TRIPARTITA Hufn. (1767); *urticæ* Hb. (1804). Common. Agrestal.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀
Orkney o
WEST. Solway Clyde ♀ ♀ o

LAT. 50°40′-59°10′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE.—IMAGO. June, July. LARVA. July-September. FOOD-PLANT. Nettle.

TRIPLASIA L. Local. Agrestal. Sub-maritime?

DISTRIBUTION—EAST. ♀ Forth Tay ♀ [Moray] o o o
WEST. Solway Clyde o o o

LAT. 54°50′-56°30′. RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. English.

TIME OF APPEARANCE.—IMAGO. June-August. LARVA. July-September. FOOD-PLANT. Nettle, &c.

PLUSIA Tr.

CHRYSITIS L. Common. Agrestal. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray Sutherland o o
WEST. Solway Clyde Argyle ♀ o

LAT. 54°40′-58°40′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June-August. LARVA. September-May. FOOD-PLANT. Nettle, etc.

(To be continued.)

THE COLEOPTERA OF SCOTLAND.

(Continued from p. 40.)

EDITED BY D. SHARP, M.B.

DELIPHRUM Kr.

TECTUM Payk. Highland. In sheep's dung, and at oozing sap.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. ∞ ∞ o o o

CRENATUM Grav. Very rare.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o o o o o

ARPEDIUM Kr.

BRACHYPTERUM Grav. Highland, alpine. Common.

DISTRIBUTION—EAST. Tweed ∞ Tay Dee Moray o o
Shetland
WEST. Solway Clyde ∞ o o

MICRALYMMA Kr.

BREVIPENNE Gyll. Maritime. Very local.

DISTRIBUTION—EAST. Tweed Forth Tay o o o o o
WEST. o Clyde. o o o

PHILORINUM Kr.

HUMILE Er. In the flowers of gorse and broom. Local.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway ∞ o o o

EUDECTUS Kr.

WHITEI Sharp. Alpine. Extremely rare.

DISTRIBUTION—EAST. o o o Dee o o o o
WEST. o o o o o

A single specimen only of this species has been discovered in Britain. It was found by me on the top of Ben-a-Bhuird.—D. S.

CORYPHIUM Kr.

ANGUSTICOLLE Steph. Very rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. o Clyde o o o

OMALIUM Kr.

RIVULARE Payk. Lowland, highland. Very abundant.
DISTRIBUTION—EAST. ♀♀ Forth Tay Dee Moray ♀♀ ♀♀ Shetland
WEST. Solway Clyde ♀♀ ♀♀ ♀♀

RUGULIPENNE Rye. Maritime. Very rare.
DISTRIBUTION—EAST. o o o Dee o o o o
WEST. o o o o o

SEPTENTRIONIS Th. Highland. Very rare.
DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o Clyde o o o

LÆVIUSCULUM Gyll. Maritime. Local.
DISTRIBUTION—EAST. Tweed Forth o o o o o Shetland
WEST. ♀♀ Clyde o o o

RIPARIUM Th. Maritime. Local.
DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o Clyde o o o

ALLARDI Fairm. In carcases. Local.
DISTRIBUTION—EAST. Tweed o o o o o o o
WEST. Solway Clyde o o o

FOSSULATUM Er. Common.
DISTRIBUTION—EAST. Tweed Forth ♀♀ Dee Moray o o Shetland
WEST. Solway Clyde o o o

NIGRICEPS Kies. Rare. In vegetable refuse.
DISTRIBUTION—East. o Forth o o o o o o
WEST. o o o o o

CÆSUM Grav. Common.
DISTRIBUTION—EAST. ♀♀ Forth ♀♀ ♀♀ ♀♀ o o o
WEST. Solway ♀♀ o o o

OXYACANTHÆ Grav. Not common.
DISTRIBUTION—EAST. Tweed Forth ♀♀ Dee Moray o o o
WEST. Solway ♀♀ o o o

EXIGUUM Gyll. In carcases. Rare.
DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

MONILICORNE Gyll. Under bark. Highland. Rare.
DISTRIBUTION—EAST. o o Tay Dee o o o o
WEST. o o o o o

PLANUM Payk. At the oozing sap of the birch tree. Rare.
DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o o o o o

PINETI Th. Highland. Under the bark of logs of Scots fir.
DISTRIBUTION—EAST. o o Tay Dee Moray o o o
WEST. o o o o o

PUSILLUM Grav. Under bark. Common.
DISTRIBUTION—EAST. o o Tay o o o o o
WEST. Solway o o o o

PUNCTIPENNE Th. Under bark.
DISTRIBUTION. ?

I have Scotch specimens of this species, but have no exact record of locality.—D.S.

DEPLANATUM Gyll. In vegetable refuse. Local.
DISTRIBUTION—EAST. o Forth o o o o o o
WEST. ♀ Clyde o o o

CONCINNUM Marsh. In vegetable refuse. Not common.
DISTRIBUTION—EAST. Tweed Forth Tay o o o o o
WEST. o o o o o

VILE Er. Under bark. Common.
DISTRIBUTION—EAST. ♀ Forth Tay Dee Moray o o o
WEST. Solway o o o o

BREVICORNE Er. Under bark. Rare.
DISTRIBUTION—EAST. o Forth ♀ Dee o o o o
WEST. Solway o o o o

FLORALE Payk. In flowers. Rare.
DISTRIBUTION—EAST. Tweed ♀ Tay o o o o o
WEST. Solway o o o o

IOPTERUM Steph. Scarce.

DISTRIBUTION—EAST. Tweed Forth o Dee o o o o.
WEST. o o o o o

STRIATUM Grav. Local.

DISTRIBUTION—EAST. Tweed o o o o o o o.
WEST. Solway o o o o

PYGMÆUM Payk. Very rare.

DISTRIBUTION—EAST. o o Tay o o o o o.
WEST. o o o o o
"Rannoch." Buchanan White.

INFLATUM Gyll. Under bark. Very rare.

DISTRIBUTION—EAST. o o Tay Dee o o o o
WEST. o o o o o

EUSPHALERUM Kr.

PRIMULÆ Steph. In the flowers of the primrose. Very local.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. o o o o o

ANTHOBIUM Kr.

MINUTUM Fab. Lowland, highland. In flowers in marshy places. Common.

DISTRIBUTION—EAST. Tweed ♀ Tay Dee Moray o o o
WEST. Solway ♀ o o o

LAPPONICUM Mann. Highland. Very rare.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o o o o o

A single specimen has occurred in Rannoch. Further specimens must be obtained to decide whether it be anything but a variety of *A. minutum*.

OPTHALMICUM Payk. In flowers. Common.

DISTRIBUTION—EAST. ♀ ♀ Tay ♀ Moray o o o
WEST. Solway Clyde o o o

TORQUATUM Marsh. In flowers. Common.

DISTRIBUTION—EAST. Tweed Forth Tay o o o o o
WEST. Solway ♀ o o o

SORBI Gyll. In flowers.

DISTRIBUTION—EAST. ♀ Forth o o o o o o.
WEST. Solway o o o o

(To be continued.)

ZOOLOGY.

ILLUSTRATIONS OF ANIMAL REASON.

(Continued from p. 104.)

By W. LAUDER LINDSAY, M.D., F.R.S.E., F.L.S.

WHEN studying two years ago the subject of *Laughter and Tears* in the lower animals, in connection with the feelings which these phenomena express, it seemed to me necessary in the first place to determine whether and to what extent the said animals possess the *muscles*, which in man are concerned in the actions or expressions of *Laughing and Weeping*. I therefore addressed myself to two eminent Comparative Anatomists and Zoologists—Professor Turner of the University of Edinburgh, and Professor Macalister of that of Dublin. The former replied by proxy, through the then senior Demonstrator of Anatomy in the University of Edinburgh, who is now Professor of Anatomy in the Owens College, Manchester.

Writing from the Anatomical rooms of the University of Edinburgh, of date 8th December, 1873, Professor Morrison Watson did me the favour to report:

"Professor Turner has asked me to reply to your questions regarding the Facial muscles and Lachrymatory apparatus of the animals you name.

"As regards the *Facial muscles* of the dog, monkey, and elephant, they are *very similar* to those of the human subject in number and general arrangement, with such modifications as are necessitated by the difference in form and configuration of the cranium and face. In the Elephant (Indian) it is worthy of remark that a particularly well developed *Risorius* muscle is present. Whether the different facial muscles in these animals are arranged in such a manner as to admit of the *expression* of *laughter* is more difficult to determine, this expression in the human subject being the result of the actions of so many muscles, that it is almost impossible to decide as to the precise

action of any particular muscle when the general expression is assumed. Upon this point, therefore, I cannot offer an opinion. I may further observe that in the Elephant (Indian) neither the large nor small *Zygomatic* muscle is present. As to the corresponding muscles in the Hare and Rat, I cannot give any information, not having examined these animals.

"With reference to the *Lachrymatory apparatus*—it is present in both the dog and monkey, and arranged in the same manner as in man. As to the *Elephant* there is a difference of opinion on the subject, and I enclose the proof-sheet containing my own observations, which you will find printed in the last number of the *Journal of Anatomy and Physiology*.

"Having extensive notes on the Facial muscles of the Elephant, I shall be happy to furnish you with any further particulars you may wish regarding them."

The special notes to which Professor Watson refers on the *Lachrymal Apparatus* of the Indian Elephant are as follows :—

"Regarding the *lachrymal apparatus* of the Elephant we find that various statements have been made by different authors. Camper and Harrison on the one side maintain that no portion of a lachrymal apparatus is present in the elephant; while on the other hand, Mayer (the most recent writer on the subject) says—'The *puncta lachrymalia* are small, the lachrymal duct single and very narrow, the lachrymal gland of tolerable size. Its excretory duct is as large as a strong knitting needle, and opens on the external angle of the eyelids.' And, he adds, 'it is striking that Camper should neither have discovered this gland, its excretory duct, nor the lachrymal canal.' Perrault also mentions the presence of lachrymal glands in the elephant. My own observations agree with those of the authors who have not discovered any portion of a lachrymal apparatus, although each separate element was carefully looked for. It is difficult to explain the statements of those authors who maintain the existence of such an apparatus; more especially when it is borne in mind that the Ethmoid bone in the elephant is quite imperforate, and consequently affords no way of escape for the lachrymal secretion. True, a Harderian gland, similar to that which exists in connection with the third eyelid in birds, is to be found in the elephant. It does not, however, occupy the usual position of the lachrymal gland at the outer angle of the orbit, but rests between the inner wall of that cavity and the internal *Rectus* muscle. Its excretory duct, moreover, opens on the

surface of the third eyelid, and not in the usual position of the ducts of the lachrymal gland. That this gland, to some extent, fulfils the function of the lachrymal gland is rendered probable by the statements of African travellers, one of whom (Cumming) describes an elephant, after suffering from the effect of several balls, as *weeping* profusely. The mode, however, in which the secretion of this gland is got rid of under ordinary circumstances is difficult to determine in the absence of all trace of an excretory apparatus."

Professor Macalister wrote me from Trinity College, Dublin, of date 15th February, 1873 :—

"I send you some papers* which may help you. You will see from them that some Facial muscles are present in very many animals. The Gorilla has a fine lot of them, and there is no anatomical reason why he should not *laugh* as well as the best of his cousins. The *Risorius Santorini* is by no means a constant muscle, nor is it essential to laughing. The *Zygomatics*, which are among the most constant muscles of the face in mammals, are very much more directly concerned in the action. My idea is that the hairy covering of the face obscures the action of the *muscles* in many animals, and if we shaved them we would see a very much greater play of *feature* than we imagine them to possess. *Barefaced* monkeys do show modifications of *expression* very decidedly."

To the same distinguished Irish zoologist I am indebted for the following additional Bibliographical notes :—

"There are some very interesting things on your subject of *Mind in the Lower Animals* in C. G. Carus' 'Vergleichende Psychologie oder Geschichte der Seele in der Reihenfolge der Thierwelt,' published at Vienna in 1860. Also in a rather curious treatise by W. Wandt, 'Vorlesungen über die Menschen

* These papers consist of reprints of a number of the Professor's contributions to Comparative Anatomy—originally published in the "Annals and Magazine of Natural History," including the following subjects :—(1) "On some points in the Myology of the Chimpanzee and others of the Primates." Annals, May, 1871. (2) "On the Myology of *Bradypus tridactylus*, with remarks on the general muscular anatomy of the Edentata." Annals, July, 1869. (3) "On the Myology of the Wombat and the Tasmanian Devil." Annals, March, 1870. (4) "Further observations on the Myology of the Tasmanian Devil." Annals, July, 1872. (5) "The Muscular Anatomy of the Koala." Annals, August, 1872. (6) "Notes on the Anatomy of the Derriah." Annals, July, 1872.

und Thier-seele.' Leipzig, 1863. There are two other books dealing with the subject that have a good deal of interest—Ludwig Schmarda's 'Andeutungen über das Seelenleben der Thiere,' and Scheillin's 'Versuch einer vollstand Thierseelenkunde.' I came across these in the course of my reading lately, and was much struck with them."

There is a popular belief that the dog, cat, and other animals —domestic or wild—are in the habit, at certain times, or under certain circumstances, of inducing in themselves vomiting or purging by chewing or swallowing various common native plants, especially one or more Grasses. And the presumption is that such a common popular belief is based, to some extent at least, on facts. But it is important, for the purposes of generalisation, to determine exactly what the *facts* are. In order to which I had occasion recently to apply to several authorities conversant on the one hand with our domestic animals and their habits, and on the other with our native plants and their properties. The fullest and most satisfactory reply I received came from Mr. William Gorrie of Trinity, Edinburgh, formerly one of the Vice-Presidents of the Botanical Society of Edinburgh, and also one of the editors of the "Farmer" newspaper, published in Edinburgh.

Writing from Rait Lodge, York Road, Trinity, Edinburgh, on 3d May, 1875, Mr. Gorrie, says :—

"I regret that I am not able to give you any definite information on the use by animals of plants, *medicinally*. I have never seen the *dog* using the *Cynosurus cristatus*, but have often seen dogs chewing up the common Couch grass *(Triticum repens)*, as well as other broad-leaved grasses, such as *Cocksfoot (Dactylis glomerata)*. And when they get into my garden here they frequently make free with the leaves of the Holy grass *(Hierochloe borealis)*, and the Bunch grass of British Columbia *(Elymus condensatus)*. Their teeth do not appear to be suited for pulping these grasses, but they rather roll them up aud swallow them nearly whole. This is generally, or rather among shepherds and other dog owners, looked upon as a proof that the dog is *not well*. The grass does not seem to be digested by them, but passes through much in the same condition as when swallowed. I have on several occasions seen it so passed, with *tape-worm* intermixed or entwined in the folds of the grass. And rightly or wrongly, I have a notion that these broad,

roughish-leaved grasses thus act *mechanically* in clearing them of this troublesome parasite, which, or something like it, is very frequent in them. *Cats* sometimes chew up broad-leaved grasses as keenly as dogs, and their doing so is looked upon as evidence that they are *unwell.*

"In the large sheep park at Prestonhall, we had a large number of old Holly trees, which in autumn 1851 were attacked by the sheep peeling off and eating the bark. To save them from destruction, we had to use means for their immediate protection, and after a fortnight or three weeks these attacks ceased, and were never repeated for the remaining eight years that I lived there. The shepherds in the district said that the sheep had used the bark for either the prevention or *cure of some disease*, and not for food, of which they had plenty in the shape of pasturage at the time.

" Gerard says of *Dog's-bane*, that " it is a deadly and dangerous plant, especially to four footed beasts." *Wolf's-bane* is a name applied by him to two plants very different from the Aconite. An arrow dipped in the juice of which, and a man or four footed beast wounded therewith, 'they die within half an hour after remedilesse.' The *Aconitum* he calls ' Mithridate wolf's-bane.' "

Mr. George R. Jesse, author of the well-known " Researches into the History of the British Dog," published in 1866, writing from Henbury, Macclesfield, Cheshire, on 17th April, 1875, says :—

" There is no doubt whatever as to the Dog grass.* That I know for certain. Try a poor creature who is chained like a malefactor near his master's door, lingering out a miserable life in captivity, as Professor David Low well said it. Try him with a handful of it, which the poor tyrannised-over brute has seen waving a few yards from him, and longing for in vain for many a day, and see if he will not think you a friend.

To Dr. M'Dowall of Morpeth, I am indebted for the following instances of so-called " *Monomania* in *Horses* "—" The following curious facts are extracted from a paper by Professor Rodet, in the " Veterinarian," a sensible monthly publication :—

* *Cynosurus cristatus*—otherwise known as " Dog's-tail grass "—so named according to Hooker & Arnott's " British Flora," (1850, p. 542), " from the shape of its spike," and not from the use of the plant medicinally or otherwise by the dog.

(1) "In 1806, during the campaign of Austerlitz, a Piedmontese officer possessed a beautiful, and in other respects, a most serviceable, mare, but which one peculiarity rendered at times exceedingly *dangerous* for the saddle. She had a decided *aversion to paper*, which she immediately recognised the moment she saw it, and even in the dark if one or two leaves were rubbed together. The effect produced by the *sight* or *sound* of it was so prompt and so violent, that in many cases she unhorsed her rider; and in one case, his foot being entangled in the stirrup, she dragged him a considerable way over a stony road. In other respects, this mare had not the slightest *fear* of objects that would terrify most horses. She regarded not the music of the band, the whistling of the balls, the roaring of the cannon, the fire of the bivouacs, or the glittering of the arms. The *confusion* and *noise* of an engagement made no impression upon her; the sight of no other *white* object affected her; no other *sound* was regarded; the *view* or the *rustling* of *paper* alone roused her to *madness*. All possible means were employed to cure her of this extraordinary and dangerous *aberration*, but without success; and her master was at length compelled to sell her, for his life was in continual *danger*.

(2) "A mare belonged to the Guard-Royal from 1816 to 1821. She was perfectly manageable, and betrayed no antipathy to the human being, nor to other animals, nor to horses, except they were of a light-grey *colour*: but the moment she saw a *grey* horse she rushed upon it, and attacked it with the greatest *fury*. It was the same at all times and everywhere. She was all that could be wished on the parade, on the route, in the ranks, in action, and in the stable; but such was her *hatred* towards *white* or grey horses, that it was *dangerous* to place them in the same stable with her, at whatever distance. If she once caught a glimpse of one, whether horse or mare, she rested not until she had thrown her rider, or broken her halter, and then she rushed on it with the greatest fury, and *bit* it in a thousand places. She generally, however, seized the animal by the head or by the throat, and held it so fast that she would suffocate it if it were not promptly released from her bite. As she grew *old* (for she was eighteen years old in 1821), this mania was not quite removed, but was somewhat *weakened*. No other body of *white* colour appeared to make the least impression on her.

(3) "A mare, belonging to the fifth squadron of Hussars,

feared, on the contrary, *all white inanimate* objects—such as white mantles or coats, even the sleeves of shirts and chemises too much displayed, and particularly white plumes. When any of these white bodies, and especially *in motion*, were *suddenly* perceived, if they were of any magnitude, and their motion was rapid, she was in a dreadful *fright*, and strove to escape; but if they were of no great size, and moved more gently, she rushed *furiously* upon them, struck at them with her fore-*feet*, and endeavoured to tear them with her *teeth*. No other colours produced the slightest effect upon her; nor did the appearance, however sudden, of white horses or dogs; but if a white plume waved, or a white sheet of paper floated by her, her fear or *rage* was *ungovernable*.

"These three cases of singular and particular *aversion* possess, in my mind, all the characters of *true monomania*."—[Extract from "Penny Magazine," 1835.] It is noteworthy that in all the above cases *Mares*, not Horses, were the subjects of Eccentricity.

From Wakefield, Yorkshire, Dr. M'Dowall also wrote me on 29th June, 1873:—

"Perhaps the following passage in *Shakespeare* may be of use to you as a curious illustration of *Insanity* among the lower animals.

ROSSE.—And Duncan's *horses*
(A thing most strange and certain),
Beauteous and swift, the minions of their race,
Turned *wild* in nature, broke their stalls, flung out,
Contending 'gainst obedience, as they would
Make war with mankind.

OLD MAN.—
'Tis said they *eat each other*.

ROSSE.—They did so,—to the amazement of mine eyes,
That look'd upon't.

(MACBETH, ACT II., SCENE IV.)

"In all probability you already know that in former times, when *witchcraft* was believed in, *Insanity* among the lower animals was believed to be exceedingly common. I am working up a paper which will contain all sorts of "Antiquarian scraps relating to Insanity," and have a large number of cases of

Insanity in *cows*, *cats*, and other animals, supposed due to *witchcraft*. You will find these cases in Dalzell's "Darker Superstitions of Scotland," a book in all public libraries. In all probability my paper will appear in the "Journal of Mental Science" for October,* and will contain these instances of Insanity among the lower animals. Of course their scientific value is small, but these cases might be used by you for literary ornamentation."

According to a newspaper notice of his admirable volumes of "Études sur les Facultés mentales des Animaux comparées à celles de l' Homme," published in Belgium in 1872, "Mons. Houzeau maintains that not only does each group of animals possess a *language*, which is understood by other members of the same group, but that they can *learn to understand* the language of other groups. His dogs, for instance, perfectly understood his poultry. Cocks and hens have one *danger signal* for the approach of a bird of prey; another for that of a terrestrial animal or for a man. When the latter was sounded, the dogs would rush out and bark; while to the former they paid no attention whatever. He therefore concludes that fowls have the power of *expressing* slightly different but closely allied *ideas*, and that dogs can learn to understand these *differences*."

In old historical works there are occasional descriptions of singular events illustrative of peculiarities in animal life: descriptions that are interesting as directing attention to the desirability of observing and recording any similar incidents at the present day. For instance, in certain "Memorabilia of the Seventeenth Century" in Britain, contained in "Chambers's Papers for the People" (No. 12), I find the following account of a remarkable *Bird-Battle*. I cite it not for the purpose of basing any remarks on the facts asserted, but simply in order to point out the propriety of recording, in such media as the *Scottish Naturalist*, accounts by competent observers—and properly authenticated—of any such occurrences as may happen now—in these our own times—in our own country.

"In October 1621, a most remarkable *Battle* of Starlings was fought over the city of Cork, frightening the citizens out of their wits, and inspiring the whole country with terror and wonder as

* It duly appeared, and may be consulted in vol. xix, 1874, p. 386, of the said Journal.

to what it might portend. Our author sets out in his preface by stating to the "gentle reader," that "to report strange or admirable accidents is subject both to danger and disgrace—to danger, in that they may be held as prodigious or ominous; to disgrace, in that they may be reputed *fabulous*. I need not fear disgrace in reporting so strange an accident to be reputed fabulous, being able to free myself from any suspicion of such an imputation, by certificate of letters from right honourable persons in Ireland, where the accident fell out, to right honourable persons at court, and divers in London at this present; as also by the testimony of right honourable and worshipful persons, and others of good reputation, now in London, who were *eye-witnesses*, beholding the same during the time it continued.

"To come to the *fight* of these birds. They *mustered* together at this above-named city of Cork some four or five days before they fought, every day more and more increasing their *armies* with greater supplies. Some came from the east, others from the west, and so accordingly they placed themselves—as it were, *encamped* themselves—eastward and westward about the city. The citizens more curiously observing, noted that from those on the east and from those on the west some twenty or thirty in a company would pass from the one side to the other, as it should seem employed in *embassages*, for they would fly and hover in the air over the adverse party with strange tunes and noise, and return back again to that side from which, as it seemed, they were sent.

"And further, it was observed, that during the time they assembled, the Stares of the east sought their meat eastward, as the Stares of the west did the like westward, no one flying in the circuits of the other. These courses and customs continued with them until the 12th of October, which day being Saturday, about nine of the clock in the morning, being a very fair and sunshine day, upon a strange sound and noise, made as well on one side as on the other, they forthwith at one instant took wing, and so mounting up into the skies, encountered one another with such a terrible shock, as the sound amazed the whole city and all the beholders. Upon this sudden and fierce encounter there fell down into the city and into the river multitudes of Stares, some with wings broken, some with legs and necks broken, some with eyes picked out, some their bills thrust into the breasts and sides of their adversaries in so

strange a manner, that it were incredible, except it were confirmed by letters of credit, and by eye-witnesses with that assurance which is without all exception. Upon the first encounter, they withdrew themselves backward east and west, and with like *eagerness* and *fury* encountered several times, upon all which these Stares fell down in like strange and admirable manner as upon the first encounter. They continued this most admirable and *violent* battle till a little before night, at which time they seemed to vanish, so that all Sunday, the 13th of October, none appeared about the city.

"Upon Monday, the 14th of October, they made their return again, and at the same time, the day being as fair a sunshine day as it was the Saturday before, they mounted into the air, and encountered each other with like violent *assaults* as formerly they had done, and fell into the city upon the houses, and into the river, wounded and slaughtered in like manner as is before reported; but at this last battle there was a Kite, a Raven, and a Crow, all three found dead in the streets, rent, torn, and mangled."

Another extract from the same "Memorabilia" illustrates control over, or at least inactivity of, the natural antipathies, passions, and habits of predatory animals of different species and gender—*in the face of a serious common danger*. Referring to a sudden flood in Monmouthshire, in which a milk-maid saved herself by retiring to a high bank above water-mark, on which bank a number of animals—domestic and wild—had found a similar asylum, it is stated that—"The hill or bank where the maid abode all that space was all so covered over with wild beasts and vermin, that came thither to seek for *succour*, that she had much ado to save herself from taking of hurt by them, and much ado she had to keep them from creeping upon and about her. She was not so much in danger of the water on the one side, as she was troubled with those vermin on the other side. The beasts and vermin that were there were these—namely, Dogs, cats, moles, foxes, hares, rabbits, yea, and not so much as rats and mice but were there in abundance; and that which is the more strange, the one of them never once offered to *annoy* the other, although they were deadly *enemies by nature* the one to another. Yet in this danger of life they not once offered *to express their natural enmity*, but in a gentle sort they freely *enjoyed the liberty of life*, which in mine opinion, was a most wonderful work in nature."

The following is a sample of *anonymous* newspaper articles of a commoner kind—representing incidents in animal life that are of daily occurrence. Nevertheless such accounts, however true to Nature, are valueless for the purposes of Science, by reason of their anonymity. We want some guarantee as to the reality of the facts—the veracity or credibility of their observers and recorders.

"A Four-Footed *Friend.*—We believe our Nero to have been an English *Cat*, but we know nothing of his antecedents, for he came into our house one wintry day, seated himself on the hearthrug beside the chair of the house-father, and instantly *adopted* him for his master—a relation to which he contrived to give an entirely novel and much-varied significance, and which remained unbroken to the end. He was then full-grown and very beautiful, with a peculiar upright grandeur of *demeanour*, which was different from the usual *slinking* and *stealthy* grace of his tribe. His head was finely shaped, and his whiskers were superb, as was the fur upon his snow-white breast. He had large, green, *wistful* eyes, with such a *gaze* in them as I never saw before, and sometimes, when he was in *grief*, as I could hardly bear to look at; and a small black mouth, the most *eloquent* with which a dumb creature ever spoke. He had powerful forepaws, and the daintiest little white hind feet, of which he was *proud* and *careful*. He would dispose them in the palm of his master's hand when he was carried up to bed by him, laying, at the same time, one forepaw round the back of his master's neck, and the other on his breast, while the face rested *confidentially* against his cheek. He allowed himself, especially after his health began to fail, to be carried about by other members of the household, but this particular *attitude* was strictly reserved for his master. He would sit with both forepaws hanging over my shoulder, or lie along my folded arms, but he never put his paws round my neck, or rubbed his face to mine. In this way he invariably *saluted* his master, and occasionally, when he believed himself *unobserved*, he would stand on his hind legs, lay a forepaw on each side of his master's face, and laying his little white nose alongside of his, remain in that position for several moments, uttering a peculiar *contented* sound, not a purr, which we used to call his "bleat." He instantly *recognized* any *new* article of dress worn by any member of the family, and he *invented* for himself a method of curling himself up so as to *adapt* his back to the arch of a new

bonnet, with his legs stretched out in careful *avoidance* of the strings, which I venture to think has never been surpassed in *effectiveness* and *ingenuity*. Shortly after he took possession of our hearts and home we changed our residence. He was carried to our new house in a basket, and, when set free, went direct to his master, with *eloquent gestures* and *expressions of resentment and inquiry*. The matter was gravely *explained* to him, for we never presumed to limit his intelligence to *our* perception of it, and he presently *acquiesced*. He *led* his master to the door of every room in the house in succession, *deliberately* made the tour of the apartments, was lifted up to each window-sill, whence he *studied* the front and back aspects of the house and adjacent gardens, taking his time over it, and then, returning to the study, as yet unfurnished, recognized, with manifest *pleasure*, a standing desk he was in the habit of seeing his master use, gave the little *gasp* which meant that he wanted to be lifted up, was placed upon it, went to sleep, and ever afterwards took to the new house with more than acquiescence, with *enthusiasm*. He had *favourite* rooms, and his especial *place* in each, and he resorted to them at different *hours* with undeviating *regularity*. If he found a door shut, he went to the nearest person, made the sound which we all knew meant that he *wanted to be followed*, and then led the individual to the door, and stood aside until it was opened."—*Quoted from the "Spectator" in the local newspapers in January, 1872.*

Of the Dog with the ugly name, "Mum," this further incident has to be noted, from a letter written by Dr. Murray Lindsay, in June, 1875. The animal was not allowed to lie on a certain parlour sofa. He did so, nevertheless, in his mistress' absence from the house, well knowing that he did what was *forbidden*, and, therefore, *punishable*. But he knew her footstep; and whenever he heard it, he made off at once, *assuming*, as he best could, an *air of innocence*. All this he did over and over again, thus clearly exhibiting his *sense of guilt*.

(To be continued.)

ANIMAL PSYCHOSIS.

(Continued from p. 96.)

By the Rev. J. Wardrop.

THIS view of Dr. Carpenter—that the animal, psychically, is not a free productive power, but only obeys stimuli, that is, so far from commanding motives, does not feel them, and is no cause at all, having no will, is the most feasible view, so far as it goes, yet offered on the whole question. It accords exactly with what a careful observation of animal action might suggest to any one. On the other hand Mr. Huxley's is, it may be said visibly, not true to the facts. But first, irrespective of whether Mr. Huxley's results answer to the facts, either on the human, or on the animal side, there is an error and an inconsistency in his method. How is it that Mr. Huxley admits the excitation of "states of consciousness which are termed sensations, emotions, and ideas," as the result of the ingoing molecular movement of the animal nervous organism? He does not strike on these things with the point of his scalpel. He does not see them under his microscope. They are not among the small dust of his balance. They are not to be detected by physiological observation in any way whatever. They are got only by the "introspective method," as it is called. Mr. Huxley has looked into his own bosom, and he has taken what he found there, and by a legitimate analogy employed it in philosophising on what he observes in animals. But if Mr. Huxley allows the introspective method to be the voucher for certain facts which he accepts and works with, consistency binds him to allow its testimony in the case of all facts, whatever they are, in reference to which it tenders testimony. Now men are not more conscious of the passive power of sensations—they are not more conscious of feeling emotions and having ideas, than they are of their active power—their real efficiency in muscular movements. Mr. Huxley must be held to the same witness for an explanation of the efferent phenomena, that himself has adduced on the afferent. And it is a witness clean against him. If the human consciousness vouches for anything, it vouches for this, that movements are often the result of a state of consciousness—that the will, the personality, the man, is a free productive power, and does "stand in a causal relation to action." Irrespective of

an inconsistency of procedure, Mr. Huxley's result, substantively, could not be accepted as a possibly true account of animal action, not to speak of human action. Admitting the analogy of man's mind at all, it is a result that cannot apply to all the facts. The animal transcends it. Blind automatism of an organism is one thing, and is a sufficient account of certain actions. Blind automatism in an emotional and intelligent principle is a very different thing, and is the equally sufficient and necessary account of certain other and very different actions, The actions of animals are not susceptible of interpretation throughout by the former. Many of them, the actions *i.e.* in which there is, we would say, intelligence, require the latter. Besides you cannot divorce intelligence even from sensation. "It is manifestly impossible," says Sir W. Hamilton, "to discriminate with any rigour, sense from intelligence," (Reid 878 and 881). It is not organism that feels or sees or hears. There is no place for sensations or emotions or ideas but in mind. "Mind seeth it, mind heareth it. All beside is deaf and dumb." Far less can you divorce what can only be called emotional and ideational action from an intelligent principle. We have no clue to the interpretation of animal action, but the clue our own action gives. This action reveals that intelligent mind is competent to act in an automatic manner. And we hail the discovery as applicable to our difficulties with animal action. As far as investigation has yet gone, the line on which we seem to be invited to proceed, in order to resolve the mystery of the animal soul, is certainly automatism. But while we are promisingly invited along this line, we are also warned from the same quarter not to leave out of our automatism the automatic action of intelligence.

But however different may be the part allotted to the soul in two such views as those we have been considering, it is admitted by both that soul of some kind in animals there is. Both, therefore, remain burdened with the question, is the mind of animals of the same nature with that of man—the same out and out in nature, though possibly differing in capacity? or is there an essential difference between the two? We have already seen how that question is answered by the prevailing voice of the science of the day. So decided is the answer, that the popular notion of an essential distinction is, as we have seen, held to be little more than a superstition. A contributor to this Journal, Dr. Lauder Lindsay, is one of the ablest and boldest

in expressing the favourite conviction, the conviction that there is "no essential mental distinction between man and other animals." For myself, I have to confess that I feel insuperably hampered in coming to this conviction—hampered by what I conceive to be facts in the case that are not having their due at the hands of those who feel no difficulty. It has not been unusual, with at least students of mental philosophy, to point to self-consciousness as a fundamental distinction between the two series of mental manifestations. Self-consciousness is a prominent fact of the mental nature of man. And it is held that this element is not proved to be found among the manifestations of the mental nature of animals. The idea of this distinction seems to have occurred first to those who saw so much else that nobody had seen before—the schoolmen of the middle ages. (Bayle 8, 762.) I do not know if it has been so systematically wrought out as, especially with the help of present science, it might be. I suspect it has not. The most extended and powerful advocacy I have known it to have received was at the hands of the late Professor J. Goodsir, in a course of, I think, some six or eight lectures he gave about eighteen years ago. Few men then or since have had equal qualifications, philosophical or scientific, for estimating the validity of such a view. But his lectures, which he promised to his students to publish, were not by himself given to the world. His lamented death interfered. And in reference to his powerful exposition of the view which they supported, such notes as we have in his posthumous works leave us but to desiderate "the touch of the vanished hand and the sound of the voice that is still." Bayle argued against the distinction made on the ground of self-consciousness. "It is evident to any person," he says, "who is able to judge of things, that every substance which has any sensation knows that it is endued with it; and it would not be more absurd to maintain that the soul of man knows actually an object without knowing that he knows it, than it is absurd to say that the soul of a dog sees a bird without perceiving that it sees it." (8, 762.) And he adds, it is a thousand times more difficult to see a tree than to know the art by which we see it. (p. 764.) But in so far as Bayle's self-consciousness, as these words describe it, may be more than the mere consciousness of phenomena, its presence in animals is begged or claimed to be self-evident, when it ought to be proved. Self-consciousness is our consciousness of a self in our conscious-

ness of aught else. As Dr. Bischoff, an advocate of this distinction between the animal and the man, says—"We cannot deny to animals consciousness. We assert that man alone possesses self-consciousness, *i. e.*, the capacity of meditating on himself and his connection with the rest of the creation." The late Professor Ferrier signalized this characteristic of human knowledge more than it had been before. The fact that whatever man knows he has a knowledge of himself along with that knowledge, he made the foundation principle of his philosophy; and though he did not himself pronounce an opinion, he says there is good reason for holding that this quality of mind does not belong to animals—that they have no cognizance of themselves. Though Mr. Huxley himself now says, "very strong arguments would be needed to prove that such complex phenomena as those of consciousness first make their appearance on man," (F. R. p. 573) what did he mean, when not long ago he wrote that man is "the only consciously intelligent denizen of this world?" (Placeæ 110.) Was he not looking in the direction of self-consciousness, and did he not, instinctively it may be, attribute to man alone that prerogative, when he used the latter expression? In another place, however, he says that animals, by perceiving objects as external, practically recognise the difference between the self and the not self. (C. Rev., May 1871.) If what the animals do "practically"—which is very much the philosopher doing it for them—they would but do it speculatively, which would be doing it for themselves, the point of self-consciousness would be gained for them; but only then.

It is from the quarter of self-consciousness that my difficulties arise in accepting the identity of the animal and human soul. It is not proved that animals possess this power. And so far as the theory of their mental nature given above in Dr. Carpenter's words, is a true one—in fact, so far as automatism, organic or intelligent, is the real account of their psychical action, it seems to involve the absence of self-consciousness. But, to expiscate this matter farther, what is it that must be held implied in the want of self-consciousness—implied in fact as the source of its absence? It is the want of a *self*—nothing less. Animals, if they want self-consciousness, want it because they have no self to be conscious of. They want *Personality*. Their soul is not a soul that is a self or a Person. The I, the ego, the ich, le moi, that idea of selfhood to which expression

is given in all languages, that have become vehicles of a philosophy, is not attributable to animals. The home-felt consciousness of self, that goes, though generally unnoticed along with the man in all his walks of mental action, never warms the animal spirit, never flits across the disk of its consciousness. A lady calls her dog an affectionate "*thing*," perhaps; never an affectionate person.

It is at this point of the self and its consciousness, I conceive, that the battle of identity or non-identity of the animal and human souls is to be fought. It is here the day is to be lost or won for the "poor brutes." Other points of the field are often selected at which to make a stand. Man is said to be the only creature that laughs; the only creature that can make or use a tool; the only one that lights a fire, and so on. Max Müller says, "the true Rubicon which the brute has never passed is articulate language. But if selfhood or personality could be claimed for animals, they would not find much difficulty in occupying in succession these and every other point in the field. Other writers select their ground, and make a stand nearer the central position. Quaterfages and others make the moral and religious powers of man the ground of distinction, and on that ground Quaterfages erects man into a separate kingdom—raising him, in view of the totality of his attributes, out of the animal kingdom altogether. Isidore St Hilaire does the same; and perhaps they are near the truth. Another distinction was signalised by a late Archbishop of Canterbury—Dr. Sumner—as it has been by others, viz., the character of progressive and improveable reason. Such efforts as these to find the fundamental distinction are on the right track. But they have struck on it, not at the beginning, but in the middle. We should begin with what lies involved as the foundation of these and such like powers in man, and what is awanting to be the fountain from which they might issue in animals, *i. e.*, selfhood or personality. This is the true Rubicon over which the brute is not seen to pass. This, and all that lies beyond—all that has this for its basis—and the characteristics just mentioned have—is distinctively human.

ON THE GREY SEAL, HALICHŒRUS GRYPUS, ON THE EAST COAST OF SCOTLAND.

BY ROBERT WALKER, F.G.S.E.

THE history of the Grey Seal in the British Seas was for a long time enveloped in considerable obscurity. This was to a certain extent, no doubt, owing to the limited number of people who took sufficient interest in biological matters to induce them to investigate any subject for themselves. In the case of the seals, the few opportunities that occurred to those that were interested in them of examining living or recently killed specimens, allowed the indentification of nearly all our seals to remain long in confusion and uncertainty. There has also to be taken into account the difficulty presented in the close resemblance that almost all the northern seals have to each other in external shape, and to a great extent in colour, more especially in young and half-grown individuals. This is, unfortunately for the purpose of identification, the condition not only in which they are most frequently obtained, but that in which they present a somewhat different aspect, both in colouring and form of the head, from that exhibited by the mature members of the same species. All this, and the anatomical characters whereby they can with certainty be distinguished from each other, not having been formerly well known, led, as a matter of course, to the seal in question receiving several specific names.

In 1742, Dr. Parsons [1] shortly described and figured a young specimen of a large seal that was exhibited alive for some time at Charing Cross, as the sea calf. He does not state at this time where his seal was caught, but in a subsequent paper in the same publication in 1750, he gives the coast of Cornwall and the Isle of Wight as the localities frequented by what he then calls the long bodied seal, a name by which it was afterwards known. Buffon [2] in his "Le grand Phoque" identified Parsons' seal with the Urksuk of Crautz. [3] The latter animal was, not long after, identified by Fabricius [4] with his *Phoca barbata.* Pennant [5] follows Buffon, and states that the sea calf or great seal was not uncommon on the coast of Scotland, particularly about the rock Hiskyr, one of the western isles, where it

1 Philosophical Transactions. 2 Hist. Nat. Supp.
3 Hist. Greenland. 4 Fauna Grœnlandica. 5 Brit. Zoology.

grows to the length of twelve feet. In his voyage to the Hebrides he was not fortunate enough to meet with this seal himself, so that the size given must be from the report of others. In his "Arctic Zoology," published some years after Fabricius' "Fauna Grœnlandica" appeared, he includes under *Phoca barbata* the large seal of the coast of Scotland, and Parsons' London animal. The latter, it would seem, became the property of Donovan, who also figured it in his "British Animals" as *P. barbata*; ultimately, at his death probably, it was deposited in the British Museum, where it was long regarded as a genuine specimen of *P. barbata.*

After the publication of Pennant's "Arctic Zoology," it appears to have been taken for granted, without further investigation, that all the large seals of British waters were *P. barbata.* This is the more remarkable, if we assume that none of them were of that species; because, in 1790, Fabricius [1] published figures of a number of the seals' skulls described by him, amongst others were those of both *P. barbata* and *H. grypus.* And, in 1821, Lichtenstein [2] described and figured a young example of *H. grypus*, two or three specimens of which were driven ashore upon ice during a storm on the Pomeranian coast. Two of these seals were exhibited alive for some time by the fishermen in the district, and one of these was taken to Berlin for that purpose. He notices the surprise of the exhibitors when they saw the animal, after it had been about a month in their possession, rapidly changing the colour of its coat from a yellowish white to that of a dusky spotted grey.

Dr. A. Edmondston [3] gives an interesting account of the Haaf-fish or Great Seal, as *P. barbata,* of the Zetland Islands Amongst other particulars, he states that one which he saw caught in a net struggled more than twenty-five minutes without ever performing a single respiration, and when brought to the surface was still alive. Dr. Fleming [4] throws no more light on the matter. He gives the northern islands as the locality where *P. barbata* is met with. It does not appear that he had seen the seal himself, but refers to Maclean and Edmondston's account of it.

In Wilson's [5] paper on the habits of the Scottish Phocæ, the Tapvaist or great seal of the western islands is referred with

1 Skrivter Naturhistorie Selskabet. 2 Akademie der Wissen. zu Berlin.
3 Zetland Islands. 4 British Animals. 5 Mag. Zoology and Botany, vol. 1.

doubt to *P. barbata*. This seems, however, to have been mainly caused by the appearance of "Bell's Brit. Quadrupeds." Backie and Heddle [1] include both the Great Seal *P. barbata*, and the Grey Seal *H. grypus* in the Orkney fauna; whether they had themselves examined what they believed to be examples of the former is not apparent. In the case of the latter, they state that Macgillivray had seen two individuals of this species killed in Orkney; and they notice a large seal in the Kirkwall museum, which they consider agrees in most respects with the description of that animal. They also include the Greenland Seal, *P. grœnlandica*, amongst the Orkney animals. The chief evidence they seem to have relied in this was the skull of the Greenland Seal figured by Home in the "Philosophical Transactions," 1822. Home stated that the drawings of the three skulls that he figured at that time were made for Hunter thirty years ago, and that the seal whose skull is figured on plate 28 (the Greenland Seal) was shot near the Orkney Islands. In this he was evidently mistaken, as it was the Grey Seal whose skull he figured on the preceding plate, and which he stated was from the South Seas, that was shot in Orkney.

According to Professor Owen [2] the seal in question was presented to Hunter by a Mr Oxendon, probably the gentleman who went two years to Orkney for the purpose of shooting it. Home's skull of the grey seal affords probably the earliest undoubted evidence we possess of the occurrence of that animal in the British seas nearly a century ago. The skull was not identified as such, I believe, until Ball [3] had clearly proved, from skulls he procured on the Irish coast, that one of the large seals of that country, at any rate, was *H. grypus* and not *P. barbata* as had been supposed. After the publication of the first edition of Bell's British Quadrupeds, containing a figure and description of the Grey Seal, and stating that Ball recognised in Donovan's seal in the British Museum a badly stuffed specimen of *H. grypus*, it seems, in the main, to have been taken for granted that every large seal observed on our coasts pertained to that species.

In 1841 Selby's [4] paper on the large seals of the Farne Islands appeared. In this he states that the great seal of these Islands,

1 Nat. Hist. of Orkney. 2 Cat. Osteological Coll. of Surgeons.
3 Trans. Irish Academy, vol. 18. 4 Annals Nat. Hist., 1841.

which he had formerly stated in the *Zoological Journal* to be *P. barbata*, had, upon further investigation, proved to be *H. grypus*. He also adds that an old gentleman, who formerly rented these Islands, informed him that the seals were more abundant there some forty or fifty years ago than they are now, and that in 1772 he killed seventy-two young seals, and once also fourteen old ones in one day on the Crimstone Rock, all of this species. Dr. L. Edmondston [1] was not so easily induced to give up the name of *P. barbata*. He had, moreover, better opportunities of observing the habits of the large seals of the Shetland Islands, as well as examining them alive and dead, than falls to the lot of most mortals. He expresses the opinion after the publication of "Bell's British Quadrupeds" that the Haaf-fish or large seal of these islands was *P. barbata*, and that Bell had figured the cranium of a different species from the Haaf-fish as that of the animal in question. "The figure of it looks very like the male *barbata* with the exception of the teeth." Whatever may be the facts of the case as to this, it is not quite easy to reconcile the accounts of the disposition manifested by the large seal of the Irish coast and that of the Shetland Islands when in captivity, as given by Ball and Edmondston, if the observation alluded to were in both cases made on the same species of seal, and of a similar age. The former states that his father had made several attempts to rear and tame this seal, but all in vain. It appears scarcely susceptible of domestication. The latter, on the other hand, gives it altogether a different character. He says that a young male, which he took from a cave, in a day or two became as attached to him as a dog, that he knew no animal capable of displaying more affection than he did, and that his temper was the gentlest imaginable. He also gives an interesting account of a female which he had in captivity for some time. This animal was carried daily in a hand-barrow to the sea to bathe &c., by and bye she was allowed to go fairly into the sea without any restraint, and she regularly returned after a short interval, and of her own accord mounted her carriage to be taken to or from home. She was one day allowed to go to sea in a thick fall of snow and did not find her way back. The same author also mentions a young Greenland seal, *Phoca grœnlandica*, that he saw shot in the Bay of Burrafirth, in October, 1830. Had Edmondston preserved

1 Memoirs, Wernerian Society, 1839.

some of the crania of his seals they would have decided the question definitely as to what species they belonged, whether they were all *H. grypus*, or whether some of them were not *P. barbata*. As the matter stands the weight of evidence appears in favour of the former seal. Whether the latter has occurred anywhere in the British seas may be regarded meantime as an open question. This much may be said, at any rate, it has not heretofore been satisfactorily shown to have done so; at the same-time it is a species that may turn up some day or other. As to Parson's seal, it may or it may not have been of this species. The late Dr. Gray, than whom none were more competent to give an opinion on the subject, was, so far as I am aware, silent regarding it: he placed it amongst the synonyms of *P. barbata* with a query. Macgillivray's [1] Scottish example of *P. barbata* in the Edinburgh Museum cannot now apparently be distinguished in that collection. He may have been mistaken about it. However this may be, it has been long known that a large seal has been occasionally met with on the east coast, but, so far as I can learn, it was not by any means a common animal. With the exception of the Farne Islands, it is not mentioned as of frequent occurrence anywhere near the mainland. Pennant [2] notices a large seal that was shot on the Sutherland coast. Wilson [3] mentions one that was shot near Stonehaven by Lord Cassilis. Don includes it in his list of the animals of Forfarshire, and St. John [4] shot one at the Findhorn that weighed three hundred and sixty lbs. What species of seals these were is a different matter; the old authors, of course, called them *barbata*.

The Grey Seal seems to me to be the species most commonly met with now on the east coast of Scotland. It may be seen all the year through at the mouth of the Tay, and along by the Carr Rock chiefly in summer. In autumn they congregate in great force in the vicinity of the banks of the Tay. These banks forming a favourite resting place for them when the tide is out, as many as twenty having been counted at a time.

In 1863 six specimens of this seal were caught in the salmon nets at Tentsmuir, some of them large animals, and all more or less ferocious and difficult to secure. The largest example was estimated by the fishermen to weigh fifty stones.

1 Naturalists' Library. 2 Arctic Zoology, vol. 1.
3 Mag. Zool. and Bot., vol. 1. 4 Nat. Hist. and Sport in Moray.

He was a rather formidable customer to encounter; after a struggle, still keeping the net around him, they succeeeded in getting him into the boat, but their difficulties were not yet over, the question being how to keep him there. Blows with oars and sticks appeared to have no other effect than to make him still more savage. He endeavoured to attack all and sundry, and bit pieces out of the thwarts of the boat. They managed at last to stun him, when the poor beast was quickly rowed on shore and despatched. Other two examples of this seal were caught at the same place in 1868. Professor Turner noticed one of these in the *Journal of Anatomy and Physiology*; the skull of the other Mr Speedie kindly sent to me. Since then specimens have been occasionally caught at that station.

The shape of the molar teeth of the Grey Seal changes considerably as the animal advances in years. In the skull of a young individual in my possession, which weighed eight stones, the two posterior molars of the lower jaw have each an anterior and posterior small cusp, beside the large central one; similar cusps are also present on the third molar, although not so prominently displayed. The third and fourth molars of the upper side have each a posterior cusp feebly pronounced, and the last has two of like size. As the animal gets old these cusps in the most instances disappear, and the teeth when not placed close together in the jaw become more or less round and blunt. In other examples, not of unfrequent occurrence, where the teeth are inserted close to each other, and those of the upper and lower series impinge upon each other, the teeth in these cases are worn into very irregular and curious shapes. All the teeth of this species have each a single root, except the posterior molar above and below, the only true molars in this and other seals—which have in general two roots or fangs. In a cranium in my possession, the last molar of the lower jaw on each side has three roots; the third is placed about the middle of the tooth toward the inner margin. It is not nearly so thick as the other two, and a little shorter; but has a distinct perforation exactly its own size in the alveolar border to receive it.

Professor Turner gives in the *Journal of Anatomy, &c.*, a notice of a skull of a half-grown individual of this species, which he received from Montrose, that had no molar teeth, although the canines of both sides were present, and of the usual dimensions. Dr. L. Edmondston [1] mentions an adult cranium in

1 Mem. Wernerian Society, 1839.

his possession that had only four molars on each side in the lower jaw, and, he adds, most obviously there never had been more. All the crania of this seal that have come under my notice had the normal number of teeth in one shape or other. In the lower jaw of a female I have, the posterior molar has been attacked by caries immediately above the alveolar margin, and is wasted about half-way across the tooth. This is a smallish jaw, although evidently that of an oldish individual. The female does not seem ever to attain to much more than half the dimensions reached by the old members of the other sex. In all the skulls that I have seen of this species, the ascending processes of this intermaxilla are in contact with the nasal bones to a much greater extent than is represented in the figures of Ball,[1] Bell,[2] or Blasius.[3] Another curious feature in the cranium of the Grey Seal is the unossified condition of the sutures between the facial and cranial bones, which do not appear to become anchylosed at any size or age.

St. Andrews, July, 1875.

Captures of Helicidæ at Moulin, near Pitlochry, Perthshire.—The following list by no means pretends to be a complete list of the shells of the district, but is simply an account of my own experience, and as such, may be of use, if any conchologist should visit Moulin :—

Vitrina pellucida—very common under moss and stones. *Helicella cellaria*—abundant. *H. alliaria*—less common than *cellaria*. *H. pura*—common. *H. crystallina*—rather scarce. *H. fulva*—rare. *Helix nemoralis*—not uncommon. *H. hortensis*—less common than *nemoralis*. *H. hispida*—rather scarce. *H. fusca*—not uncommon ; on nettles and coarse grass. *H. aculeata*—one specimen. *H. arbustorum*—rather common ; *var. alpestris*—on the banks of Craigeour Burn. *H. rotundata*—the commonest of the genus ; on one log of wood I counted about twenty specimens. *Bulimus obscurus*—rare. *Zua lubrica*—common. *Pupa umbilicata*—scarce ; among dead leaves. *Clausilia rugosa*—common, especially on limestone rocks and roots of trees.

The shells enumerated in the above list were collected in June, which was this year rather a favourable month for mollusk-gatherers, on account of the frequent showers.—H. Coates, Perth, August 1875.

Helix caperata—I found a *white* specimen of this shell at Troon, on a wall facing the sea.—*Id.*

A New British Moth.—In July last I had the pleasure of taking a few specimens of *Ablabia argentana* Cl., a beautiful white Tortrix not previously recorded as British. It was found on the side of a mountain near Blair Athole, where I was collecting in company with Sir Thomas Moncreiffe and Mr. W. Herd, who also secured a few specimens. *A. argentana* is rather local on the continent.—F. Buchanan White.

1 Trans. Irish Academy, vol. 18. 2 British Quadrupeds.
3 Säugethiere Deutschlands.

OUTLINE DESCRIPTIONS OF BRITISH COLEOPTERA.

(Continued from p. 27.)

By Rev. T. BLACKBURN, B.A.

Amara *continued.*

16. Very wide. Gr. Legs gen. b. Th. impunc. at ba. E. str. 4 l. B. . . . . ovata
Obsc. gr. Tib. pale. Th. punc. at ba. E. str. 3¾ l. E. I. ! . . . . similata

17. More than 3 ls. Brassy gr. Th. punc. at ba. E. finely p.-s. throughout. Tib. and ap. of h.-b. as in communis. 3¾ l. B.c. . . . spreta
Less than 3 ls. Dull obsc. gr. Th. not (or hardly) punc. at ba. E. str., more deeply near ap. Tib. and ap of h.-b. as in trivialis 2½ l. B. . curta

Zabrus.

Winged. Reddish b. Mouth, ba. of an., pal. and tib., paler. Th. tr., consp. punc. at ba. E. dist. p.-s. 6½ l. E.s. . . . . gibbus

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Ninth Family—HARPALIDÆ. (7 genera.)

1. Length more than 2½ l. (exc. S. elegans). E. test. or variegated 2
- - - - -. - not test. or variegated 4
- less than 2½ l. 5

2. Ant. tib. with a single spine at the ap. . . . 3
A consp. spine *before* ap. of ant. tib. and one *at* the ap. Diachromus

3. The whole insect closely and unif. punc. . . Dichirotrichus
Glabrous species . . . . . Stenolophus

4. 1st j. of ant. tar. of ♂ consp. less than 2nd. Often with a r. mark on h. . . . . Anisodactylus
Not possessing the above characters . . . Harpalus

5. Mentum with a sharp tooth. Interm. tar. of ♂ simple Bradycellus
- - no dist. tooth. Interm. tar. of ♂ with dil. js. . Acupalpus

Diachromus.

Thickly punc. H., pal. and legs, test. Th. tr., gr. or bl. E. str., test.; a bluish cloud near. ap. U.-s. b. 3¾ l. E.s.c. . . . . , . *germanus*

Dichirotrichus

Pub. Test. A dusky cloud on disc of e. E. str., widest *behind* mid.; 3 rows of *fine* puncs. on each int. 3¾ E.c. . . . . obsoletus
-. -, often much clouded with fuscous. E. str., widest *at* mid. 2 rows of *coarse* puncs. on each int. 3 l. B.c.! pubescens

ANISODACTYLUS

Ap. spine of ant. tib. simple B. Ba. of an., and often legs, r. Th. widest in front of mid.; its ba. angs. laterally prod. E. el., str.; ints. conv. 5 l. B. binotatus
- - - - - 3 pronged. Gr., bl. or b. An. paler at ba. Th. widest *at* mid.; its ba. angs. rounded off. E. rather wide, str.; ints. hardly conv. 5¼ l. E.s.c. . pœciloides

HARPALUS

1. H., th. and e., thickly punc. An., pal. and legs, test. or r. 2
E. and ba. of th. (but not h. or disc of th.) thickly punc. B. Pal., an. and legs, yel. E. str., with golden pub. 6 l. B.! . . . . . ruficornis
Only *out.* ints. of e., and *ba.* of th. punc. Met. Gr, bl., cop. or b. Legs, pal. and an., gen. r. E. str.; mar. notched near ap. 4¼ l. B!! . . . Proteus
Ints. of e. not dist. punc. 8
2. Th. regularly contr. from mid. to ba. H., th. and e., bl. or gr. 3
- cordate. 4
3. Ba. angs. of th. very obt. but dist. Mar. of e. ind. sinuate near ap. Th. roughly punc., widest *in fr. of* mid.; fr. wider than ba. H. and th. blackish. 6 l. E.s. . . . . sabulicola
- - - - not dist. Mar. of e. dist. sinuate near ap. Th. moderately punc., widest *at* mid.; fr. hardly wider than ba. H. and th. unic. with e. Ints. of e. equally punc., exc. large puncs. on 3, 5, and 7. 6 l. E. . . . . *obscurus*
- - - - - -. - - - - - - - - - finely punc., widest *at* mid.; fr. hardly wider than ba.. H. and th. more or less reddish. Ints. of e. most closely punc. behind. 5 l. E. . . . . rotundicollis
4. H. and th. r. or reddish. E. reddish or pit. . . . 5
H., th., and e. bl. or gr. H. and th. coarsely punc. Th. mar. behind. Ints. of e. rather strongly punc. 3½ l. E.s . . . . . azureus
H., th., and e. obsc. gr. H. and th. finely punc. Th. not mar. behind. Ints. of e. finely punc.; 3d, 5th, and 7th, with some larger puncs. 4 l. E.s. . punctatulus
5. Only extreme hi. part (if any) of side mar. of th. falling quite perpendicularly on ba.. . . . 6
The hi. ¼ of side mar. of th. falls quite perpendicularly on ba. Th. hardly tr., much contr. behind mid., thickly and strongly punc. E. thickly and finely punc.; the sut. gen. consp. r. 4 l. E.s.c. . cordatus
6. E. not very parallel, less than twice as long as together broad, ints. consp. less strongly punc. than th. . . 7

E. very parallel, quite twice as long as together broad, ints. in fr. hardly less strongly punc. than th. Th. only slightly tr. 3¾ l. E. . . . rupicola

7. Th. strongly punc. all over, though a little less thickly on disc. E. moderately punc. In type specimens the th. is dist. but slightly tr., and rectangular (almost sharply) at ba. There are specimens, however, with the th. *scarcely* tr. and the ba. angs. gently obt. This is probably a distinct species. It *may* be *rectangulus*, Thoms. 3½ l. B! . . puncticollis

Very like type form of prec. Smaller. H. and th. more regularly punc. Ant. angs. of th. more rounded off. Outline of th. more sinuate. 2¾ l. E. . parallelus

Th. very strongly tr.; rather finely punc., especially on the disc, where the puncs. are almost obs.; ba. angs. ac. E. very short and very finely punc. 3½ l. E. . . . . rufilabris

8. Th. cordate, tr., its hi. angs. laterally prod. E. deeply str. B. Pal., an., tib. and tar., r. 4 l. E. consentaneus

- not cordate., its hi. angs. not laterally prod., but sharply rectangular or ac. 9

- - - - - - - - - - obt. or rounded off. . . . 12

9. Some dist. puncs. on 7th or 8th int. of e. near ap. . . 10

Not as above. 11

10. The puncs. on the 7th int. H. and th. shining bl., gr. or b. Th. punc. at ba. E. consp. str., coloured as th., duller in ♀. An., pal. and legs r. A *wide* species. 4½ l. E. S. I. . . . rubripes

- - 8th int. B. An., and pal. r., gen. marked with b. Legs pit. Tar. r. E. finely str. (the str. punc. in fr.), pointed at ap. 4½ l. E.$^{s.w.}$ I.$^{s.w.}$ . . melancholicus

11. Hi. angs. of th. right. H. and th. blackish. E. pit. or gr. Pal., an., legs, mar. of th., and sut., r. Th. punc. at ba. E. finely str. 4½ l. E.$^{s.}$. *discoideus*

- - - - ac. Pit. b. E. and mar. of th. often paler. An., pal., tar., and ba. of tib. reddish. Th. widest at ba. E. finely str. A wide flat species. 3¾ l. E.$^{s.c.}$ . . . . servus

12. Some dist. puncs. on 7th or 8th int. of e., near ap. . . 13

Not as above. 14

13. Th. dist. punc. at ba. E. with puncs. on 5th and 7th ints. B. Th. gen. bl. or gr. E. often bluish. An. pit., ba. r. Pal. pit. or r. E. consp. str.; ints. often elev. 5¾ l. E.$^{s.}$ . . . caspius

- not dist. punc. E. with puncs. on 7th int. only. B. or bluish. Pal. and an. r., pit. near ba. Legs pit. Tar. reddish. E. deeply str. 4¼ l. E. . ignavus

14. Legs unic. r.-yel. B. An., pal., and mar. of th. test. Th. punc. at ba. E. strongly str. 4 l. E. S. I. ! latus
- Very like prec., legs often darker. Th. unic. E. with 2 or 3 large puncs. on 3rd int. 4¼ l. S.M. . *quadripunctatus*
- Legs more or less b. or pit. Th. ruggedly punc. at ba., often very narrowly edged with r. H., th. and e. br. gr. An. and pal. pit. Sut. brown. E. deeply str.; str. faintly punc. 5½ l. E.S. . . *cupreus*
- - - - - - -. - not ruggedly punc. at ba. . . 15

15. Th. not (or hardly) punc. at ba. . . . 16
- dist punc. at ba. Bl.-b. An. pal. and tar. r. Mid. js. of an. pit. E. consp. prod. at ap. and strongly str. 4½ l. E. . . . . tenebrosus

16. An. and pal. unic. rusty or r. 17
- - - not as above 19

17. Th. hardly, if at all, wider in mid. than at ba. . 18
- cons. wider in mid. than at ba., its ba. impunc. exc. in the fov. Bl.-b. An., pal., tib. and tar. r. E. strongly str. 3¾ l. E. . . . *sulphuripes*

18. - very tr., its ba. impunc., and ba. angs. hardly rounded off. B. An., pal., and tar. r. Tib. more or less r. E. very strongly str. 3¾ l. B. . tardus
- tr., its ba. impunc., and ba. angs. very strongly rounded off. Pit. b. An. & pal. r. Legs pit. r.; fem. darker. E. very finely str. 2½ l. E.S.C. . picipennis

19. - dist. narrower in fr. than at ba. . . . 20
- hardly narrower in fr. than at ba.; ba. impunc. exc. in the fov.; ba. ang. obt. B. An. pit., with r. ba. Pal. reddish. Legs pit. E. strongly str. 3½ l. E.S.E.C. . . . . neglectus

20. Th. very much contr. in fr.; ba. impunc., exc. in the fov.; ba. angs. much rounded. B. Ba. and ap. of an. and pal. test. Tar. often reddish. E. strongly str. 4¾ l. E.C. . . . serripes
- moderately contr. in fr.; ba. impunc.; ba. angs. hardly rounded. B. An., pal., legs and mar. of th. more or less reddish. E. finely str. 3¼ l. E.C. ! . . . . . anxius

Stenolophus

1. Th. blackish, not tr., punc. at ba.; its mar. yel. E. narrow, dusky, often pale in fr., str. Legs and ba. j. of an. test. H. b. 2½ l. E. . . vespertinus
- Not as above. 2

2. E. test. in fr., with a well def. b. cloud behind. Ba. of th. not punc. exc. in the ba. fov. . . . 3
- rusty r., often dusky at sides and ap., str. H. b. An. b.; ba. 2 js. r. Th. tr., r., punc. at ba. Pal. and legs r. 3 l. E. . . . . Skrimshiranus

3. H. b. Th. hardly tr., r. E. str., r. in fr., wholly (except outer mar.) b. behind. An. b.; ba. 2 js. r. Pal. r.; ap. j. dusky at ba. Legs r. 3 l. E.$^{c.}$. Teutonus
Like prec. Th. tr. E. test., each with a large oblong b. spot. Sut. pale. 2 l. E.$^{s.c.}$ . . . elegans

ACUPALPUS

1. Ba. angs. of th. very obt., or rounded. More than 1⅜ l. 2
- - - - rounded. Not more than 1⅜ l. Narrow. H. b. Th. r. or dusky, tr. E. pit. or brown, str. An. dusky; ba. j. pale. Pal. and legs test. 1¼ l. B. . . . . exiguus
- - - - hardly obt. H. b. Th. hardly tr., contr. behind, r. or dusky. E. str., test., with a dusky cloud behind. An. b., ba. 2 js. test. Pal. and legs test. 2 l. E. . . . . consputus

2. Th. not punc. across ba., nor wholly yel. . . 3
- - - - -, yel., very tr. H. b. E. str., dusky; mar. and sut. test. An. b.; ba. 2 js. pale. Legs and ba. of pal. test. 1½ l. E.$^{s.}$ . . . . flavicollis
- punc. across ba.; hardly tr.; contr. behind; b. H. b. E. el.; str.; b.; extreme ba. and the sut. pale. An. b.; ba. pale. Legs and ba. of pal. pale 1⅔ l. E.! meridianus

3. Ba. fov. of th., and the whole ba., quite impunc. Very like *Gyllenhalli;* a wider insect; darker; th. wider; tar. more el. 1¾ l. E. . . . *derelictus*
- - - - more or less punc. 4

4. Pit. b. Th. and e. partly test. Ba. of an. and of pal. pale. Legs often pale. E. str., with some well def. puncs. in hi. half of 2nd int. 1⅔ l. B. . Gyllenhalli
- -. H. th. and e. unic. E. more finely str., without dist. puncs. on 2nd int. 1⅔ l. E.$^{s.}$ . . *brunnipes*

BRADYCELLUS.

1. E. without a shortened str. near sc. 2
- with a shortened str. near sc. 3

2. Brown, clouded with b. Legs and ba. of an. pale. Th. tr., narrowed at ba.; ba. angs. rounded; ba. and fr. punc. E. str., rather wide; sides rounded. 2¼ l. B. . . . . placidus
Very like prec. Gen. darker, especially legs and ba. of an. Th. less narrowed at ba. E. more el. and parallel; sut. consp. the palest part. 2 l. B. . cognatus

3. Ba. angs. of th. dist. obt. or rounded, and not laterally prod. 4
- - - - hardly obt., and slightly prod. laterally. Pit. or b. An., pal., and legs pale. Th. deeply punc. at ba. E. str. 2½ l. E. S. I. . . . distinctus

4. Th. more or less reddish. 5

- h. and e. deep pit. b. An., pal., and legs paler. Sut. often r. Ba. of th. punc. only in the fov. E. very faintly str., especially near mar. 1½ l. B. . similis

5. Th. not narrowest at ba. 6

- narrowest at ba. H., th., an., pal., and legs rather consp. r. E. darker. Th. punc. only in the fov. E. str. 1⅔ l. B. . . . . collaris

6. Hi. angs. of th. strongly rounded, and ba. dist. punc. Pit. r. An., pal., and legs paler. E. strongly str. 2 l. B. . . . . harpalinus

- - - - dist., though obt., and ba. strongly punc. R. brown. E. often darker. An., pal., and legs paler. E. strongly str. 2¼ l. E. S. I. ! . verbasci

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Tenth Family—TRECHIDÆ. (5 genera.)

1. Eyes not pub. 2

- pub. [Ap. j. of pal. very narrow.] . . . Perileptus

2. E. very flat and parallel, not dist. str., and shorter than h.-b. Eyes hardly conv. A long spine under 4th j. of ant. tar. . . . . Aëpus

Not as above. 3

3. Ap. j. of pal. not dist. longer than prec. j. . . . 4

- - - - very dist. longer than prec. j. . . . Patrobus

4. H. and th. shining brassy or gr. . . . Pogonus

- - - not shining brassy or gr. . . . . Trechus

N.B.—*Lymnæum* (in the *Bembidiadæ*) bears sufficient resemblance to this family to be capable of confusion with it.

PATROBUS.

1. Wingless species 2

Winged. H. and th. b. E. pit. or r. An., pal., and legs reddish. Th. cordate, rather strongly tr.; ba. fov. very large and deep, separated from side mar. of th. by a narrow elev. ridge. E. p.-s. 4 l. E. S. I.[M.] . . . . . septentrionis

2. Very like prec. Smaller. Th. only very gently tr. 3½ l. B. . . . . excavatus

Very like *excavatus*. Th. rather more tr.; ba. fov. close up to side mar. of th. E. longer and more parallel. 3¾ l. E. S. I.[M.] . . . assimilis

POGONUS.

1. H., th., and e. brassy gr. Pal. and an. dusky . . 2

H. and th. br. gr. An., pal., legs and e. test. Region of sut. dusky. Th. double as wide as long. 3¼ l. E.[E. S. C.] . . . . . luridipennis

2. Legs reddish. Th. tr. E. p.-s. The punc. str. obs. on sides and near ap. $2\frac{3}{4}$ l. B.$^{c.}$! . . chalceus

Very like prec. Th. narrower behind. E. much more el. and parallel. The punc. str. hardly fainter at sides, and not at all fainter near ap. Tar. shorter and thicker than in prec. 3 l. E.$^{c.}$ . . littoralis

TRECHUS.

1. E. pub. 2

- not pub. 3

2. R. Legs paler. H. dusky. A dist. band near ap. of e. b. An. nearly as long as whole body. Ba. angs. of th. ac. E. p.-s. Ints. smooth. $2\frac{1}{4}$ l. E. discus

-. - -. - -. Disc of e. often dusky. An. not more than $\frac{3}{4}$ length of whole body. Th. rectang. at ba. E. faintly p.-s.; ints. punc. 2 l. B. . micros

3. Ba. angs. of th. well def., though sometimes obt. . 4

- - - - rounded off. R. An. and legs paler. E. short, with rounded sides. 1st str. very deep, reaching ap., punc. in fr., bent round at ap. to include 2d, 3d, and 4th str, which are fainter, but strongly punc.. 5th str. faint. $1\frac{3}{4}$ l. B. . . secalis

4. E. with rounded sides. 5

- very long and parallel. Pale brown. H. darker. An. long. Th. rectang. at ba. 1st, 2d, and 3d str. of e. deep, but faintly punc. Ap. of 1st str. bent round to include 2d. The 4th str. faint. $1\frac{3}{4}$ l. B.$^{c.}$ . . . . . *longicornis*

5. Str. of e. rather strongly punc. Th. rectang. at ba. . 6

- - - hardly punc., and faint. 7

- - - - -; the 3 in. ones very deep,—the 4th faint. Pit. or r. An. r.; 2nd, 3d and 4th js. darker. Legs test. Th. rectang. at ba. 2 l. E.$^{F.}$. *rivularis*

6. Str. of e. all well def., the 4 in. ones very deep. R. An. pal. and legs paler. E. short, with strongly rounded sides. $2\frac{1}{2}$ l. E. S. I.$^{c.}$ . . lapidosus

Out. str. obs.; the 3 in. ones only rather deep. Pit. r. Pal., an., legs, and (often) ap. of e. paler. E. longer and more parallel than in prec. $2\frac{1}{2}$ l. B. rubens

7. Pit. r. Pal., an. and legs pale. Ba. angs. of th. dist. obt. E. finely str., the in. 4 str. well def. $1\frac{1}{4}$ l. B.! . . . . . minutus

Very like prec. Rather darker. Ba. angs. of th. almost *rounded*. E. shorter, more faintly str. Not more than in. 3 str. well def. $1\frac{2}{3}$ l. E. S. I. . obtusus

AEPUS

Th. rectang. at ba. Pale r. 1 l. B.$^{c.}$ . . marinus

B. angs. of th. very obt. Pale r. ; fr. of e. gen. darker
1 l. B.^{c} . . . . . Robinii

PERILEPTUS

Pit. Ba. of an., mouth, legs and disc of e. pale. Th. tr., rectang. at ba. E. dist. p.-s. 1¼ l. B.$^{c.}$. areolatus

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Eleventh Family—BEMBIDIADÆ (5 genera.)

1. E. with a shortened str. near sc. . . . 2
- without a shortened str. near sc. . . . 3
2. Ant. tib. with a strong spine near ap. of ex. mar. . Cillenum
- - simple . . . . . Bembidium
3. H., th. and e. unif. and densely punc. . . . Tachypus
Not as above 4
4. Sut. str. of e. consp. bent round at ap. . . Tachys
Not as above . . . . . Lymnæum

N.B. *Perileptus* (in the *Trechidæ*) bears sufficient resemblance to this family to be capable of confusion with it.

LYMNÆUM

Pit. b. Mouth, pal., an. and legs pale. Ba. of th. faintly punc. E. flat, deeply str. Ints. elev. ; 2 deep imprs. on 4th. 2 l. E.$^{s.c.}$ . . . nigropiceum

CILLENUM

H. and th. gr. Mouth, pal., an., legs and e. pale brown. Th. not tr., with right angs. at ba. E. deeply str. ; str. faintly punc. 1¾ l. B.$^{c.}$ . . . laterale

TACHYS

1. Ba. angs. of th. obt. 2
- - - - sharp 3
2. H. and th. dark brown. An. brown, paler at ba. Legs test. E. test., clouded with darker. Th. tr. In. 2 str. of e. dist. ; the rest obs. Ap. of bent part of 1st str. consp. bent towards sut. 1⅛ l. B. . scutellare
Pit. (sometimes paler). Ba. of an. and legs paler. Th. tr. E. with only the in. 2 str. well def. Bent. part of 1st str. nearly parallel to sut. 1 l. E. . bistriatum
3. Pit. b. Ba. of an. r. Legs r. brown. A r. spot near should. and ap. of each e. Th. tr. E. flat, with 3 dist. punc. str. ; the outer str. fainter ; 8th dist. 1⅛ l. E.$^{N.}$ . . . . . *quadrisignatum*
R.-yel. An. and legs paler. Th. gently tr. E. short, conv., twice as wide as th., with the in. 2 punc. str. deep ; the out. ones grow obs., the 8th deep behind. 1⅛ l. E.^{N} . . . . . *Focki*

(To be continued.)

GEOLOGY.

THE ORIGIN OF SOILS.

By F. SMITH.

AS all the multitudinous things in the world may be traced to a few elements, so there possibly was a time when the world was wholly made up of those elements, under a very few combinations. If, as the geologist asserts, he can read the world's history in the rocks of which it is composed, then there was such a time. That the world does contain its own history is undoubted, and that this history is in a measure decipherable is as certain ; but that it will ever be read as it was written is altogether improbable, and, indeed, impossible. The record is itself a ruin—a ruin of former records ; the present volumes have been made out of old, their pages have been crossed and recrossed, and some of their characters have become illegible, or confounded together. Only he who has thought deeply upon the subject, and worked extensively among the rocks, can realize the full extent of their obliteration ; only he who has attempted to read that which does remain, can form a just estimate of its comprehensiveness, of its profound superiority to all that man has been able to do or to suggest, in his boldest experiments, and in his deepest philosophy. Yet one can read sufficient to be able to declare how wonderful earth's history has been, and that a human life is far too short fully to comprehend even one of its many pages. It is one of the greatest, as well as one of the highest pleasures, to read such portion of the record as can be discerned, for

> He, the God, the Infinite,
> Gives to the finite mind of man,
> A ray of omnipresent light,
> Wherewith the mighty work to scan ;
> And in that light the simple will
> Reads, meekly trembling as it reads,

And tells that the Creator still
The wonderful procession leads
Of all things that are, that have been blest,
And, being blest, were bid to yield
The life He gave them.

In making a few remarks on the origin of soils, a history of soils is not intended, but as an explanation has been asked of one or two assertions in a former paper, relative to the origin of "soil" in the Carse of Gowrie, I take this opportunity to explain my ideas of the origin of rocks, or as we will now put it, the origin of soils.

All sedimentary rocks, and, therefore, soils, have been derived from the plutonic rocks, or the crystalline masses of the first-formed solid crust of the globe. These igneous rocks—very various in their aspect—are composed of comparatively few elementary materials, but from these, by means of their chemical attributes, as affecting each other under continually altering conditions, have resulted all that can now be found to partake of the nature of things earthly.

If granite be taken as a type of these early rocks, its constituents are quartz, felspar, and mica; quartz comprises about one fourth of its bulk, felspar rather more than a half, and mica less than a fourth.

These granitic rocks were, as soon as formed, subjected to degrading forces that cohesion and chemical attraction or affinity, were powerless to resist; and from this disintegration has come about, with an economy and simplicity of design that may well astonish us, nearly all that is found in the inanimate world.

The first or simple results of the disintegration of granite are (if by the sea) beds of sand resulting from the accumulation of quartz grains near the shore; micaceous clay-slate beyond the area of sand, the result of the liberated mica, or, mixed with the sand, micaceous sandstone; and in the deeper parts of the sea beds of clay settling down from the finely disseminated particles of decomposed felspar. If the degradation takes place upon the land by atmospheric agencies, rain, wind, frost, &c., then the result is the same, but the distribution of the derived materials is less regular, the quartz and mica accumulating mixed or unmixed in the valley, while the lighter particles of felspar are carried to considerable distances, and scattered abroad with every flood, and even in large quantities borne

into the sea. This simple re-arrangement of the primary rocks is a perfect illustration of what is now taking place, in so far as re-arrangement is concerned, and yet the sources of the redistributed materials are indeed almost endless.

But we will follow out the decomposition of granite somewhat farther, and we may, perhaps, see more clearly what the laws which govern distribution and chemical combination have produced from these rocks. From quartz, silica is derived; from silica, silicon; from mica, magnesia, lime, potash, peroxide of iron, silica, &c.; from magnesia, magnesium; lime, calcium; potash, potassium; from peroxide of iron, iron; from felspar, silica, alumina, and potash; from alumina, aluminium; and so on; and from the ultimate division of all these, oxygen.

From quartz, as has been said, all sandstones were derived (in a former paper on "Trap Rocks," see *Scottish Naturalist*, Vol. II., p. 219). Silex was more particularly spoken of, but (where *magnesia* is named as a colouring material please read *manganese*) it is not soluble in water at its ordinary temperature, but it is contained in the waters of the Geysers, and some thermal springs, and if fused with an alkali is soluble in water, but much of its operation and modification in nature is beyond present chemical knowledge.

To the lime and magnesia of mica (and to trap rocks, &c.) are owing the immense accumulations of lime, mountain limestone, magnesian limestone, chalk, &c., and to the peroxide of iron of mica, many of the iron impregnated masses of the earth are due.

Clay, with its alum and potash, under any circumstances whatever found has possibly come from the felspathic ingredients of the early rocks.

Lime is a compound of calcium, carbon, and oxygen; but to attempt to follow these substances through their wonderful metamorphoses and combinations would be as absurd as it would be endless. The following graphic description of the important part that iron is playing in the economy of things may show us what a work this would be:—"How strange, if the steel axe of the woodman should have once formed part of an ancient forest; if, after first existing as a solid mass in a primary rock, it should next have come to be diffused as a red pigment in a transition conglomerate; then as a brown oxide in a chalybeate spring; then as a yellowish ochre in a secondary sandstone; then as a component part in the stems and

twigs of a thick forest of arboraceous plants; then again as an iron carbonate slowly accumulating at the bottom of a morass of the coal measures; then as a layer of indurated bands and nodules of brown ore underlying a seam of coal; and then, finally, that it should have been dug out, and smelted, and fashioned, and employed for the purpose of handicraft, and yet occupy, even at this stage, merely a middle place between the transmigrations which have passed, and the changes that are yet to come."

As with iron, so with most other substances, dissemination, combination, change, has been the perpetual order of all material things. Upon these mechanical and chemical laws of change the vegetable, and hence the animal kingdom, has dependêd. Had not the denuding agencies laboured to destroy, and the mechanical distribution of the *debris* been effected, the world would have remained a bleak and barren wilderness of rugged rocks; but "Nature is but a name for an effect whose cause is God," and so the hardest rocks have yielded to the influences that the Almighty Creator fore-ordained, and their ruins are spread abroad upon the earth, and the world is fitted for vegetable existence. Barren spots are greatly the exception, and places utterly void of animal and vegetable life are very rarely met with.

If the general ideas of less than forty years ago were correct, that plants derived their nutriment from pre-existing vegetable matter, it were then necessary that all soils should contain a large proportion of carbonaceous and other constituents of vegetables; but this is found to be not at all necessary, indeed, where the soil contains any such carbonaceous material it has invariably been derived from vegetable growth, and where vegetation is growing upon such humus the carbonaceous matter is proportionably increasing. It is not necessary in some cases that any such vegetable material should exist in the soil. Plants have been grown in soils from which all organic carbonaceous matter has been purposely expelled with perfect success, and crops are abundantly reared upon natural soils in which no vegetable material exists—indeed some plants grow best upon such soils. "According to Darwin, rich harvests of maize are yielded in the interior of Chili and Peru by soils consisting of the merest quicksand never enriched by manure. According to Colonel Campbell, the soil of the cinnamon gardens at Colombo, and where else the tree is cultivated, is

pure quartz sand as white as snow. Dr. Schleiden again observes that the oil palms of the western coasts of Africa are grown in moist sea-sand; and that from the year 1821 to the year 1830 there were exported, as produce of these palm trees, into England alone, 197,118,000 lbs. of palm oil, containing 76 million lbs. or 32 thousand tons of carbon—these thousands of tons of carbon being furnished by trees grown in a soil that was practically free from organic or carbonaceous matter of any kind whatever."

What then constitutes a soil? The answer is—any earthy material whatsoever. This is putting it broadly, but it is in this broad simple law that so much beneficence and wisdom is seen. Had it been an essential that earth, to become a soil, must contain an amount of organised carbonaceous and other material, then in a world constituted as is ours no soil whatever could have been formed, and carbon with every earth and mineral would have retained their inorganic form. But the vegetable kingdom is ever ready to transform the most arid plains into beautiful gardens where physical conditions are not sufficiently powerful to oppose this usurpation.

If some extensive forests could be placed in the centre of the Sahara, it would bid fair to become in time as fruitful a country as any part of Africa. The shifting of the sand would be checked by an increase of moisture; and if the forests extended their limits in the least degree, their conquest of the whole district would become almost a certainty. In other words, if perfect rest, with sufficient moisture, could be given to the Sahara sands, they were then soil fit for the growth of forests that would in the end produce a *humus* rich with vegetable material. The soil of the Carse of Gowrie, and of the Tay, and Earn valleys, are what I described them before as being the wear and tear of the high-lying shoulders of the Grampians. The floor of the Earn Valley is, as was before shown, composed of layers of coarse pebbles, beds of sand, merging from coarse material above the pebbles, to fine arenaceous, or argillo-arenaceous soils at top, or in some parts from the pebble-beds through sands to stiff clays at top. In all this we see nothing but the re-arranged materials of older denuded rocks, and we may generalize upon their origin by roughly estimating their several natures. The pebble beds contain perhaps 80 per cent of siliceous material: some of the pebbles are micaceous, and in other ways vary from a state of pure quartz, but not to any

very great extent. The sands probably contain about the same proportion of silex, but as they become clayey they necessarily contain alumina, potash, lime, or some such materials in proportion as the clay increases.

We have seen how of old forests flourished upon these sands and pebbles, and that then were produced countless tons of carbon, much of which remains still buried below the upper clay beds. This carbon was not derived from the sands (it was, of course, chiefly, if not wholly, derived from the atmosphere, but this is not immediately our subject), but it remains an almost imperishable monument of the bygone forest. In many parts of England and Scotland, forest remains are met with embedded in peat, &c., in districts where trees at the present time scarcely exist. I have seen hosts of tree-boles (chiefly oak) exhumed from the peat of Cambridgeshire that grew upon the Chalk-marl and Upper Greensand beneath. I found the peat at the foot of the "Sow of Athol" to be full of birch and Scots fir, and yet from that spot not a tree was visible in any direction. That last forest took its rise upon the glacial material with which the valley is thickly strewn, when the drainage was better than it is now, owing to the *absence* of the *humus*. The accumulation of carbonaceous material was probably the cause of the decay of the trees. The forests of the Fens of Cambridgeshire and Strathearn (and what has been said of Strathearn applies equally to the Tay Valley), were perhaps destroyed in the same way. Nothing blocks up drainage more surely than accumulating vegetable matter. The vegetable mould of our fields possibly originated from forest growth, but before the vegetable mould was formed the forests had to take up their abode upon the gravel or sand or clay that some geological phenomena had prepared.

Scottish soils would be much more variable than they are were it not for the almost universal presence of the stiff Boulder clay or "till" of northern farmers. This covers a great variety of rocks that would have degraded into many varieties of soil. In many cases this "till" is an advantage upon what would have been; in others it may not be so.

Ancient soils are frequently met with in the stratified rocks. The Portland dirt-beds are a notable instance. These beds of humus are inter-stratified with Portland limestones, so that one sees forest beds resting upon ancient sea bottoms, upon which the vegetables must have taken root. In these beds tree trunks

are found still standing as they grew. Beneath layers of coal an under-clay is often found permeated by the roots of the coal-forming plants. The underlying beds, however, are not always clay, but sometimes sand, or limestone, permeated also with roots.

In all this we see how wonderfully vegetable life adapts itself to circumstances, and it is enabled to do this because it does not derive its principal substance from the soil. But in adducing this, we do not mean to disparage the value of certain soils above others, nor the fact that by adding certain substances to soils (they may, however, be entirely free from carbonaceous materials,) plants may be made to produce twice or thrice as much carbon and other matters as without the application of such substances. Most decisive experiments regarding these and similar facts have been made during a series of years by Messrs. Lawes and Gilbert, at Rothamstead.

Soils are sometimes deteriorated, but often improved by the "subsoils" upon which they rest, so that the nature of the subsoil being ascertained, it can at once be seen whether deep ploughing is advantageous or not.

Natural mixtures of soils might be copied with good results. Or to put it in another form, we might say, Imitate in one district what nature has done for our advantage in another. For instance, eight-ninths of a soil good for turnips may be siliceous, and the rest lime or alumina; then as far as practicable, clay or lime might be added to the turnip-land, not as an experiment, but with some assurance as to the result. Great improvements in agriculture have resulted from the practical application of Organic Chemistry to the developement of cultivation; and this is nothing less than an attempt to simulate Nature in her grand economy. The more the secrets of the conversion of carbon, oxygen, hydrogen, and nitrogen into hosts of organised substances are inquired into, the more it will be found necessary to submit to, and to imitate the laws that regulate matter. In many ways the vegetable kingdom stands between us and the mineral (we use but one mineral as an article of food), but although sulphur, phosphorus, chlorine, calcium, sodium, potassium, and some other elements are sometimes found in the substance of plants, they occur in very small quantities.

The destruction of the rocks has produced the soils upon which plants through all time have flourished, and their ultimate division and dissemination have strewn a vast variety of mate-

rials over the face of the earth, assorted and arranged so as best to suit the functions of vegetables, by what we conceive to be the most natural phenomena. Natural phenomena is of course another name for ordained law, and although all through the geological ages there have been great alterations in the "soils," there has never been anything like accident in the continuation of the vegetable kingdom, seeing that the magnificent but simple rule that the food of plants is not so much in the soils as in the atmosphere, made it of no vital importance of what the soils were composed. In fine, soils may be, and are, derived from an infinity of sources; and any natural, or what is called accidental mixtures of decaying rocks, produces a soil that with few exceptions is a fit habitat for plants. This is a striking fact when one places it beside the wonderful mutations that have taken place on the world's surface during an immensity of time. Had the vegetable world depended even upon certain proper combinations having been geologically produced, its existence would have been precarious, and its continuation somewhat uncertain; but tufa from the burning mountain, accumulations on the bottom of the ocean, or any local patch of sand or gravel are adapted to the *natural* wants of vegetables. If the whole world were subjected to the influence of fire, and the whole of the vegetable and animal tissue disseminated, its ashes would be ready to support its vegetable forms as heretofore. The universal atmosphere has since the world began been more essentially the habitat of vegetable life than the soil in which it has grown; and it has exercised a divinely bestowed right of modifying and subduing the effects of the constantly occuring changes to which the soils have been and are still subjected.

I have just seen the report of a lecture by Professor Wyville Thomson, delivered at Japan, June 21, 1875. After referring to the formation of ooze (chalk), from the accumulated shells of globigerina, &c., the Professor is reported to have remarked, "At the great depths (2000 to 3000 fathoms), the bottom is a red ooze. This substance he ascribed to the carbonate of calcium being entirely dissolved out of the shells during their slow fall through such a distance, so that only the ashes, as it were, of the shell reach the bottom. These ashes were found to be a *silicate of alumina* and iron, *thus upsetting the doctrine that clay was formed by the disintegration of rock.*" (The italics are my own.)

Many vast rocky masses have been formed through the instrumentality of animals, and it is not more wonderful that silicate of alumina—the general constituent of clays—should be formed by these means, than that carbonate of lime should have such origin; but the Professor's fact does not disprove the chemical origin of clays any more than the coral reef or chalk ooze annuls the chemical origin of stalagmite and certain limestone strata. Still the fact that immense beds of clay may have been formed by means of organised beings is another of the grand illustrations of the perfectness of the economy that constitutes our world.

Gold in Scotland.—On the occasion of a recent visit to the National Museum of Science and Art at Edinburgh, I found, in the Mineralogical department, a large lump of Auriferous Quartz labelled "Gold: Gediegen Gold *Germ.*: Or natif *Fr.*, from *Leadhills, Scotland.*" It has quite the naked-eye characters of numerous samples of Auriferous Quartz I have seen from California, Australia, New Zealand, Nova Scotia, or other auriferous countries.

F. W. Hutton, F.G.S., Provincial Geologist of Otago, and Director of the Otago Museum at Dunedin, New Zealand, writes me of date May 28 1875, "I suppose that by *Quartzites* you mean Quartz-veins? For Quartzite is a Rock, an altered Sandstone, and never to my knowledge contains Gold. . . . It is quite certain that Quartz Mining is improving in Otago." I have used the term *Quartzite* in its most comprehensive sense, as including all forms of massive quartz, whether as a Rock or in *Veins*. In Scotland, Auriferous Quartz occurs chiefly, if not exclusively, in the form of *Veinstones* in various Rocks. But there are, in other auriferous countries, very few Rocks indeed in which Gold has not been frequently or occasionally found.

Reports of Gold-finds in Scotland, in other localities than those mentioned in my various published Papers on the Native Gold and Gold-rocks of Scotland, every now and then reach me. The latest comes from Dr. Grierson of Thornhill, Dumfriesshire, who writes of date August 18, 1875—"I beg to communicate to you that Gold has been found in *Galloway*. I have just returned from a Natural History and Antiquarian tour in Galloway and have brought with me Native Gold." He does not explain in what form it occurs, or under what circumstances or where he found it; but he promises details in a future communication, which he might very fitly make direct to the *Scottish Naturalist* in his own name. A subsequent Dumfries newspaper, reporting the proceedings of the August (1875) meeting of the Society of Inquiry, Thornhill, states that "Dr. Grierson gave a lengthened account of a Natural History and Antiquarian tour in Galloway, from which he had just returned; in the course of which he mentioned the finding of Native Gold in Galloway, and exhibited specimens. The Gold will be specially inquired after by competent parties. It may be remembered that about two years ago the first Gold

that had been found imbedded in Quartz at Wanlockhead was shown at this Society. The specimen has been frequently inquired after. But, owing to its having been *lent for a special purpose, and not yet returned to the Museum, many inquiring Visitors have not haa an opportunity of examining it, which is to be regretted.*" Dr. Grierson's regret at the non-return of a Museum specimen of such public interest, borrowed two years ago, is much too mild a criticism of the behaviour of the borrower, whoever he may be.—W. LAUDER LINDSAY, Perth, August, 1875.

PHYTOLOGY.

Note on Merulius lachrymans.—The following seems to me a remarkable case of dissemination of the spores of Merulius lachrymans :—

In a closet, about seven feet in length and height, and four feet in breadth, two small plants appeared recently at the level of the floor, and soon began to shed their ferruginous spores. In the course of a fortnight I was surprised to find the floor becoming tinted all over; and shortly afterwards, although I carefully guarded against disturbance, by excluding draught, a wooden shelf, some feet above the floor, and the sill of a window, still higher up, became quite coated with a layer of the same colour. Near the roof, also, one or two cobwebs, which I had preserved for the purpose of watching the habits of the spiders, assumed the same hue. On submitting to the microscope portions of this layer of colour from the different elevations, I found them to consist of the spores of *Merulius lachrymans*. I could not discover any source from which these could proceed except the two small plants at the level of the floor. The whole atmosphere in the place must have been charged with their spores, which were in due time deposited. Such dissemination will help to explain the extraordinary rapidity with which this fungus usually completes its work of destruction.—J. STEVENSON, Glamis, August 1875.

New British Fungi.—I have recently found *Hydnum lævigatum* Fr. and *Labrella ptarmicæ*, which, I believe, have not previously been recorded as British. I am indebted to the Rev. M. J. Berkeley for verifying my determination of the first, and for determining the second for me.—F. BUCHANAN WHITE, Rannoch, Sept., 1875.

THE FUNGUS SHOW OF THE CRYPTOGAMIC SOCIETY OF SCOTLAND.

WE need hardly remind our readers that the first Annual Conference and Show of the Cryptogamic Society of Scotland is to take place at Perth on September 29th and 30th, and October 1st.

We trust it will, as it promises to, be a great success. We understand that several of the foremost English, and, of course, most of the Scottish, cryptogamists will be present. The arrangements for the conference will be found on the last page of the wrapper.

REVIEWS.

1.—"THE NATURALIST": Journal of the West Riding Consolidated Naturalists' Society. Edited by C. P. Hobkirk and G. T. Porritt, F.L.S., Huddersfield.

2.—"THE QUARTERLY JOURNAL OF CONCHOLOGY." No. 5, vol. I., Leeds.

3.—"FIELD AND FOREST": Bulletin of the Potomac-side Naturalists' Club. Edited by C. R. Dodge, Washington, U.S.A.

4.—"ON THE CONSERVATION OF OUR RARER NATIVE PLANTS AND INSECTS:" a Presidential Address to the Edinburgh Naturalists' Field Club, by William Gorrie, Edinburgh.

Though as a general rule we do not care to devote the scanty space at our disposal to matters of such temporary interest as reviews, we cannot resist noticing the appearance of several new journals devoted to Natural History, as we trust their appearance in the field is an indication of progress. The first on our list is the third attempt made by the West Riding Naturalists to establish a journal of their own, and we sincerely trust this venture will be more successful than the former two. Amongst so many Yorkshire societies, and with the editors whose services have been secured for the new journal, it ought surely to be a matter of little difficulty to obtain enough material and subscribers to make the *Naturalist* (rather an ill-chosen name by the way) a success. If, however, it is to have an interest outside of Yorkshire, less prominence must be given to the local societies' reports.

The next two on our list are also well printed and got up Magazines, and not so local in their contents. We wish them also success.

No. 4 is chiefly occupied by a review of various plants that have become extinct, or nearly so, in various localities known to the author. Botanists, sheep, rabbits, and rats appear to be the chief instruments of destruction. Mr. Gorrie suggests the introduction of some of our rarer plants into localities favourable for their naturalization, and suggests that field clubs should record such introductions, both past and future. The importance of the latter point should not be lost sight of. After disposing of the plants, Mr. Gorrie next directs attention to insects, and thinks that insect collectors are more to be blamed for extirpation of the objects of their pursuit than plant collectors. The will to do so may be present in some cases, but we do not think that in Scotland at least much mischief may be attributed to insect collectors. Some suggestions then follow regarding the advisability of the introduction of certain beautiful insects. By all means let this be attempted, but do not let the experimenter be too sanguine of success. "In conclusion," says Mr. Gorrie, "let each and all who study botany and entomology, or other branches of natural history, do so carefully, perseveringly, and above all, economically, not only avoiding needless waste, but rather promoting or aiming at the increase of the rarer objects; so that those who come after may find no diminution of plants, insects, or other specimens they may be in search of, in the habitats where they may have previously been found. And in natural history, as in other pursuits, it is a good rule to avoid all needless and ostentatious expenditure, over-indulgence in which not only dulls personal exertion, but detracts from the real pleasures that are derivable from natural history studies generally, and from the country excursions of Naturalists' Field Clubs in particular."

INSECTA SCOTICA.

THE LEPIDOPTERA OF SCOTLAND.

(Continued from p. 132.)

EDITED BY F. BUCHANAN WHITE, M.D., F.L.S.

BRACTEA L. Not common. Agrestal.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♂ o o
WEST. Solway Clyde ♂ West-Ross o

LAT. 54°40′-57°50′. RANGE IN EUROPE. Britain, South and north-eastern Germany, Alps, Finland, &c. TYPE. Centro-septentrional. TYPE IN BRITAIN. Scottish.

TIME OF APPEARANCE—IMAGO. July. LARVA. September, June. FOOD-PLANT. Nettle, etc.

FESTUCÆ L. Not common. Agrestal and palustral.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway Clyde Argyle ♂ o

LAT. 54°40′-57°40′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. August, September. LARVA. May-July. FOOD-PLANT. Various low plants, grasses, &c.

IOTA L. Not common. Agrestal.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♂♀
Orkney o
WEST. Solway Clyde Argyle West-Ross o

LAT. 54°40′-59°10′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. August-May. FOOD-PLANT. Nettle, etc.

PULCHRINA Hw. Not uncommon. Agrestal.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀♀ Orkney o
WEST. ♀ Clyde ♀ West-Ross o

LAT. 55°-59°10′. RANGE IN EUROPE. Central (and northern?). TYPE. Centro-Septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. August-May. FOOD-PLANT. Nettle, etc.

GAMMA L. Common. Agrestal and pascual. Ascends to above 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀♀ Orkney o
WEST. Solway Clyde Argyle West-Ross ♀♀

LAT. 54°40′-59°10′. RANGE IN EUROPE. Throughout. TYPE. Territorial. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June-September. LARVA. April-September. FOOD-PLANT. Low plants.

P. Hochenwarthi Hchw. may perhaps be found on the mountains.

INTERROGATIONIS L. Not uncommon. Ericetal. Ascends to 1300 feet.

DISTRIBUTION—EAST. Tweed ♀ Tay Dee Moray Sutherland o o
WEST. ♀ Clyde Argyle ♀ ♀

LAT. 55°40′-58°30′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. Scottish.

TIME OF APPEARANCE—IMAGO. July, August. LARVA. September-June. FOOD-PLANT. Heather.

HELIOTHIDÆ.

ANARTA Tr.

MYRTILLI L. Common. Ericetal. Ascends to 1300 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray Sutherland Orkney ♀
WEST. Solway Clyde ♀ West-Ross o

LAT. 54°40′-59°10′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. April-July. LARVA. August, September. FOOD-PLANT. Heather.

CORDIGERA Thnb. Local. Ericetal. Ascends to 2200 feet.
DISTRIBUTION—EAST. o ♀ Tay Dee Moray ♀ o o
WEST. o ♀ ♀ ♀ o
LAT. 56°30′-57°30′. RANGE IN EUROPE. Northern and central; Alps, etc. TYPE. Septentriono-central. TYPE IN BRITAIN. Scottish.

TIME OF APPEARANCE—IMAGO. April-June. LARVA. June-August. FOOD-PLANT. *Arctostaphylos uva-ursi?* &c.

Some other species of *Anarta* may yet be found on our mountains, especially in the north.

MELANOPA Thnb. Local. Alpine. Ascends to 4200 feet.
DISTRIBUTION—EAST. o ♀ Tay Dee ♀ ♀ ♀ Zetland
WEST. o Clyde ♀ ♀ ♀
LAT. 56°30′-60°30′. RANGE IN EUROPE. Scotland and Lapland: (a variety on the Alps). TYPE. Boreal. TYPE IN BRITAIN. Alpine.

TIME OF APPEARANCE—IMAGO. June. LARVA. July-August. FOOD-PLANT. *Azalea procumbens?* &c.

Heliaca tenebrata Sc. (1763; *arbuti* F. 1775) has been reported from Clyde.

HELIOTHIS Tr.

ARMIGER Hb. Rare. Pascual.
DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o
LAT. 54°50′. RANGE IN EUROPE. South and west-central, &c. TYPE. Meridiono-central. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. August-October. LARVA. June, July. FOOD-PLANT.

H. peltigera is reported from Clyde.

CHARICLEA Stph.

UMBRA Hufn. (1767); *marginata* F. (1775). Not common. Pascual, maritime.
DISTRIBUTION—EAST. Tweed ♀ Tay ♀ ♀ Moray o o o
WEST. Solway ♀ o o o
LAT. 54°40′-57°40′. RANGE IN EUROPE. Central (S. Sweden). TYPE. Central. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. May, June. LARVA. July, August. FOOD-PLANT. Rest-harrow *(Ononis)*.

Thalpochares ostrina Hb. was reported from Clyde several years ago.

(To be continued.)

THE COLEOPTERA OF SCOTLAND.

(Continued from p. 136.)

EDITED BY D. SHARP, M.B.

PROTEINUS Kr.

BREVICOLLIS Er. Rare.

DISTRIBUTION—EAST. ♀ Forth o o o o o o
WEST. Solway o o o o

BRACHYPTERUS Fab. Common in decaying vegetable matter.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway ♀ o o o

MACROPTERUS Gyll. Very rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

ATOMARIUS Er. In fungus. Local.

DISTRIBUTION—EAST. Tweed o o Dee o o o o
WEST. Solway o o o o

MEGARTHRUS Kr.

DEPRESSUS Payk. In dung. Common.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ o o o
WEST. Solway ♀ o o o

SINUATOCOLLIS Lac. In fungus. Common.

DISTRIBUTION—EAST. Tweed Forth ♀ Dee ♀ o o o
WEST. Solway ♀ o o o

DENTICOLLIS Beck. In fungus. Common.

DISTRIBUTION—EAST. Tweed Forth ♀ Dee ♀ o o o
WEST. Solway ♀ o o o

[HEMIPTERUS Ill. Very rare.

DISTRIBUTION—EAST. o o o o o o o
WEST. Solway o o o o

"Raehills, Rev. W. Little." Murray.

PHLŒOBIUM Kr.

CLYPEATUM Müll. Lowland. Common.

DISTRIBUTION—EAST. Tweed Forth ♀ Dee ♀ o o o
WEST. Solway ♀ o o o

PHLŒOCHARIS Kr.

SUBTILISSIMA Mann. Under bark of Scotch fir.

DISTRIBUTION—EAST. o o Tay Dee Moray o o o
WEST. o o o o o

MICROPEPLUS Kr.

PORCATUS Payk. Lowland. Not common.

DISTRIBUTION—EAST. ♀ Forth o o o o o o
WEST. Solway ♀ o o o

STAPHYLINOIDES Marsh. Common.

DISTRIBUTION—EAST. Tweed Forth ♀♀ Dee ♀ o o o
WEST. ♀ ♀ o o o

MARGARITÆ Duv. Lowland. Rare.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

TESSERULA Curt. Lowland. Very rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. o Clyde o o o

PSELAPHIDÆ.

BRYAXIS Leach.

[SANGUINEA Fab. Doubtful as Scottish.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

"Raehills, Rev. W. Little." Murray Cat.

FOSSULATA Reich. Lowland. Local. In marshes.

DISTRIBUTION—EAST. o o o o o o o
WEST. Solway Clyde o o o

COTUS De Saulcy. Riparial. Very local.

DISTRIBUTION—EAST. o o o o o o o
WEST. Solway o o o o

In sandy places by the Nith and Ken; peculiar to Scotland.

HÆMATICA Reich. Lowland. Very rare.

DISTRIBUTION—EAST. o o o o o o o
WEST. Solway o o o o

Found at the æstuary of the Nith below New Abbey.—D. S.

(To be continued.)

PHYTOLOGY.

NOTES ON ERGOT.*

By A. STEPHEN WILSON, F.C.S.S.

THE investigations of the Messrs. Tulasne have left little of an obvious character to be gleaned on the subject of Ergot. But the following notes of observations and experiments may be of some use to any one who desires to enter on this branch of mycology.

In those localities of Aberdeen and Kincardine which I have examined, about twenty of the grasses are usually ergotised. Whatever may have been the case anciently, when the land was undrained and full of gramineous weeds, and the crops perhaps later, at the present day cereal rye is very rarely ergotised. I have searched whole fields without finding a single spur. It is therefore obvious that some of the conditions under which rye is grown in France (from which the Ergot of rye for medical practice is derived), are different from those under which it is now cultivated in the north-east of Scotland. But whether the absence of Ergot on rye in Scotland, as compared with France and other places, is due to a cultivation which destroys the Ergot; or whether it results from the fruit of the Ergot not being ripe in Scotland "when the bloom is on the rye" to the same extent as on the Continent, I am not aware. But the quantity of Ergot which can be found almost any autumn, on the various grasses of this country, would probably be found equal to the demand. The smaller Ergots are more compact and less fractured than those of rye, and would probably better preserve whatever qualities they possess. These Ergots are worth a practical trial.

The grasses most liable to be ergotised are the common rye

* Read at the Conference of the Cryptogamic Society of Scotland, Sept. 30, 1875.

grass (*Lolium perenne*); the vernal grass (*Anthoxanthum odoratum*); the cat's tail (*Phleum pratense*); the floating meadow grass (*Glyceria fluitans*); and some others. The crested dog's tail (*Cynosurus cristatus*), and the various species of *Bromus*, are not ergotised in the places named. Wheat and barley are rarely ergotised; and on the cultivated oats, the wild oats (*Avena fatua*), the bristle-pointed oats (*Avena strigosa*), and the fly oat (*Avena sterilis*), I have never seen a single case of Ergot.

The time of the year at which the grasses begin to be ergotized depends on the time at which the *Claviceps* is ripe. I have found the *Claviceps* growing naturally as the Ergot had fallen, nearly in a ripe state, on the 27th of June. The grasses therefore, which are fertilised before the middle of June, must generally escape Ergot. The latest date at which I have seen Ergot in its early and growing state is the middle of September. Thus the hay crops being past flowering before the heads of the fungus are mature, entirely escape the spores, which are so fatal to the seeds of rye grass on individual stalks at a later date.

It appears from Mr. Cairuthers' recent paper in the *Journal of the Royal Agricultural Society of England*, (vol. x. pt. 2, 1874) that differences of opinion exist as to the character of season most favourable to Ergot; some holding that a wet season is most favourable, and others that a dry season is most favourable. Such statements are too loose. The conditions necessary to a crop of Ergot appear to be these:—That there shall remain from the previous year a considerable quantity of Ergot upon the ground: that during May, June, and July, there be sufficient moisture to cause the vegetation of the fungus: and that at the time when the heads are ripe there be sufficient dry, hot, and sunny weather, for the dissemination of the spores. Because if a quantity of Ergot is collected at an early date, and with the *Claviceps* only beginning to appear here and there, and is laid aside in a dry place, the growth of the fungus is instantly arrested. And if, when by sufficient moisture the heads come to maturity, there is heat and sunshine, the spores will be disseminated; while, if at this time, they are drowned by frequent rain, the spores will either not be projected into the air, or will be washed down into the soil and lost. There must be wet weather for the growth of the fungus, and dry weather for the scattering of the spores.

In proof of this theory, if a quantity of Ergot, bearing the fungus nearly ripe, is put into a small clear bottle, the process of sporing may be watched. The pileus, smooth at first, is known to be ripe when the mouths of the conceptacles begin to pout in protuberances above the general surface. If the bottle is held up in the bright sunshine so as to give the proper reflection, instantly a head here and there begins to open its batteries, and to discharge a shower of needles in all directions. These needle-spores are about half a hundredth of an inch in length, and can easily be seen with the naked eye floating about in glittering shoals in the bottle. It would appear that they are shot into the air by elastic pressure, brought to a crisis by the expansion by the light and heat; for whenever the pressure (as it seems) has been withdrawn by the projection of a certain number, the remainder, or some of them, are merely pushed to the mouth of the ascus and fall over on the surface.

But of course it is obvious that although there may be plenty of spores flying about, if the season is unfavourable to the tillering of the grasses, there will be fewer late-flowering spikes thrown up, and so a defective crop of Ergot from the want of nests to be hatched in. At any spot where the grass is much ergotised in one year, it is more ergotised in the same place the following year than the grass at a short distance.

When the parts of a recently-opened grass floret have been attacked by a flying spore, there soon appears a drop of fluid adhering to the pales. Some ears of rye which I had inserted into a test tube containing many ripe heads from the Ergot of *Glyceria fluitans*, were placed as they grew, in the inside of a clear bottle with the bottom out. This protected them from rain and wind. In a few days drops began to appear at various florets, increasing to large dimensions. These drops have a strong and peculiar smell. At the bottom of them there accumulates a deposit of spermatia, which must be exuded from the growing Ergot. But it seems clear that the great masses of fluid must be drawn from the air. These were constantly visited during the day by about six species of diptera, which drank part of the fluid, or the sperm it contained. A portion of the fluid was collected by a dipping tube every morning and put into a small phial.

Some other neighbouring spikes became affected which had not been artificially touched; but whether the flies had carried

the spermatia to these, I could not determine. Nor could I determine what effect was produced on the flies themselves. Two artificially affected barley florets which stood inside in pots, were visited constantly and persistently by the house fly, and one of these dropt dead on the paper before me; but whether from Ergotism or old age, I could not tell. Ergot, in its complete state, is also eaten by swarms of black ants and other insects as it hangs on the grass.

In the case of the rye artificially ergotised, although the drops were immense and promised good spurs, all turned out very small. Two artificial barley Ergots were of large size, and one which showed the drop very largely merely destroyed the seed without producing an Ergot at all. Perhaps the rye Ergot may have been hindered in its growth by the withdrawal of the fluid.

The Ergot on each species of grass is of a peculiar shape. The heavier spurs on rye weigh five grains, while those on *Poa pratensis* do not weigh more than about the hundredth of a grain. The heavier rye Ergots are ten times the weight of the healthy seed; but in some of the other grasses the Ergot is from twenty to forty times the weight of the seed. In many cases, however, the Ergot is little larger than the natural kernel.

The structure of many grass florets and their mode of fertilisation render them specially liable to the floating spores of Ergot. When a rye floret opens for fertilisation, the feathery stigmas are thrown outside the pales on both sides, and are seldom retracted; while in many cases the pales remain open to a certain extent after fertilisation has been effected. In wheat, on the other hand, the flower cup is much wider; the feathers are seldom exposed outside, even when the flower opens for fertilisation; and they are, as a rule, retracted as the flower shuts. The pales remain open only for twenty or thirty minutes, and finally close, barring all doors against the flying darts of the enemy.

I have found the fungus growing naturally only upon the Ergot of *Glyceria fluitans* and *Holcus mollis*, but have succeeded in producing it by cultivation from the Ergot of eleven species of grasses. Whether all these fungi are to be classed as one species, I will not venture to decide. But where many hundreds on the Ergots of one kind of grass are seen growing together—some a tenth of an inch in length of stem, some two inches, some with a double head, some purple in colour, some

pale yellow, some with a thick stem and large head, some with a thin stem and small head—the species *purpurea* and *microcephala* seem to run into each other. The *Claviceps*, which grows in deep shade under withered grass, near the bottom of a ditch, is less ruddy in colour than that which grows on a ledge more exposed to the light.

A question suggests itself—What may be the effect of Ergot on the grasses? Of course the immediate effect is to prevent the growth and ripening of a certain proportion of the seeds; and thus to hinder in one way the natural propagation of the plant. But it is a fact that the ripening of the seeds and culms of the cereal grasses tends to make these grasses annual. They are not absolutely annual even when a few spikes on a stool are fully ripened, but grow occasionally for two or three years. Now, if before rye was cultivated, it was so largely ergotised as to prevent all but a few seeds from maturing, the plant may at that time have been a perennial grass. And the present effect of Ergot on the grasses may be to give a longer term of perenniality to the roots and lower nodes, than if all the seeds were allowed to exhaust the plant by coming to maturity.

APPENDIX—No. I.

List of Ergotised Grasses referred to.

1. Wheat, *Triticum sativum* Linn.
2. Wheat grass, *Trit. repens* Linn.
3. Rye, *Secale cereale* Will.
3. Rye, *Sec. cereale*, artificially ergotised.
4. Barley, *Hordeum distichum* Linn.
4. Barley, *Hor. distichum*, artificially ergotised.
5. Vernal grass, *Anthoxanthum odoratum* Linn.
6. Mat grass, *Nardus stricta* Linn.
7. Fox-tail grass, *Alopecurus pratensis* Linn.
8. Reed Canary grass, *Phalaris arundinacea* Linn.
9. Cat's-tail grass, *Phleum pratense* Linn.
10. Turfy hair grass, *Aira caespitosa* Linn.
11. Waved hair grass, *Aira flexuosa* Linn.
12. Creeping grass, *Holcus mollis* Linn.
13. Meadow soft grass, *Holcus lanatus* Linn.
14. Oat grass, *Arrhenatherum avenaceum* Beau.
15. Smooth meadow grass, *Poa pratensis* Linn.

16. Floating sweet grass, *Glyceria fluitans* R. Br.
17. Cock's-foot grass, *Dactylis glomerata* Linn.
18. Tall fescue grass, *Festuca elatior* Linn.
19. Meadow fescue grass, *Festuca pratensis* Hudson.
20. Rye grass, *Lolium perenne* Linn.
21. Darnel, *Lolium temulentum* Linn.

No. II.

Grasses referred to on the Ergot of which the Claviceps has been grown.

2. Wheat grass, *Triticum repens.*
3. Rye, *Secale cereale* (23 fungi on one spur).
5. Vernal grass, *Anthoxanthum odoratum.*
6. Mat grass, *Nardus stricta.*
10. Turfy hair grass, *Aira caespitosa.*
12. Creeping soft grass, *Holcus mollis* (found growing naturally, 1874).
14. Oat grass, *Arrhenatherum avenaceum.*
16. Floating sweet grass, *Glyceria fluitans* (found growing naturally in many hundreds, 1874).
17. Cock's-foot grass, *Dactylis glomerata.*
18. Tall fescue grass, *Festuca elatior.*
20. Rye grass, *Lolium perenne*

NOTES ON RARE OR PROBABLE SCOTTISH FUNGI.*

By M. C. COOKE, LL.D., Cor. Mem. C.S.S.

IT is never a difficult task for a practical worker in any department of Natural History to find a subject on which to communicate with his fellow-workers, either in propounding and seeking the solution of problems which have presented themselves in his experience, or in communicating from his own knowledge facts and hints which may assist and lighten the labour of others. Hence it will be concluded that two or three days' notice was ample to enable me to present to the Cryptogamic Society of Scotland such a communication. It was, nevertheless, the cause of some anxiety, since such an opportunity so seldom occurs, of producing just such a short

* Read at the Conference of the Cryptogamic Society of Scotland, Sept. 30, 1875.

paper as should combine brevity with utility, and supply the kind of information which would best serve the interests of this Society and of Scottish Cryptogamists generally.

It is well known that I have abjured the study of all other Cryptogamia on behalf of Mycology, and deeming the interests of the *Hymenomycetes* perfectly safe in the hands of Mr. Worthington Smith, it is but little attention that I can find time to bestow on any but Microscopic Fungi, and, therefore, it is of these alone that I purpose to write.

The geographical distribution of Fungi in Scotland is a topic of interest; but as yet the materials are deficient for constructing any such tables. This, I would suggest, is an eligible work for the Cryptogamic Society to undertake, and as the Rev. J. Stevenson is making a contribution to such a work, we may fairly conclude that it has really commenced. I shall not attempt, therefore, to enumerate the Fungi found in Scotland, or any portion of it, since this Society may soon avail itself of much more complete materials than any which I possess. The subject which appeared to me at once the most advisable to attempt, and the one which would best secure your approbation, consists of a few stray notes and suggestions on Fungi not yet recorded, or but rarely found in Scotland, deeming that thereby you might be enabled considerably to augment the Scottish catalogue.

Before proceeding directly to this subject, I cannot forbear, on this the first opportunity I have had of addressing Scottish Cryptogamists on their own soil, to pay my tribute of respect to the memory of workers who have ceased their labours and gone to their rest. Foremost amongst these stands the name of Dr. Greville, whose Scottish Cryptogamic Flora still holds a respectable place in Cryptogamic literature, notwithstanding that his microscopical details are not up to the standard of the day. Dr. Greville was a hard and earnest worker, and set an example which may be worthily followed.

In a humbler sphere William Gardiner must not be forgotten, although chiefly as a collector, yet he performed useful work in his generation.

No collections however have been more important than those made by Captain Carmichael in Appin. Considering the time at which he worked and the difficulty of acquiring information, it is no small honour that Carmichael found so much that was new and interesting.

Coming down to more recent times, the late Mr. Jerdon deserves mention, as quietly and in a manner void of assumption adding to the number of Scottish Cryptogamia.

The rarer Scottish Fungi found by each and all of these gentlemen should be sought after again by their successors, so as to establish their work.

Of Greville's species his *Hysterium* figured as *Hysterium varium*, but which Berkeley has named *H. Carmichælianum*, although figured by Greville was found by Carmichael, and the specimen in the Edinburgh Herbarium, which I examined by permission of Professor Balfour, contains sporidia very similar to those of *Hysterium repandum*, Blox., except in being rather larger. It may be that additional specimens if found would prove that the two are identical.

Æcidium Parnassiæ found by Greville in the neighbourhood of Edinburgh, I am informed has since been found by a member of this Society; until recently the only specimen I had seen was the single leaf from Dr. Greville in the Edinburgh Herbarium.

Puccinia Chrysosplenii, which, by the way, is quite different rom the *P. Chrysosplenii* of German authors, has recently been found south of the Tweed by my good friend the Rev. J. E. Vize, of Forden, fully according with Greville's specimens.

Helotium ochraceum, the *Peziza ochracea* of Greville; *Helotium cribrosum*, the *Peziza cribrosa* of Greville; *Helotium claroflavum*, the *Peziza claroflava* of Greville, are all species so rare that they merit a good search.

Cylindrosporum concentricum, Grev. (pl. 27), is a species which has given rise to some confusion, and one I have never seen. It occurs on cabbage leaves, but I am not aware that it has been found since Greville's time.

Puccinia Fabæ, according to Greville's figure, is only an *Uromyces*; but he speaks of it as containing more than one cell. I have never seen other than *Uromyces* on leaves of the bean, although included in the Handbook, on the faith of Greville and Berkeley. A *Puccinia* on *Faba* is therefore a desideratum.

Sphœria (Cryptosphœria) Tamariscinis, Grev., is a species which should be sought, as I do not think that the *Sphœria* on Tamarisk, with which I am acquainted, is the same species.

Nectria Purtoni (*Cucurbitaria pinastri* of the S. C. Flora, pl. 50), is certainly rare, and should be diligently sought after.

Puccinia variabilis, according to Greville, has the cells often subdivided and constricted. I must confess that I could never find a spore with more than one septum in what is supposed to be *Pucc. variabilis*, and the experience of others coincide with my own. If specimens could be found in Scotland upon Dandelion leaves, agreeing with this portion of Greville's description, the fact should be recorded.

Whether Greville's *Peziza reticulata* (pl. 156) be the same as *P. venosa* is considered by some to be doubtful. The Scotch plant was found near Edinburgh, and it would be well that the forms of *P. venosa* found in Scotland in the spring should be carefully compared with southern forms.

Lophium elatum (pl. 177), is another of Carmichael's plants first figured by Greville. It appears to be everywhere rare—though since found on the continent of Europe—and is always worth searching after.

Dothidea betulina is probably not very uncommon in Scotland; indeed Greville states that it is common, whereas I have never met with it in England or Wales.

Stictis Wauchii (Cryptomyces Wauchii, Grev.*)* is clearly a condition of *Rhytisma maximum*, which occurs in some parts of England.

Chætopsis Wauchii (Grev. fig. 236) I have never seen in any condition, or from any part of the world. It is a very curious mould, and requires further examination. It was found in spring, on rotten wood, at Fox Hall, and might probably be found again if sought after.

Virgaria nigra is another scarce mould on dead trunks, found at Appin, but which is also found in N. Europe. It is one of those obscure plants which, being seldom met with, has never been satisfactorily figured.

These are some of the fungi figured or described by Greville, which it is well that Scottish Cyptogamists should bear in mind, and probably they will be found again under similar conditions. For my own part, I always feel more satisfied in finding a lost plant which has been described by a botanist of a previous generation than in two or three which are absolutely new.

There are also records of other rare plants in Scotland, besides those figured by Greville, which may be found again. For instance, a pale rosy-pink *Peziza* on old *Stereum*, which I named *Peziza stereicola*, and of which the only specimen is in the Edinburgh Herbarium. A pretty little red *Peziza* on fir

leaves, named *Peziza incarnata*, hitherto only found by Mr. Jerdon. *Venturia atramentaria* found by Dr. Buchanan White on living leaves of *Vaccinium uliginosum*; also *Vibrissea Margarita*, found by the same gentleman. *Peziza albo-spadicea* (Greville), which I have had recently sent me from the United States. *Peziza livida* (Sch.)—The true plant was found in Scotland by Sir William Jardine. *Peziza Polytrichi* Schum. —The only genuine plants yet found in Britain are the Scotch specimens. *Peziza Dalmeniensis*, an elegant golden yellow *Peziza*, found on the ground amongst old nettles at Dalmeny. The little *Peziza Grevillei*, on stems of Umbellifers, which Greville mistook for *P. nidulus*. *Peziza subtilissima*, so like *P. calycina*, except in fruit, is probably equally common on firs.

The rarest of our British species of *Puccinia* is *P. Rhodiolæ*, found on *Sedum rhodiola*, in Clova and Glen Callater, and, I believe, nowhere else. It was first discovered by Gardiner. *Ustilago vinosa* on the flowers of *Oxyria*, found at Glendole, in August, is another of Gardiner's species, and one of the rarest species of *Ustilago*. *Hydnangium carneum* has been found by Dr. Dickson at the Botanic Garden, Glasgow, and hitherto in no other station in Britain. Subterranean fungi are apparently rare in the North.

Eustegia arundinacea, Fr., is certainly an interesting fungus, found in Scotland by the Rev. J. Fergusson,* but apparently not yet in England. The same gentleman has also found several other fungi, as yet confined to Scotland. It may be of interest to note that I found *Puccinia Fergussoni* many years ago in North Wales, as *Puccinia Andersoni* was also found originally by Mr. Gardiner.

Amongst the Fungi collected at Appin there are several not yet recorded from any other place in Britain, as for instance: *Stictis pallida* P., *Stictis microstoma*, *Helotium buccina* Fr., *Helotium sclerotioides* B., *Helotium agaricinum* B., *Puccinia clandestina* Carm., *Helminthosporium subulatum* N., *Sporotrichum inosculans* B., *Peziza melaxantha* Fr. All of these should be sought again. Amongst Capt. Carmichael's specimens there were apparently fragments and indications of other species, too immature or insufficient for description.

It is scarcely necessary to include here the more recently discovered or described species, such as those found by Mr. Jerdon, or those collected by mycologists still living, except

* See note on p. 197.

perhaps to intimate that *Ascomyces trientalis* requires more minute examination, especially in a fresh state, than it has received, and that Professor Thistleton Dyer found a *Rhytisma* on leaves of *Vaccinium* at the same time that he collected the *Exobasidium*, which was not in a sufficiently perfect state for description or identification. The same may be said of a *Sphæria* or punctiform *Rhytisma* on leaves of *Empetrum nigrum*.

Species not yet recorded in Scotland include *Uromyces Trientalis*, found on a single leaf from Dr. Dickie, of Aberdeen. It has never been described or recorded, because only this single specimen has been found. *Uredo Empetri* was found sparingly in North Wales, but there is no reason why it should not be found on *Empetrum nigrum* in Scotland. A single example of *Melampsora padi* was found within about twenty miles of London, but it is far more probable that it will be found on leaves of *Prunus padus* in Scotland, where *Uredo porphyrogenita* occurs, than in the south. *Calyptospora Gœppertiana* is a very curious brown fungus, investing the stems and branches of *Vaccinium Vitis Idæa*, hardly looking like a fungus, but a diseased condition of the tissues; still it is placed amongst the Uredines, and I have great faith in its being ultimately found in Scotland, since it occurs in North Europe and North America.

There is no reason to suppose that some of Karsten's Finland species may not also be found in these northern parts of the British Isles, or some of the smaller species found by other mycologists in Northern Europe. For instance, *Peziza chrysophthalma* and *Peziza pithya*, on small branches of firs, both elegant little orange species, not unlike *Peziza calycina*. *Peziza hirtella* and *Peziza avicularia* on grouse dung, also *Ascobolus crenulatus* and *Peziza Cesatii* on the same substance. It seems to me most extraordinary that hitherto no fungus has been found on grouse dung in Scotland, and I believe that it only requires to be looked for, and some one or more forms of Discomycetes will be found.

There is certainly no scarcity of *Pinus sylvestris* in Scotland and yet we have no record of such species of Discomycetes as *Ombrophila abacina*, or *Helotium proximellum*, or *Desmazierella acicola*, all of which are very likely indeed to be met with, the latter having recently been found in the south. Fir leaves, and the small twigs or bark of firs, are the habitat of numerous species, some of which are still unknown to Britain.

Two other plants not at all uncommon in Scotland—*Calluna* and *Erica*—have not been satisfactorily examined. It would occupy too much time to enumerate all the species separately which should be sought on these and other common plants, such as the species of *Vaccinium*, *Spiræa*, *Alchemilla*, &c., and, indeed, it would take more time to prepare a satisfactory list than was at my disposal in the preparation of these notes.

It will perhaps be objected that these suggestions are too fragmentary to be of much service, and this is doubtless true; but, as no intimation reached me that a communication would be acceptable until only a few days remained before the journey to Perth had to be commenced, this must be accepted as an earnest of good-will and a desire to assist, even though inefficiently, the Mycologists of the north.

CRYPTOGAMIC SOCIETY OF SCOTLAND.

THE first annual conference of this Society was held at Perth, on Sept., 29th and 30th, and October 1st, 1875, and was fairly successful. As a report of the conference has been already published, it is not our intention to give here more than a brief account of the proceedings.

The first day was devoted to excursions in the neighbourhood of Perth—Moncreiffe Hill, Scone Woods, and Dupplin Woods, being visited by different parties. Though by this plan more ground was searched than would otherwise have been the case, yet it seems to us that it might have been preferable for all the botanists to have united in one party, and thus given an opportunity to those from different parts of the country of making each other's acquaintance: (and more than one day might have been devoted to the excursions with great advantage). Another matter may here be alluded to, and that is the desirability on another occasion of so arranging matters that all the visitors to the Conference may have a common meeting place in the evenings, for the examination of specimens and for conversation. Under the circumstances it was impossible to make any arrangement for this being done, chiefly because the various members were located (through the kind hospitality extended to them) in various places more or less distant from a common centre.

The second day was fully occupied. The forenoon was devoted to the arrangement of the specimens. In the afternoon the Business Meeting was held. After the election of various honorary, corrresponding, and ordinary members, Kelso was selected as the place at which the conference of 1876 should be held. It appears doubtful to us whether it would not have been more advantageous to have selected a larger town than Kelso for the place of meeting, but on behalf of Kelso, it was urged that it was a place very accessible from all parts of the south of Scotland, and that it was moreover the centre of a district probably very prolific in cryptogamic plants. The following papers were then read:—"On certain probable Scottish Fungi" by M. C. Cooke, LL.D., editor of *Grevillea*. This will be found at p. 190.

In moving a vote of thanks to Dr. Cooke, the Rev Mr Fergusson, of Fern, said—I am sure that I express not only my own, but the feelings of all the members of the Cryptogamic Society of Scotland, when I say that we are deeply indebted to those distinguished English Cryptogamists who have come so far to honour us with their presence at our meeting, and to aid us in so brotherly a way by their wider and more varied experience, and larger knowledge. More particularly are we indebted to Dr. Cooke, whose name is so well known everywhere in connection with Fungi; for he has not only come all the way from London, but has also been at the trouble to prepare this most interesting and important paper which he has just read to us. Before moving a hearty vote of thanks to him for this paper, I may perhaps be allowed to say a very few words on some of the points contained in it. We in Scotland know very little about Fungi; and for a long time, until quite recently we had been doing very little that was worth mentioning—but lately some of us have been working up the Fungi of the north of Scotland—though quietly not altogether unsuccessfully. The result has been, that though many of those species which Dr. Cooke has advised us to look for, have been looked for unfortunately without success, there are others which have been found. *Æcidium parnassiæ* has been found both by Mr. Anderson of St. Andrews and myself, in several localities, but except on one occasion never in any quantity. So far as yet appears it must still be considered as rather rare. *Puccinia chrysosplenii* though apparently local has been found in so many places that it can hardly be considered as rare. *Puccinia rhodiolæ* has also been met with, far removed from Clova and Glen Callader, but the localities, for reasons which can be appreciated by many members of the Society, are not at present divulged. Again, *Puccinia clandestina* was discovered by Mr Anderson and myself in company, but only in one spot and very sparingly indeed. Dr. Buchanan White has gathered *Uredo empetri* in Rannoch, and I believe that I have also gathered it in the north-east of Scotland. Moreover Mr. Anderson and myself once came upon *Vibrissia margarita* in great abundance. With regard to *Puccinia fabæ*, I may say that the Rev. Mr. Keith of Forres, and others, have gathered not only the *Uromyces* but the *Puccinia* state of this species, and that this latter state seems not very unfrequent in Scotland in certain seasons. I may further mention that though I am put down as the discoverer of *Eustegia arundinacea*, my friend Mr. Stevenson is really the discoverer of that species, which indeed I have never seen. I am also credited with some of Mr. Anderson's discoveries; and some of the localities given by Mr. Berkeley for our gatherings are occasionally mistaken; but this is not to be wondered at. The wonder is that, considering the thousands of specimens which pass yearly through his hands, he makes so very few mistakes. Other species mentioned by Dr. Cooke as worthy of our search, have already been discovered in Scotland. Amongst these are *Stictis pallida*, *Helotium ochraceum*, *Helotium claroflavum*, *Peziza Grevillei*, &c., and there are not a few of the Appin species of Captain Carmichael which have come to light elsewhere. But we are under large obligations to Dr. Cooke for calling attention, in this seasonable and important paper, to species which ought to be re-discovered, or which have not yet been, but are likely to be met with in Scotland. It is of the utmost importance to know what to look for, and where to look for it. Dr. Cooke has largely helped us in this way, and I beg to move that we accord him a hearty vote of thanks.

In replying to Mr. Fergusson's remarks, Dr. Cooke begged to ask how they in England were to know what their Scottish brethren were doing unless the latter recorded their discoveries. He thought, too, that any mistakes (in localities) that might have crept into Messrs. Berkeley and Broome's report in the "Annals of Natural History" might be corrected in the pages of the *Scottish Naturalist*, where also other discoveries might be reported.

Dr. Buchanan White remarked that he was always happy to give space in the *Scottish Naturalist* for reports of discoveries, and that some of these discoveries had been reported, and the mistakes alluded to by Mr Fergusson, corrected in that magazine.

The next paper was "On the Fungi of Scotland north of the Tay," by the Rev. J. Stevenson, of Glamis. In submitting this extensive list to the Society, the author intimated that he intended to supplement it at next Conference, by a list of the species south of the Tay, and that then the Society might perhaps publish it. We would take an opportunity in the meantime, of asking assistance from every one who could give it.

Mr. C. P. Hobkirk of Huddersfield, read the next paper "On *Zygodon rupestris*," in which he discussed the differences between that species and *Z. viridissimus*. This paper will appear in the *Journal of Botany*.

The concluding paper was "On ergots" by Mr. A. Stephen Wilson, of Aberdeen, and will be found at p. 185.

In the evening the members of the Society and their friends had a Fungus Dinner.

On the last day the Show was thrown open to the public. It was estimated that at least 150,000 specimens of fungi, mosses, lichens &c., were exhibited—the space covered amounting to nearly 3000 square feet. A fair amount of species new to Britain were exhibited. Special features of the show were the original drawings of Mr. W. G. Smith's discoveries (see *Gardener's Chronicle*, &c.,) regarding the potato fungus (*Peronospora infestans*), and a series of beautiful water colour drawings of fungi, by Miss Johnstone of Inverary.

A full account of the Show will be found in the report referred to above.

Though the Cryptogamic Society may well be proud of the success of their first exhibition, "the most comprehensive," it was declared, "ever seen in the world;" yet there are one or two points of failure which we may allude to. The chief of these was the absence of a systematically arranged and named collection of fungi. An attempt was made to have such, but the immense number of specimens sent in for exhibition, and the shortness of the time available for arrangement, as well as the comparatively small number of workers, prevented anything approaching completeness. On another occasion it might be advisable to have more unpackers and arrangers, so as to permit those qualified to classify and name. To reduce the number of collections sent in, would be to risk the loss of many specimens instructive in various ways.

On another occasion, too, the Show might be kept up for longer than a single day. As it was, the shortness of time prevented many of the arrangers from having a thorough examination of the specimens.

Naias flexilis in Perthshire.—On the 13th of August last, I accompanied my friend Mr. Robb, of Worcester College, Oxford, for a few days' botanizing among the aquatic plants of the Loch of Cluny. This Loch,

as most readers of the *Naturalist* will know, lies about midway between Blairgowrie and Dunkeld, receiving the waters of the Lochs of Butterstone and the Lowes, and discharging into that of Marlee. Its surface is 157 feet above the level of the sea, and about two miles in circumference. It abounds in such interesting aquatic plants as *Elatine hexandra*, *Subularia aquatica*, *Lobelia dortmanna*, *Nuphar lutea*, *Nymphæa alba*, several species of *Potamogeton*, &c.; and in addition, *Stratiotes aloides*, and, I believe, *Butomus umbellatus*, though I have never found it. Its castle, which stands on a small island near its western shore, is historically interesting, as, if not the birthplace of the admirable Crichton, at least the place where he spent the early years of his boyhood.

In the course of our dredging operations—our dredger being a six-foot-rod with a strong hook attached—we were so fortunate as to fish up a plant, which was new to both of us, but a reference to Hooker's Manual, and afterwards to Bentham's Illustrations, convinced us that we had added *Naias flexilis* to the flora of Great Britain.

We found the plant pretty generally distributed over that part of the loch which we examined, viz., the north-west side, growing on the gravelly and muddy bottom, generally along with *Callitriche autumnalis* or a *Chara*, but sometimes in patches by itself. As seen from the side of the boat, the loch is so clear and limpid that plants may be seen and recognised through six feet of water—a patch of it looks very like *Callitriche*, only somewhat darker, and more diffuse. One peculiarity of its growth deserves to be noticed. A considerable depth of water, five feet at least, seems to be necessary to its existence, for nowhere did we find it on the shallow water near the edge. True to its name, it appears, like the Water-Naiads of ancient mythology, to avoid the curious gaze of mortals, and to delight in the placid depths of its native pool.

The question at once occurred to us, "Is it native?" At first we felt disposed to doubt it, knowing, as we did, that other plants had been introduced into the loch. It is a well-known fact that the Rev. Mr. M'Ritchie, who was minister of the parish of Cluny during the first thirty years of the present century, was an enthusiastic botanist, and introduced, at least, *Stratiotes* and *Butomus* into the loch, and *Typha latifolia* into a pond near by the church. Of course he would not intentionally, but it has been suggested that he may, accidentally, have introduced it in seed along with another plant. I incline to think not. On inquiring of Mr. Duff, the intelligent and obliging gardener at Cluny Cottage, we learned that Mr. M'Ritchie inroduced these plants from Wales. Now, when we consider how irregularly *Naias* is distributed over Europe—in Sweden, North Germany, and Ireland—it is just as likely to be native in the Loch of Cluny as in Wales, from which it has never been recorded. As far as we could learn, Mr. M'Ritchie never got plants from Ireland or North America, where I believe *Naias* is common. On the whole, therefore, at present I incline to consider it one of the native rarities of the Loch of Cluny.—ABRAM STURROCK, Rattray, December, 1875.

NEW SCOTTISH FUNGI.

WE are indebted to Dr. M. C. Cooke, editor of *Grevillea*, for the following extracts from a paper on New British

Fungi, about to appear in *Grevillea*. Some of the species were exhibited at the Perth Fungus Show, and the others found about the same time.

Badhamia fulvescens. *Cooke.*

Peridia sessile, subglobose, scattered, or 3-6 together, tawny-ochre, towards the base clad with a delicate white pubescence; spores pale brown, minute, ovate.

On old sacking. Dupplin Castle, Perth. Dr. M. C. Cooke.

Spores (·0003 in.) ·0075 m.m. diam.

The cysts investing the spores are quite distinct. I am indebted to Mr. C. E. Broome for examining this plant, and he coincides in the opinion that it is undescribed.

Ustilago intermedia. *Schröter.*

Produced within the florets, violet-brown; spores subglobose, ovate, or shortly elliptic, rather large; epispore minutely spinulose.—*Schröter in Rabh. F. Eur. No. 1696.*

On flowers of *Scabiosa*. Scotland. Rev. J. Fergusson.

The spores are larger and darker than in *U. flosculorum*; in the latter being ·01 m.m., and in the present species ·015 m.m.

Geoglossum microsporum. *Cook & Peck.* "Mycographia," fig. 11.

Var. **tremellosum.**

Sporidia biseriate, cylindrical, or subfusiform, hyaline, becoming at length faintly 5-7 septate.

On the ground. Rannoch. Dr. Buchanan White.

This is referred to the American species as a variety, but it seems to be more tremellose than the typical form, and the sporidia do not flow out and cover the surface of the club; this may be accounted for in that the specimens were not so fully matured. Sporidia ·03 m.m. long.

Peziza (Sarcoscypha) coprinaria. *Cooke.*

Subgregarious, sessile, crimson. Cups hemispherical, soon flattened (1 c.m. broad): margin slightly elevated, fringed with long pale brown septate hairs; asci cylindrical; sporidia elliptical, smooth; paraphyses clavate at the tips, filled with orange granules.

On dung. Rannoch. Dr. Buchanan White.

A very distinct species, exhibited at the Perth Fungus Show. The cups remain flattened in drying, external cells very large, hairs $\frac{1}{2}$ m.m. long. Sporidia ·02 × ·01 m.m. The hairs are never stellate as in *P. stercorea*, nor is the cup so densely hairy, the hairs being confined to the margin. The name of *P.*

hippocopra, under which this species was first reported, has been replaced since it appears to have occurred on cow-dung. It is curious that at the same time an interesting species allied to *P. stercorea*, on dung, was sent from the United States by Mr. W. R. Gerard, which also is undescribed.

Peziza (Dasyscypha) comitessæ. *Cooke.*

Cæspitose or single and gregarious, bright golden-yellow, externally paler, and tomentose, stipitate, common stem branching below. Cups at first clavate, then expanded and cupulate; asci cylindrical; sporidia minute, linear, straight or curved; paraphyses filiform.

On a fallen tree. Dupplin Castle, Perth. Dr. M. C. Cooke.

Asci ·05 × ·006 m.m.; sporidia ·006-·0075 m.m. long.

The branching stem resembles that of *Peziza pygmea*, to which this species is allied; the tufts contain from two to four cups proceeding from a common stem, or sometimes single. It is an elegant species dedicated to the Countess of Kinnoull, on whose estate it was discovered.

Peziza (Hymenoscypha) monilifera. *Fckl. Sym. Myc.* 310.

Stipitate, scattered, or cæspitose. Cups seated amongst *Bispora*, at first subclavate, at length dilated; disc concave, patellate when mature, marginate, waxy, externally and rather long stem, smooth, pallid brown; disc slightly darker; asci elongated; sporidia biseriate, oblong, attenuated towards each end, but obtuse, at length uniseptate, hyaline; paraphyses filiform, subclavate.

Amongst *Bispora monilioides* on cut timber. Dupplin Castle. Dr. M. C. Cooke.

Cups 1-2 m.m. broad, 1-3 m.m. high; sporidia ·012 × ·004 m.m.

Fuckel has constituted a new genus under the name of *Bispora* for this species, of which he assumes that *Bispora monilioides* is the conidia form.

Helotium scoparium. *Cooke.*

Scattered or subgregarious, pallid, sessile; disc convex, rather paler, whole plant becoming greyish in drying; asci clavate; sporidia cylindrical, obtuse, straight or curved, binucleate, at length with the endochrome divided; paraphyses simple, filiform, slightly granular.

On dead twigs of broom. Dupplin Castle, Perth. Dr. M. C. Cooke.

Cups 1 m.m. broad; Asci ·1 × ·02 m.m.; sporidia ·02-·025 × ·005 m.m.

Ascobolus crenulatus. *Karst. Fung. Fenn. No.* 763.

Gregarious, sessile, at first spheroid, then flattened, nearly plane, greenish-yellow, furfuraceous; margin crenulate (1-5 m.m. broad); asci clavate; sporidia elliptical, striate, violet becoming brownish; paraphyses slender.—*Karst. Myc. Fenn.* i. *p.* 77.

On grouse dung. Rannoch. Dr. Buchanan White.

Sporidia ·012-·016 × ·006-·008 m.m.; cups about 1-1½ m.m. broad; disc of the Rannoch specimens, vinous when old, retaining the greenish colour at the base of the cups.

Ascobolus (Ascophanus) pilosus. *Fr.*

Minute, sessile, yellow, testaceous, yellow or tawny-orange, externally pilose with long hairs; disc papillate; margin naked; hairs simple, incrassated at the base; asci clavate; sporidia hyaline, oblong ovate; paraphyses slender, septate, simple, or branched, granular.

On grouse dung. Rannoch. Dr. Buchanan White.

Cups $\frac{1}{10}$th m.m. broad; sporidia ·02 × ·01 m.m.

This is referred to *A. pilosus* as a variety, but the specimens were more minute than usual, scarcely visible to the naked eye, pallid. It differs from any form of *A. papillatus* and *A. ciliatus* in the hairs not being marginal but clothing the surface of the cup; they are also more slender than in the other species. It was accompanied by a minute *Ryparobius* and *Sphœria (Sporormia) Notarisii.*

Xylaria Scotica. *Cooke.*

Suberose; stem very long, pallid, root-like, slender, 1-3 times dichotomously branched above; branches elongated, or very short and fasciculate; heads elongated, subcylindrical; apex more or less acute, greyish-brown, then black; perithecia very numerous, slightly papillate; asci cylindrical; sporidia uniseriate, elliptical, brown, minute.

On the ground. Meikleour. Mr. D. Matheson.

Entire length, including rooting base, 2 to 6 inches. Clubs about 1 inch long; sporidia ·005-·006 × ·003 m. m.

A most interesting addition to the British Flora. It was exhibited at the Perth Fungus show, and is wholly unlike any described species. The sporidia are smaller than in any other British *Xylaria.* Commonly 6-8 heads arise from the rooting stem.

Sphœria (Sporomia) Notarisii. *Car. Rabh. Fung. Eur. 976b.*

Perithecia black, rather shining, ovoid or rounded; ostiola wart-like or mamillæform; asci cylindrical, octosporous; sporidia tetramerous, brown, not apparently surrounded by a hyaline coat.—*Hedwigia*, 1868, *p.* 69, *t.* 1, *fig.* 1.

On grouse dung. Rannoch. Dr. Buchanan White.

Sporidia ·022-·026 × ·004-·005 m.m.; segments of the sporidia ·005-·006 m.m. long.

Sphœria (Sordaria) curvula. *D. By. Morph. Pilze, p. 209.*

Perithecia scattered, superficial, or rarely semi-immersed, oblong-conical, rugulose, densely clothed with articulate fasciculate brown hairs; asci broad, cylindrical, stipitate; sporidia ovate or elliptic, dark brown, with hyaline terminal appendage; paraphyses articulated, longer than the asci.—*Sphœria stercoraria*, Fungi Britt. i. 589.

On cow dung. King's Lynn (C. B. Plowright). Rannoch (Dr. Buchanan White).

Sporidia ·029 × .015 m.m., without appendage.

Bryological Notes.—Mr S. A. Stewart, of Belfast, who knows more about the Geology and Botany of the north east of Ireland, than any other man now living, has recently published a list of the Mosses of that district. The list is an admirable one, contains many important species, and very largely extends our knowledge of their geographical distribution in that region. Among the more important species mentioned are *Cryphæa heteromalla*, *Hypnum giganteum*, *Hyp. hamulosum*, *Hyp. Teesdalii*, *Hyp. pumilum*, *Tayloria serrata*, *Zygodon conoideus*, *Z. saxicola* (*Z. Stirtoni* Sch.), *Glyphomitrium Daviesii*, *Grimmia robusta*, *Hedwigium imberbe*, *Grimmia conferta*, *Trichostomum tortile*, *Pottia littoralis*, *Seligeria calcarea*, and many others. The district ought to be a rich one, and should furnish more than the 238 species here enumerated, which is only about half the number found in the north-east of Scotland, and we do not doubt but that continued search on the spot will yet reveal the existence of yet more and interesting species. Might we venture to hope that some one will do for the north-west of Ireland what Mr Stewart has done for the north-east? As yet the the north-west is almost unknown to us, so far as its mosses are concerned. —J. Fergusson, The Manse, Fern, near Brechin.

Manual of Bryology.—I should feel much obliged to all collectors of mosses were they to send me specimens of any rare mosses or records of localities for such, before I finish the manuscript of "the Manual of British Bryology.—*Id.*

ZOOLOGY.

ANIMAL PSYCHOSIS.

(Continued from p. 153.)

By the Rev. J. Wardrop.

IF animals have not a self or self-consciousness, let us see what else they must be destitute of, that man, in having a self and self-consciousness, has; and let us observe, besides, if it be not the fact that, what the absence of selfhood dooms animals by inference to be without is exactly what they cannot by observation be proved to have.

2. A self or person is not only, as a being, self-conscious, but as an intelligence, it is self-regulated, and as an agent, it is self-determined. A self is a freely active and productive power. It is not only power, *nisus*, action, but will or self-determined action. Man is such a self or person. Will is an essential element of our personality. Kant says, will is a man's "proper self." In the proper sense of the term "Will is a power of control over the other faculties or capacities of our nature, by means of which we are enabled to determine personal activity" (Calderwood, Hdb. of Moral Phil. p. 165). In this sense of the term, "an animal," as Goodsir says (Anat. Mem. 1. 213), "has no will." Will is not only characteristic of man, as introspection at once shows, but observation of animal action can discover nothing to prevent us from calling it also *distinctive* of man. There is no indication of proper voluntary agency in the animal. All its activity is determined for it and necessary. Huxley's doctrine that man's volitions, so called, do not enter into the chain of causation of his actions, who that looks within himself can for a moment admit? It is the grovelling doctrine of H. G. Atkinson and Harriet Martineau over again. "All causes are material causes." "I am what I am," it makes a man say. "A creature of necessity, I claim neither merit nor demerit. I feel that I am as completely the result of my nature, and impelled to do

what I do, as the needle to point to the north, or the puppet to move according as the string is pulled." This is as false to fact as it is grovelling. The order of man's inner nature, as can be ascertained with certainty, is quite the reverse. The sequence of his thoughts and the resultant actions are determinable by will. In the words of Mr. Huxley, elsewhere than in the *Fortnightly Review:* "Our volition counts for something as a condition of the course of events" (Phys. Basis of Life). It counts for that tremendous something, the rendering man a self-regulated intelligence, and a self-determined agent—that is to say, a man, and not a puppet. Huxley's other statement about the nonentity of volition will hold, however, of animals. They may take up the above language of H. G. Atkinson and H. Martineau. In them volition counts for nothing. It does not enter into the chain of causation of their actions. In them the connection between the idea, or feeling, or stimulus, and the action is immediate, predetermined, and necessary. There is no self-control—"no choice between action and inaction" (Goodsir). In the words of Carpenter, "there is no evidence that any of the lower animals have a voluntary power of guiding, restraining, or accelerating their mental operations at all similar to that which man possesses" (Hum. Phys. p. 771., and Mental Phys. p. 105. and 377). But Huxley's protean philosophy, true again to itself, had said, in the *Comtemporary Review*, "There is as good evidence that animals possess powers of emotion and volition as sensation, and as good evidence that they possess all these as there is that man possesses them." These, for the most prominent physiologist of the day, are rash words. It would be a strange philosophy, of which such tampering with "evidence" would not be unworthy. What is the evidence that animal action, in any of the conditions of it, is free and self-determined. It is harmless enough, in an easy and popular way of speaking, to allow animals *wills of their own.* But when, in scientific discussion, Mr. Huxley, and others who, it may be, are otherwise far from his platform, such as Dr. Leitch (Ethics of Theism, p. 373, seqq.), and Max Müller (Lect. on Science of Lang. 1. Lect. ix.), ascribe the faculty of will to animals, there is the want either of vigorous definition, or of adequate evidence. If man be not the only second cause in the universe, he is the only second cause that is voluntary and free.

3. The absence of self-consciousness and voluntary agency must leave the whole mental faculties, whether subservient to

knowledge or to impulse, modified in the animal in a manner totally different from what is presented in man—so modified indeed that they can no longer be called the same faculties. Leaving aside meanwhile the lower faculties of sensitive perception, memory, and the simply representative, as distinguished from the creative, imagination, and taking thought proper—that conceptual power by which man reduces to knowledge and truth the real, and that idealising power by which he can deal with the possible and body forth the desirable; where is the evidence that animals can, even in the most rudimentary fashion, abstract, generalise, ideally create, extract the thoughts that are in things, or have a sense of certitude, or realise the dimmest feeling of axiomatic necessity, or taste in any way the joy of knowledge, or even rise to the dignity of being curious about knowledge. Their *knowing* is not of the human type. Hence it is at this point of abstract and notional knowledge that Locke found the fundamental distinction between animals and man. Max Müller does the same, though he prefers to signalise the distinction by the outward expression of it in language. To him the brute creation constitutes what Lord Erskine called the "mute creation:" man, on the other hand, is "articulately speaking." He embodies in words the generalised thoughts that are his mental interpretation of the universe.

It may of course be expected that it will not be easy to show, by a direct appeal to the psychical phenomena of animals, either that they have or have not the power of conceptional thought. I appeal here only to the following considerations. It is this power that makes man the possessor of truth, and the architect of science and literature, and that therefore bestows on him, as it makes him capable of, the boon of progressive civilisation, and the promise of indefinite perfectibility. All these characteristics man owes to his notionalising and elaborate powers of mind. Now, *first*, these characteristics are strikingly distinctive of man, and peculiar to him, indicating that the mental ground of them is also distinctive and peculiar. The amassing of knowledge, self-culture, the power of indefinite improvability, is absent in the animal,—of course, is it not? with the absence of the self to cultivate. There is no amassing of knowledge, no science, competent to animals,—is it not because the real condition of true knowledge and its end they lack—self-hood? What have they done for self-development, for the improvement of their knowing powers,

and the hoarding up of results in the shape of truth, during the secular periods that have been allotted to them. These periods of probation have been multiplied to them above those allotted to man; but with what result? Mr. Huxley has expressed it when he says, "Man has accumulated and organised the experience which is almost wholly lost with the cessation of every individual life in other animals" (Man's Place, &c., 112). He says "*almost* wholly lost." True, a pointer can have his instincts somewhat improved by human care, and skill, and whipping. And he can bequeath the accumulation to his posterity; and if the means of training at the hands of man are persevered in, the forced result in the shape of education may be considerable. At the most, it is plainly a limited, not an indefinitely augmentable, result. And if the means were neglected, what would the dog grow to? He would ungrow very soon the whole product of his laborious education, and retrograde to his own place. There is a fixity about animals most unlike anything about man. As Sumner says, "Animals are born what they are intended to remain. Nature has bestowed on them a certain rank, and limited the extent of their capacity by an impassible decree. Man she has empowered and obliged to become the artificer of his own rank in the scale of beings, by the peculiar gift of improvable reason" (ap. Lyell Antiq., &c., 497). Mr. Huxley has ascribed this accumulative power of man to the "possession of the marvellous endowment of intelligible and rational speech." But it is not speech, the *logos proforikos*, that is to be credited with this result. The achievement must rather be laid to the account of the *logos endiathetos*, the archbishop's "improveable reason." The amassed truth, the organised experience that exists in the body of human knowledge and science; the self-culture, which the mere life-bound soul of the animal does not need, but which a self constantly craves, and to which every man may make his acquaintance with objects and beings beyond himself subservient; and the fact that every man is capable of adding, in his measure, a contribution to the accumulated store; all this forms one of the broadest and most glaring distinctions between animals and man.

As, moreover, there is no self-development in the animal intellectually, so there is no self-aggrandisement, so to speak, in things material. There is no wealth, no trade, no commerce, no industrial occupation. The whole outward life is diverse

from the human type. It requires a self-regulated intelligence, having conceptional powers, and a self-determined activity in the use of them,—a person, in short, to make use of tools or machinery, or to store their products and follow a system of material accumulation. Animals are as incapable of material civilization as of intellectual. In reference to some of the above points, and some others not here mentioned, the following passage from a very able, though not always a very clear writer, is well worth quoting—

"Nothing appears more really conclusive against all supposed capacity for great development 'in the animal' than the history of what are called 'learned animals;' of the mechanical means necessarily employed for teaching them, and the mechanical results obtained. There is, indeed, no better word to describe the true state of the case than the term 'mechanical,' as opposed to everything that is ideal or truly creative. If a brute could idealise the laws of outward nature, or the laws connecting his own powers with their proper functions, he might see them as a man does, and give them a fresh existence within his own intelligence. He would then be able to invent an alphabet, conceive a picture, and view the properties of outward objects as universals inwardly apprehended. In this way he would acquire exemption from the reign of mechanism, and live a really creative life. It is manifest at a glance how far in fact these conquests are from the world of creatures—by us, therefore, called unreasoning. Art, letters, and abstract thought are no visitants of the animal sphere. Words cannot come where thoughts are not, and therefore language, in the *human* meaning of the term, is unknown to brutes; and no effort of man has ever been successful in sharing with his humble companions any one (much less all) of these attainments. His artistic sense of Beauty, and power of giving it varied expression, find no echo beneath himself. He can in nowise teach by historical record, poetry, abstract calculation, or abstract thought. Neither can he impart the true secret of social sympathy, and forbid the stricken deer to weep and die alone. Intelligence without imagination cannot conceive a sorrow so lonely or unseen, therefore it knows little of deep sorrow, for even the mortally wounded bird will strive to hide its wound."—(Jackson, Philosophy of Nat. Theology, pp. 312-3).

Is it open to us to hold an identity of mental principle where the mental powers are so opposite? Till it can be shown that

at least the highest animal has something of the capacity for improvement possessed by even the lowest human savage, we should not be asked to admit that it is the same kind of being that the improvement is to affect. Especially as *secondly*, in the reverse way, if animals had had the self-consciousness and the abstract cognitive faculty that gave man his powers of attainment and progress, it may well be asked, How is it that animals do not benefit in the same way by the endowment? Have they not yet had their opportunity? What arrest has been laid on the natural tendency of the faculty that in them it has remained thus, not only stunted but altogether ungerminative? These considerations do not make it hopeful that any direct inspection of the psychical phenomena of animals shall ever discern in them a likeness to human thought, or in their principle a subject identical with the human soul.

4. Animals are sometimes credited with the principle of *prudence*—that outward self-love that refuses a present good in order to secure a future greater good. In man the "reflex ego" is never busier with its reflex functions, never more occupied with itself than in an act of prudence. Through all such prudential actions in him, there constantly shoots the warm light of self-consciousness, making the end, the motive, and the means clear to the mind, personal, self-regarding, and self-determined. If the animal be capable of such action in a true human fashion, it is as much a person, self-conscious and free, as any of us. But is it true that the mole, while he stores his worms—even granting that he employs ingenious means of keeping them fresh—is exercised in mind much as the husbandman is when he stores his harvest? Even if there had not been found far down in the animal series, such a typical storer as the bee or ant, I do not know that it would have been much less easy than with that circumstance it is seen to be, to answer the question. But with an entomological claim on the dignity of prudential motive and conduct, the anthropological prerogative must be held safe, sacred, and incommunicable.

5. The *moral* and *religious* faculties—the highest powers of humanity, still remain. They again stand or fall with self-hood; and self-hood stands or falls with them. If there is no will, no personality, no self determining agency, the foundations of morality are not laid. It is because man is not predetermined, but is a law to himself that he is moral and responsible. The animal receiving its law, all the conditions

of its being from without, and acting thus by fate, is beyond the moral sphere. Having no will, "it cannot be conceived" as Goodsir says "to possess a choice between right and wrong." Where is the evidence that animals, even the highest of them, ever come within sight of such a power? It might have been well if all scientific men had left it to old Montaigne to lead this evidence. Dr. Lindsay, however, says, "the actions of certain animals, especially those which have been highly educated, such as the dog, show that they possess a distinct consciousness, perception, knowledge or appreciation of the nature or meaning of right and wrong, of praise and blame, of rewards and punishments, of justice and injustice, of duty and its obligations, of trust and responsibility, of property and ownership, of moral and immoral actions, of honesty and dishonesty." (Journal of Mental Science, April 1871, p. 50). He then adduces proofs. But the words which Mr. Wallace has employed in dealing with Houzeau, who advances similar reasonings and conclusions, are a fair answer to Dr. Lindsay. "Our author adduces the usual proofs that animals have a sense of right and wrong, but which really show nothing more than that they can be made to acquire certain habits through the fear of punishment, or the expectation of reward." &c. (Nature, vol. vi. 470). Indeed a more conclusive method for convincing any one of competent philosophical attainments, that animals are not moral beings, could hardly be resorted to than just to study the facts and reasonings adduced to show that they are moral beings. One of the first established distinctions between the man and the brute, that of Aristotle, shall no doubt remain to the last. It is the possession by man of a conscience. Dr. Lindsay himself, to all intents and purposes gives up the point, when he says, "this—'the conscience grounded on fear;'" which is not the conscience at all in Aristotle's sense, "animals undoubtedly possess. *Whether they possess* also the gradually developed 'conscience grounded on spontaneous approval,'" which is the conscience of Aristotle and truth, bating something about the "development," "is one of *the many probably insoluble questions that arise* in comparing the mind of other animals with that of man." If "insoluble," or even if as yet unsolved, so far the conclusion that any "animals possess mind of the same nature as that of man," is beyond the premises. But why is comparative Psychology presumably so helpless at this point? If animals do really possess a true conscience, spon-

taneously approving the right and disapproving the wrong, their actions may be expected to reveal its presence. If their actions do not reveal the influence of such a faculty, why place its possession among possibilities—except indeed for the sake of the conclusion?

Thus, the whole round of faculty that belongs to human selfhood is untouched at any one point by any power within the animal range. There is no inward self to be either a free productive power or a conscious end to the brutes. Their outward individual life, and the life of their race, is all that their actions are directed to maintain; and not for a moment is either that life or its maintenance before their consciousness or in their purpose in the homefelt sense of being *theirs*, *their* end, and *their* work. Such is the effect of the absence in them of self consciousness and free agency on the higher psychical functions.

But now, since this want of personality affects the very nature of the psychical principle itself, does it not affect also the character even of the lower manifestations of mind, such as have been allowed to be similar to those of man? If, on passing up the scale of mental powers, we come at last to personality, with its accompanying specialities, and find them awanting in animals, must not this fatal want at the top make its influence be felt on the previous series, even to the bottom, and really transform all the psychical powers we have previously allowed to have a similarity to man's, into something quite different from the human type? All human mental operations, from sensation upwards, are accompanied, we have seen, by a real home-coming knowledge of self. Those of animals never are. Are the two series, in that case, even at the start, of the same type? Ending wide as the poles asunder, do they begin in identity? We find them beyond dispute diametrically divergent at last, must not this radical distinction cast its shadow before, and establish a variety of type from the beginning? At all events, where the powers manifested are so widely different, the principial source cannot be the same.

There is no reasoning ever yet resorted to by the keenest advocate of identity that has even plausibility about it, or, at least, such a speciousness as will bear a second look. When Bayle argues that the souls are the same, and that it is only deficiency of organisation in the animal tribes to which their deficiency in psychical manifestation is due,—this would have argued a serious mistake on the part of the Creator, unless it had turned

out to be only an error on the part of the physiologist. Agassiz argues for an immaterial principle in all animals, similar to that which, by its superior excellence and superior endowments, places man so far above them. He does this on the ground that they possess *individuality*. If this individuality had been a conscious possession of animals, *i.e.* one they knew anything about, it would have argued a psychical principle that might be equal to man's, for that possession is one of man's highest prerogatives. But as the idea of individuality is only an attribute that the scientist describes the animal by, as he also does the crystal, it argues an immaterial, or at least a human-like soul in the animal no more than it does in the stone.

(To be continued.)

ILLUSTRATIONS OF ANIMAL REASON.

(Continued from p. 148.)

By W. LAUDER LINDSAY, M.D., F.R.S.E., F.L.S.

IT is scarcely possible now-a-days to take up any Newspaper or Magazine of the better class, without finding—whether or not they are looked for—incidents or Anecdotes illustrative of Animal intelligence. This is a significant sign of the times, showing the growing attention that is being given by the general public to the Mental status of subject creatures. But, for various reasons, the paragraphs or articles devoted by newspapers or magazines of all kinds to the illustration of the mental endowments of the lower animals are too generally regarded as ephemeral and worthless. They are far too little utilised for the purposes of generalisation by those who will neither take the trouble to observe Nature for themselves, nor give their attention to the study of such published works as those of Darwin, Huxley, Wallace, and Spencer. It is only the industrious and sagacious compiler, such as the Rev. J. G. Wood, F.L.S., who has the sense, and takes the pains, to garner the scattered grains of Newspaper science. This feeling or estimate of the valuelessness of Newspaper anecdotes arises partly from their usually being anonymous, and partly from the ephemeral nature of the medium in which they are presented to the public. But that they, or at least many of them, deserve a better fate—a more permanent record—it is the object of the present article to point out. I have personally taken a con-

siderable amount of trouble in the endeavour to fix the value pertinent to many "Illustrations of Animal Reason" given in current serial literature, and the results are perhaps of sufficient interest to warrant description somewhat in detail.

Firstly, as regards *newspapers* of all classes—including not only the daily—such as the "Telegraph," but the weekly, such as "The Graphic," "Illustrated London News," "North British Advertiser and Ladies' Miscellany," "Saturday Review," and "Spectator."

(1.) Their occasional *leading articles* on subjects connected with Natural History are usually by men holding a high or a good position in the scientific world, either as general Naturalists or as Zoologists. I do not happen to know who are the authors of those "leaders" of this class that every now and then appear in the "Daily Telegraph"—with reference, for instance, to doings at the London Zoological Gardens. But they bear the stamp of being written by men thoroughly versed in their subject, men not only of great experience as Field Naturalists, but of great erudition as Library Students. These leader-writers are indeed of a far higher class—as will be shown in the sequel—than the contributors of zoological articles to such pretentious works as "Chambers's Encyclopædia."

(2.) It is the custom of Newspapers now-a-days to give copious *reviews* of Natural History works, with *extracts* therefrom. These *criticisms* are by the same class of popular Naturalists as the writers of leaders on Natural History subjects; while the extracts or quotations, of course, give reference not only to the works criticised, but to various of the incidents contained in these works.

(3.) In noting current events in which the dog, horse, and other animals take a part, the correspondents of the public press frequently give the dates of the incidents—the names, addresses or residences of the proprietors of animals, and of the eye-witnesses of their behaviour—whereby such Anecdotes admit of satisfactory investigation.

(4.) Newspapers are in the habit of giving copious extracts with comments, or of otherwise mentioning the contents, of all the leading Serials—such as "Nature," "Science Gossip," the various Quarterly Reviews, "Cornhill" and "Macmillan's" Magazines, and "Good Words."

(5.) Even in Newspapers, articles on Natural History—Anecdotes of Animal sagacity—are not always *anonymous*.

(6.) It happens then that where incidents illustrative of Animal Reason are of such a character as to render it worth while to investigate their authenticity or truthfulness, it is generally possible—with much trouble it may be—to prove to what extent they are based on *fact.*

Let me now give a few special examples from my own experience, in support of the foregoing general propositions.

I know no Newspaper which gives so much, or so frequent, attention to Anecdotal Zoology as the "North British Advertiser," an Edinburgh weekly, which contains not only original articles, but plentiful quotations from recently published volumes and serials. I have personally known that newspaper and its proprietors for at least thirty years; and the nature of this knowledge leaves me in no doubt as to the genuineness of its extracts and the character of its contributors. In January 1875, appeared in its columns certain letters on the "Reasoning Powers of Animals," signed "Mary Mackellar." To assure myself of the character of the writer (whose signature might have been a mere *nom de plume*), and of the truth of her statements, I applied to the proprietors; with the result that one of them at once wrote me (Feb. 1, 1875) in the following terms:

"In reply to your memo. of 30th ult. Mary Mackellar is the wife of a sea captain, without family, and frequently accompanies her husband when he goes to sea. She has thus ample opportunity for observing the habits of animals on ship board, &c. Our Editor, who comes in personal contact with her, believes that her naratives are founded on facts brought under her own observation. Her address is—Mrs. Mackellar, 22 William Street, Edinburgh."

There are probably no readers of the well-known "Inverness Courier," which, under the editorship of the accomplished Dr. Carruthers—himself an eminent Scottish litterateur, is one of the best provincial newspapers in Scotland, who are not acquainted with the letters from its "Nether Lochaber" correspondent. Every now and then these letters contain, in the midst of a profusion of Celtic Folk-lore, incidents, obviously founded on personal observation, illustrative of the Intelligence of West Highland birds or other animals. Desirous, however, of being assured of the perfect accuracy of some of the more striking of the statements made by the anonymous writer of the letters, I made application to Dr. Carruthers. The result was the following answer from the Resident in Nether Lochaber himself:—

"DR. CARRUTHERS of the "Inverness Courier" has sent me your note.

"You are at perfect liberty to make use of such parts of my contributions to the "Courier" as may best suit your intended publication, giving my name as writer and authority in full.

"If you will explain to me the nature of the work on which you are engaged, and I find that I can help you in any other way, I shall be very glad. (Signed) ALEX. STEWART, Minister of the Parish of Ballachulish and Ardgour—Feb., 1874,"

who is at the present moment, it may be added, editing, with memoir and notes, a re-issue of "Logan's Scottish Gael." His competency both to observe and report upon facts in Natural History is unquestionable, and far superior to that of the authors of not a few works on Animal Sagacity that I have had occasion to peruse.

In October, 1875, there appeared in the "Perthshire Constitutional and Journal" newspaper, a couple of Papers entitled "The Cats' Opera Man," being the biography of Samuel Bisset—once a shoemaker in Perth, but who subsequently became known throughout the three kingdoms as a trainer of "performing animals:—who was in his way, indeed, one of the celebrities of Perth—one never heard of, however, alongside of the nobodies who, by reason of the butchery of their fellow-men, have achieved what is called military "Fame," or who, by "strict attention to business" and the "selection of the best style of goods," have amassed wealth and attained civic eminence. These articles—devoted to poor Bisset's memory—were contributed by the writer of the series of Antiquarian papers for which the "Perthshire Constitutional" has acquired local distinction—a series of sufficient value to have required their republication in a more permanent form in at least 3 volumes—one of which has just been issued as "The Perthshire Antiquarian Miscellany," whose contents, however, cannot be wholly "Antiquarian," seeing that it contains a paper on "The Salmon of the Tay." The author of the said "Miscellany"—the Biographer of worthy Bisset—is a residenter in Perth, Mr. Robert Scott Fittis—known to the literary world less perhaps by his "Illustrations of the History and Antiquities of Perthshire" than by his "Gilderoy: a Scottish tradition,"* and other works. In reply to certain inquiries as to Bisset's Biography, Mr. Fittis favoured me with the following particulars:—

* Published as one of the volumes of "Routledge's Railway Library:" London, 1866.

"The 'old biography' referred to appeared in an octavo volume, of some 300 or 400 pages, entitled 'Curiosities of Biography, or Memoirs of Remarkable Men' (no author's name given), which was published at Glasgow by Griffin & Co. in 1845. It is a collection of the lives of dwarfs, giants, fat men, misers, &c., and is evidently in the main a reprint of much older matter. Bisset's life occupies 2½ pages. I suppose the book is now entirely out of print. I saw it in 1856, and at that time copied Bisset's life. But I may state that I have incorporated the *whole* of the biography in my articles—for there are *two* of them. Several notices of Bisset have occasionally appeared in periodicals. There was one, I understand, about a year ago, in *Land and Water*, and one, a number of years ago, in *Hogg's Instructor*. It is remarkable that no notice of him appears in Chambers's *Book of Days*, though that work contains an account of some 'Animal Comedians' in London about the same time. The well-known work, 'Wilson's Wonderful Characters,' never mentions Bisset."

In April, 1874, an accident, fatal to a young lady belonging to a well-known family in the Carse of Gowrie, occurred on the Public Bridge of Perth—a runaway ox having butted her so suddenly and seriously against the parapet wall as to have speedily caused death. So at least said the Newspaper accounts, which differed in their details, though all were correct in the essential facts. Desirous, for many reasons, of ascertaining the simple facts of the case, particularly in reference to the mental state of the accused animal—for I have a strong conviction that at least the majority of such accidents are due to man's culpability in his treatment of over-driven, footsore cattle, infirm both in body and mind—I appealed to Mr. Melville Jameson, the Procurator-Fiscal for the city and county, for permission either to read, or to be present at, the depositions of the witnesses in the event of there being any judicial investigation. He promptly replied as follows :—

"County Buildings,
"*Perth, 23d April, 1874.*

"Accident to Miss ———.—The circumstances did not render it necessary for me to conduct any criminal investigation, and no depositions were taken from any of the witnesses. Had an inquiry been instituted, I would have been glad to have suggested your name to the Crown Office as a professional witness in the special facts to which your attention has been directed."

For a series of years the "People's Journal" (Dundee), has signalised itself by offering Prizes to youth of both sexes—especially to those still attending school—for Essays and poems on various popular subjects. The prize essays and poems are published in the Christmas No. of the "Journal," and constitute a special kind of Christmas literature. The subjects proposed

have sometimes included Natural History, Popular Zoology, the Habits of the Domestic or other Animals:—the object of the donors of the prizes and projectors of the essays being apparently, on the one hand, to stimulate the faculties of Observation and Description, and, on the other, to inculcate lessons of Kindness to the lower animals—a twofold object deserving of all commendation. Thus, in or about 1872, Dr. Stables, R.N., offered, through the Journal in question, a series of prizes for stories, anecdotes, or poems about *Cats* and their doings; and many of the resultant facts—illustrative of the affection, sagacity, or other good qualities of these animals—are quoted in a work published by him in 1874;* or rather, it should be said, the Prize Poems appeared in the "Journal," while the Stories or Anecdotes were woven into the text of Dr. Stables' book.

In December, 1872, I was struck with an article in the "Graphic," entitled "Our Parrot," which was described as possessing the power of *appropriate remark and repartee.* Inquiry at the Editor, as to the accuracy of the facts or statements, elicited the following prompt and courteous reply; and I mention specially that it was both prompt and courteous in contrast with the procedure of certain other Editors who vouchsafed no reply—and might have had good reasons for withholding one—or whose reply was neither prompt nor satisfactory:—

"'The Graphic' Office,
"*190 Strand, W.C., London, Jan.* 8, 1873.

"In reply to yours of 6th instant, I beg to say that before inserting 'Our Parrot,' I wrote to ask the author if the *facts* were authentic, and she assured me they were. Mrs. E. M. Lynch, Warrenstown, Navan, Ireland, wrote the article. (Signed) Arthur Locker, Editor."

The "Illustrated London News" has frequently reproduced in its pages, or supplements, the pictures of Landseer and other great Animal painters—pictures that in themselves are eloquent exponents of many of the noblest moral and intellectual attributes of such animals as the dog and horse; and these pictures are invariably accompanied by descriptive letterpress, occasionally at least embodying "Illustrations of Animal Reason." The same may be said of the "Graphic," and other illustrated newspapers or serials of the best or better class.

* "Cats: their Points and Characteristics; with Curiosities of Cat Life, and a Chapter on Feline Ailments," by W. Gordon Stables, M.D., R.N. London, 1874.

On looking over my mass of Notes of Incidents illustrating Animal Reason, in order to determine their source, I find a large proportion taken, in the first instance, from Newspapers —and not only from the leading ones of the English and Scottish Metropolises—the "Daily Telegraph" or the "Scotsman"—but also from a number of smaller, even obscure, Provincial ones, which use as "padding," in the paucity of local matter of sufficient interest, citations from recently issued works on Natural History, or from serials containing popular Zoological articles. Thus excerpts have been taken, amongst other newspapers, and in addition to those already mentioned in the text, from the "Daily Review" and "Courant," Edinburgh; "North British Daily Mail," "Weekly Herald," and "Evening Citizen," Glasgow; "Andover Chronicle," Hants; and "Pall Mall Gazette," London. These Newspaper criticisms and quotations have frequently introduced me to important sources of information.

At the same time, it must be borne in mind that Newspapers abound in "sensational" Anecdotes of dogs, horses, and other sagacious animals. There is too frequent a mixing up of Fiction with Fact, and it is not an easy matter in such cases to distinguish the grain from the chaff. Fortunately, it is only now and then worth while to essay their separation; for the "stock"—the general run—of newspaper "stories" of animal intelligence illustrate mental attributes that are already sufficiently well known.

Common Swallow (Hirundo rustica).—For a period of six years, a pair of these birds, or their descendants, have regularly every season repaired to a weaver's house near me, built their nest, and reared their young on the rafters, amongst old heddles and sticks, in an attic room not much used, the skylight window of which was left open all season for their convenience. There is perhaps not much novelty in this, but the fact that the same pair of birds have reared and departed with two nests of young, is perhaps one not generally known. The first nest of young were reared and able to fly early in July, and the second about the sixth instant; and a week ago the whole took their departure for more congenial climes. I may add, the same birds, last year, reared one nest of young ones, and laid three eggs at the beginning of September, for the second lot, but finding the season too far advanced and cold to incubate, deserted them and left. I am not aware that I have seen this fact recorded of swallows breeding twice in one season; but for migratory birds like these it is indeed a nice calculation to do so and yet be in good time for departing; a decided improvement on their efforts of 1874. It is indeed a wonderful instinct, that year after year the same birds should traverse thousands of miles to visit their humble birth place, the "poor weaver's" garret room.—ALEXANDER MURDOCH, Allan's Hill, Maybole, September 25, 1875.

[The Swallow generally breeds twice during the season.—Editor *Scottish Naturalist.*]

OUTLINE DESCRIPTIONS OF BRITISH COLEOPTERA.

(Continued from p. 168.)

By Rev. T. BLACKBURN, B.A.

Bembidium.

1. The 9th int. of e. much narrower than the rest . 2
- - - - - about equal to the rest. Pale copper or silvery. An., pal. and legs greenish. Th. tr.; ba. angs. sharp. E. dist. p.-s. On the 3rd int. are 2 large square pits. 2½ l. B.[N.] . . paludosum

2. Entire surface of h. and th. strongly punc. Greenish or dusky. Legs and ba. j. of an. more or less r. Ba. angs. of th. sharp. E. strongly p.-s. 2¼ l. E. S. I. . . . . punctulatum

Not as above. 3

3. E. with 7 well def. symmetrical str. 4
Str. of e. faint at sides and ap. . . . 9

4. - - - punc. 5
- - - impunc. Bronzy gr. An., pal. and legs dusky. Th. tr., not much contr. at ba.; ba. angs. sharp. Ap. of 5th str. of e. very deep. 2⅛ l. B.[N.] . prasinum

5. E. test., often dusky at ap. H. and th. gr. An., pal. and legs test. Th. little contr. at ba. A fov. on each side of mid. line besides the usual ba. fov. 1½ l. E.[C.] . . . . . ephippium

Not as above. 6

6. 2nd and 3rd js. of an. more or less test. . . . 7
An. b. exc. 1st j. which is r. beneath. Bronzy gr. E. with 2 narrow pale fasc. Th. tr., little contr. at ba. E. finely p.-s.; ints. very flat. 1¾ l. E.[S.] . obliquum

7. Ap. of h.-b. not dist. test. 8
Extreme ap. of h.-b. dist. test. H. and th. obsc. gr. E. and legs fuscous. E. more or less mottled with test. An. and pal. dusky, test. at ba. Th. tr. E. strongly p.-s.; ints. not quite flat in fr. 2⅓ l. E. S. I. . . . . flammulatum

8. Th. not wider at ba. than in fr. Obsc. gr. E. more or less mottled with test. Legs pit. Ba. of an obsc. pale. Th. tr. E. finely p.-s.; ints. very flat. 2¼ l. E. . . . . varium

Very like prec. Th. wider at ba. than in fr. The test. markings on e. well def., occupying at least half the surface. Ba. 3 js. of an., and the legs test. E. more strongly str. 1¾ l. E. . . *adustum*

9. Th. cons. narrowed at ba.; more or less cordate; ba. angs. sharp. 10
- little narrowed at ba.; not cordate; ba. angs. obt. or rounded; mars. very narrow . . . 40
--- - -; - -; mars. very broad . . . 44

10. Whole surface of h. coarsely punc. 11
Not as above 12

11. An., pal., legs and e. pale test. E. with a darker tr. fasc. H. and th. gr. or cop. Th. tr. E. dist. p.-s. 2⅛ l. B.N.C. . . . . pallidipenne
Unic. Obsc. gr. Th. tr.; punc. in fr. and at ba. E. finely p.-s.; a consp. pit on each, in fr. of mid. 2 l. E. S. I. . . . . bipunctatum

12. Fr. of h. with 2 well def. longi. ridges on each side . 13
- - - - not more than 1 ridge on each side . . . 15

13. E. not mottled with test. 14
Blackish. E. mottled with test. Legs and ba. of an. r. Th. tr. E. dist. p.-s. 2 l. E. . . . fumigatum

14. Obsc. greenish. Legs, ba. of an. and a spot near ap. of e. test. Th. tr. with a simple ba. fov. on each side. E. strongly p.-s. in fr. 1½ l. E. . . assimile
Very like prec. Th. wider at ba.; the ba. fov. each contain a small dist. longi. ridge. E. with no dist. pale spot near ap. 1⅝ l. E. S. I. . . Clarki

15. Ba. fov. of th. close up to side mar. of th. . . . 16
- - - - separated from side mar. by a dist. elev. ridge . 17

16. Brassy b. An. reddish at ba. A large test. spot near fr., and a small one near ap. of each e. Tib. very pale test.; fem. and tar. darker. Th. not tr. E. with rows of puncs. failing in hi. ⅔. 2 l. B. ! quadriguttatum
Very like prec. Ba. of an. paler. Fem. pale. Th. gently tr. E. p.-s. to behind mid. 1½ l. E. quadrimaculatum
Very like *quadriguttatum*. An. wholly b. Th. tr. E. p.-s. to behind mid. 1¾ l. E.S. . . *quadripustulatum*

17. Part (at least) of fr. half of e. dist. test. . . . 18
Front half (at least) of e. unic.; not test. . . . 27

18. Less than 1¾ l. (E. dusky, mottled with test.) . . 19
More than 1¾ l. 20

19. H. and th. br. gr. Legs, ba. of pal., and ba. of an. test. 2 fov. on each side of h.: the in. ones meet in fr. Th. not. tr. E. consp. p.-s. 1½ l. E. . . articulatum
H. and th. b. Legs, ba. of pal. and 1st j. of an. test. Th. tr. 1¼ l. E.S. . . . . *Sturmi*

20. Th. not (or hardly) tr.; not dist. punc. across ba. . . 21
Th. not as above 22

21. H. and th. br. gr. E. el., narrow, with gently rounded sides, dusky, with a pale blotch on should. and near ap.; strongly p.-s. Legs, ba. of an. and ba. of pal. test. Th. el. 2¾ l. E. . . . . fluviatile
E. broad, flat, parallel, p.-s., obsc. test., without dist. markings. H. and th. br. gr. Th. slightly tr., very short and narrow. Legs and ba. of an. r. E. rarely marked as in *littorale*. 2 l. B.N. . . . testaceum

22. Ap. of pal. and of an. dusky. H. and th. gr. E. dusky, with a pale blotch at should. and near ap. . . 23

H. and th. br. gr. Legs, pal. and at least ba. and ap. of an. test. E. dusky, with a pale blotch at should. and near ap. connected along the mar. Th. tr. E. strongly p.-s. 2½ l. B. . . . . concinnum

23. Not more than the in. 3 str. of e. continued in ap. quarter as more than a faint row of puncs. . . . 24

At least the in. 5 str. of e. dist. continued *as* str., quite (or almost) to the ap. Pal. dusky. Ba. 3 js. of an. and the legs, gen. test. Fem. sometimes dusky. A. flat, parallel species. 2¼ l. B. . . . saxatile

24. Ap. part. of 3rd j. of an. dist. blackish . . . 25

- - - - - - - at most ind. fuscous. . . . 26

25. An. with ba. 1 or 2 js. test. Th. hardly punc. at ba. E. narrow, widest *at*, or *in fr. of* mid.; pale part *whitish* brown, finely p.-s.; 7th str. ind. Fem: dusky. Tib. pale. 2 l. E. S. I. ! . . femoratum

Very like prec. Th. punc. at ba. E. widest *behind* mid.; more strongly p.-s.; 7th str. dist. Pale part of e. *brown*. 2 l. E. S. I. . . . bruxellense

26. Th. strongly punc. at ba. E. strongly p.-s. Legs entirely test. Pale part of e. *brown*. 2½ l. E. S. I. !! . . . . . littorale

Th. hardly punc. at ba. E. finely p.-s. Fem. sometimes dusky in mid. Pale part of e. *whitish* brown. 2¼ l. B.[N]. . . . . anglicanum

27. Not less than 2 l. Fem. dusky. Ba. j. only of an. test. . 28

- - - -. At least ap. of fem. test. Ba. 2 or 3 js. of an. test. 29

Less than 2 l. 34

28. Dusky gr. Tib., tar., ba. j. of an., and often extreme ap. of fem. reddish. Th. tr.; sides strongly rounded. E. conv., strongly str.; the str. consp. punc. to cons. behind mid. Ap. of e. very obt. 2½ l. B.[N]. . tibiale

Very like prec. Narrower and much flatter. E. much more finely p.-s., and with the str. hardly punc. behind mid. 2 l. E. S. I. . . . atrocœruleum

29. E. without dist. markings. 30

Brassy. Legs, pal., a semicircular fasc. near ap. of e., and ba. (often the whole) of an. pale. Th. strongly tr., ba. punc. E. strongly p.-s. 2⅞ l. B.[N]. . . lunatum

30. E. with dist. rounded sides, ... 31

E. long, flat, parallel. Bl.-gr. Legs, ba. of pal. and ba. of an. r. A few puncs. on h. behind eyes. Th. hardly tr., obs. punc. at ba. E. strongly p.-s. 2½ l. E. S. I. . . . . decorum

31. Th. dist. tr. 32

- not or hardly dist. tr. 33

32. Brassy brown. Pal., legs and at least ba. 3 js. of an. test. E. rather strongly p.-s., widest behind mid. 2⅞ l. E. . . . . Stephensi

Gen. gr. Ba. of pal., not more than ba. 2 js. of an. and the tib. test. Fem. dusky, with broadly test. ap. E. widest *at* or *in fr. of* mid. H. shorter than in prec., eyes more prominent, an. longer. 2 l. B. — brunnipes

33. Br. bl.-gr. Legs, ba. of pal. and ba. 2 js. of an. r. Th. hardly punc. at ba. E. conv., very finely p.-s. 2⅛ l. B.N. . . . . — monticola

Bronzy gr. An. reddish. Legs, pal. and ba. of an. r.-yel. Th. strongly punc. at ba. E. str.; sides dist. rounded; str. very strongly punc.; 8th str. obs. in fr., very deep behind. 2⅓ l. BN. . . — stomoides

34. The fov. on fr. of h. parallel in their hi. half . . . — 35

- - - - - - consp. sloped from ba. almost to meet in fr. B. Legs and ba. j. of an. reddish. Th. hardly tr., narrow behind; 2 dist. fov. on each side at ba. E. finely p.-s., gen. pale near ap. 1½ l. E. S. I. . — doris

35. An. entirely b. . . . . — 36

- not entirely b. . . . . — 37

36. Brassy. Legs reddish. Pal. brown. Th. very strongly tr., with strongly rounded sides; ba. angs. slightly obt. E. moderately p.-s., 7th str. wanting. Very like *lampros*. 1¾ l. E.N. . . . — *nigricorne*

B. Ba. of tib. and ap. of e. sometimes pale. Th. tr. E. with 7 strongly punc. str. 1⅓ l. B.c.! . . — minimum

37. Fov. on fr. of h. not approximated in fr. . . . — 38

The fov. dist. sloped together in fr. of eyes . . . — 39

38. Th. very tr., rectang. at ba. Br. brassy. Ba. j. of an. (more or less) and legs r. E. faintly str. (7th str. gen. wanting); str. strongly punc. 1¾ l. E. S. I.!! . . . . . — lampros

- gently tr.; ba. angs. obt.; 2 equal fov. on each side at ba. Blackish. Ba. j. of an., legs, and ap. of e. obsc. r. E. strongly p.-s. 1½ l. E.c. . . — normannum

39. B. or blackish. Legs and ba. 2 js. of an. clear test. Th. strongly tr. E. strongly p.-s., smooth at ap. 1⅛ l. E. . . . . — gilvipes

Very like prec. Bluish or greenish. Fem. pit. Pal. reddish. Th. less narrowed behind. E. shorter; the in. str. are dist. to ap. 1¼ l. B.N. . . — Schuppeli

40. Ba. of th. emarginate behind the ba. angs., so that its mid. part. is strongly prod. backw. . . — 41

Ba. of th. straight, or only slightly emarginate behind hind. angs. . . . . — 42

41. B. Legs, ba. of an. and a spot near ap. of each e. more or less pale. Th. very tr. Ba. angs. extremely obt. E. with 6 or 7 very strongly punc. str., the 6th strongly punc. to behind mid. 1¾ l. B.! . — biguttatum

Very like prec.; more brassy in color. Ba. angs. of th. only slightly obt. Str. of e. only 6, finely punc., and more dist. near ap. than in prec. Ap. pale spot on e. often wanting. 2 l. E. S. I.c. . — æneum

42. Th. dist., though slightly, emarginate at ba., widest at mid. 43
- straight at ba., widest in fr. of mid. Blackish, gr., or bronzy. Legs, ba. of an., and ba. of pal. test. E. very finely p.-s. 1⅓ l. B. . . . obtusum

43. Brassy b. Legs, ba. of an., and a red spot near ap. of each e. r. E. rather el., rather strongly p.-s. 6th str. not dist. punc. so far as to mid. of e. 1½ l. B.! guttula
Very like prec. B. (not brassy). Legs and ba. of an. test. Extreme ap. of e. often reddish. Th. broader than in prec., more narrowed behind, more rounded on sides. E. shorter, with more rounded sides. 1½ l. E. S. I. . . . . Mannerheimi

44. R. E. gen. clouded with fuscous. An. pal. and legs test. Th. very tr., its ba. angs. very sharp. Sides of e. much rounded. E. very finely p.-s. 2⅓ l. E. S. I. . . . . rufescens
Obsc. gr., sometimes bronzy. An., pal. and legs test. Th. extremely tr., its ba. angs. rather blunt. E. very long, strongly p.-s. in fr. 2¼ l. B. quinquestriatum

TACHYPUS.

Cop., marked with gr. Legs, pal. and ba. of an. more or less test. Up. side of fem., pal., and 1st and 2nd j. of an. often gr. H., across eyes, hardly wider than th. Th. cordate, hardly tr. E. pub., minutely punc., ind. str., each with 2 consp. pits. 2½ l. B. pallipes
Very like prec. Pal., legs and ba. of an. more unif. test. H., across eyes, dist. wider than th. Th. dist. tr. E. more strongly punc. 2 l. B. . flavipes

TABLE OF FAMILIES OF HYDRADEPHAGA.

1. An. not shorter than h., having only 10 js. . . Haliplidæ
- - - - -, - 11 js. 2
- shorter than h. . . . . Gyrinidæ

2. Tar. with only 4 visible js. Sc. invisible . . Hydroporidæ
- dist. 5 j. Sc. (exc. in *Noterus* and *Laccophilus*) well def. 3

3. H. deeply inserted in th. . . . Dytiscidæ
- protruded and dist from th. . . . Pelobiidæ

First family—HALIPLIDÆ. (3 genera.)

1. Space between the eyes not consp. less than diameter of eye 2
- - - - very consp. less than diameter of eye . . Cnemidotus

2. Th. about same width in mid. as at ba. . . Brychius
- much narrower in mid. than at ba. . . . Haliplus

CNEMIDOTUS.

Test. Some large b. puncs. at ba. of th. E. with 10 rows of large b. puncs. 1⅔ l. B. . . cæsus

HALIPLUS.

1. H., th. and ints. of e. (independently of larger puncs.) minutely reticulated, dull 2
- - - - - - - - - - smooth, shining 3

2. Test. Th. punc. at ba. E. with rows of fine puncs. placed on b. lines; the b. lines interrupted at least twice, and often run together. 1½ l. B. . . obliquus
Very like prec. Th. with a faint fov. and (often) a b. mark on each side at ba. E. with the b. lines seldom interrupted more than once, and less run together. 1½. l. E.S.I. . . . . confinis
Very like *obliquus;* smaller, broader in fr. Ba. and fr. of th. b. Resembles *confinis* in having fov. at ba. of th. but they are very faint. Perhaps a var. of one of the 2 prec. 1⅓ l. E.[N.] . . . varius

3. Th. with a dist. furrow on each side at ba. . . . 4
- without the furrow 7

4. E. just behind shoulds., hardly wider than in mid. . . 5
- - - - very cons. wider than in mid. Reddish. Back of h. and fr. of th. dusky. H. and th. punc. E. with rows of puncs. placed on b. lines which are confused and blotched. 1-1½ l. E.S.I. ! ! . ruficollis

5. Coloured much as *ruficollis*, or darker . . . 7
Very pale test. H. and fr. of th. darker. E. with rows of fine puncs. placed on b. lines which do not run together, but are not of even width. H. and th. punc. 1⅓ l. E.S.I. . . . . fluviatilis

6. Very like *ruficollis* in color and markings, but the b. lines on the e. do not run together, and are of even width throughout. 1⅛ l. S. . . . striatus
H. and fr. of th. nearly b. Some b. marks at ba., and gen. a well def. b. line down mid., of th. H. and th. strongly punc. Markings of e. as in *ruficollis*. 1½ l. E. S. I. ! . . . . . lineatocollis

7. E. marked with numerous well def. dark spots . . 8
- not so marked 9

8. Dark test. H. and th. punc. Th. with a consp. row of large puncs. along ba. E. with rows of puncs. forming str.; ints. with rows of smaller puncs. The *long* dark blotches on the e. are not confluent with the sut. 1¾ l. E. S. I.. . . . . fulvus
Very like prec. Less pointed behind. The rows of puncs. at ba. of th. less consp. Some of the *round* dark spots on e. confluent with sut. 1½ l. E. . variegatus

9. Ba. puncs. of th. confused, not forming a consp. row . . 10
A consp. row of large puncs. along ba. of th. (besides smaller ones). H. and fr. of th. punc. E. with rows of strong b. puncs., and of fine ones in the ints. Sides rounded. 1⅞ l. B. . . . . flavicollis

10. Dark test. E. very parallel in fr. ⅔. H. wide and short. H. and th. (exc. on disc.) thickly punc. E. with rows of puncs. and finer rows between. 1⅞ l. E.s. *mucronatus*
Test. Sides gently rounded. H., and th. (in fr. and behind), strongly punc. E. with rows of puncs., and finer rows between. 1⅔ l. E.s. . . cinereus

BRYCHIUS.

Th. with a mar. fold on each side. E. p.-s., clouded with b. The fr. part of the 3rd int. and the hi. part of sut. strongly elev. 1¾ l. B. . . . elevatus

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Second Family—PELOBIIDÆ. (1 genus) Pelobius.

Dull reddish. Thickly punc. Th. at ba. and in fr., 2 marks on h., and disc of e., b. 4½ l. E. . Hermanni

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Third Family—HYDROPORIDÆ. (3 genera)

1. Ap. of e. prod. in a consp. and very sharp point. . Oxynoptilus
Not as above. 2
2. Claws of post. tar. unequal; the in. claw fixed. . Hyphydrus
- - - - equal, moveable. . . . . Hydroporus

OXYNOPTILUS.

Punc. Reddish brown. Th. darker in mid. Each e. with the mar. and two indist. bands paler. 1¼ l. E.s.c. . . . . *cuspidatus*

HYPHYDRUS (1 species) and HYDROPORUS.

1. Forehead with an elev. mar. in fr. (Body globose). . . 2
- simple. R.-m. of e. with a mar. pit at should. to receive the ba. end of the mid. tib. . . . 6
- -. - - - simple. On each side a furrow at ba. of th. is continued on the e. 9
- -. - - - -. - - - - - on th. runs parallel to the mar., but is not continued on e. . . . 11
- -. - - - -. No dist. furrow on th. E. test., with dist. dusky lines or spots, or *vice versa*. . . . 17
Not belonging to any of the above groups . . . 22
2. Less than 1¾ l. Body dist. globose. H., th. and e. punc. 3
More than 1¾ l. Body *very* globose. R.-brown; e. darker. Irreg. punc., with mingled large and small puncs. E. often with obsc. pale lines and blotches. Hyphydrus
♂ shining, ♀ dull. 2⅛ l. B. . . . ovatus
3. A well def. and consp. pale line close to sut. runs from near ba. to ap. of each e. 4
This line is wanting, at least on disc. . . . 5
4. H., th., an. and legs pale brown. Ap. of an. and ba. and ap. of th. often dusky. E. b.; the irreg. mar., and 2 lines (joined in fr. and behind, not reaching ba.) test. These lines meet the pale mar. in fr. and behind, and an irreg. fasc. joins the out. one to the

mar. just behind mid. E. very finely reticulated, and spar. sprinkled with very coarse puncs. 1⅓ l. E. . . . . reticulatus

Very like prec. Thickly punc. with mingled large and very fine puncs. The pale mar. and 2 lines on the e. are all dist. in fr., and commence nearer the ba. of e. 1⅓ l. E.S.I. . . . . quinquelineatus

5. Resembles prec. The in. line on e. (and often the out.) absent, exc. at ba., or near ap., or both. Ba. and ap. of th. dist. b. No. consp. well def. contrast in size of puncs. on e. 1¼ l. E.S.I.! . . inæqualis

Brown b. H., th., and a blotch near ba. and ap. of each e., paler. E. spar. punc., with very fine and very coarse puncs. mingled. 1 l. E. . . decoratus

6. Coarsely punc. Dark brown. An., legs, fr. of h. and fr. of th. paler. Fr. part of each e. with 4 dist. str. formed by rows of consp. puncs. 2 l. E.S.I. . picipes

Not as above 7

7. Less than 2 l. 8

Finely punc. Test. Sides of h., disc. of th., sut. and 4 lines on each e. (of which the 2nd reaches the ba. and which are often more or less confluent) b. Mar. of e. gen. marked with b. 2 ¼ l. E.c. parallelogrammus

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Gonepteryx rhamni in Fifeshire.—In the second volume of the *Scottish Naturalist* mention is made by Dr. J. Boswell Syme, of the capture of *Gonepteryx rhamni* in Fifeshire. This was a very unusual occurrence, and I should much like to know if either of its food-plants *Rhamnus catharticus* or *Rhamnus frangula*, are found in that locality.—Owen Wilson, Carmarthen, Oct. 26th, 1875. [Is it certain that species of *Rhamnus* are the only food-plants of *Gonepteryx rhamni?* We think it is doubtful. At the same time, it is not only possible, but probable, that the Fifeshire specimen alluded to was not bred in that county.—Editor *Sc. Nat.*]

VARIOUS NOTES.

We are glad to hear, that a Natural History Society in Inverness is in course of formation. Dr. Aitken, of the Inverness District Asylum, is the *interim* Secretary, and will no doubt be glad to give information to those interested.

Messrs. J. R. and T. Drummond are about to bring out a Flora of Clackmannanshire and its neighbourhood. The subscription price is only four shillings, so doubtless many persons will be glad to avail themselves of the opportunity of learning something of the botany of what is rather an interesting—phyto-geographically—part of Scotland. Messrs. Maclachlan and Stewart of Edinburgh are the publishers.

As will be seen from the advertisement on the wrapper, the Rev. J. E. Vize, is prepared to send out microscopic preparations of cryptogamic plants. Having seen some specimens of Mr. Vize's work, we can heartily recommend them as illustrating well the structure of an interesting class of plants.

INSECTA SCOTICA.

THE LEPIDOPTERA OF SCOTLAND.

(Continued from p. 182.)

EDITED BY F. BUCHANAN WHITE, M.D., F.L.S.

HYDRELIA Gn.

UNCULA Cl. (1759); *uncana* L. (1761). Not common. Palustral.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

LAT. 54°50′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. June. LARVA. August. FOODPLANT. Sedges *(Carex)*.

Erastia fasciana L. (1761 ; *fuscula* Bkh. 1792) has been reported from Moray (Dingwall).

PHOTHEDES Ledr.

CAPTIUNCULA Tr. var. *expolita* Stt. Rare. Pascual.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o o o o o o

LAT. 56°30′. RANGE IN EUROPE. Britain (the variety only) Austria, Styria, Finland, &c. (the typical form). TYPE. (of the var.) British. TYPE IN BRITAIN. British?

TIME OF APPEARANCE—IMAGO. July. LARVA. FOODPLANT.

PROTHYMIA Hb.

VIRIDATA Cl. (1759); *ænea* Hb. (1788). Common. Ericetal. Ascends to 3000 feet.

DISTRIBUTION—EAST. ♀ Forth Tay Dee Moray ♀ ♀ ♀
WEST. Solway Clyde ♀ ♀ ♀

Lat. 54°40′-57°40′. Range in Europe. Nearly throughout Type. European. Type in Britain. British.

Time of Appearance—Imago. June, July. Larva. August, September. Foodplant. Milk-wort *(Polygala).*

EUCLIDIIDÆ.

EUCLIDIA Ochsen.

MI Cl. Not uncommon. Pascual.

Distribution—East. Tweed Forth Tay Dee o o o o
West. Solway Clyde o o o

Lat. 54°40′-57°10′. Range in Europe. Central and northern. Type. Centro-septentrional. Type in Britain. British.

Time of Appearnnce—Imago. June. Larva. August, September. Food-plant. Clover, etc.

GLYPHICA L. Not uncommon. Pascual.

Distribution—East. Tweed Forth Tay Dee o o o o
West. Solway Clyde o o o

Lat. 54°40′-57°20′. Range in Europe. Nearly throughout. Type. European. Type in Britain. British.

Time of Appearance—Imago. May, June. Larva.
Food-plant.

Ophiodes lunaris has been taken in Tay (Perth), but was evidently an accidently imported specimen.

HERMINIIDÆ.

ZANCLOGNATHA Ledr.

GRISEALIS Hb. Not common. Nemoral.

Distribution—East. o o o o o o o o
West. Solway o o o o

Lat. 54°50′ Range in Europe. Central (to South Sweden and Finland). Type. Central. Type in Britain. English.

Time of Appearance — Imago. June-July. Larva. April. Food-plant. *Chrysosplenium?*

TARSIPENNALIS Tr. Not common. Nemoral.

Distribution—East. o o o o o o o o
West. Solway o o o o

LAT. 54°50′ RANGE IN EUROPE. Germany, Belgium, Britain, South Sweden, &c. TYPE. Occidento-central. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. August, September. FOOD-PLANT. Raspberry.

HYPENIDÆ.

HYPENA Tr.

PROBOSCIDALIS Hb. Common. Agrestal.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ♀ ♀
WEST. Solway Clyde ♀ ♀

LAT. 50°40′-57°50′. RANGE IN EUROPE. Central and northern; local in the south. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. May, June. FOOD-PLANT. Nettle.

THOLOMIGES Ledr.

TURFOSALIS Wk. Rare. Palustral.

DISTRIBUTION — EAST. ♂ ♂ Tay ♂ ♂ ♂ ♂ ♂
WEST. ♂ ♂ ♂ ♂ ♂

LAT. 56°40′ RANGE IN EUROPE. North-western. TYPE. Occidental. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. July. LARVA. ? FOOD-PLANT. ?

RIVULA Gn.

SERICEALIS Sc. Not common. Nemoral.

DISTRIBUTION—EAST. ♀ ♂ ♂ ♂ ♂ ♂ ♂ ♂
WEST. Solway Clyde ♂ ♂ ♂

LAT. 54°50′-56° RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. English.

TIME OF APPEARANCE.—IMAGO. June, July. LARVA. May. FOOD-PLANT. ?

BREPHIDÆ.

BREPHOS Ochs.

PARTHENIAS L. Local. Nemoral. Ascends to 1400 feet.

DISTRIBUTION—EAST. ♀ ♀ Tay Dee Moray ♀ ♂ ♂
WEST. ♀ ♀ ♀ ♀ ♂

LAT. 56°30′-57°40′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE.—IMAGO. March-April. LARVA. June-July. FOOD-PLANT. Birch.

B. nothum Hb. has been recorded from Moray; but as it so greatly resembles *B. parthenias*, and I have not seen examples, I hesitate to include it in the Scottish list.

EUGONIIDÆ.

RUMIA Dup.

LUTEOLATA L. (1758); *cratægata* L. (1761). Common. Agrestral and nemoral. Ascends to 1300 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde Argyle West-Ross o

LAT. 54°40′-57°40′. RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May-August. LARVA. June-April. FOOD-PLANT. Hawthorn, sloe, &c.

URAPTERYX Leach.

SAMBUCARIA L. Local. Nemoral.

DISTRIBUTION—EAST. ♀ [Forth] o o o o o o
WEST. Solway o o o o

LAT. 54°50′[-56′]. RANGE IN EUROPE. Central (South Sweden, &c). TYPE. Central. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. July. LARVA. September-June. FOOD-PLANT. Oak, elder, bramble, &c.

METROCAMPA Latr.

MARGARITARIA L. Common. Nemoral. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde ♀ West-Ross ♀

LAT. 54°40′-57°40′. RANGE IN EUROPE. Central (Sweden &c.) TYPE. Central. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. July. LARVA. September-May. FOOD-PLANT. Oak, beech, &c.

ELLOPIA Tr.

PROSAPIARIA L. (1758); *fasciaria* Schiff. (1776). Common in pine woods. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde ♀ ♀ ♀

LAT. 54°40′-57°40′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June-July. LARVA. September-May. FOOD-PLANT. Scots-fir.

The ab. *manitiaria* HS. (violet-ferruginous) has occurred in Dee (*fide* Tait).

(To be continued.)

THE COLEOPTERA OF SCOTLAND.

(Continued from p. 184.)

EDITED BY D. SHARP, M.B.

JUNCORUM Leach. Lowland. In sphagnum. Very local.

DISTRIBUTION—EAST. Tweed o o o o o o
WEST. Solway o o o o

[IMPRESSA Panz. Doubtful as Scottish.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

"Raehills, Rev. W. Little." Murray Cat.

PSELAPHUS Herbst.

HEISEI Herbst. Lowland. Rare. Among sphagnum.

DISTRIBUTION—EAST. ♀ Forth o o o o o o
WEST. Solway ♀ o o o

DRESDENSIS Herbst. Lowland. Extremely rare.

DISTRIBUTION—EAST. Tweed o o o o o o o
WEST. o o o o o

BYTHINUS Leach.

PUNCTICOLLIS Den. Lowland, highland. Not rare.

DISTRIBUTION—EAST. Tweed Forth ♀ Dee o o o o
WEST. Solway Clyde o o o

BULBIFER Reich. Lowland, highland. Common.

DISTRIBUTION—EAST. ♀ Forth Tay o o o o o
WEST. Solway Clyde o o o

CURTISI Leach. Lowland. Rare.

DISTRIBUTION—EAST. o o o o o o o o o
WEST. Solway o o o o

SECURIGER Reich. Lowland. Rare.

DISTRIBUTION—EAST. ♀ ♀ Tay o o o o o
WEST. Solway o o o o

BURRELLI Den. Lowland. Rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway Clyde o o o

EUPLECTUS Leach.

SIGNATUS Reich. Rare. In the nests of the wood ant.

DISTRIBUTION—EAST. Tweed Forth o o Moray o o o
WEST. o o o o o

SANGUINEUS Aubé. Rare. In decaying hay.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

KARSTENI Reich. Rare.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

AMBIGUUS Reich. Lowland. Rare. In moss.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

BICOLOR Den. Rare. Under bark of dead birch.

DISTRIBUTION—EAST. o Forth Tay Dee o o o o
WEST. o o o o o

CLAVIGER Preys.

FOVEOLATUS Müll. Very rare.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. o o o o o

SCYDMÆNIDÆ.

EUMICRUS Cast.

TARSATUS Müll. Lowland. Rare. In fermenting grass and hay.

DISTRIBUTION—EAST. Tweed o o o o o o o
WEST. Solway ∞ o o o

SCYDMÆNUS Latr.

COLLARIS Müll. In moss. Not rare.

DISTRIBUTION—EAST. Tweed Forth ∞ Dee o o o o
WEST. Solway ∞ o o o

PUSILLUS Müll. Very rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

EXILIS Er. Highland. Very rare. Under bark of dead trees.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o Clyde o o o

(To be continued.)

ZOOLOGY.

NOTES ON THE DISTRIBUTION OF THE COMMON JAY IN SCOTLAND.

By JAMES LUMSDEN, Jun., F.Z.S.

THE Common Jay *(Garrulus glandarius)* is a well-known bird in many parts of the continent, and is met with in nearly every county in England, both as a migratory and breeding species. According to Mr. J. H. Guerney,[a] it is a regular autumnal migrant to the eastern coasts.

In Scotland, however, its distribution is more local. Macgillivray gives its northern limit[b] "in the woods skirting the Grampians from Forfar to Dumbarton." But it appears to be somewhat extending its range, as it has occasionally occurred in districts north of that line. It has once been observed in Shetland,[c] and also in Caithness. In Orkney, however, we have no trace of it, and it is not mentioned by Mr. Low in his "Fauna Orcadensis." Neither have we heard of it ever having been observed in the Outer Hebrides, or any of the western islands.

In collecting the following notes, I have to express myself indebted to the many correspondents who have so kindly and readily answered my questions about the occurrence of the Jay in their respective districts. Besides those, I must specially mention the following gentlemen who collected and forwarded me information from various parts of the country: Sir George H. Leith; John Gilmour, Esq. of Lundin, Fifeshire; The Rev. James E. Somerville; Mr. Henderson, of Dundee; and the

a Harting's Handbook of British Birds, p. 32.

b A. G. More on "The Distribution of Birds in Great Britain during the nesting season."

c Birds of Shetland, p. 138.

late Mr. James Thomson, of the Kelvingrove Museum, Glasgow, who was still working for me when overtaken by his last illness. I am also more than obliged to Mr. J. A. Harvie Brown for furnishing me with the names of correspondents and also for thoroughly working up the Stirlingshire district.

CAITHNESS.—The only trace of the Jay we have been able to find in this county is a notice in Mr. R. J. Shearer's paper [a] on the Birds of Caithness, in which he states that the Jay is rare, "probably introduced."

SUTHERLAND.—Mr. John Crawford kindly informs me that, as far as he knows, the Jay has never been met with in Sutherlandshire. And my friend, Mr. J. A. Harvie Brown, who has paid much attention to the birds nesting in this county, omits the species in his recently published paper on the subject. [b]

ROSS-SHIRE, with which is included CROMARTY.—In Rossshire I am also unable to trace the species, although I have corresponded with several of the authorities on the natural history of the county. In fact, I consider that any Jays which may have been met with in the north of Scotland are only stragglers driven there by storms or by some other accidental cause.

NAIRN and ELGIN.—The Jay does not occur in either of those counties. Mr. M'Leay of Inverness, who has for the last 20 years done most of the bird stuffing in the neighbourhood, has never seen a Jay from Morayshire. Neither is the species mentioned by Mr. St. John in any of his interesting works on the natural history of the neighbourhood. Nor does the Rev. G. Gordon include the Jay in his "Fauna of Moray." [c]

BANFF.—Writing in 1856, Mr. Thomas Edward [d] says he has several times observed the Jay in various parts of the county. It must, however, have become much more rare of late years, as it is now seldom if ever seen. The last I have heard of was a pair seen in the neighbourhood of Banff in the summer of 1872-3, which fact was duly recorded in a local newspaper.

a Proceedings of the Royal Physical Society of Edinburgh, vol ii. p. 338.

b "Birds found breeding in Sutherlandshire." By J. A. Harvie Brown. Proceedings of the Nat. His. Society of Glasgow, vol. ii. p. 69.

c Zoologist, 1844, page 502.

d List of the Birds of Banffshire,, Zoologist, 1856, page 5273.

ABERDEENSHIRE.—Mr. George Sim, of Aberdeen, tells me the Jay is quite unknown in Aberdeenshire. It is also omitted in Macgillivray's list of birds of Deeside and Braemar[a]

KINCARDINESHIRE.—In the county of Kincardine Jays are rare. But I am informed on good authority, that at one time they were more common than they are at present.

FORFARSHIRE.—This is one of the few counties in which there is still a fair sprinkling of Jays. Mr. Henderson of Dundee, informs me that they are found in all the wooded districts of the county, especially in the north and east. But, as in other places, the gamekeepers are wageing war against them, and reducing their numbers year by year. In some districts however where it is unmolested the species is on the increase.

PERTHSHIRE.—In many parts of Perthshire the Jay is very common. Mr. M'Gregor, head gamekeeper to the Duke of Athole, writes, 8th July, 1875:—"There are plenty of common Jays about us, and they breed here. There are not quite so many as I have seen, as we kill a great many of them every year; but it is quite a common thing to see them." On the Castle Menzies estate, near Aberfeldy, they also breed every season. Mr. Harvie Brown, informs me that the species has within the last ten or twelve years, "increased its numbers in the valleys of the Tay and Tummel, especially in the latter, above Ballinluig, and in the neighbourhood of Aberfeldy." Mr. W. Cameron, in his list of the birds of Balquhidder,[b] notes the Jay as breeding in Strathyre Woods. In the North-East of the county they are met with but are on the decrease; and in the North-West they are very rare. Writing of the Jay from the neighbourhood of Auchterarder, Mr. J. A. Haldane, junior, of Cloanden, says, "at one time there used to be a considerable number, but now they are rare; I fancy from being killed down as vermin, and for the sake of their feathers for Salmon flies." Sir Thomas Moncreiffe states that a few breed every year at Moncreiffe, and that there are generally a few to be found in the Lynedoch Woods, near Methven. Colonel Drummond Hay tells me that about forty years ago the Jay was "abundant in the Carse of Gowrie, and various other localities in the vicinity of Perth, but from their being trapped, poisoned,

[a] Natural History of Deeside and Braemar, by W. Macgillivray, Edited by E. Lankester, 1855.

[b] Scottish Naturalist Vol. ii. p. 9.

and destroyed in every way by gamekeepers, their numbers are reduced, generally speaking, to a mere trifle; though in some places where game is not so strictly preserved in the Carse, a few may still be seen occupying the woods unmolested." There can be no doubt that, but for persecution they undergo, Perthshire would long continue to be one of the strongholds of the species in Scotland.

Inverness-shire.—I am indebted to Mr. M'Leay bird-stuffer, Inverness, for the following, written 19th January, 1875. "The Jay is considered a 'Rara Avis' in Inverness-shire. I have been in business here over twenty years, and so far as I know, only three specimens have been got. Two of these were killed two years ago in Glen Urquhart, on the north bank of Loch Ness. The third was killed last year at Grantown Strath-spey. I never heard of one being seen north of Inverness or in this neighbourhood." In the Moidart district, Mr, J. J. Dalgleish tells me, the species is quite unknown. Mr. Robert Gray has been informed *a* that it is only within late years that it may be occasionally seen about "Nether Lochaber, and north as far as Glengarry; along the woods skirting the Caledonian Canal, and about Lochiel's seat—Achnacarry."

Argyleshire.—In the central part of Argyleshire the Jay is not uncommon. But I am informed by Mr. Dalgleish, that it is not found further west than the estate of Airds. It is not so far as I can learn found on any of the Islands. On Loch Fyne side and in the Cowal district, it is not uncommon, but does not occur in Cantire, in the south of the county, and Ardnamuchan in the north.

Dumbartonshire.—The Dumbartonshire woods have been long known as a breeding place of the Jay. The "Jay Piet" is mentioned by the Rev. John Stewart in his list of the birds of the Parish of Luss. *b* In all the woods on the banks of Loch Lomond and Gare Loch, the Jay is very common, and during the autumn and early winter months, its numbers are much increased by migratory flocks. It breeds regularly in the county, although the nest is not easily found until the young are hatched and become noisy.

The number of the species is being reduced as in other counties by the gamekeepers of the district.

a Birds of the West of Scotland p. 187.

b Statistical account of Scotland 1796. vol. 17. p. 247.

STIRLINGSHIRE.—Mr. John A. Harvie Brown sends me the following notes on the Jay in this county:—

"The Jay is now an exceedingly scarce bird in the East of Stirlingshire but is more abundant in the West. In 1866, I recorded in the Zoologist[a] that it was rare even then, and at that time I had only once met with the nest in this part of the county; and in September 1867 I made further mention[b] of the Jay, as still lingering in the Dunmore woods, where it is difficult entirely to extirpate them, as accessions to their numbers take place from time to time from the woods on the opposite side of the Forth on the estates of Tulliallan, West Grange, &c. In the coppices and woods of Alva, on the south slope of the Ochils, the Jay is still found, but not numerously. Further eastward it becomes somewhat more plentiful. The Jay is well known by name to nearly every farm labourer in the east of the county, and at one time was equally well known by sight, but their decrease of late years, and almost total extirpation in some parts, is distinctly traceable to the persecution of gamekeepers."

CLACKMANNAN and KINROSS.—Mr. J. J. Dalgleish writes as follows:—"The Jay is by no means an uncommon bird in the district bounded on the south by the Forth, and lying between Alloa and Dumfermline as far north as the Ochil hills, but its numbers vary very much owing to their being at times nearly exterminated in certain parts of this district by game keepers; even in those parts, however, they are generally found in spring about the breeding season."

Mr. Miller, gamekeeper, Tulliallan Castle, reports that Jays are not rare in the woods of that estate and are found breeding, but that they have much decreased in numbers during the last twelve or sixteen years.

FIFESHIRE.—Mr. John Gilmour of Lundin, tells me the Jay is a very rare bird in that part of the "Kingdom of Fife." As before mentioned it is more common in the neighbourhood of Dunfermline and is also frequently met with in the north of the county and on the borders of Perthshire.

Mr. Robert Walker, writing of the Jay says[c] "This bird

[a] Zoologist S. S. p. 70. [b] Zoologist, 1867, p. 894.
[c] Scottish Naturalist, vol. i. p. 79.

which was not uncommon at one time, has now become rare in the east of Fife."

HADDINGTON-SHIRE.—Mr. A. Hepburn writing in 1843, notes the decrease of the species in East Lothian,[a] and Mr. Turnbull in his "Birds of East Lothian" says the Jay is[b] "rather scarce, used to be plentiful in Gladsmuir Woods."

Mr. R. Scott Skirving, in his examination before the committee of the House of Commons on wild birds' protection states that there are no Jays in the neighbourhood of his farm in East Lothian.[c]

The result of enquiries up to the present date shows that the species is yearly becoming more scarce in this country.

EDINBURGH and LINLITHGOW.—Lieut.-Colonel Wedderburn in his list of the birds found at Rosslyn and neighbourhood[d] marks the Jay as a common species. But it is rather rare in other districts. The birdstuffers of Edinburgh do not receive many from either of these counties. And this with a species of such marked plumage as the Jay is a strong proof of its scarceness. In Linlithgowshire it has very much decreased in numbers during the last twenty or twenty-five years; for at one time, I am informed, it was a comparatively common bird in the county, and now it is rarely seen.

LANARKSHIRE.—Mr. E. R. Alston writes, "In the upper ward of Lanarkshire the Jay is decidedly local. I have never seen it myself, but a few breed in some places, as at Blackwood and Darfen, in Lesmahagow parish. I have received it from near Bothwell," It is also found breeding in the Hamilton woods, but in very limited numbers, and is getting scarcer every year. Mr. Stewart of Murdostoun Castle writes me that neither he nor his gamekeeper—who has been on the ground for 9 years—has ever seen a Jay on that estate.

RENFREWSHIRE.—I have no note of the species having ever occurred in this county.

Mr. John Peebles, gamekeeper to Sir M. R. S. Stewart, writes "There are none on the Ardgowan estate, and there

a Zoologist, 1843, p. 370.

b Birds of East Lothian, by William P. Turnbull, pub. 1867, page 18.

c Report from the Select Committee on Wild Birds' Protection, 1873, p. 64.

d Scottish Naturalist, vol. i. p. 152.

have been none for twenty years at least; whether there were any before that I am unable to say."

Buteshire.—The Jay is not now met with in this county; but the "Jaepy" is included in the list of "fowls and birds abiding or coming in their seasons" in a manuscript account of the Natural History of Bute, written by John Blain, commissary of the isles, about the year 1800. [a]

Ayr and Wigton.—In the counties of Ayr and Wigton, the Jay is far from common, although a few pairs are sometimes observed. It has according to Messrs. Gray and Anderson [b] been much destroyed on account of its thievish habits.

In the New Statistical Account of the parish of Kilbirnie, Ayrshire, it is included in the list of rare birds of the parish by Mr. John Jamieson.

Kircudbrightshire.—In the county of Kircudbright the Jay is very rare, and I have been unable, after many enquiries, to find any trace of its breeding in the district. It is, however, possible that a few pairs may yet be found in the county.

Dumfries-shire.—The Rev. James E. Somerville, late of Langholm, kindly sends me the following information. He states, that the Jay does not occur in Langholm parish. In the parish of Canonbie, five miles below Langholm, "it is found, but not abundantly; a few pairs breed but it is not increasing." It is met with altogether in about seven or eight places in this parish which is of considerable extent. On the Springkell Estate, the Jay has not been seen for upwards of nine years; but it is reported to have been known at one time in that district. In the neighbourhood of Annan and in Hoddam parish, the species is also quite unknown.

Dr. Grierson of Thornhill informs me that "The common Jay has not been known in Nithsdale for a very long time—some forty or more years ago—but about that time I have heard it said there were a few."

Roxburgh and Selkirk.—I am informed by Sir George H. Leith, who has kindly made many enquiries for me, that there are no Jays in either of those counties. A gamekeeper in

[a] Geology of Arran, by James Bryce, M.A., LL.D., &c.—4th ed. p. 301.

[b] On the birds of Ayrshire and Wigtonshire. Proceedings of the Natural History Society of Glasgow. Vol. i. p. 294.

Selkirkshire remembers having trapped one thirty-five years ago, but there is no record of any having been seen since that time.

Peebles.—The Jay is, and has for some time been, very rare in this county.

In the New Statistical Account[a] of the united parishes of Broughton, Glenholm, and Kilbucho the Jay is mentioned as "seldom seen," and the same remark may be made of it at the present time throughout the county. Mr. Small, of George Street, Edinburgh, has occasionally but rarely had Jays sent in from Peebleshire.

Berwickshire.—At one time the Jay may have been common in Berwickshire, for in the New Statistical Account of the united parishes of Cockburnspath and Old Cambus it is mentioned that "In Penmanshiel Wood, Jays build in considerable numbers."

At the present time, however, it is very rare all over the county. The only recent record of the Jay I can find is in Mr. A. Kelly's notes on the birds of Lauderdale[b] where he mentions two having been shot in a wood in that district—one in 1874, and the other some years previously.

From the foregoing notes it will be seen that only in a very few counties can the Jay be now called plentiful; while in others, where at one time it was well known, it is rarely or never seen. In one thing correspondents seem to agree, that the cause of its decrease is the continual persecution by gamekeepers. Were it left undisturbed it would be certain to increase and distribute itself over the country—as it is doing in a few places where not killed down: the many young oak and fir woods yearly springing up, forming the very kind of shelter in which the Jay delights to nest. It is much to be regretted that this, one of the most lovely of our few bright coloured birds, should be driven from our land. But we cannot blame any one for not preserving them as they are a thieving race, whether they are found digging up, and eating the gardener's peas, breaking the carefully watched eggs in a pheasant covert, or clearing small birds' nests of their young.

a New Statistical Account of Scotland, pub. 1845.

b Proceedings of the Berwickshire Naturalists' Club, 1875, p. 304.

ILLUSTRATIONS OF ANIMAL REASON.

(Continued from p. 218.)

By W. LAUDER LINDSAY, M.D., F.R.S.E., F.L.S.

IN the last number of the *Scottish Naturalist* I endeavoured to show how rich a mine of information, concerning the moral and intellectual faculties of the lower animals, exists in the *Daily Newspaper Press*; and how this mine may be profitably worked by those competent to such an undertaking. To point out that this is even truer of the more permanent forms of the Serial Press,—that the nature and amount of the information which they treasure on the same subject are superior, and the reward of extracting their riches correspondingly greater,—is the object of the present paper, which relates to the valuation and value of *anonymous* articles on Animals and their habits in all kinds of *Serials*, from Weekly Magazines or Journals, such as Chambers's or "Once a Week," to ponderous Quarterly Reviews.

In the "Cornhill Magazine" for December, 1872, there appeared an anonymous paper—an excellent article equally instructive and interesting—entitled, "Dogs whom I have met." An inquiry at the editor, as to the authorship of the article, and the authenticity of its anecdotes, elicited the following courteous reply:—

"LONDON, *January* 19, 1873.

"The editor of the "Cornhill Magazine" presents his compliments to Dr. Lauder Lindsay, and begs to inform him that the writer of the paper—'Dogs whom I have met' is Miss Frances Power Cobbe; and he has no doubt but that the statements it contains are actual *facts*."

In the same year (1872) my attention was attracted by a still more admirable—again anonymous—contribution to the "Quarterly Review" for October, on "The Consciousness of Dogs." As usual I applied to the editor (who is also by the way, so far as I am concerned, anonymous) for the name and address of the author, but in this case without reply. It then occurred to me that Dr. John Brown of Edinburgh, the well-known Canophilist, and author of "Rab and his Friends," might know something of the authorship of such an article in so important a serial. My surmise proved correct. On application to him, he at once suggested the name of Miss Cobbe

as the probable writer of the paper. A communication to her —through the publisher of others of her works—forthwith elicited the following acknowledgment of her authorship of both the articles, that of the "Cornhill Magazine," as well as that of the "Quarterly Review":—

"26 Hereford Square, London, S.W.,
"*December* 4, 1873.

"Miss Cobbe is happy to answer Dr. Lauder Lindsay's inquiries. The articles in the 'Quarterly Review,' and in the 'Cornhill Magazine,' referred to by Dr. Lindsay, are by Miss Cobbe, and she has no objection to owning their authorship.

"There is also an article from 'Fraser's Magazine,' republished in Miss Cobbe's *Studies—Ethical and Social*[a]—on 'The Rights of Man, and the Claims of Brutes,' which may possibly have some interest for Dr. Lindsay.

"The *Confessions of a Lost Dog* is not a pamphlet, but a child's book—written for the Bazaar for the *Dog's Home*—and not worth Dr. Lindsay's attention."

The result is this, that everybody acquainted with Miss Cobbe or her numerous writings,[b] will at once admit her competency to observe and report on such a subject as the mental endowments of the Dog; and will accept her Facts, and perhaps also her inferences or opinions. Having carefully studied her two articles—above mentioned, on the Dog—and knowing, as I do, the character of her other published works, I can confidently commend her panegyric on that animal to the attention of all students of Mind in the Lower animals.

Fortunately these two essays are easily and cheaply accessible; for, last year Miss Cobbe threw aside her Anonymity, and republished the two papers in question (along with two others that appeared originally in the "New Quarterly Magazine" for March and October, 1874—entitled respectively "Animals in

[a] "Studies on Subjects New and Old—Ethical and Social": reprinted from "Fraser's Magazine." London, post 8vo., 1865. Chapter on "The Rights of Man, and the Claims of Brutes."

[b] These writings—so far as they relate to the mental faculties of animals—include:—(1) Minor articles—such as that on "Instinct and Reason" in the "Animal World," vol. i, p. 40: (2) Reprints of Major contributions such as:—"Darwinism in Morals and other Essays":—from the Theological and Fortnightly Reviews, and from Fraser's, Macmillan's, and other Magazines. London: 1872.

The most noteworthy chapter in the latter work relative to our present subject, is that on "The Evolution of Morals and Religion."

Fable and Art" and "The Fauna of Fancy")—as one of the volumes—published at one shilling each—of Messrs. Ward, Lock, and Tyler's, "Country House Library"—Miss Cobbe's volume bearing the title "False Beasts and True: Essays on Natural and Unnatural History." It is a most convenient and important little Manual: but without an *Index*—a serious defect to such a work. The "Fauna of Fancy" gives an account of Griffins, Dragons, Krakens, and other purely Fabulous animals.

Miss Cobbe is well known in England as the authoress of various Moral, Religious, and Social Works; and was long a member of the London Literary world as Leader-writer of the *Echo* Newspaper. Of her, Mary Somerville in her "Memoirs" (p. 305) speaks as "my dear friend and constant correspondent . . . . the cleverest, and most agreeable woman I ever met, and one of the best:" while she refers also (p. 359) to "all the energy of her vigorous intellect as a Moral Philosopher."

The practice now so common, on the part of publishers or authors, of reprinting—in one or more convenient and attractive volumes, under an author's proper name—series of articles that originally appeared anonymously in various Magazines or Reviews—among other advantages has this one—that it makes public the *Names* of many *Anonymous* writers, whose productions, and whose names deserve equally a better fate than the mere ephemeral popularity of a monthly or quarterly serial, whatever be the reputation of the latter. Miss Cobbe's is a case in point. But, other, even more pertinent, cases might be cited:—for instance, those of Frank Buckland and Dr. Wynter. The chapters of which Dr. Wynter's two volumes of "Fruit between the Leaves"[a] are composed, originally appeared, he tells us, in such serials as the *Edinburgh Review*, *Good Words*, *Pall Mall Gazette*, and the *Graphic*. The same probably is the case with the various popular Natural History Works by[b] Frank Buckland, editor of "Land and Water," in which Magazine no doubt many of his popular Zoological papers were first published.

a 2 vols. 8vo., London, 1875: contain chapters on:—(1) Clever Dogs; (2) Eccentric Cats; (3) Rats and their doings; (4) Were-wolves and Lycanthropy.

b For instance his "Curiosities of Natural History," of which there are several editions:—the last being the "People's Edition" in 4 vols., fcap. 8vo., illustrated; published by Bentley, London, 1872-4.

In November, 1872, there appeared in "Cornhill Magazine" what seemed to be a "sensation" article, entitled "An Ugly Dog." It read like a story or fiction. In doubt whether or not it really was *Fiction*, or how much of it was *Fact*, I applied to the editor for the name and address of the author. As on the previous occasion of Miss Cobbe's paper in the same Magazine, my application was promptly and politely attended to; and the author of the article himself, Mr. E. C. Grenville Murray, of No. 163 Rue de Lille, Faubourg St. Germain, Paris—wrote me in January, 1873, assuring me of the authenticity or veracity of the whole narrative—the singular mode of life, and the adventures, of a Blind and Dying Beggar's Dog. I had asked him whether the story was true—whether the narrative represented *Facts observed by the writer himself.* To which his reply was emphatically and simply "Yes." If I am not much mistaken, Mr. Murray is, or was in 1873, one of the Paris correspondents of the "New York Herald": he is a well-known correspondent of other leading newspapers—English as well as American; and is an English Litterateur long resident in Paris, the author of many brilliant papers, illustrating modern Parisian life, in "Cornhill."

In the "Field Quarterly Magazine and Review," for February, August, and November, 1872, there was published a series of articles, entitled—"Do Animals Think?" Once more I applied to the editor to ascertain the name and competency of the writer, as an observer and describer of Facts. Very promptly again the editor wrote me as follows:—

"11 Church Row, Hampstead, London, N.W.
"*January* 15, 1873.

"I enclose my card. I have the honour to edit the 'Field Quarterly Magazine,' and have employed a few (to me pleasant) hours in writing the sketchy articles, entitled—'Do Animals *Think?*'

"Arthur Nicols, F.R.G.S."

Of date January 30, 1873, he favoured me with a fuller communication, containing the following additional information:—

"My articles—'*Do Animals Think?*'—appeared in the 'Field Quarterly Magazine and Review' in February, August, and November, 1872, and there are no others in that publication on the subject. I have seen from time to time articles on

this subject in current publications. But they have been, for the most part, of so worthless a nature that I should not care to bring them under your notice. Certain writers are just as ready to credit animals with mental powers, which they do not possess, as others are to deny them all such faculties whatever. And both classes have no regard for the value of their *Facts*. I believe that there are *human* minds totally *incapable of appreciating the evidence* of the existence of mental faculties in animals. The want of *sympathy* between some human beings (and animals) is very marked. Such human beings I find also deficient in sympathy with their own kind. . . . My time is terribly occupied; but I will endeavour to give you any help by way of illustration that I can, if you wish it. Mr. Darwin has done me the honour to accept some Notes of mine on the habits of certain Australian species for future use. And I could give you some results of observation, if I could find time to put them into form."

In the preface to his series of Papers—*Do animals think?*—Mr. Nicols professes to record only "*Facts* drawn exclusively from *personal observation in Australia*. . . . . I pretend" (he says) "to give nothing but bare facts within my own knowledge, and have set them in the plainest language I can find. . . . . Every one of the cases, of what I believe to be simple *thought* in animals, ... has been observed by myself. And I can only guarantee that each will be carefully stated from Notes made at the time."

In other words, Mr. Nicols has had much experience of Bush life and Bush animals in Australia, and is one of those now numerous Traveller-Naturalists or Naturalist-Travellers, whose observations are of the highest value as Bases for Generalisation.

The "Animal World" is a monthly illustrated Folio—the organ of, and issued by, "The Royal Society for the Prevention of Cruelty to Animals." It was started in 1869: is now in its 7th volume, the first having been issued in 1870: has a circulation of at least 26,000 copies per month: costs 2d. per number, or 2s. 6d. per annual volume: is the avowed advocate of *Humanity to the Lower Animals:* and is published by Messrs. Partridge & Co., London, who are also publishers of a whole series of works illustrative of *animal sagacity*. The "Animal World" is intended for readers of all ages and classes and of both sexes. It contains accordingly a judicious mingling of Verse with Prose—of the gay with the serious—of anecdote or story with

argument. Its numerous engravings are by Harrison Weir and other well-known artists. It is specially suitable for circulation among teachers and school children; in school and popular libraries; and in general wherever it is desirable to inculcate feelings, and the practice, of *Humanity to Animals.* While many of its contributors and contributions are *anonymous*, or under mere *noms de plume*, others bear the names of the writers; and these names include the following that are more or less known in the world of Science, Letters, or Philanthropy:—The Bishop of Gloucester and Bristol; Bishop Claughton; The Rev. Edmund Gray, who writes in it a series of articles on "Animal Instinct and Intelligence"; The Rev. F. O. Morris, B.A. of Nunburnholme Rectory, Hayton, Yorkshire, the author of a well-known beautifully illustrated "History of British Birds," in 7 vols.; &c., &c.

In the number for February 1876 (p. 27), the Editor of the "Animal World," Mr Colam, who is so well known, in these days of Anti-Vivisection outcry, as Secretary of the Royal Society for the Prevention of Cruelty to Animals aforesaid, announces that "It has always been our study not to publish *unauthenticated Anecdotes.*" He complains that nevertheless "a few people disbelieve in our integrity," and he gives a case in point, in which Fun was literally made—by the periodical called "Fun"—of an anecdote headed "Intelligence of a Pig." "There is no need to maintain secrecy"—says Mr. Colam—"as to the Name of the witness of the singular conduct of that clever Pig. . . . The writer of the paragraph was an eye-witness of the act described, and he is a gentleman and a clergyman, whose name shall be forwarded to any inquirer."

I had not myself occasion to call in question the truthfulness of the recorded feats of this Learned or Clever Pig; but I had occasion to make inquiry regarding the accuracy of certain statements in the "Animal World," by an anonymous writer, as to the Intelligence of a *Parrot.* Mr. Colam's reply, which was prompt and satisfactory, was as follows:—

"Office of "The Animal World," 105 Jermyn Street,
"St. James's, London, S.W., 14th April, 1874.

"The Editor presents his compliments to Dr. Lauder Lindsay, and begs to say that, having received the consent of the author of 'Reminiscences of a French Parrot,' he is now enabled to forward name and address of such writer, which is as follows:—

"Miss Knox, 48 Havelock Road, Hastings.

"Miss Knox states that she will have much pleasure in answering any questions Dr. Lauder Lindsay may wish to ask her.

"The Editor takes this opportunity to thank Dr. Lindsay in advance for his promise to recommend *The Animal World*. Nothing is inserted in its pages unless received from respectable or reliable sources."

That wonderful, evergreen "Chambers's Journal"—a serial that was virtually the forerunner or pioneer of all our best cheap serial literature, and which still maintains, notwithstanding its age and the competition to which it is subjected, its high character, continuing its weekly issue from that Edinburgh Publishing house that has done so much for the spread of popular literature of a proper kind—abounds in anonymous articles, of varying value, illustrative of the mental aptitudes—the character or disposition—the habits or mode of life—of animals. Here, for instance, are some of them:—

(1) "The Talking Bird;" a most instructive account of a well-known Edinburgh Parrot: Number for October, 1874.
(2) "Our Coon:" in the Number for March 15, 1873.
(3) "About Dogs:" Number for June 21, 1873.
(4) "Animal Volunteers;" describing the mental peculiarities of a number of Regimental Dogs and other Regimental Animal Pets: Number for April 24, 1875.
(5) "Trap-door Spiders:" Number for March 8, 1873.
(6) "About Spiders:" Number for April 10, 1875.
(7) "The Cuckoo and the Nightingale:" Number for July 8, 1865.

Some of these papers, for instance No. 5, are written by the head of the firm of W. &. R. Chambers himself—Dr. William Chambers—who signs them with his familiar initials, *W. C.*, and so vouches for the authenticity of their contained anecdotes.

Writing me on December 23, 1873, Dr. Chambers informs me that "the writer of the article, 'Our Coon' (No. 2 in the foregoing list), was Mr. D. Kerr, 34 Regent's Park Road, London."

Regarding the truthfulness of the remarkable statements made in No. 1, as to the sensible conversational powers of a *Parrot*, I preferred satisfying myself by personal inquiry, in Edinburgh, in the summer of 1875. I saw the master of the animal, a well known Photographer in Princes Street. He in-

formed me that the gentleman who "interviewed," for the press the Parrot and its doings, in other words the writer of the paper (No. 1) in Chambers's Journal, was a clergyman whose name and address he gave me. I visited the Mistress of the Bird—the Photographer's mother—in her Country quarters; and I saw the Parrot for myself. From all that I heard and saw, I had no difficulty in coming to the conclusion, that the clerical writer had given a faithful account of the Bird's performances; and that these Talking feats of the Parrot—a plain looking grey one—well deserved being placed on record. [a] I was myself struck in particular with the following features in the character of what may conveniently be called the *Truefitt Parrot*, from the name of its owners :—

(1) Its *apròpos* remarks are notorious. Instances were given me by (*a*) Mrs. Truefitt—the animal's mistress, whose pet it especially is, who has trained it, and with whom it habitually lives; (*b*) her daughter, Miss Truefitt, an artist in colours; (*c*) her son, Mr. Truefitt, the Photographer aforesaid; and (*d*) Mr. Nisbet, who was, at the time of my visit to the country quarters of the family at Cramond, a lodger in the house, and had his easel fitted up in the same room occupied by the Bird—the kitchen. Its appropriate remarks had reference to such commonplace events as dinner; its master's home-coming in the evening; going to bed of the family; and the entrance of strangers, before whom it is shy and taciturn, but observant. I was unfortunate in seeing the Parrot shortly before the dinner hour, and when he had been taking a forenoon nap; and for other reasons he was not, on the occasion of my visit, at all in a demonstrative mood, disposed to show himself off to advantage, which he can do, and knows he can do.

(2.) His wonderful Mimicry of the cat, dog, cock, and human voice, including whistling and singing. There could be no doubt of the distinctness of his Articulation.

(3.) His successful Deception of the family dog "Jack." The parrot cheats him constantly by his whistle, which Jack obeys or answers.

a This gentleman described for instance how the Parrot called his master; ordered the servant "with an air of authority;" made enquiries "in a most pathetic voice," and requests "in a most affectionate voice," or uttered exclamations "in a waesome manner;" cajoled, scolded, hurrahed; and exhibited joy unbounded on the appearance of his favourites.

(4.) His hearty Laughter at his own Practical Jokes, such as suddenly biting unwary and admiring strangers.

"Jack," The Truefitt Spaniel, is also a "character" in his way, exhibiting many of the typical Feats that are performed by trained intelligent dogs. For instance—

(1.) His patience, obedience, and Self-control—a distinct knowledge of what is permitted, and what forbidden, and in that sense of Right and wrong—are illustrated by his sitting on his hind legs in a begging attitude, with a piece of biscuit on his nose for any length of time, not eating it till permission is given, and allowing another bit of biscuit to lie before it within easy reach, or to be snapped up by other dogs before his face, without moving or remonstrance.

(2.) His knowledge of Number, or at all events of signs; barking once if one finger of his master is held up; twice, if two; thrice, if three, and so on—to what limit, however, I omitted to inquire.

(3.) His recognition of Differences in personality, and his corresponding very different behaviour to his master and to strangers.

The "New Moon," for November, 1873, a monthly 4to. published in Dumfries, contained a short anonymous account of the doings of "An Eccentric Starling." The editor, Dr. Gilchrist of Dumfries, to whom I put the usual question whether, and how far, the Facts recorded were true, replied, of date November 25, 1873,—"As to the Starling every word is *literally true*, as I am ready to swear before a Justice of the Peace."

A common and instructive feature now-a-days of all the better classes of serials—newspapers included—is their *Reviews* of works of Natural History or Zoology, by competent critics, whose comments are frequently as valuable as the quoted observations of the authors criticised. In other words, such Reviews, which are themselves also anonymous, frequently embody much valuable original information of a thoroughly trustworthy kind. This sort of Reviewing is prominent occasionally in Chambers's Journal—for instance in the notice of Dr. Saxby's "Birds of Shetland," in the Number for October, 1874; and it is no less characteristic of the "Daily Telegraph" and other newspapers, as of the "Quarterly" and other Reviews.

(To be continued.)

ANIMAL PSYCHOSIS.

(Continued from p. 212.)

By the Rev. J. WARDROP.

JESSE of Selborne says: "There is not a faculty of the *human* mind of which some evident proofs of its existence may not be found in *dogs*." The author of "Rab and his Friends" and "Our Dogs," asserts, "I differ from Professor Ferrier in thinking that the dog has the *reflex eye*, and is a *very knowing being*." Now, in such men all this is very beautiful. In them it is all in a sense quite right. In the face of anything that these standard enthusiasts may find it good to say in filling up their glowing pictures, one can hardly have the heart either to argue or to disbelieve. But we protest against the ordinary run of scientists being allowed any such privilege. *They* must keep vigorously to facts and logic. How should Mr. Huxley be allowed to set down this—"I may add the expression of my belief, that the attempt to draw a psychical distinction between the animal world and ourselves is futile, and that even the highest faculties of feeling and intellect begin to germinate in lower forms of life;" and then in the same breath to define "*ourselves*' as "the only consciously intelligent denizens of this world!"—(Man's Place, pp. 109-110). Is the presence or absence of "conscious intelligence" of no account as a distinction? Such treatment will not further the solution of our problem.

Dr. Lauder Lindsay, after a laborious investigation into the mental manifestations of the animal world, arranged under *twenty-nine* headings, and embracing an immense array of facts and authorities, comes as we have already seen, to the conclusion, that "there is no essential distinction between man and other animals." I would beg to make the following remarks on this conclusion, and on the logic by which it is supported.

1. Is there not a one-sidedness in the citation of authorities for facts and opinions, observable all through the paper? For instance, under the difficult heading "Abstraction," we have cited "*a recent reviewer*," whose complexion is very apparent from his words, *Milne-Edwards*, and *Maudsley*, who is a constant authority under all the headings; but we have not *John Locke*, who first strongly signalized this faculty in the discussion; nor John Müller, the most philosophical of physiologists; nor

Max Müller—all of whom give a very different sound from the chosen three. Again, under the heading "Moral Sense," we have Maudsley, Leroy, Menault, Chambers's Encyclopædia; it is needless to repeat the names we might have expected here, either added, or, better, substituted. 2. The competency for psychological discussion displayed, is just what is so frequently and so easily at the command of even the foremost naturalists and biologists of the day—such as Darwin. The true mental philosopher has good reason to retort the demand for "experts" so loudly made by these scientists. I instance what is said under the heading "Moral Sense," especially *in fine.* May I not instance the number of the mental rubrics themselves—*twenty-nine*, or at least their *co-ordinate* arrangement? 3. The conclusion of the writer, *as a fact*, is opposed by many considerations, some of which have been dwelt upon above, and which go to establish a different view, but which have not had due or even any attention in the discussion. 4. As an *inference*, Dr. Lindsay's conclusion does not exhaust the facts alleged in the line in which it interprets them. If they can be of force to establish such a conclusion at all, they will avail to advance us a good stage further; for (*i.*) the facts alleged show that the same kind of mind which is manifested in the higher animals, is found to be present as far as we can trace down the series. There is scarcely one of the twenty-nine classes of mental phenomena that Dr. Lindsay does not find in the lowest as well as in the highest animal races—in the flea and ant as well as the dog and elephant. Dr. Carpenter has minutely observed and described the beautiful architecture of the *Foraminifera.* If he had been as able to observe the process of building as he has the finished work, analogy leaves no doubt but that he would have found that the foraminiferous speck of protoplasm is as competent to repair mishaps in its work, to adapt itself to sudden emergencies, to occurrent difficulties, and in every way to suit its instincts to circumstances, as is the bee or the beaver. It is one mind that is at work all through the animal sphere. (*ii.*) If this mind is shown by the facts to be "*of the same nature as that of man*," it is incontestable that they also show that, in the degree of its powers, it, at many points, *surpasses* the mind of man; and accordingly man comes to play the part of the lower animal to those brute superiors; and not only so, but the lower to the lowest. Dr. Lindsay's premises, if they carry him the length

he goes, are sufficient to carry him thus farther. Those who do not interpret the facts to the identity of the animal and human mind, are of course not put to difficulties by the instances of greater mental perfection displayed in the animal world. These instances, in fact, are of themselves sufficient to discountenance utterly the idea of sameness of nature, while, in other directions, in the words of Bacon (Advancement of Learning, Bk. iv. chap. 3), "There are many excellencies of the human soul above the souls of brutes, manifest even to those who philosophise only according to sense. And wherever so many and such great excellencies are found, a specific difference should always be made. We do not, therefore, approve that confused and promiscuous manner of the philosophers in treating the functions of the soul, as if the soul of man differed in degree, rather than species, from the soul of brutes, as the sun differs from the stars, or gold from metals." Dr. Lindsay's conclusion cannot stand on the premises. What kind of soul, positively, the animal has, since it specifically differs from the human, it is hard to say. All we can say is, man has a soul that is a self or personality. The animal has a soul that is not a self. We have got a negative position. But we are without a positive. The abyss remains. The mystery is unsolved. We may see a little farther, or a little more clearly into its depths. To search the bottom seems meanwhile hopeless.

It might have been surmised that we had drawn the line between matter and mind too low, and been unjust to material force and its capabilities in supposing them not competent to evolve the phenomena of the animal world with which we are dealing. But though we were to draw the line higher, it does not appear that we could ever be permitted to strike it so high as that all animal psychosis could be reduced within the range of material force. There are animal manifestations such, that we have no analogy, nor evidence or ground of any sort to permit us to lay at their root aught but a psychical principle—a soul. There may, however, be souls and souls. One soul may differ from another soul in kind and quality. And then, if function is to be allowed to be a chief determinant of biological distinctions, must we not fall back, with Geoffroy St. Hilaire, Isidore St. Hilaire, Goodsir, and Quaterfages, on the position that human beings, "a community of persons," constitute a *kingdom*, distinct from that mere aggregate of sensitive

or conscious units that forms the animal kingdom? (Goodsir 1, 210, 274, 282).

What further is to be done in travailing in the difficult task of explaining the animal soul is plain enough. We have to *observe*; and we have to *interpret* our observations. We have to go on just much as we have been doing. There is no other method. Only, it is to be remembered that the field of observation is not the world of animal action alone; nor is it that world *first*. Unless we enter that territory furnished with adequate and accurate observations of the world of human intelligence and action, we shall enter it to no purpose, or only to blunder. "As the facts of human psychology," says Goodsir, "are attained by a process of self-examination, it is evident that we can only investigate comparative psychology by an indirect method. Nevertheless, as we can compare the combined instinctive and rational elements of our own human economy, so we may, with confidence, conduct our indirect comparative psychological investigations under the control of our own experience." It is the same rule that holds elsewhere, that holds here. We must, if we are to philosophise *beyond* ourselves at all, philosophise at least *from* ourselves outward. Hence, whenever we deal with beings of the same mental nature with ourselves, this rule makes the accurate philosophy of the investigator's own mind at the same time the accurate philosophy of the minds which he is investigating. But when we come, in the application of our rule, to deal with beings that present mental variation from ourselves, we encounter difficulty from the conditions and limitations to which the rule is then necessarily subject. Thus is it in the case of animal psychosis. Nevertheless, it is the application here of the only rule possible to us anywhere, that conditions the very possibility of a comparative psychology. In the direction of this topic, Mr. Douglas Spalding makes two statements that provoke animadversion. He says, "in its fundamental principles the science of mind must be the same for all living creatures." (Nature, vii. 229). The answer is, undoubtedly, provided the mind of all living creatures is the same. But that is the question that may be to be settled; and it will not do to beg it. Mr. Spalding then adds: "farther, if man, as is now believed, be but the highest, the last, the most complex product of evolution, a system, professing to be an analysis and exposition of his mind, yet confessing itself incompetent to deal with the necessarily simpler mental processes of

lower creatures, must surely feel itself in an uncomfortably anomalous position." The answer is, not at all. Even granting man to be all that is here said of him, it might yet not be the case that the mental processes of lower creatures would be more easily dealt with than his more complex ones; for though the human abyss were the deeper, yet if you had a line, long and ready, wherewith to plumb it, it might yield its secret more readily than the shallower mystery which you were less happily provided for fathoming.

Thus it is willing, keen, impartial observation of human nature that lays the foundation of our only hope of ever seeing to the bottom of the *anima brutorum*. And, other things being equal, the best metaphysician—*pace* the naturalists and physicists—has the best chance of seeing that length first.

(Concluded.)

OUTLINE DESCRIPTIONS OF BRITISH COLEOPTERA.

(Continued from p. 226.)

By Rev. T. BLACKBURN, B.A.

8. A moderately el. species. Very finely punc. Pale test. Disc of th. dusky. Sut. and 4 lines on e. (rarely reaching ba. or ap. and gen. interrupted) dusky or b. 1¾ l. B.[N.] . . . . novemlineatus

   A short globose species. Very finely punc. and spar. sprinkled with large puncs. H. and th. reddish. E. very pale test.; the sut. and 4 lines on each e. (not reaching ba. or ap., often more or less confluent) b. 1½ l. B. . . . . confluens

9. A dist. str. on each e. close to the sut. is obs. near ap. . 10

   This str. runs consp. to ap. Finely pub. and punc. B. Th. paler. Legs, a fasc. near ba., and some marks near mar. and ap., of e. test. The continuation on e. of ba. fov. of th. shorter than th. itself. 1 l. E. . . . . geminus

10. Very finely punc. B. An., h., legs, and 3 fasc. on e. (not reaching sut.), test. Continuation on e. of ba. fov. of th. much longer than the th. itself. A long parallel species. ¾ l. E.[S.W.] . . . *minutissimus*

    Very finely pub. and punc. Pit. Disc of th. and gen. some markings on e. obsc. test. Continuation on e. of ba. fov. of th. much longer than th. itself. Not a parallel species. 5-6ths l. E.[E.S] . . *unistriatus*

11. Narrow, el. species. Less than 1½ l. . . . 12

    Not as above 13

12. Spar. and dist. punc. and pub. B. Ba. of an., and 2 lines on each e., yellow. 1 l. E. . . granularis

- - very finely punc. and pub. B. Legs, ba. of an., mar. of th., and 4 more or less interrupted lines on each e., yellow. 1⅛ l. E. . . . flavipes

13. Ap. half of an. entirely dusky or b. 14
Not as above 15

14. Tar. consp. b. Densely pub. Finely punc. B. Fem., tib., ba. of an., and some irreg. fasc. on e. (not reaching sut.) consp. yellow. 1½ l. E. S. I. lepidus
- not consp. b. Obs. pub. Spar. and dist. punc. Pit. Legs, h., th., and ba. of an. paler. A yel. line runs down disc of each e., forming a large blotch at ba. and near ap. ; r.-m. yel. 1 l. E. S. I. . . pictus

15. Length not less than twice width. Sides moderately rounded 16
- less than twice width. Sides strongly rounded. Ind. punc. Test. Disc of th. gen. darker. Disc of e. with a large b. blotch (often leaving only ba., mar., and some spots near ap., test. ; sometimes in the form of 5 b. lines). 1⅜ l. E. S. I. . . rivalis

16. Spar. and faintly punc. E. widest *in fr. of* mid. Test. A V-shaped mark on h., some marks on th., and about 7 lines on e. (seldom reaching ba. or ap. and often confluent), b. 2 l. B.N. . . Davisi
Very like prec. E. widest *at* or *behind* mid. H. gen. without the V-shaped mark. A shorter insect, less pointed behind. 1⅜ l. E. S. I. . . . septentrionalis

17. Th. contr. at ba.; or, its ba. angs. very obt. or rounded ; or both. 18
Not as above 21

18. E. with a small tooth just before the ap. . . . 19
E. not as above 20

19. Th. dist. contr. in fr.; its ba. angs. rounded. Very finely punc. and pub. Test. Ap. of an., 2 spots at ba. of th., 6 lines (more or less confluent) on e., and the tar., b. U.-s. finely punc. 1¾ l. B.N. . assimilis
Very like prec. Th. hardly contr. in fr. The b. color of the lines on e. is gen. more suffused, and there are gen. 6 consp. large pale blotches on each e. 2¼ l. E. S. I. . . . . depressus

20. Resembles *assimilis*. The dark marks on th. are on disc. Th. contr. in fr., rectang. at ba. U.-s. coarsely punc. 1¾ l. E.C. . . . *halensis*
Very finely punc. and pub. Th. as wide in fr. as at ba.; ba. angs. obt. H. test. Th. test.; ba. and ap. dusky. E. b., with 6 (often less) test. spots. duodecim-
Legs and an. test. 2½ l. E. S. I. . . [pustulatus

21. - - - - -. B. Sides of h., sides and centre line of th., ba. of an., legs (exc. tar.), and some irreg. lines on e., test. Varies to unic. test., with back of h. dusky. 1¾-2⅛ l. S.N. . . . . griseo-striatus

Strongly pub. Ind. punc. Brown. H. th., an., legs, mar. of e., and 4 more or less dist. lines on each e., test. 1⅔ l. E. S. I. . . . lineatus

22. E. simply punc., or with some *rows* of larger puncs. . . 23
Very finely punc., and spar. sprinkled with large coarse puncs. Densely pub. R.-brown. Fr. of e. paler. ♀ with a smooth keel near ap. of e. A broad species. 2⅛ l. B.[N.] . . . . . *latus*

23. Th. and fr. part of h. unif. b. or pit. b. An. not unif. pale 24
Not as above 29

24. Legs r. or test. (wide species with more or less rounded sides) 25
B. Legs and an. pit. or b. Fem. and ba. of an. reddish. Spar. and coarsely punc. Ba. angs. of th. strongly obt.; its mar. very faint. E. consp. el., parallel, widest behind mid. 1⅛ l. B.[N.M.] . . atriceps
Resembles prec.; still more parallel; less strongly punc.; the th. strongly mar. Fr. legs r. 1⅝ l. S. *longicornis*

25. Puncs. on e. fine deep and close . . . 26
- - - coarse, shallow and spar. B. Legs and ba. of an. r. Disc of th. gen. almost impunc. A short species; hardly pub.; sides little rounded. 1¼ l. E. S. I. . . . . nigrita

26. Very spar. pub. H. and th. b. E. dusky, with more or less of well def. yel. markings at ba. and mars. Sides strongly rounded. 1⅔ l. E. S. I. . lituratus
Very pub. No *well def.* markings on e. . . 27

27. Less than 1⅝ l. 28
More than 1⅝ l. E. rather long, dark brown, gen. paler at ba. and mars. Sides moderately rounded. 1⅞ l. E. S. I. ! ! . . . . . planus

28. Extremely like prec. Narrower. Color of e. varies from rather darker to unic. test. 1½ l. E. S. I. ! melanocephalus
Resembles prec. E. shorter, a little more closely punc., unic. b. Sides more rounded. 1½ l. B. . *discretus*

29. Th. and e. b. An. entirely test. r. 30
Not as above 32

30. H. more or less reddish. Legs r. Puncs. on disc of th. very obsc. E. with only obsc. traces of rows of larger puncs. Sides very parallel. Front tib. of normal form. 31
Colored as above. Puncs. on disc of th. fine but very dist. E. rather closely punc.; rows of larger puncs. pretty dist. Sides rounded. Front tib. very short and broad. 1½ l. E. S. I. . . . celatus

31. E. spar. and rather coarsely punc. A wide insect. 1⅝ l. E.[S.] . . . . . *melanarius*
E. very spar. and finely punc. Narrower and duller than the above. 1⅜ l. E. S. I. . . monticola

Puncs. on e. all well def., and spar. (i. e. spaces between puncs. much larger than the puncs.) . . . 33
Not as above. 40
33. Disc. of th. almost or quite impunc. 34
Entire surface of th. dist. punc., though often more finely and less thickly on disc. 37
34. More than 1⅓ l. 35
Not more than 1⅓ l. 36
35. Shining. El. Sides parallel in fr. ⅔, then much contr. Finely and spar. punc., with some *very* fine puncs. consp. mingled. H. and th. reddish or b. An., pal., legs, mars. of th. (often), and e. (especially in fr.), reddish. 2¼ l. E.[N.] . . . *oblongus*
Colored much as prec., but duller and paler. Broader, and less contr. behind. Much more strongly punc. 1⅔ l. B.[N.] . . . . . *obsoletus*
36. Widest part of e. (which are rather parallel) hardly wider than ba. of th. Dark brown. H., th., legs, and ba. of an., paler. Ap. of an. b. E. strongly and rather closely punc. An. short and thick. A rather wide species. 1⅓ l. E. S. I. . . obscurus
- - - - (- have gently rounded sides) dist. wider than ba. of th. Brown. H., th., ba. of an., and legs, gen. paler. E. strongly but not closely punc. An. rather long and slender. ⅞ l. E.[N.] . . Scalesianus
37. E. unif. punc. or with only slight traces of rows of larger puncs. 38
- each with 2 dist. rows of puncs. larger than the rest. Pit. b. An., legs, and often h. and mars. of th., reddish. Ap. of an. often dark. Not pub. Finely and spar. punc. A consp. row of puncs. across fr. of th. ♂ shining, ♀ dull, and much less spar. punc. 1⅞ l. E. S. I. . . . . memnonius
- - - - - - - - -. Broad, flat and parallel. Not very shining. E. very strongly and rather thickly punc. R.; palest about ba. of e. 1⅞ l. B. . . *ferrugineus*
38. Mars. of th. cons. paler than disc. . . . 39
Narrow, el., rather strongly punc. Hardly pub. H. dusky, paler in fr. Th. b. E. dark brown. Legs and ba. of an. reddish. 1½ l. E. S. I. . . tristis
Very like prec.; often paler in color. Rather narrower. An. longer. E. more dist. contr. at ba. Th. with dist. rounded sides. Sides of th. often obsc. r. 1¼ l. E. . . . . neglectus
39. Rather el.; sides gently rounded. Very strongly punc. Hardly pub. Pit. r.; fr. of h. and sides of th. paler. 1⅔ l. E.S.I. ! . . . . . Gyllenhalli
40. Th. widest about ba. 41
- - cons. in fr. of ba. Rather el. and flat. E. much wider than th. Pub. Very closely and finely punc.

Dark brown. Legs, mars. of th., ba. of an., and mar. and often fr. part of e., r. U.-s. obsc. r. 2¼ l. E. . . . . dorsalis

41. Side mars. (at least) of th. broadly r. or test. . . 42

El. Very conv. Spar. Pub. Strongly and rather closely punc. H. reddish. Th. b. (mars. sometimes very narrowly r.). E. brown, paler at ba. and mars. Legs and ba. of an. r. Ap. of an. pit. Mar. of th. broad. 2⅓ l. B. . . . rufifrons

El. Rather flat. Pub. Closely and very finely punc. Colored much as prec. Mar. of th. very narrow. 1¼ l. E. S. I. . . . . umbrosus

42. Hi. half (at least) of u.-s. of th. b. 43

\- - of u.-s. of th. for the most part test. . . . 44

43. El.; widest behind mid. Very conv. Densely pub. Strongly and closely punc., exc. disc of th. which is almost impunc. H., legs and ba. of an. test. Th. and ap. of an. b. E. brown. Sides of th. and ba. of e. paler. ♀ often duller and more finely punc. 1¾ l. E. S. I. ! . . . . erythrocephalus

Resembles prec. in shape; flatter, and narrower behind. Whole surface very much more finely, closely and evenly punc. H. and th. b. Mars. of th. widely test. E. brown, widely test. at ba. Legs and ba. of an. more or less test. 2 l. E.[s.w.] . . *marginatus*

44. Th. or e. or both (exc. in extreme vars.), with dist. markings 45

Pale brown. E. and ap. of an. darker. H.-b. blackish. Disc of th. often a little dusky. El., narrow, pub. Thickly and rather strongly punc. A rather well def. ba. fov. on each side on th. 1½ l. B. . angustatus

45. El., narrow, very pub. Thickly and very faintly punc. Th. with no dist. ba. fov. H., legs and ba. of an. test. Th. pale brown; disc dusky. E. blackish; ba., mars., and ap., more or less marked with clear yel. (Varies from almost b. with fr. of h. and sides of th. test., to unif. pale test.) 1⅝ l. E. S. I. ! ! . . . . . palustris

Very like prec. Shorter and broader, with more rounded sides. Darker in color, especially the e., which have only the ba. and mars. narrowly pale. 1⅝ l. B. . . . . vittula

Extremely close to *palustris*. Broader, with more rounded sides. Less pub. (especially th.), more shining. A little less faintly punc. Colored much as *palustris*, exc. that the pale markings on e. are not well def. 1¾ l. B.[N.] . . . . *incognitus*

Fourth family—DYTISCIDÆ. (9 genera.)

1. Sc. obs. 2

\- well def. 3

2. E. sprinkled with large coarse puncs. . . . Noterus
   Not as above . . . . . Laccophilus
3. One of the 2 claws of the hi. tar. consp. longer than the other 4
   The claws of about equal length 7
4. An. short and stout (hardly, if at all, longer than h. and th.). Body extremely conv. The shorter claw on hi. tar. cons. more than ½ longer one. . . Ilybius
   Not as above. 5
5. Th. not dist. punc. 6
   - thickly and consp. punc. Ant. tar. of ♂ much as in *Hydaticus*. E. of ♀ with consp. hairy furrows. . Acilius
6. Claws of ant. tar. hardly, if at all, shorter than ap. j. of ant. tar. Ant. tar. of ♂ with, at most, *moderately* dilated js. . . . . Colymbetes
   - - - - consp. shorter than ap. j. of ant. tar. Ant. tar. of ♂ with 1st 3 js. many times wider than 4th. . Hydaticus
7. Less than 6 l. 8
   More than 6 l. Ant. tar. of ♂ as above (in *Hydaticus*). E. of ♀ gen. with some deep furrows. E. of ♂ with 3 rows of consp. puncs. . . . . Dytiscus
8. The ba. 3 js. in interm. tar. of ♂ strongly tr. . Leiopterus
   Not as above . . . . . Agabus

Noterus.

Reddish. E. darker. Smooth and shining. E. with 3 irreg. *rows* of puncs. Breast flat. Js. 5 and 6 in an. of ♂ very tr.; the rest much narrower. 1¾ l. E. . . . . clavicornis

Very like prec. Larger and paler. E. with irreg. coarse puncs. not in rows—most puncs. near ap. An elev. keel on breast. J. 5 in an. of ♂ very wide, 6-10 narrower, 11 very narrow. 2 l. E. . . sparsus

Laccophilus.

1. Well def. pale markings *across the ba.* of e. . . . 2
   U.-s. test. Smooth, shining. H., th., an., and legs, test. brown. E. gen. darker; along each side mar. 4 greenish test. spots, which are often ind. or obs. Th. much prod. backw. in mid. of ba. 2 l. E. S. I. minutus
2. Very like prec. The markings dist. and, in addition, some irreg. ones of same color across ba. of e. Ba. of th. hardly prod. backw. 2 l. E. S. I. ! . hyalinus
   Narrower than prec. 2. B. or nearly so. An., legs, th. (exc. ba. and fr.), and some markings near ba. and ap. and on mars. of e., very consp. yel. U.-s. brown. Ba. of th. hardly prod. 1⅔ l. E.s. . variegatus

Colymbetes.

1. E. finely wrinkled transversely. Brown. Fr. (and some marks on disc) of h., side mar. of th. and e., and gen. the tib. and tar., test. On disc of e. 3 more or less dist. rows of puncs. 7¾ l. E. S. I. ! . fuscus

Not as above 2

2. E. test. very closely sprinkled with b. (exc. on sut. and mars.) 3

Dull b. An., pal., the fr. legs, and fr. of h., test. Mars. of th. often r. Narrow. El. E. each with 3 ind. rows of punc. 5 l. E. . . . Grapei

3. Disc of th. marked with b. 4

- - - without b. markings. 5

4. Test. H. and disc of th. marked with b. E. very closely sprinkled with b. Legs r. or pit. r. U.-s. b. A broad flat species, with strongly rounded sides. Fr. claws of ♂ not lengthened. 5½ l. E. . pulverosus

- H., and ba. (often) and disc of th., marked with b. E. sprinkled with b. Legs r. U.-s. b. with test. or r. markings, or vice versâ. Conv. Rather narrow. Sides little rounded. Fr. claws of ♂ lengthened, one much longer than the other. 5 l. B. notatus

5. U.-s. (at least principally) b. Fr. claws of ♂ lengthened. 6

Test. Ba. of h. and ba. of th. often dusky or b. E. sprinkled with b. Legs and u.-s. test. Fr. claws of ♂ gen. very much lengthened. Shaped much as *notatus*. 5 l. E. S. I. . . . . exoletus

6. Test. Ba. of h. and ba. of th. b. E. sprinkled with b. Legs test. U.-s. b. Segments of h.-b. often mar. with r. Shaped much as *notatus*. 5 l. B.N. . bistriatus

Test. Ba. of h. and ba. of th. often b. E. very closely sprinkled with b. Legs test. U.-s. b. Segments of h.-b. mar. with test. Breast test. in mid. A short broad species with rounded sides. Less than twice as long as wide. 4½ l. E.F. . *aberratus*

ILYBIUS.

1. E. very finely reticulated; b.; with 2 small, often obsc., pale spots near mar.,—1 about mid., 1 near ap. . . 2

- - - -, brassy, with the mar. consp. pale . . . 5

2. Not more than 5½ l. Back of h. with 2 obsc. r. spots . 3

More than 5½ l. A wide species. E. contr. backw. from a little *behind* the mid. Fr. claws of ♂ untoothed. U.-s. of last seg. in h.-b. of ♂ with a long elev. keel. B.; obsc. brassy. Fr. of h., 2 spots at back of h., mars. of th. and of e., and hi. legs, more or less obsc. r. Pal., an., and fr. legs, r. 6 l. E. S. I. . . . . ater

3. E. contr. only from *behind* the mid. backw. Fr. claws of ♂ untoothed. U.-s. of h.-b. in ♂ hardly keeled 4

- - *from* the mid. backw. A narrow species. Fr. claws of ♂ each with a tooth in the mid. U.-s. of last seg. in h.-b. of ♂ with a long elev. keel. B. Mouth, mars. of th. and of e., and hi. legs, obsc. pit.

brown. Pal., an., and fr. legs, r. Some obsc. rows of puncs. on e. 5 l. B. . . . . obscurus

4. Brassy b. Rather el. and narrow; sides little rounded. Mars. of th. and hi. legs obsc. r. brown. Pal., an., fr. legs and fr. of h. r. 4¼ l. B. . . . ænescens

Very like prec. B. (not brassy). Obsc. rows of puncs. on e. 4½ l. E. . . . . *guttiger*

Very like ænescens. More brassy. An. pit. near ap. [Doubtful as British.] . . . . *angustior*

5. Widest at mid. On the u.-s. the plate on the side of ba. of mid. legs is triangular and broad. . . . 6

Widest *behind* mid. On the u.-s. the plate on the side of the mid. legs is narrow, with its hi. side rounded. Brassy brown. Pal., an., legs, back of h., side mars. of th. and of e., and u.-s., r.-brown. The pale mar. of e. gen. leaves a dist. pale dash within it, on the e. behind mid. 5 l. E. . . . fenestratus

6. Resembles prec. The pale mar. is wider, paler, and much more consp., not leaving a pale dash within. On the e. it is (at its widest) about as wide as diameter of the eye. 4⅔ l. E. S. I.! . . fuliginosus

Resembles prec. Wider. The pale mar. of th. and e. is obsc. and narrow. 5 l. E. . . . *subæneus*

LEIOPTERUS (1 species) and AGABUS.

1. Surface of e. covered with fine longi. str. (or wrinkles) which occasionally run into one another, . . . 2

Not as above 4

2. The str. on e. very close and running almost entirely in a longi. direction. A tooth at ba. of in. claw of fr. tar. of ♂. E. with some rather dist. rows of puncs. Sides rounded. 3

- - - - not very close, and intersected by numerous dist. tr. str. Shining. Not very narrow. Sides little rounded. B.; often with an obsc. pale mark near mar. of e. behind mid. An. and pal. dull r. Legs pit. A small tooth at ba. of in. claw of fr. tar. of ♂. Fr. claws of ♂ equal. 4½ l. B.N. . . . tarsatus

The str. on e. closer and more dist. longi. than in prec. No tooth at ba. of in. claw of fr. tar. of ♂. The claws equal. An el. narrow species; flat, with parallel sides. Some obsc. large puncs. on e. hardly form rows exc. near ba. B. Fr. of h., 2 marks on h., an., and pal., r. Legs more or less r. 3¾ l. E. . *striclatus*

3. A wide species. Ba. of th. sinuate, its hi. angs. ac. Th. wide. Colored much as prec. ♂ brassy, ♀ dull. Mars. of e. often obsc. r. 4¾ l. E. S. I. ! ! . bipustulatus

Very like prec. Narrower, and more pointed behind. Th. narrower, its ba. dist. narrower than ba. of e., and hardly sinuate; its ba. angs. slightly obt. 4¾ l. S. . . . . Solieri

(To be continued.)

Notes on the Entomology of Skye.—Last August I paid a visit of a few days' duration to the isle of Skye, and as the entomology of that wild but beautiful island is still but little known, perhaps the following notes on the few insects I observed during my stay will be of interest to readers of the "Scottish Naturalist."

I arrived at Portree, the capital of Skye, on August 7th, by steamer from Strone Ferry, and left again on the 12th for Gairloch, so that I only had six days there, and of these one was consumed by a visit to the celebrated Quiraing, in the north of the island, some distance from Portree, during which I had no time for collecting.

I may at once say that, entomologically speaking, the results of my visit were disappointing, as no novelty, and but one or two rarities, either in Lepidoptera or Coleoptera, rewarded my search. This, however, I feel sure, is in part to be accounted for by the fact that the time of my visit (the beginning of August) is one of the very worst in the whole year for Coleoptera, and not particularly productive in Lepidoptera. Moreover, the neighbourhood of Portree, where I had taken up my quarters, is not in itself favourable to an abundance of insect life, as it is surrounded on all sides, except towards the sea, by monotonous peat-mosses, covered by heath, sphagnum, sweet-gale, and other moss-loving plants. Over these you might walk for miles without seeing any but the commonest insects, and but few of them. Portree too, is too far from any of the higher hills, such as the Cuchullin Hills, in the south of the island, which attain an elevation of more than 3,000 feet, to allow of one's working them from that place. I should strongly advise any entomologist who contemplates visiting Skye, to take up his abode in this south portion of the island, within a convenient distance from the hills there, as I believe that species new to the British lists may well occur on some of the lonely and little visited peaks in that district. A small plantation behind the town of Portree, and the shores of the Cove, on which it is so pleasantly situated, were my most productive hunting grounds, whilst the peat-mosses, and some of the hills near Portree afforded me a few other species of Lepidoptera.

The following are the only ones requiring any special notice; the others are merely mentioned in the subjoined list. *Argynnis Aglaia* occurred on all the heaths and mosses, but not in abundance. As a rule only single specimens were seen at a time, and these were already well worn. A pair frequented a small wooded gully on the shores of Portree bay, sailing up and down in the sun for several hours, then settling on the brambles or other bushes, and then sailing off again for a few minutes over the adjacent slopes to reappear again in the accustomed place. *Satyrus Semele* was also abundant in this locality and the adjoining slopes, being particularly partial to settling in the bright sun on places where the rock had become exposed, and broken up into sloping masses of fine gravel. I also saw several specimens of one of our too common smaller species of *Pieris* fluttering about the gardens, but unfortunately neglected to see whether they were *Napi* or *Rapæ*.

Of *Noctuæ*, I got three specimens of *Stilbia anomala* in good order, one on the mosses, the other two in the aforesaid plantation behind the town. *Charæas graminis* flew over the moors, and I also swept up one larva, which seems to be *Hadena pisi*. A much worn specimen of *Agrotis porphyrea* fell to my net on the moors, as well as two specimens of *Plusia pulchrina* (*V-aureum*) in a bit of wet ground near Portree.

Amongst *Geometræ*, a few more species occurred. I took one specimen of *Coremia munitata* on the top of a hill near the Storr Rock, at an elevation of about 1200 feet above the sea. Mothing at dusk along the hedges, (or their representatives) around Portree, produced a ♀ *albulata*, also one specimen of *Larentia olivata*; whilst beating trunks in the plantation gave me a fair series of *Cidaria immanata*, including some beautiful varieties, varying from almost white to nearly black in colour, some intermediate forms being rich brown with broad black transverse bars. The terminal shoots of *Myrica Gale* on the mosses I often noticed spun together, and on opening these, I found, inside many, a Geometrous larva, in others a *Tortrix*. These unfortunately nearly all died before reaching the pupa stage, but the former were, I believe, the larva of *Melanippe hastata;* the latter probably *T. viburnana*. *Anaitis plagiata* and *Eubolia mensuraria* abounded on the slopes of Portree Bay, flying about in the sunshine like butterflies. *Scopula lutealis* was rather common in damp places, and a single specimen of *S. alpinalis* occurred on the same hill as *C. munitata*, at the summit. *Crambus margaritellus* was very common on the moors I noticed, particularly in the damper places, and a specimen of *C. culmellus* occurred on the grassy plateau at the top of the table land of Quiraing. *Ablabia pratana* was as common on the moors as in the other parts of the Highlands that I have visited, and *Tortrix viburnana* occurred in similar places. I may here mention that my Skye specimens of *pratana* are somewhat smaller than those I have from other parts of Scotland; indeed, I was enabled to at once pick out the Skye specimens from my series of the species by their diminished size. *Depressaria costosa* and *liturella* occurred on the slopes of the Bay with some of the other species before mentioned.

The following is a complete list of all the Lepidoptera I observed during my stay in Skye, those marked with an *a* being those that have as yet been unrecorded for the division of Scotland ("West Ross") to which Skye belongs, in the "*Insecta Scotica*" now publishing in this magazine :—

Lepidoptera.—*a* Argynnis Aglaia (§), *a* Satyrus Semele (§), Epinephele Janira, Cœnonympha Pamphilus, Lycæna Icarus, Pieris sp., Agrotis porphyrea, *a* Stilbia anomala (§), *a* Charæas graminis (§), Hadena pisi, Plusia pulchrina, Larentia didymata, L. olivata, Emmelesia albulata, Melanthia ocellata, Melanippe fluctuata, M. hastata (?), Coremia munitata, Camptogramma bilineata, Cidaria immanata, C. testata, Eubolia mensuraria, Anaitis plagiata, Scopula alpinalis, S. lutealis, Crambus margaritellus, C. tristellus, C. culmellus, Aphomia sociella, Tortrix viburnana, Lozotænia rosana, Peronea favillaceana, Dictyopteryx bergmanniana, Lithographia Penkleriana, Ablabia pratana, Tinea fuscipunctella, Plutella cruciferarum, Depressaria costosa, D. liturella.

Coleoptera.—As already stated, I met with but few Coleoptera during my visit. Those, however, that I did procure are species that, though mostly common, have not been as yet recorded from this part of Scotland. The following list includes all the species I found :—

a Nebria brevicollis (§), *a* Loricera pilicornis, *a* Anchomenus marginatus, *a* Pterostichrus niger Schal., *a* P. vulgaris L., *a* P. nigrita (§), *a* P. diligens, *a* P. madidus (§), *a* Harpalus latus, *a* Patrobus assimilis (§), *a* Trechus obtusus, *a* Hydroporus umbrosus, *a* H. obscurus, *a* H. melano-

(§) This mark is placed after the species indicated (l.c.) as *likely* to occur in West Ross.

cephalus, *a* Agabus bipustulatus (♀), *a* A. congener, Aleochara brevipennis, *a* Tachyporus chrysomelinus (♀), *a* Bolitobius pygmæus, *a* Quedius fuliginosus, *a* Q. boops, *a* Staphylinus erythropterus (♀), *a* Ocypus cupreus (♀), *a* Philonthus carbonarius, *a* Philonthus fimetarius, *a* Xantholinus linearis (♀), *a* X. distans (1), *a* Othius melanocephalus, *a* Anthobium opthalmicum, Geotrupes stercorarius L., Barynotus mærens, Chrysomela staphylæa.—W. A. FORBES, 32 Gower Street, London.

Captures of Lepidoptera in Scotland during 1875.—The following are the best species which I took in the summer of 1875, in various parts of Scotland, chiefly near Edinburgh. :—*Erebia medea*, common in the Pass of Killiecrankie, August 2. *Erebia epiphron*—common on the slopes of Cam-Craig, one of the hills near Ben Lawers, on the north side of Loch Tay, at an elevation of from 1500 to 2,500 feet, July 16, though then rather worn. I subsequently met with the some species on Ben Nevis, at about 1800 feet up, on August 4, but then in extremely bad condition. *Fidonia pinetaria*—a single female of this species, at rest amongst bilbery, at Braemar, July 27. *Emmelesia alchemillata*—two specimens on the Pentlands, beginning of July. *E. albulata*—very common in wet places near Edinburgh, where Rhinanthus grows, middle of June, in company with *Botys fuscalis*. *E. ericetata*—Glen Callater, Braemar, July 28. *Eupithecia succenturiata*—one specimen near Pettycur, Fife, in 1874 (omitted in my list of captures—Sc. Nat. iii. 64; in the same list *E. helveticata* is introduced by mistake). *E. satyrata* and *nanata*—on the Pentlands, near Redford, June 17. *E. subfulvata*—near Granton, July 24. *Ypsipetes elutata*—two specimens of a beautiful red and white variety, beaten from fir trunks with the ordinary form, near Braemar, July 30. *Coremia munitata*—common on Camcraig and Ben Lawers, July 15 and 16; also in Skye. *Cidaria populata*—several very dark varieties with the forewings unicolorous red-brown, near Braemar. *Thyatira Batis*—two specimens at sugar on Corstorphine Hills, June 9. *Mamestra furva*—two specimens bred from pupæ found on Arthur's Seat. I sent what I took to be the larva of this species—as it corresponded very closely with one that in the preceding year produced *furva*—to Mr. Buckler to describe and figure, the larva of *furva* being one of his desiderata. Unfortunately as it grew older, it became clear that it was only *Xylophasia polyodon*, and this was proved for certainty when the imago appeared; the resemblance of the larvæ of these two species has been already noted by M. Guenèe. *Plusia interrogationis*—Glen Callater, Braemar, July 28. *Scopula alpinalis*—common on Ben Lawers and Camcraig: on the former at an elevation of about 3300 ft. Also on Ben Nevis, and in Glen Tilt. In this species the ♂ is larger than the ♀, and duller in colour, contrary to the general rule in Lepidoptera. *Scoparia murana*—on stone walls about Killin, Loch Tay, July 15. *Crambus margaritellus*—common on Ben Lawers and Camcraig; also at the foot of Ben Nevis in wet places amongst rushes. *Ephestia ficella*—one specimen in my rooms at Edinburgh, July 10. *Tortrix icterana*—common on grassy banks at the side of the roads near Morningside, July. *Sericoris irriguana*—a specimen on Ben Lawers, July 16. *Mixodia palustrana*—a specimen in the same place as the preceding. *Argyrolepia cnicana*—a specimen amongst rushes and thistles on the Pentlands, July 4. *Plutella Dalella*—I took a specimen of this near West Linton in 1874. *Gelechia politella*—Arthur's Seat and Morningside, begin-

ning of July. *Acrolepia assectella?*—I forwarded a specimen of an *Acrolepia*, with some other micros, to Mr. Stainton for determination. He returned it under the above name, with a mark of interrogation, as the specimen was too worn to be able to be certain about it. *A. assectella* has not hitherto been recorded as British, though common on the Continent. Mr. Stainton tells me it feeds upon leeks, and he thinks it certain to occur here some day. My specimen was taken on the windows of my rooms in Edinburgh, July 14, 1875.—W. A. FORBES.

Food Plants of Gonepteryx rhamni.—In reply to an Editorial note in the *Scottish Naturalist* (vol. 3, page 226), I may say I am inclined to think it is by no means certain that *Gonepteryx rhamni* has no other food-plants than the two Buckthorns. Kaltenbach, in his Pflanzenfeinde, mentions Medlar and the "Pyrus-tribe," on the authority of De Geer, as food-plants of the species, and in the absence of the Buckthorns it is possible that the insect might take to other plants; but still it would be interesting to find that the egg had been laid or the larva taken in this country from any of the trees mentioned by Kaltenbach.—OWEN WILSON, Carmarthen.

Sphinx convolvuli in Orkney.—In the autumn of last year *Sphinx convolvuli* was abundant at Swanbister, on the south coast of the Mainland of Orkney, about half way between Kirkwall and Stromness. The first I took was on the evening of the 12th August, and I saw several every night until the 16th, or the morning of the 17th, when I left Orkney for the south. A week afterwards my niece, Miss Irvine Fortescue, in a letter, said—"the large moths have been in the garden in numbers every evening since you left." I caught 10 specimens flying over honeysuckle, and single Pheasant's-eye Pinks, mostly at the former. They appeared about 8 p.m., and ceased flying about nine; but, after packing up, on the morning of the 17th I went out about 1 a.m., and heard the "whirr" of the moth. So I lighted a lantern, and in a few minutes caught four specimens. They were in fine condition when caught, but got much damaged in transit, as I had no means of packing them with me. I have no doubt they were bred in Orkney; but on what can the larva have fed? There is no *Convolvulus* in Orkney so far as I know, for though Neill gives *C. arvensis* as an Orkney plant, no one has found it there since—J. T. BOSWELL, Balmuto, near Kirkcaldy, February, 1876.

Chariclea umbra in Forth District.—I see you do not give this *(Heliothis marginatus)* as in "Forth." I took a specimen here on 22d July 1874.—*Id.*

Goshawk and other Rare Birds in Aberdeenshire.—Two specimens of the goshawk *(Accipiter palumbarius)* were killed, one on the estate of Firglen, Banffshire, December 23, 1875, the other in the woods of Hazelhead, near Aberdeen, January 22, 1876; both are females, the first mentioned being a bird of the second year, the latter that of the first year. Six specimens of the rough-legged buzzard *(Buteo lagopus)* have come under my notice since December last—four of which were killed in various parts of Aberdeenshire, and two in Orkney.—GEO. SIM, Aberdeen.

Scoparia basistrigalis and Cochylis Smeathmanniana in Scotland.—Amongst some insects brought to me for names by Mr. W. Herd, I find these two species. They were taken near Perth. I have also taken them near Dunkeld (in 1872).—F. BUCHANAN WHITE.

Story of a Pigeon.—A gentleman in Alyth, who owns pigeons, made the following observation in regard to the instinct of a pigeon of the common blue kind, such as are seen in dovecots all over the country; but the pigeon of which the observation is now to be recorded lived in a wooden dovecot fixed on the wall of a dwelling house. Two pigeons had built their nest in the top story of the dovecot, and had hatched their young, which came out of the egg about the middle of March, 1876. On the 16th day of March a very severe storm of snow and snowdrift set in at dusk. It must be noticed that the door of the dovecot looked to the north-west from whence the storm was coming, so that the snow blew right into the portal where the young pigeons were lying, only a few days old. The storm was very severe, so much so that it was thought to be the hardest that had happened for many years; and the young brood would have no doubt perished, but for the happy expedient that the father of the young pigeons adopted. He stood in the doorway with his tail spread out to the storm, and his wings in a fluttering position, evidently with the intention of stopping the draught, so as to shelter his naked offspring; and there he stood for hours with the snow thick upon his back and tail, breaking the intensity of the cold. But for this the young must have died. And herein we have a very direct evidence of the truth of the saying that God tempers the wind to the shorn lamb; only with this addition, that the story gave evidence of the high power of instinct, especially when called into exercise by parental care.—WILLIAM JAPP, Alyth.

Note on Certain Species of Eupithecia.—(1) *Eup. oxydata* Tr. This name M. Guenée (the well-known French lepidopterologist) applies to a specimen taken at Moncreiffe, and of which I have also a specimen, which I captured in Kirkcudbrightshire. M. Guenée remarks, "Said to be, but wrongly I think, a simple variety of *subfulvata*." The specimen in question was submitted to the late Mr. Doubleday, who declared that it was a species unknown to him. Dr. Staudinger, in his "Catalog," places *oxydata* as an aberration of *subfulvata*; and Doubleday, in the supplement (1873) to his "List," also gives *oxydata* Tr. as a variety of *subfulvata*, and equivalent to *cognata* Steph. In the "Proceedings of the Royal Physical Society of Edinburgh" (April, 1857), Mr. R. F. Logan states that he has had the larvæ of *subfulvata* and *cognata* at the same time, and has no hesitation in considering them to be the same species. They fed on the common yarrow. *Oxydata* differs from *subfulvata* by the much more numerous transverse greyish white lines. The reddish fulvous patch so conspicuous in *subfulvata* is reduced to a small reddish patch on the disc, which is also traversed by the transverse lines. (2) *Eupithecia sp.* Along with the above-mentioned specimen I sent another to M. Guenée, with the provisional name *septentrionata*. He says that it does not agree with any in his collection. It is therefore presumably an undescribed species, but of course it is impossible to found a species, in this difficult genus, upon a single individual; and I therefore in the meantime would merely direct attention to it, in the hope of more specimens turning up. As I have not yet got the specimen back from France, I must wait for another opportunity to point out its peculiarities. It was taken in Rannoch last summer.—F. BUCHANAN WHITE.

PHYTOLOGY.

NEW SCOTTISH FUNGI.

JUST a year has passed since we called attention to certain additions to the Mycological Flora of Scotland included in the "Notices of British Fungi," published in the *Annals and Magazine of Natural History* by Messrs Berkeley & Broome, and now we have again to welcome another instalment from the pens of the same authors. This, which appears in the *Annals* for February, includes about 130 additions to the British list, of which about 72 are from Scotland. Last year we pointed out that the district in Scotland from which these species came was comparatively a small one, and included in five counties. The district examined is still a small one, though a little more extensive than the previous one. To show, however, what has been done we extract (by Mr. Berkeley's kind permission) the references on Scottish Fungi, giving at the same time a few notes —included within brackets [ ]—on certain of the species.

We would take this opportunity of tendering, in the name of all students of Scottish Mycology, our thanks to Messrs Berkeley & Broome for the great kindness they have shown to all of us who have applied to them for assistance.

1502. *Agaricus* (Armillaria) *robustus*, A. & S.; Fr. Ep. p. 41. Rannoch, Perthshire, Dr. Buchanan White. Agreeing closely with Krombholz's figure. Flesh very firm; taste and smell exactly that of *Polyporus squamosus*.

1503. *A.* (Tricholoma) *loricatus*, Fr. Ep. p. 60. In woods. Viscid. Glamis, Rev. J. Stevenson. Remarkable for the thick coat of the pileus.

1504. *A.* (Tricholoma) *virgatus*, Fr. Ep. p. 62; Icon. tab. 34, fig. 1. Forres, Rev. J. Keith.

1506. *A.* (Tricholoma) *militaris*, Lasch.; Fr. Ep. p. 71. Glamis, Rev. J. Stevenson.

1511. *A.* (Clitocybe) *expallens*, Fr. Ep. p. 100. Glamis, Rev. J. Stevenson.

1516. *A.* (Mycena) *aurantio-marginatus*, Fr. Ep. p. 131; Fl. Dan. tab. 1292, fig. 2. Near Perth, Dr. Buchanan White, Nov. 1, 1875. This is a most interesting addition to our list of Fungi. It is admirably figured in the "Flora Danica," and has a peculiar aspect which separates it from other species, looking more like a *Marasmius* than a *Mycena*. Stem very brittle, fistulose. Smell strong. Margin striate.

1517. *A.* (Mycena) *excisus*, Lasch.; Fr. Ic. tab. 81, fig. 1. Glamis, Rev. J. Stevenson.

1519. *A.* (Mycena) *metatus*, Fr. Ep. p. 142. Forres, Rev. J. Keith. Wrotham, Kent, Oct. 1875.

1520. *A.* (Mycena) *collariatus*, Fr. Ep. p. 146; Ic. tab. 82, fig. 5. Glamis, Rev. J. Stevenson. Addington, Kent, Oct. 1875.

1522. *A.* (Pleurotus) *pulmonarius*, Fr. Ep. p. 176. This interesting species was exhibited at the Aberdeen Fungus Show in 1874, the specimens exactly according with Paulet's figure, tab. 21.

1525. *A.* (Inocybe) *maritimus*, Fr. Ep. p. 229. Glamis, Rev. J. Stevenson. Menmuir, Rev. M. Anderson. [Common in the Black Wood of Rannoch.]

1527. *A.* (Inocybe) *Whitei*, B. & Br. Pileo convexo, primum hemisphærico, fulvo, margine albo viscidulo, cortina candida fibrillosa, demum expanso toto fulvo; stipite e candido fulvescente, glabrescente, solido; lamellis e candidis adnexis. Rannoch, Oct. 1, 1875, Dr. Buchanan White. A very curious and beautiful little species, allied to *A vatricosus*. Stature that of *A. geophyllus*. [Here and there in a mixed wood below Craig Var, about half-a-mile on the road to Pitlochry, from Kinloch-Rannoch. There is a possibility that the same species has occurred near Perth.]

1528. *A.* (Flammula) *lupinus*, Fr. Ep. p. 246. Glamis, Rev. J. Stevenson.

1529. *A.* (Flammula) *apicreus*, Fr. Ep. p. 249. On rotten trunks. New Pitsligo, Rev. J. Fergusson. [Glamis, Rev. J. Stevenson, Sept. 1874.]

1530. *A.* (Naucoria) *temulentus*, Fr. Ep. p. 262. Glamis, Rev. J. Stevenson.

1532. *A.* (Naucoria) *graminicola*, Nees, Syst. f. 186; Fr. Ep. p. 265. Glamis Rev. J. Stevenson. A very rare species, which certainly belongs to *Naucoria*, a point still remaining doubtful in the last edition of the "Epicrisis," but which we are fortunately able to confirm.

1535. *A.* (Galera) *vittæformis*, Fr. Ep. p. 269; Schæff. tab. 63, figs. 4-6. Perth, Dr. Buchanan White, Nov. 4, 1875. [On the side of the Durdie Road, close to Balcraig, 2½ miles from Perth.]

1536. *A.* (Stropharia) *caput-medusæ*, Fr. Ep. p. 288. Glamis, Rev. J. Stevenson. A very rare and interesting species, which has occurred again this year, and was exhibited at the Fungus Show at Perth.

1537. *A.* (Hypholoma) *cascus*, Fr. Ep. p. 294. Rannoch, Perthshire, Dr. Buchanan White. [Craig Var Wood, near Kinloch-Rannoch.]

1538. *A.* (Psilocybe) *chondrodermus*, B. & Br. Pileo campanulato carnoso, margine appendiculato excepto glaberrimo lævi spadiceo, hic illic rimoso; stipite subæquali fistuloso pallidiore, fibrilloso, basi squamuloso; lamellis ventricosis affixis secedentibus, margine albo. In pine woods. Glamis, Rev. J. Stevenson. Pileus 1 inch across, dark bright brown, cracked here and there in different directions; veil woven and jagged; stem 2½ lines thick above, 3 at the base. Spores ·00025 inch long, half as much wide, purple-black, almost oblong. Pileus stains the paper yellow. The species, which is quite distinct, will take its place in the first section of *Psilocybe*.

1540. *A.* (Psathyrella) *caliginosus*, Jungh. in Linn. v. 5, tab. 6. fig. 13. Glamis, Rev. J. Stevenson.

1541. *Cortinarius* (Phlegmacium) *claricolor*, Fr. Ep. p. 336. Glamis, Rev. J. Stevenson.

1542. *C.* (Phlegmacium) *sebaceus*, Fr. Ep. p. 337. Glamis, Rev. J. Stevenson.

1545. *C.* (Inoloma) *redimitus*, Fr. Ep. p. 363. Glamis, Rev J. Stevenson.

1547. *C.* (Dermocybe) *myrtillinus*, Fr. Ep. p. 368. Glamis, Rev. J. Stevenson. Rannoch, Dr. Buchanan White.

1548. *C.* (Dermocybe) *venetus*, Fr. Fp. p. 374. Rannoch, Perthshire, Dr. Buchanan White. A small but interesting species, differing in colour from any species with which we are acquainted.

1550. *C.* (Telamonia) *plumiger*, Fr. Ep. p. 377. Glamis, Rev. J. Stevenson. A single small specimen, densely plumose.

1552. *C.* (Hydrocybe) *detonsus*, Fr. Ep. p. 397. Glamis, Rev. J. Stevenson. Amongst moss in woods. Probably a very common species.

1556. *Lactarius squalidus*, Krombh. tab. 4. figs. 23-25. Scotland, 1875.

1557. *L. minimus*, Smith, in Journ. of Bot. 1873, p. 205. Forres, Rev. J. Keith.

1560. *Hygrophorus sciophanus*, Fr. Ep. p. 417. Perth, Dr. Buchanan White. [Bonhard and Balcraig, near Perth.] Spores very pale clay-coloured. There were two forms—one with a darker pileus and the flesh dark, the other paler, with the flesh also pale. The former only deposited spores; it is probable therefore that the pale form was not so fully developed. Species of *Coprinus* occasionally occur without a trace of spores.

1561. *H. cinereus*, Fr. Ep. p. 413; Atl. Svamp. tab. 30. Coed Coch, Mrs. Lloyd Wynne. Great Elm, Somerset, C. E. Broome. Rannoch, Dr. Buchanan White. Exactly according with the upper figures in the plate cited above, and surely distinct from *H. pratensis*. [Very common on the moor at the east end of Loch Rannoch.]

1564. *Russula pectinata*, Fr. Ep. p, 449; Bull. tab. 409 N, O, P. Glamis, Rev. J. Stevenson. Smell like that of *R. fœtens*. Pellicle separable. Exactly resembling the two latter figures of Bulliard, which he refers rather doubtfully to *R. heterophylla*.

1567. *Lentinus pulverulentus*, Fr. Ep. p. 482. *Agaricus pulverulentus*, Scop. Carn. p. 434. Glamis, Rev. J. Stevenson. Tufted, at first infundibuliform, then lateral flabelliform, fuliginous, floccoso-pulverulent, with little umber particles; stem elongated, at length smooth; gills thick, pallid, deeply decurrent, their edge crenulate but not torn. Pileus 2 inches across, stem 3 inches high. This seems to be truly the plant of Scopoli.

1568. *Polyporus floccopus*, Rostk. tab. 13. Glamis, Rev. J. Stevenson. Fries remarks that it is a question whether this species is not a form of *Polyporus brumalis*; but it appears to us quite distinct.

1569. *P.* (Resupinati) *subgelatinosus*, B. & Br. Orbicularis, margine elevato, subgelatinoso, albo-tomentoso, nigricante; poris griseis, parvis, acie acutis. On dead wood. Rannoch, Dr. Buchanan White. Apparently parasitic on a decuerent form of *P. amorphus*. [On a pine stump in the Black Wood, close to Camachgouran, Oct. 21st, 1875. It grew between the bark and the wood.] This singular species forms little pulvinate masses, with an obtuse raised border, which is at first tomentose and pallid, of a subgelatinous consistence, and turning black. The pores are of a pale delicate grey, with an acute even edge, about 1-40th of an inch in diameter. We cannot point out any species to which it is allied.

1572. *Hydnum lævigatum*, Swartz; Fr. Ep. p. 599; Sverig ätl. Svamp. tab. 81. In pine woods. Rannoch, Dr. Buchanan White. A far more solid species than *H. fragile*.

1573. *Irpex pendulus*, Fr. Ep. p. 620. Menmuir, Rev. M. Anderson.

Agreeing with the figure of Albertini and Schweinitz. The species varies greatly; specimens obtained previously were not in a normal condition.

**Craterellus lutescens*, Fr. Ep. p. 630. Rannoch, Perthshire, Dr. Buchanan White. The hymenium of a beautiful orange. Sent at the same time with very characteristic specimens of *Cantharellus lutescens*. [*Cantharellus lutescens* is common in the Black Wood, but the *Craterellus* occurred only under one pine tree. *Craterellus sinuosus* occurred amongst birches in Rannoch.]

1575. *Thelephora clavularis*, Fr. Ep. p. 634. On the ground. Wallington, Northumberland, C. H. Spencer Perceval. We have lately received from Dr. White specimens which would be referred to this species were it not for the strong fœtid scent of *T. palmata*.

1576. *T. intybacea*, Pers. Syn. p. 567. Amongst *Tetraphis pellucida*. Burnham, Rev. G. H. Sawyer. Glamis, Rev. J. Stevenson. Exactly answering to Bulliard's figures, tab. 483. figs. 6 & 7, tab. 278, and quite distinct from *T. laciniata*.

1578. *Stereum vorticosum*, Fr. Ep. p. 639. On beech. Menmuir, Rev. M. Anderson.

1579. *S. pini*, Fr. Ep. p. 643. On bark of Scotch fir. Glamis, Rev. J. Stevenson.

1580. *S. rufum*, Fr. Ep. p. 644. Glamis, Rev. J. Stevenson. Rev. J. Keith.

1581. *Corticium salicinum*, Fr. Ep. p. 647. Forres, Rev. J. Keith. This is certainly the same with *Exidia cinnabarina*, A. & C., which has the curved spores of *Exidia*. We have not sufficient specimens of the European form to justify us in separating it from *Corticium*, to which genus it can scarcely belong.

1582. *C. amorphum*, Fr. Ep. p. 648. On larch. Perth, Dr. Buchanan White. [On dead spruce branches lying on the ground—there were larch branches at the same place but only *Peziza calycina* was seen on them—in a grove of silver firs, behind the hamlet of Corsie Hill near Perth.* In the same grove many interesting fungi have occurred of which I hope to give some day a list in the *Scottish Naturalist.*] This curious plant is so like large specimens of *Peziza calycina* that it is not surprising that the two should have been confounded, and in consequence the plant figured by Willkomm under the name is really *P. calycina*. We were at first inclined to think that it might be a conidiiferous form of the *Peziza* in question, analogous to *Cyphella Currei;* but the structure is such as to make us consider it autonomous, and probably the type of a new genus; for it does not agree well with the characters of *Corticium*. The substance is white and fleshy, consisting of rather coarse threads which at the base form a close sclerotioid network. The hymenium consists of colourless threads and orange coloured clavate bodies filled with pigment. These at length project beyond the surface, and produce four globose rough spores, ·001 inch in diameter, which contain an angular body within, which looks like a cystolith. After a time each spore becomes elliptic, and now measures ·0012 inch in length, produces about eight elliptic echinulate sporidia in its cavity, which are

* Since the above was in type I have found *Corticium amorphum* on dead silver fir branches on Moncreiffe Hill. The peculiar structure of this fungus, as described above by Messrs. Berkeley & Broome, from specimens gathered in autumn, is equally well shown by these vernal examples.—F. B. W.

from ·0004-·0005 inch long—a circumstance without parallel as far as we know in Hymenomycetes. All these points have been observed by each of us independently.

1583. *C. serum*, Fr. Ep. p. 659. *Thelephora sera*, Pers. Syn. p. 580. Epping, Mr. James English. Numerous specimens have been received from the Rev. J. Stevenson, Rev. M. Anderson, and others from Scotland. A very curious species, some specimens approaching, if not identical with, *Hydnum papyraceum*. The aculei are mostly very distant, either entire or plumose at the tips, with the interstices just like the hymenium of a true *Corticium*. Sometimes they are radiato-floccose; but there are intermediate states.

1584. *C. cinnamomeum*, Fr. Ep. p. 650. On wood. Glamis, Rev. J. Stevenson.

1585. *C. ferrugineum*, P.; Fr. Ep. p. 661. On various decayed vegetable substances. Wothorpe. Received also from Scotland.

1586. *Clavaria Krombholzii*, Fr. Ep. p. 669. *C. Kunzei*, Krombh. tab. 53, figs. 15, 16. On the ground in woods. Glamis, Rev. J. Stevenson. [Also at Moncreiffe, near Perth.]

1589. *Typhula translucens*, B. & Br. Candida pellucida; stipite brevi sursum incrassato; capitulo irregulari subobovato. On the ground. Glamis, Rev. J. Stevenson. Minute, pure white, resembling somewhat a prematurely dried Myxogast, but a true Hymenomycete.

1592. *Reticularia olivacea*, Fr. Syst. iii. p. 89. On decayed fir. Aboyne, 1870. Named on the authority of Dr. Rostafinski, who considers *R. versicolor* synonymous. A small specimen has been gathered by Dr. Buchanan White near Perth.

1593. *Chondrioderma Œrstedii*, Rtf. Mon. On bark more or less covered with moss. Jedburgh, R. Jerdon.

1594. *C. niveum*, Rtf. Mon. On dead wood. Linlithgow, J. C. Bauchop.

1595. *Badhamia capsulifer* (Bull. sub. *Spharocarpo*), Bull. tab. 470. fig. 2. Glamis, Aug. 1874, Rev. J. Stevenson. The spores are rough, whereas in *B. utriculosa* they are smooth. Fries, as far as we can find, does not quote Bulliard's figure. The peridia reflect the most beautiful tints of steel-blue and lilac; they are densely crowded, as in Bulliard's figure.

1596. *Physarum theioteum*, Fr. Syst. iii. p. 142. *P. virescens*, Dittm.; Sturm, D. F. tab. 61. On little twigs. Glamis, Rev. J. Stevenson.

1598. *P. nigrum*, Fr. On decayed wood. Rev. J. Stevenson. Threads slender; spores nearly black, ·0007 inch in diameter.

1599. *Craterium leucostictum*, Fr. Syst. iii. p. 152. On dead leaves. Glamis, Rev. J. Stevenson.

1600 *Cribraria macrocarpa*, Schrad. tab. 2. fig. 3. Glamis, Rev. J. Stevenson.

1601. *C. fulva*, var. b. *intermedia*, Schrad. tab. i. fig. 2. On decayed wood. Glamis, Rev. J. Stevenson. Spores ·00035—·0005 inch in diameter.

1602. *Arcyria Friesii*, B. & Br. Gregaria; peridiis stipitatis, globoso-ovatis, cinereis; capillitio ovato-cylindrico sporisque glaucis. On sawdust. Glamis, Rev. J. Stevenson. The plant which generally passes for *Arcyria cinerea*, and which is figured in the 'Flora Danica,' and is common in exotic as well as British collections, has not glaucous spores. The speci-

mens received above appear to be what Fries intended; and therefore the above name is assigned to them. The capillitium is coarser than that of *A. cinerea*, and the spores are decidedly blue. Its habit also is different, the peridia being scattered in *A. cinerea*.

1605. *Lindbladia effusa*, F. *Licea effusa*, P. & Ehrb. With *Cribraria argillacea*. Aboyne, 1870. Forres, Rev. J. Keith. We have an orginal specimen from Fries marked as probably belonging to a new genus, before it was characterised.

1605 bis. *Perichæna decipiens*, B. & Br. Sporis majoribus minoribusque læte aureis. On fir-cones. Perth, Dr. Buchanan White. The external appearance is just the same as that of *P. strobilina;* but the spores are bright yellow and of two kinds, the larger ·0009-·002 inch long, those of *P. strobilina* ·001-·0012 inch long, which is about the size of the smaller spores of *P. decipiens*. [In the above-mentioned grove of silver firs, where also Nos. 1516, 1582, and 1592 occurred. The *Perichæna* filled the whole of one spruce cone.]

1607. *Sporidesmium triglochinis*, B. & Br. Soris punctiformibus e basi cellulari oriundis; sporis junioribus obovatis, stipite, brevi sursum incrassato, dein subglobosis oblique divisis, demum oblongis fenestratis. On *Triglochin palustre*. Perth, Dr. Buchanan White, 1875. Sori bright brown, ·006—·008 inch in diameter, spores ·0003—·0007. Approaches *S. pallidum*, B. & C.; but that is on fir, and the spores are not composed of globose cells as in that species. [At Arnbathie, Moor of Durdie near Perth; not in Rannoch, as stated in the "Annals."]

1608. *Puccinia Molinæ*, Tul. Ann. d. Sc. Nat. Sept. 1854, p. 141. On *Molinia cærulea*. Rannoch, Dr. Buchanan White.

**P. calthæ*. On leaves of *Ranunculus ficaria* with *Æcidium calthæ*. New Pitsligo, Rev. J. Fergusson.

* *Trichobasis Cirsii*, Lasch., has been found in Perthshire by Dr. Buchanan White and Dr. Cooke. [On the upper side of leaves of *Carduus lanceolatus*; Craig Var, Kinloch Rannoch. Dr. Cooke gives Dupplin Castle as a locality for the brand spores—*Pucinia cirsii.*]

1610. *Fusarium translucens*, B. & Br. Pellucidum, substipitatum, margine sub lente leviter ciliato albo-lutescente, sursum umbilicato; sporis tenuibus cylindricis. On deal. Glamis, Rev. J. Stevenson. Forming little transparent specks about 1/6 of a line in diameter. Spores ·0003 inch long. Differs from *F. minutulum*, Cd., in the form of the spores.

1612. *F. rhabdophorum*, B. & Br. Erumpens, subfulvum, elevatum e basi orbiculata alba; sporis rectis rhabdiformibus. On dead sticks. Forres, Rev. J. Keith. Spores ·0006 inch long.

1613. *Cylindrosporium senecionis*, B. & Br. Cæspitulis e floccis flexuosis gracilibus; sporis cylindricis e maculis candidis oriundis. On leaves of *Senecio vulgaris*. Rannoch, Dr. Buchanan White. Forming white conspicuous irregular patches on the leaves.

1615. *Exobasidium vaccinii*, Wor.; Woronin, Abh. d. naturf. Ges. zu Freiburg, iv., Fung. Aust de Thumen, No. 322. On leaves of *Vaccinium vitis-idæa* and other species. On *Rhododendron* it forms a thick gall-like swelling. [On *Vaccinium vitis-idæa* this is a common species in all the woods of northern Scotland.]

1617. *Leotia circinans*, P.; Fr. Syst. ii. p. 27. On the ground, abundantly. Glamis, Rev. J. Stevenson.

1618. *Vibrissea microscopica*, B. & Br. Minutissima; stipite brevi nigro; capitulo griseo. On damp fir wood. Rannoch, Dr. Buchanan White. Scarcely visible without a lens. Stem very short, black; head grey, leaving a cup-shaped depression when completely washed off. Sporidia ejected, filiform. [In the Black Wood, near Camachgouran; very rare.]

1619. *Peziza* (Geopyxis) *arenaria*, Osb.; Fr. Syst. ii. p. 65. On sands near St. Andrews, Rev. M. Anderson. This very curious species, which is so brittle that it is difficult to preserve good specimens, forms a cylindrical or forked process penetrating the sand and collecting its particles. The roots of the *Psamma* are often attached, and perhaps in some cases have been mistaken for mycelium.

1624. *Helotium laburni*, B. & Br. Breviter stipitatum, cupulis extus villosis furfuraceis pallidis, margine inflexo; disco ochraceo læticolori; sporidiis fusiformibus quadrinucleatis. On decorticated branches of *Cytisus laburnum*, or beneath the cuticle, which it seems to throw off. Menmuir, Rev. M. Anderson. Sporidia ·0009 inch long. Mr. Philips, who has paid great attention to the genus, writes that the only species approaching it in the fruit is *Helotium salicellum*, Fr. Karsten has a species, *Pezicula subliciformis*, which has sporidia nearly the same size and shape, with two nuclei, but is otherwise different.

1625. *Nectria Keithii*, B. & Br. Peritheciis minutis, pallidis, congestis, furfuraceis, ostiolo distincto; sporidiis fusiformibus inarticulatis; conidiophoris punctiformibus confluentibus carneo-griseis. On cabbage stalks. Forres, Rev. J. Keith. Sporidia ·0002-·00025 inch long, conidia ·0002.

1627. *Sphæria empetri*, Fr. Syst. ii. p. 522. On leaves of *Empetrum nigrum*. Sow of Athol, May 1874, Dr. Buchanan White. Asci ·002 inch long; sporidia pale brown, linear, uniseptate, ·0007 inch long.

* *Labrella ptarmicæ*, Desm.; Fr. El. ii. p. 149. On leaves of *Achillea ptarmicæ*. Rannoch, Dr. Buchanan White. These are the first truly British specimens we have seen.

1630. *Rhytisma empetri*, B. White. Ambiens, atrum, lucidum, secundum longitudinem rugosum. On *Empetrum nigrum*. Rannoch, [Perthshire, Inverness-shire, Aberdeenshire, &c.] Dr. Buchanan White. Completely surrounding the stem, shining jet-black, wrinkled longitudinally. The asci are straight and immature. [In examining specimens which had been kept in the open air all winter, I find no trace of asci, but abundance of Sphæropsis-like fruit. This consists of spores, in various stages of development, borne upon comparatively stout pedicels. The pedicels are somewhat unsymmetrical in outline, closely crowded together, and more or less filled with a granular yellowish endochrome, but otherwise transparent. The base is yellowish brown. Length of pedicel about ·0015-·001 inch. The spores are in various stages of development. At first spherical and less in diameter than the diameter of the pedicel; then larger, and finally ovate oblong. They are filled with granular yellowish endochrome in which, when the spore is nearly mature, may sometimes be seen a clear yellow nucleus. After the spore has fallen off the endochrome divides, leaving a somewhat irregular transparent band across the middle of the spore. Length of mature spore about ·00075 inch. This structure of *Rhytisma empetri* may be compared with that of *R. maximum* Fr., as described by Mr. C. B. Plowright, in "Grevillea" iv. 28. Pl. 53. Compare also Tulasne t. xvi., fig. 4.]

INSECTA SCOTICA.

THE LEPIDOPTERA OF SCOTLAND.

(Continued from p. 230.)

EDITED BY F. BUCHANAN WHITE, M.D., F.L.S.

VENILIA Dup.

MACULARIA L. Local. Nemoral.

DISTRIBUTION—EAST. ○○ ○○ Tay ○○ Moray ○ ○ ○
WEST. Solway Clyde ○○ ○ ○

LAT. 54°40′-57°40′. RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE.—IMAGO. May-June. LARVA. August-September. FOOD-PLANT. Low plants.

MACARIA Curt.

NOTATA L. Very local. Nemoral.

DISTRIBUTION—EAST. ○ ○ Tay [Dee] Moray ○ ○ ○
WEST. ○ ○ ○ ○ ○

LAT. 56°30′-57°30′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE.—IMAGO. June. LARVA. August-September. FOOD-PLANT. Sallow.

LITURATA Cl. Not uncommon. In pine woods.

DISTRIBUTION—EAST. ○○ Forth Tay Dee Moray ○ ○ ○
WEST. Solway Clyde ○○ ○○ ○

LAT. 55°-57°30′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE.—IMAGO. July. LARVA. August-September. FOOD-PLANT. Pine.

EPIONE Dup.

APICIARIA Schiff. Local. Nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay ♀ Moray Sutherland o o

WEST. Solway Clyde ♀ o o

LAT. 55°-58°30′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE.—IMAGO. July-September. LARVA. May-August. FOOD-PLANT. Willow, poplar, and alder. Are there 2 broods in Scotland?

SELENIA Hb.

BILUNARIA Esp. (1794); *illunaria* Hb. (after 1797). Common. Agrestal and nemoral. Ascends to 1300 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ o o

WEST. Solway Clyde ♀ ♀ ♀

LAT. 54°40′-58°. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE.—IMAGO. April-May. LARVA. July, August. FOOD-PLANT. Various trees.

LUNARIA Schiff. Not common. Nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay ♀ Moray o o o

WEST. Solway Clyde Argyle ♀ o

LAT. 54°50′-57°40′. RANGE IN EUROPE. Central (Finland &c.) TYPE. Central. TYPE IN BRITAIN. British.

TIME OF APPEARANCE. — IMAGO. June. LARVA. July, August. FOOD-PLANT. Various trees.

TETRALUNARIA Hufn. (1769); *illustraria* Hb. (after 1793). Rare. Nemoral.

DISTRIBUTION—EAST. o o Tay o o o o o

WEST. o o o o o

LAT. 56°40′. RANGE IN EUROPE. Central (Finland, &c.) TYPE. Central. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. May, June. LARVA. July, August. FOOD-PLANT. Various trees.

A second brood of each of these three species occurs in England and elsewhere, but in Scotland it is of very rare occurrence, at least in the north, if it happens at all.

ODONTOPERA Steph.

BIDENTATA Cl. Common. Nemoral. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway Clyde ♀ ♀ o

LAT. 54°40′-57°40′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE.—IMAGO. May, June. LARVA. August-October. FOOD-PLANT. Various trees.

CROCALLIS Tr.

ELINGUARIA L. Common. Nemoral. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray Sutherland o o
WEST. Solway Clyde ♀ ♀ ♀

LAT. 54°40′-58°30′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. July, August. LARVA. September-June. FOOD-PLANT. Sloe, &c.

EUGONIA Hb.

ALNIARIA L. (1758); *tiliaria* Bkh. (1794). Not very common. Nemoral.

DISTRIBUTION—EAST. Tweed ♀ Tay ♀ Moray o o
WEST. Solway Clyde ♀ ♀ o

LAT. 54°50′-57°40′. RANGE IN EUROPE. Central (Sweden). TYPE. Central. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. August-September. LARVA. June. FOOD-PLANT. Birch, oak, alder.

This species must not be confounded with *alniaria* Esp. (*autumnaria* Wernb).

EROSARIA Bkh. Not common. Nemoral.

DISTRIBUTION—EAST. Tweed o Tay o o o o o
WEST. ♀ ♀ o o o

LAT. 55°40′-56°30′. RANGE IN EUROPE. Central (South Sweden, &c.) TYPE. Central. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. August, September. LARVA. June. FOOD-PLANT. Oak, birch, &c.

E. quercinaria Hufn. (*angularia* Bkh.) and *fuscantaria* Hw. have been reported from the south and west of Scotland, but more evidence is desirable.

(To be continued.)

THE COLEOPTERA OF SCOTLAND.

(Continued from p. 232.)

EDITED BY D. SHARP, M.B.

ELONGATULUS Müll. Rare.

DISTRIBUTION—EAST. o o Tay o o o o o

WEST. Solway o o o o

SPARSHALLI Den. Very rare.

DISTRIBUTION—EAST. Tweed Forth o o o o o o

WEST. o o o o o

FIMETARIUS Thoms. Very rare.

DISTRIBUTION—EAST. o Forth o o o o o o

WEST. o o o o o

SCAPHIDIDÆ.

SCAPHISOMA Leach.

BOLETI Panz. Very rare.

DISTRIBUTION—EAST. o o o o o o o o

WEST. Solway o o o o

"Dumfriesshire, Rev. W. Little." Murray Cat.

TRICHOPTERYGIDÆ.*

PTERYX Matth.

SUTURALIS Heer. Highland. Rare. Under bark of dead fir.

DISTRIBUTION—EAST. o o Tay ♀ Moray o o o

WEST. o o o o o

TRICHOPTERYX Matth.

THORACICA Walk.

DISTRIBUTION—EAST. o Forth o o o o o o

WEST. Solway o o o o o

* In the nomenclature of this family I have followed the work recently published by the Rev. A. Matthews, "Trichopterygia illustrata et descripta." The distribution of the Scottish species is given chiefly from my own collection, and I am sorry I can give no information as to the habits of most of the species.

ATOMARIA De Geer.

DISTRIBUTION—EAST. o Tay o o o o o
WEST. Solway o o o o

FASCICULARIS Herbst.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. Solway Clyde

LATA Mots. Amongst dead leaves.

DISTRIBUTION—EAST. o o o o Moray o o o
WEST. Solway o o o o

GRANDICOLLIS Mann.

DISTRIBUTION—EAST. o o o o Moray o o o
WEST. Solway o o o o

SERICANS Heer.

DISTRIBUTION—EAST. o Forth Tay o o o o o
WEST. Solway Clyde o o o

BOVINA Mots.

DISTRIBUTION—EAST. o Forth Tay o o o o o
WEST. o o o o o

BREVIPENNIS Er.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

PICICORNIS Mann.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

MONTANDONI All.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

VARIOLOSUS Muls. Rare. In sheep's dung.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o o o o o

EURYPTILIUM Matth.

SAXONICUM Gill. Rare. Among bones and hides.

DISTRIBUTION—EAST. o o o Dee o o o o
WEST. Solway o o o o

PTILIUM Matth.

CALEDONICUM Sharp. Local. Highland. Under bark of dead Scotch fir.

DISTRIBUTION—EAST. o o o Dee o o o o
WEST. o o o o o

KUNZEI Bar.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

RUGULOSUM All.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o o o o o

SPENCEI All.

DISTRIBUTION—EAST. o o o Dee o o o o
WEST. Solway o o o o

MYRMECOPHILUM All. In the nests of the wood ant. Very local.

DISTRIBUTION—EAST. o o o Dee Moray o o o
WEST. o o o o o

ACTIDIUM Matth.

CONCOLOR Sharp. In sand on the banks of rivers. Very rare.

DISTRIBUTION—EAST. Tweed o o o o o o o
WEST. Solway o o o o

PTENIDIUM Matth.

PUNCTATUM Gyll. Maritime.

DISTRIBUTION—EAST. o o o o o o o o
WEST. o Clyde o o o

NITIDUM Heer.

DISTRIBUTION—EAST. Tweed Forth ♀ Dee o o o o
WEST. o o o o o

FUSCICORNE Er.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

WANKOWIEZII Matth.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

EVANESCENS Marsh.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. Solway Clyde o o o

KRAATZI Matth. In nests of *Formica rufa.*

DISTRIBUTION—EAST. o o [Tay] o o o o o
WEST. o o o o o

This species was described by Mr. Matthews from individuals captured by Foxcroft in nests of *Formica rufa* in Scotland; though no special locality is mentioned, it would probably be in Rannoch.

CORYLOPHIDÆ.

ORTHOPERUS Steph.

BRUNNIPES Gyll. In decaying vegetable matter. Local.

DISTRIBUTION—EAST. o Forth o Dee o o o o
WEST. o o o o o

ENDOMYCHIDÆ.

ENDOMYCHUS Payk.

COCCINEUS Lin. Rare. Under bark with cryptogamia.

DISTRIBUTION—EAST. Tweed Forth Tay o o o o o
WEST. o o o o o

EROTYLIDÆ.

TRIPLAX Herbst.

RUSSICA Lin. Rare. In fungi.

DISTRIBUTION—EAST. o o Tay o Moray o o o
WEST. o o o o o

COCCINELLIDÆ.

HIPPODAMIA Muls.

TREDECIMPUNCTATA Lin. Lowland. Rare.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. Solway o o o o

(To be continued.)

ZOOLOGY.

FURTHER REMARKS ON ANIMAL PSYCHOSIS.

By the Rev. J. WARDROP.

ON this subject the following conclusions have already been reached :—1*st*, That animal action is not to be explained simply by the automatism of the material organism—the mental states taking no part, but standing by as idle spectators of the organic movements. 2*nd*, That it is to be explained by the automatic action of the organism, and of an intelligent principle both. 3*rd*, That the intelligent principle in animals is not a self-conscious or self-determined or self-regulated power; in other words, the animal soul does not constitute a free personality, and therefore is not of the same kind with the human soul. Animals are not self-conscious beings; and they are not so because they have no self of which to be conscious. They are not persons as far as evidence goes. If the question in reference to them were—Persons or things? I should certainly go in for *things*. But that alternative is not one to be put; for it prejudices what seems to be the very point to be settled by the investigation. It supposes persons or things to make up the totality of existence. But, between beings that have neither soul nor personality, and beings that have both, are there not a class that have the one but want the other—have the soul but want the personality? Animals seem to be such midway beings. They are capable of actions which we can ascribe only to an intelligent soul as their principle. But that that intelligence is a self-conscious, free, or personal intelligence is the point at which the evidence in their favour fails. And I do not see on what *à priori* or presumptive ground it could be established anterior to facts in the case, that

there can be only one kind of intelligent souls among earthly creatures.

The main point at issue, then, is clear and definite. It is this—Is the animal soul of the same kind as the human?

As to the means, or even the possibility, I may say, of pursuing an investigation into the subject, I would wish to emphasize a point to which I formerly alluded. It is a point on which we find able writers taking diametrically opposite sides. It refers to the relation between the special psychology of man and comparative psychology—which of the two is the basis for the study of the other. It seems to me that you could not state the problem of the animal soul in any workable manner, without pre-supposing and employing a knowledge of the human soul. It must be obvious that if it could be stated, it could not be worked without that knowledge. Action so mysterious as animal action we can hope to understand only by help of the analogy of other action, the nature and cause of which is more accessible, *i.e.*, immediately accessible in its inner nature, and that is our own action. No doubt, if you say the human mind is more complex than the animal, there is a rule of general method that might seem to condemn the procedure of beginning as I have said. "The order of investigation must in all sciences be from the simple to the complex!" (Cald. Hdb. 3.) "It has come to be a recognised action in science that the study of the *simple* should precede that of the complex" are the opening words of Dr. Lindsay's paper in the "Journal of Mental Science;" and he makes "the substitution of a better state of matters," in reference to our knowledge of the animal and human soul, conditional on "beginning our studies on mind with its genesis or rudiments in the simplest forms of animals, tracing its gradual progress from simplicity to complexity." But clearly this rule will hold only when the investigator's instruments of research are equally good for the simple and for the complex.

For if this is not the case, the rule must give place to another —*begin where your instruments and means are most adequate and facile of application.* Besides, going by the rule of the simplest first in this case, supposes that the physiological method of search alone is to be followed, not the introspective—a method which Comte has declared to be imposible. But when the object of search is mind, it is better to designate at once as it deserves the proscription of the introspective or psychological method, and say, such proscription is sheer nonsense. It is

suicide, for it makes all investigation impossible. If any one will choose to look at Maudsley's arguments against the introspective method, he shall find the following summary of them, given by an able writer, correct—"*1st*, Few can use the introspective method. *2nd*, Those who can are not agreed as to the results thereby secured. *3rd*, Nobody can use it at all." (Cald., Hdb. 5,6.) We can see into our own souls by the light of inward experience, and we must see into them thus in order to seeing into them or into any other souls in any outward manner.

Formerly I quoted Goodsir, as against Mr. D. Spalding, on this point. I may now quote G. H. Lewes as against Dr. Lindsay. In the preface to his "Problems of Life and Mind," Mr. Lewes says, "Rightly to understand the mental condition of animals, we must first gain a clear vision of the fundamental processes in man; since, obviously, it is only through our knowledge of the processes in ourselves that we can interpret the manifestations of similar processes in them." This testimony is the more emphatic and valuable, that Mr. Lewes had began his work on the other rule. Those who would think to begin mental studies with the animal soul, and those who would think to pursue such studies solely by physiological observation and experimentation, are both under the same kind of illusion. It is simply impossible and absurd to attempt to investigate either the animal or human soul without the introspective method by consciousness. Without the knowledge which that method alone, and from the first moment of the exercise of self-reflection, has given, no mode of anatomical or physiological procedure could ever have revealed the more essential facts, or even the true nature of any of the phenomena. And the reason why physiologists think that they are investigating mind without this method is that this knowledge, gotten only by the instrument supposed to be discarded and held unconsciously, is unconsciously employed partly to direct, partly to interpret physiological observation.

In like manner, it is impossible and absurd to think to begin an investigation of the animal soul immediately and solely in itself and without a knowledge of man's physical processes. Without that knowledge consciously, or unconciously employed, as the key for the interpretation of animal phenomena, we could never get so far as to be able to describe these phenomena as *psychical* at all. The reason why it is thought that they are capable of investigation without any self-furnished applianees, is that that key which the investigator has always carried with

him whenever he went abroad from himself to explain anything, is here too in his hand and employed by him without his observing that he is doing it.

Equipt, then, for the problem of the animal soul with a competent knowledge of the philosophy of the human mind, the next point of method is to have the question stated in the form in which it may go to proof in the manner most favourable for the reception of evidence and the attainment of a correct finding. On being asked, How can you prove that animals have not self-consciousness and will, and are not personal in their mental nature? one might say, I would prefer not to take up the subject in the form of that negation at all. I should leave it to those who hold to the animal soul being the same as ours to prove their affirmation. The form in which I would prefer to take up and support the opposite side is this positive one—that animal phenomena are explainable from other causes than self-consciousness and will, *i.e.*, automatic causes. That, however, would unnecessarily narrow the method of proof. Certainly the question presents itself very naturally, and indeed very obtrusively, in the form in which it would be thus put aside. Perhaps the very first facts that would strike a stranger when he compared the animal kingdom with man, are facts that would go far to solve the problem in the negative form, that animals have not self-consciousness or will. In animals, there is no progressiveness in mental faculties, mental habits, or in mental products. Their intelligence is not an intelligence that makes any advance either appreciably great or at all permanent. This is one of the most obtrusive distinctions between them and man. Utter fixity and finality characterize them; onward movement, expansiveness, and growth, him. But this inherent power of educability and progressiveness is in man the result and manifestation of personality, of self-consciousness and will. Every human soul is shewn to be a home or centre of self-conscious, self-determined, self-regulating force. Animals failing to produce the effects must be held to be destitute of the cause. As they have not put self-consciousness and voluntary power to use in the only way in which experience tells us they operate, they must be held to be without such power. It cannot be said they are hiding their talents in a napkin. We must hold they have not got the talents till they are seen putting them to use. How is it that their bounds are fixed, like those of the sea, that they cannot pass them—that the power of self-culture

and of indefinite rise in the scale of mind is denied them, unless it be that they are not free, independent, self-developing beings at all?

Also, there must be attended to in this connection, the fact that animals have certain powers of action and of work far superior to the human. Dr. Lindsay says, "In certain respects they are infinitely our superiors. In respect of morals,"—he goes that length, "of disposition, and character, many of them are," he reiterates, "infinitely our superiors." No one will deny the fact of superiority—though we might not describe it exact as superiority in morals and character. Animals can accomplish works to which man is altogether unequal. But what does the fact indicate? It points to a conclusion the opposite of Dr. Lindsay's. It is one of the things that utterly discountenance the idea of our mind and theirs being alike. It makes them co-ordinate with inanimate nature. Inanimate nature is as superior to us as they are, and doubtless in the same way and for the same reason. Nature and they are one. Des Cartes, in a passage that Huxley, who makes so much use of him, does not use, says, "The circumstance that animals do better than we does not prove that they are endowed with mind, for it would thence follow that they possessed greater reason than any of us, and could surpass us in all things; whereas, on the contrary, it rather proves that they are destitute of reason, and that it is nature which acts in them according to the disposition of their organs; thus it is that a clock, composed only of wheels and weights, can number the hours and measure time more exactly than we with all our skill." (Method, &c., by Veitch, p. 99.)

As to moral superiority we may go further, and say that animals are altogether *sinless*. But it is because they are not capable of either perceiving or doing either right or wrong. Neither morality nor immorality can be predicated of them, except in science gone mad.

It is interesting to notice, in connection with the likeness to animal action exhibited by man in dreaming or somnambulism, that in these abnormal states men are capable of doing what, as waking and voluntary agents, they are wholly incapable of. If that transient and unconscious and involuntary power could be brought under control, made the servant of will, and utilised freely, it would revolutionize our system. Animal superiority is like that. If it could become the free,

self-controlled force of voluntary agents, the human race could maintain no competition with it. In denying animals self-consciousness and will, and holding that psychosis in them is automatic, we must carefully observe how deep the distinction between them and man goes in consequence. The difference covers the whole mental field, and leaves no phenomenon of a psychical character in the two beings identical. We often speak as if, up to a certain stage of mental faculty, the two minds were the same in their manifestations. But this cannot be, if the above distinction be established. It begins at the beginning of mental action—*i.e.*, at its lowest form of energy, and passes on all through. Sensation is the first and simplest form of mental energy; and we may suppose that it is exactly identical in man and animals, inasmuch as something which we can only call by the name of sensation, is common to them. But it is not identical. Animal sensation and human sensation are not the same sensation. There is a characteristic that places them wide apart. In the human form of sensation, there is always accompanying it the consciousness of the sensation as *mine*. Consciousness of sensation as a form of experience is at the same time consciousness of Personality, or self. We begin as we end the gradations of our mental power, with a home-coming consciousness of ourselves. All the mental force exerted, or states experienced, are known as ours. The animal does not disengage itself from nature, or stand over against it, as man does.

In making out the negative position that the animal soul is not the same essentially as that of man, other two remarks may be made. One is in reference to the bodily forms of animals. According to the fitnesses of things, and the very conditions of human thinking, these forms for ever prevent us from imagining that the indwelling souls are of the human type; otherwise, Nature has here lost her rule and forgotten the proprieties, and not merely cast pearls before swine, but put a jewel in their snout. Another remark is teleological. The purposes for which animals exist do not seem to raise them above serving the interests of physical nature, and thus, and otherwise more directly, ministering to man's self and convenience and necessities. And if the very object of their being bind them to the world in such a subordinate capacity, why throw away on them a soul like that of man, which is the breath of the Almighty, and in virtue of which its possessor is born to rule nature and

transcend the world, and bear the likeness of and enjoy fellowship with the world's Creator? There would be an inconceivable incongruity between the endowment and the purpose which it had to serve, if the animal, with the task only of a beast of burden, were yet provided with the soul and the potentialities of a man.

This negative or destructive method of dealing with the problem seems to be both valid and successful. But the positive or constructive method, *i.e.*, accounting for animal phenomena by positive causes, which fall short of self-consciousness and will, is a task incumbent on him who holds the animal soul to be not the same in kind as man's; and he need not fear that task as compared with the task of proving that it is of the same kind by showing it to be possessed of these powers. The general result of an investigation conducted for the solution of the problem in this form is, as we have seen, that all the psychical phenomena of animals are capable of being explained by such an intelligent principle as is merely automatic in its mode of operation. There is a centre of intelligent force in animals; but it is not an intelligence self-conscious, self-determined, and self-regulated.

On this subject I wish here to give the following view. Let us distinguish these three classes of phenomena,—first, those that may be designated under the term *Irritability*; second, those that go to constitute *Sensibility* or *Sensitive Intelligence*; and third, the phenomena of *Volition*. The classification is minute and comprehensive enough to allow the nature and relations of animal psychosis to appear.

i. Under Irritability I include what is called reflex action; and I do not see why such action may not fall under that designation. There is nothing psychical, it is supposed, in the reflex action of the spinal cord. No feeling, idea, or image, nor any form of consciousness whatever intervenes. The ingoing motion excited by external stimulus passes from the afferent to the efferent system of nerves through the immediate central connection of the two systems, and the whole movement is thus confined to the external circle of innervation and is wholly mechanical. I do not see why the most even of the phenomena that Carpenter has called *sensori-motor* or *consensual* should not be to a large extent equally ranked under this head. The only difference is that the external stimulus in that action falls on the special senses, while in the so-called reflex action it affects

the general tactile sense. But then, in the first place, all the senses are but modifications of touch. In the second place, in Dr. Carpenter's sensori-motor action, the passage of the ingoing molecular movement into the outgoing is equally immediate as in the case of the reflex action. There may be an image in the eye and a sound, or air-vibrations at least, in the ear; but it is not the image taken up as a mental one nor the vibrations of the air taken up as a mentally perceived sound or tone—it is neither that causes the outward response. This is caused by the simple impact—by the touch of the light on the retinal nervous structures, and the touch of the agitated air on the terminal bodies of the nerves of the cochlea respectively. If it were otherwise, if mental elements intervened, they could intervene only in the shape of sensuous apprehension, imagination, or emotion, or idea; and then where would be the difference between sensori-motor and ideo-motor or emotional reflection? What we should on general principles presume is what the actual parts of the case clearly bear out—that there are only two fundamentally distinct classes of reflexion, viz., that in which mental elements do not intermediate the action, and that in which they do intermediate it. The one is automatic action of the organism; the other is automatic action of the psychical power and of the organism together. Carpenter himself says sensori-motor action requires the impression on the sense organ to be *felt* as a sensation. (Phys. of Mind, p. 82.) So far as it does it is fundamentally different from excito-motor, but not fundamentally different from ideo-motor or emotional reflexion. Des Cartes plainly included sensori-motor action in the reflex action by which he explained the psychical phenomena of animals. After speaking of movements in us that do not depend on the mind, such as the action of the heart and lungs, he goes on—"And when one who falls from a height throws forward his hands to save his head it does not depend upon his mind, but takes place merely because the senses being affected by the present danger some change arises on his brain which determines the animal spirits to pass thence into the nerve in such a manner as is required to produce this motion in the same way as in a machine, and without the mind being unable to hinder it. Now," he adds, "since we observe this in ourselves, why should we be so much astonished if the light reflected from the body of a wolf into the eye of a sheep has the same force to excite in it the motion of flight." (Cited by

Huxley, Fort. Rev. 95, N. S. p. 564.) The whole is regarded as the automatic action of the organism. Whether, if he had been acquainted with the automatic action of the mind he would not have resorted to that as an explanation of some movements both animal and human, and among them probably some which he here mentions, is a question which I should feel strongly inclined, from the tenor of his thoughts on this whole subject, to answer in the affirmative. This matter will occur in another connection. Meanwhile, though there may be actions called sensori-motor, that have in them mental elements, yet there are others that are, through the special sense tracts though they be, as simply reflex as those through the tracts of the general sensory system; and these are, therefore, equally with the latter, phenomena of irritability. It is to be observed that the capacity for irritability is not exclusively animal.

(To be continued.)

ILLUSTRATIONS OF ANIMAL REASON.

(Continued from p. 249.)

By W. LAUDER LINDSAY, M.D., F.R.S.E., F.L.S.

IN my two immediately preceding papers, the value of many *anonymous* contributions to serial literature, on subjects connected with Comparative Psychology, has been demonstrated or estimated.

We have now to estimate the value of *anonymous* contributions, on similar topics, to literature of a more permanent and pretentious kind—of anonymous *books*, of all sorts and sizes, treating of Animal Instinct or Intelligence.

We begin with the bulky and expensive *Cyclopædias*, taking as their type that, on the whole excellent one, of the Messrs. Chambers of Edinburgh.* For general purposes it is superior to the much more ponderous and costly "Encyclopædia Britannica," or indeed to any of its many rivals. The articles are

* My remarks have reference to the first edition, of 10 volumes, published between 1860 and 1868, and to such articles as those on the Dog, Vol. III.; Horse, Vol. V.; Elephant, Vol. IV.; Camel and Cat, Vol. II.; Ant and Bee, Vol. I.; Spider, Vol. IX. A new or second and revised edition was issued in 1874.

for the most part accurate—some of them being not very brief—by the best writers in their respective departments of knowledge. Thus, those on "Mind," "Reason," "Instinct," and allied subjects are by Professor Bain, of Aberdeen; those on Human Insanity by Dr. Browne, of Dumfries, lately Commissioner in Lunacy for Scotland; and those on Veterinary subjects by Professor John Gamgee, formerly of the New Veterinary College, Edinburgh, and Albert Veterinary College, London.

But the Zoological articles appear to constitute a singular exception to the general rule—that groups of articles are contributed by specialists eminent in their departments. I am indebted to Dr. Findlater, the Editor of the *Encyclopædia*, for informing me (in a letter dated February, 1873) that "the greater number of the Zoological articles . . . were written by the Rev. J. Montgomery, formerly Minister of the Free Church, Innerleithen," and those upon "a considerable number of the Lower Forms of Animal Life by the late Dr. Day, at one time Professor of Anatomy and Physiology in St. Andrews University." Professor Nicol, of Aberdeen, appears to have been the immediate Editor of the Zoological department.

Now, not one of the gentlemen above mentioned was or is a Zoologist proper, and specially qualified thereby for contributing articles of a kind that will be accepted as of equal value with those contributed, in their specialities, by Professors Bain or Gamgee, or by Dr. Browne. In the List of Authors given in Volume X. (1868) there is, curiously enough, considering the large proportion of space in the *Encyclopædia* occupied by Zoological articles, no Zoologist proper or professional, unless Dr. Strethill Wright of Edinburgh, or Mr. Francis, Editor of "The Field," be so regarded.

This anomaly may possibly have been amended in the new edition of the *Encyclopædia*—that of 1874, the prospectus of which professes that "its articles are written by those only who are *specially*, and in most instances *practically*, acquainted with the subjects." But such a supposition or hope is incompatible with the assurance given us by a well-known Edinburgh bookseller, that Chambers's *Encyclopædia* is *stereotyped;* which means that the defects of the first edition are perpetuated in its successors, except in so far as alterations may be embodied in Supplements or Addenda.

This matter of *stereotyping* seems to me a serious mistake and nuisance in all classes of *scientific* works, bearing in mind how

constantly the aspects of science are being altered by new data, and by new ways of looking at old data. Stereotyping, in such a series of volumes as those of the "International Scientific Series," prevents an author, in the various editions through which most of the said volumes have run, or will run, making desirable or necessary corrèctions, additions, or subtractions. The result of which is, that an author, in such a series, cannot be too careful as to what he first prints, seeing that his errors, of whatever kind, will be perpetuated by stereotype in three great languages, and in four great literary and scientific countries. He cannot, therefore,—resisting the pressure put upon him by impatient publishers, translators, critics, or readers,—take too much time to mature his opinions or inferences, and classify the facts upon which his general conclusions are based; the more especially if such conclusions are opposed to long-cherished, popular beliefs.

There is another Encyclopædia, now being published in Edinburgh as a rival to that of the Messrs. Chambers—the "Globe Encyclopædia." To its Editor I made an application similar to that which I addressed to Dr. Findlater, as to the authorship of its Zoological articles. But in this case no notice was taken of my simple request. The legitimate inferences from the non-compliance of an Editor in such a case are, either that he is

(1) Chargeable with business remissness;
(2) Or with personal or official discourtesy; or that
(3) He is not prepared to give a satisfactory reply: in other words, that he cannot satisfy inquirers as to the character of his contributors, of whose talents or qualifications and so forth it is far too common, in the copious advertisements of such publications, to make egregious boast.

In certain cases, as in that of Miss Cobbe and the "Quarterly Review," it proved that the third inference could not have been justified by the facts; and in that case, moreover, there was the intrinsic evidence of the ability of the article and the authenticity of its narrative. But, in other cases, where an Editor withholds a simple reply to a simple question, the suspicion is naturally created that the sources, or compilers, of information are not trustworthy, and cannot afford to have their names made public. Wherever such a suspicion exists, the works to which the

suspicion attaches must be set aside as valueless in a scientific sense; for it is incumbent on the student of Comparative Psychology to make use of no doubtful or doubted facts—to resort to no dubious sources of information. Hence it is that I cannot, and do not, myself quote from such a work as the "Globe Encyclopædia."

Parenthetically it may be here stated that there is no necessity for recourse to doubtful sources of information anent Animal Intelligence. Illustrative anecdotes of a perfectly authentic kind are superabundant, if carefully looked for. But even these the student would do well to set aside—except as affording secondary or confirmatory evidence—in favour of *original observation*, and personal reflection on the Facts observed; and there is scarcely a man, woman, or child so unhappily circumstanced as not to have ample opportunity, on all hands, for original first-hand or direct observation of the character and habits of certain animals.

Besides encyclopædias proper, there are many works treating exclusively, in a popular way, of animals and their habits, or containing articles of this character, that are virtually encyclopædic, and that may, therefore, fitly be reviewed in connection with the larger works. Such, for instance, are

(1) The Popular Natural Histories of Cassell and other publishers.
(2) The Percy Anecdotes.
(3) The Treasuries of Maunder and others.
(4) The "Information for the People," and "Miscellany of Useful and Entertaining Tracts," of Messrs Chambers.
(5) The Natural Histories for the Young, published by

- *(a)* The Religious Tract Society, and the Book Society, both of London.
- *(b)* The Messrs Nelson, of Edinburgh.
- *(c)* Messrs Seeley, Jackson, and Halliday, of London.
- *(d)* Messrs George Routledge & Sons, London.
- *(e)* Messrs Macmillan & Co., London and Cambridge.
- *(f)* Messrs Chapman & Hall, London.
- *(g)* "Our Dumb Companion Series" (illustrated) of Messrs S. W. Partridge & Co., London.

In regard to the "Popular Natural History" of Messrs Cassell, Petter, & Galpin, London, a handsome work in various

editions of 2 or 4 vols., crown 4to., profusely illustrated,* the Editor did me the favour to write me as follows:—

"La Belle Sauvage Yard, Ludgate Hill,
"London, E.C., *November* 7, 1873.

"I beg to acknowledge the receipt of your letter of the 5th inst., which you were so kind as to address to Messrs Cassell, Petter, & Galpin, upon the subject of the authorship of "Mammalia" in their *Natural History*. They desire me to say in reply that as that work was written by several gentlemen they will feel obliged if you will be good enough to quote it as "Cassell's Popular Natural History."

"*November* 14, 1873.

I beg to acknowledge the receipt of your letter of the 10th inst.; in reply to which Messrs Cassell, Petter, & Galpin desire me to explain that they think it possible that you may refer to the statement about *monkeys* and *smallpox* which appeared in the first edition of their Natural History. In that case, I have to inform you that the statement was afterwards discovered to be *erroneous*, and was expunged in subsequent editions. The author of that portion of the *Natural History* is dead, and they do not feel that it would be desirable to have his name now published."

This work, which treats of Mammalia, Birds, Reptiles, Fishes, and Insects, is a compilation of matter, including abundant anecdotes, bearing upon, or illustrative of, the character and habits of animals. And in so far as the names of works or authors quoted are given, assuming always that the quotations are accurate, such a work contains a mine of information. Nor is the mere fact of its containing an error here or there sufficient to invalidate the general value of the work; for, as I shall have occasion to point out by-and-bye, when treating of publications by the highest scientific authorities of the present day, absolute absence of *error* need not be looked for. Nevertheless it is always unsatisfactory not to be furnished with the names of the compilers of, or contributors to, a Natural History of any consequence.

Probably of the same character as the "Popular Natural History" is the "Wonders of Animal Instinct,"† which constitutes a volume of the "Library of Wonders," published by the same enterprising firm,‡ to whom we owe, for instance, among other admirable works, the "Races of Mankind," by Dr. Robert Brown.

* The last edition was in 2 vols., 1871; the older editions in 4 vols.

† 2nd edition, illustrated, 1874.

‡ Along with the Zoological contributions to "Cassell's Magazine," an illustrated weekly, whose articles resemble those of "Chambers's Journal" and the better class of its rivals.

The well-known "Percy Anecdotes," of which many editions have been issued,* contain a special section of "Anecdotes of Instinct," consisting of an admirable series of illustrations of the mental aptitudes of the lower animals. Isolated anecdotes also occur in the section on "Music." The work professes to have had, in its compilation, "a scrupulous regard to truth," so that the authenticity of the anecdotes of which it is made up may be apparently relied upon as much as it is safe to trust to the accuracy of any such published compilations of the too frequently *anonymous* records of fact or observation. In certain cases, satisfactory authorities are cited for the quotations, *e.g.*, Wilson, the American ornithologist; Bishop Heber, of India; and Broderip, author of the "Zoological Recreations."

Similar in the character of its quotations to the "Percy Anecdotes" is a volume published at Halifax in 1839, obviously for the benefit of youth, entitled the "Wonders of Nature and Art." It quotes largely from Shaw's "Nature Displayed."

As to Chambers's "Information for the People," Dr. William Chambers himself informed me (in December, 1873), "I am sorry I cannot say anything satisfactory as to the writers of the articles in the 'Information,' the matter being a mixture of old and new." The articles in question are such as those on the Horse, Dog, Sheep, Goat, Alpaca, Pigs, Cattle, Rabbits, Cage-Birds, Poultry, and the Honey-Bee—all in Volume I. of the illustrated last or new edition of 1873-74. Probably his remark applies also to such papers in the "Miscellany of Useful and Entertaining Tracts" as, in

Vol. I.—of the illustrated old edition of 1845—
Anecdotes of Dogs.
II. Anecdotes of the Horse.
IV. Ants.
V. Spiders.
VI. Anecdotes of the Cat.
VII. Elephants.

Referring to the new revised edition of 1869-71, Dr. Findlater later informed me (in February, 1873), "As to the articles of the 'Miscellany' you specify, they were simply reprinted, with no material alteration, from the former edition, and I cannot say who wrote them."

* One of the latest and best is the "Chandos Edition," by Timbs, in 2 vols. 8vo. London, 1868.

There is a singular variety in the quality of the popular Zoological articles contained in the publications of the Messrs. Chambers; and this is not surprising when we consider the number and variety of the said publications themselves, and the length of time during which they have been continuously issued from the well-known warehouse in the old High Street of Edinburgh. As a rule, the articles in the "Encyclopædia" and "Miscellany" are excellent, whoever the authors may have been or may be. In the "Journal," on the other hand, there are some signal exceptions to this general rule. For instance, Dr. William Chambers frankly confesses, in his letter above quoted, that "the article on Animals in 'Chambers's Journal,' November 1, was written by an unfortunate being, to whom I cannot refer. The same was the writer on Dogs." Again, the article on "Canine Sagacity," in the "Journal" for February 19, 1876, is a typical instance of that serving up of "old stories," which I have met with in so many modern popular works on Natural History. I have elsewhere repeatedly read all the anecdotes there given concerning "Canine Sagacity;" just as one constantly encounters in print the "Dog of Montargis," the "Dog of Corinth," the "Geese of the Roman Capitol," and other historical animals. The first incident related by the writer on "Canine Sagacity"—a subject, by the way, terribly hackneyed—is stated to have happened "some twenty years ago"—itself a statement calculated to arouse suspicion; for the facts so far as, or if, true, can surely be confirmed by more authentic *recent* events. In short, all three stories given by our author are hack or hackneyed, and may be but "stories" after all—unworthy of credence—no voucher being given for their authenticity.

Of a very different character are the following contributions to "Chambers's Journal:"—

(1) "Recent Observations on Ants;" recounting the results of the experimental researches of M. Forel, a Swiss Naturalist: Number for January 1, 1876.
(2) "Curious Phases in Natural History;" pointing out the inter-relations of Ants and Aphides: Number for May 6, 1876.
(3) "Cats:" Number for July 3, 1875.
(4) "Swans:" Number for July 17, 1875.
(5) "Partridges:" Number for October 16, 1875.

(6) "Rooks:" Number for February 26, 1876.
(7) "Curious Companionships:" Number for March 11, 1876.
(8) "Our Feathered Neighbours"—the Cuckoo, Nightjar, and Corncrake: Number for May 20, 1876.

Whatever may be the varying ability of the contributors on Zoological subjects to the publications of the Messrs. Chambers, whatever the intrinsic value of their contributions or the trustworthiness of their statements of Fact, it is noteworthy that neither Dr. Chambers nor Dr. Findlater hesitates to give information regarding the said contributors or contributions. In their dealings with *bona-fide* inquirers they display at once business promptitude, official and personal courtesy, and a perfectly frank and honest statement of Facts. And they have no reason to be ashamed of giving to the public all the information they themselves possess. The result will only serve to confirm or strengthen public confidence in all the literary undertakings of the firm they represent; while no man of sense will hold them responsible for the occasional shortcomings of authors, who may very likely disappoint their employers', as well as our, expectations of their ability or integrity and its results.

Other specimens of *anonymous* books or papers, of the most different qualities, kinds, or values,—connected with Comparative Psychology—are the following:—

1. *Books;* partly intended as schoolprizes, or gifts, to youth of both sexes; some of which have as their special aim the inculcation of *humanity to animals.*

   (*a*) "Paws and Claws: being True Stories of Clever Creatures, Tame and Wild:" tales namely inculcating or calculated to inculcate Kindness to domestic and other animals. Profusely illustrated by Harrison Weir and other artists. Probably a book for children: one of Cassell's publications. Extra foolscap 4to. 1874.

   (*b*) "Dog Life: Narratives exhibiting Instinct, Intelligence, Fidelity, Sympathy, and Attachment." With illustrations by Sir Edwin Landseer. Large 8vo. Seeley, Jackson, & Halliday. 1874.

   (*c*) "Lessons derived from the Animal World." First Series: Dogs, Horses, Elephants, Birds. Second Series: Bees, Ants, Spiders. Illustrated. 12mo. 1851.

(*d*) "Half-hours with the Animals: Narratives exhibiting Intelligence, Instinct, and Affection." Illustrations after Landseer and others. 8vo. London, 1875.

(*e*) "The Monsters of the Deep, and Curiosities of Ocean Life;" and

(*f*) "Fairy Frisket; or Peeps at Insect Life," by A.L.O.E. Both illustrated, post 8vo., and vols. of Nelson's "British Library."

In June, 1874, the enterprising publishers themselves—the worthy rivals in Edinburgh of the Messrs. Chambers—favoured me with the following

"Memorandum from T. Nelson & Sons, Hope Park, Edinburgh:—

"Nelson's 'British Library' was originally published about twenty-six or twenty-seven years ago, and has been out of print for eighteen years or so."

The date of its first appearance was therefore probably 1847 or 1848. "Nelson's British Library" seems also to have included a series of illustrated Weekly *Tracts*, similar in size and subjects to those of "Chambers's Miscellany." Several of the numbers treated of the mental endowments of Animals: for instance, one on "Affection in the Lower Animals."

(*g*) "The Picture Book of the Sagacity of Animals," with 60 plates, by Harrison Weir. Geo. Routledge & Sons, 1871.

(*h*) "The Alphabet of Animals, in Rhyme: designed to impress children with Affection for the Brute Creation." Illustrated with 25 engravings. An enlarged and improved edition of a "very popular little work, formerly published by Mr. J. Groom, of Birmingham, now the property of the Book Society" of London.

(*i*) "The Life and Times of Conrad the Squirrel:" a Story for Children. "Well calculated to make children take an intelligent and tender interest in the Lower Animals." Second edition, crown 8vo. 1872.

(*k*) "A Dog of Flanders and other Stories," by Ouida. Chapman & Hall, 1872.

(*l*) "Eccentricities of Animals." Messrs. Seeley, 1872.

(*m*) "Lights and Shadows in a Canine Life;" being the Biography of a Dog called "Ugly." The life and travels of a Scotch terrier—the author being a lady, according to the reviewers. Simpkin & Marshall, London, 1872.

Besides Miss Cobbe and Miss Buist, many *ladies* have written books—mostly for the young—treating of the Virtues—the lovable qualities—of our Domestic animals. Such authoresses include Mary Howitt, Mrs. S. C. Hall, Mrs. Charles Bray, Mrs. C. L. Balfour, and Miss Eliza Meteyard.

(*n*) "Histoire critique de l' Ame des Bêtes:" a work said to be in more than one volume.

(*o*) "On the Future Existence of the Animal Creation:" a work said to have been published in Edinburgh in 1871, according to the "Animal World" (vol. ii. p. 106). But reference is probably intended to the following quaint work of the late Peter Buchan—"Scriptural and Philosophical Arguments, or Cogent Proofs from Reason and Revelation, that Brutes have Souls, and that their Souls are Immortal;" published by Lewis Smith, Aberdeen, 1824.

The said Peter Buchan is better known as the author of "Ancient Ballads and Songs of the North of Scotland," which, with others of his works, are now being republished in new editions by his son. Peter was a native of Peterhead, and died in 1854 in London, aged 74.

(*p*) "Vestiges of the Natural History of Creation." London, 1860.

(*q*) "The Elephant," one of "Knight's Weekly Volumes," published in London, in or about 1844-5, by the late well-known publisher and author, Charles Knight.

(*r*) "The Knowsley Menagerie:" a description of the Animals in the collection of former Earls of Derby. 1850.

(*s*) "The Dog," by "Idstone," 12mo. London, 1872.

These *Noms de plume* are no improvement on the absence of an author's name; for there is just as great and no greater

difficulty in ascertaining the real authorship of works bearing such *pseudonyms* as, or than, in the case of those which are simply *anonymous*. The same remark applies to works the name of whose author is given to us only in the form of initials. "Stonehenge," the writer of a series of works comparable with those of "Idstone,"—such as

(*t*) "The Horse." 1862—

is now known to be J. H. Walsh, F.R.C.S., presently or formerly Editor of "The Field."

(*u*) "Maunder's Treasury of Natural History." Last edition, by Cobbold.

(*v*) "Captain Wolf, and other Sketches of Animal Biography." Seeley, Jackson, & Halliday.

II. *Articles* in Reviews, Magazines, and other Serials.

(*a*) "Cruelty to Animals," an excellent, temperate article, taking a general review of the whole subject. "Cornhill Magazine," February 1874.

(*b*) "The Boundary between Man and the Lower Animals." "Quarterly Journal of Science," January, 1875.

(*c*) "Animal Depravity." Same Quarterly, October, 1875.

(*d*) "Dogs and their Diet." "Once a Week," September 30, 1871.

(*e*) "The Philosophy of Birds' Nests." Same serial, June 24, 1871.

(*f*) "Ralphos," a Raven. Same serial, October 14, 1871.

"Once a Week" is a London illustrated weekly of the same character as "Chambers's Journal" or "All the Year Round,"—containing, like both, occasional popular articles on Animal Sagacity.

(*g*) "Dogs at Home, on Sale, on Show, and in Hospital." "All the Year Round," 1876.

(*h*) "The Agricultural Ant of Texas." "Science Gossip," January, 1868.

(*i*) "Our Winnie"—(a pet Hare). Same serial, April, 1873.

(*k*) "The Tasmanian Devil." "Spectator," July 9, 1871.

(*l*) "The Indifference of Animals to Speculative Truth." Same serial, November 26, 1870.

(To be continued.)

OUTLINE DESCRIPTIONS OF BRITISH COLEOPTERA.

(Continued from p. 261.)

By Rev. T. BLACKBURN, B.A.

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4. Th. pit. or b., or with only an extremely narrow r. mar. (the width of which is much less than ½ diameter of eye). Fr. claws of ♂ equal. . . 5
   - test. or brown, or with broad r. or test. mars. . 9
5. E. dull r.; ba. and mars. still paler. An., pal., legs, extreme mar. of th., and some marks on h., reddish. Rest of body b. Rather short, broad, and conv. ♂ shining; ♀ dull. E. (especially in ♂) with numerous large consp. puncs. forming rows in fr. Surface of ♂ spar. and minutely punc., of ♀ wrinkled. Fr. claws of ♂ simple and equal, but el. 3½ l. Bs. . congener
   Brassy b., almost glabrous. An., pal., fr. legs, some marks on h., and extreme mar. of th., reddish. E. each with two yel. spots near mar. (the fr. one about as large as the eye, and often divided), and 3 or 4 rows of puncs. A wide conv. species. Claws of fr. tar. in ♂ equal and simple, but el. 3¾ l. E. . didymus
   Not as above. Ap. j. of interm. tar. cons. longer than its claw, and a little longer than the prec. 2 js. together. Gen. 2 r. spots near mar. of each e. . 6
   - - -. - - - - - hardly longer than its claw, and hardly so long as the prec. 2 js. together. Brassy b. Pal., an., legs, r.-m. of e., and 2 marks on h., r. Surface finely wrinkled. Some obsc. rows of puncs. on e. Not a very wide species. 3¾ l. E. S. I. ! chalconotus
6. A small well def. round fov. on each side of th. near ba. Not less than 3½ l. 7
   This fov. obs. Less than 3½ l. . . . 8
7. B. An., pal., 2 spots on h., and (gen.) 2 spots on e. near mar., r. Legs pit. or r. Rather narrow, parallel and flat. Very minutely punc. or wrinkled. E. with some rows of puncs, which do not reach ba. and are quite irreg. behind. Ant. claws of ♂ equal, simple, and not el. 3½-4 l. B. . . . guttatus
   Very like prec. The rows of puncs. on e. regular and well def. in fr. Legs darker. In. claw on ant. tar. of ♂ with a tooth in the mid. 3¾ l. B. . . nitidus
8. Brassy b. Pal., an., legs, 2 spots on h., 2 spots on e. near mar., and r.-m. of e., r. or reddish. Conv. Rather narrow. Finely punc. Some rows of dist. puncs. on e. are irreg. in fr. Sides rather rounded. A sharp tooth at ba. of each claw in ant. tar. of ♂. 3l. B. . . . . unguicularis

Very like prec. Less brassy. R.-m. of e. b. Sides hardly rounded. The rows of puncs. on e. regular in fr. 3 l. S. . . . . *affinis*

9. Prevailing color of th. dist. r. or test. E. without sharply def. pale markings, their mar. not paler than lightest part of disc. 10

Not as above. Surface of e. covered with a dist. but fine network of wrinkles. 11

- - -. - - - not consp. wrinkled. . . . 13

10. Test. Hi. ⅔ of h., 2 marks in mid. of th., some small well def. lines and blotches closely and irreg. placed on e., and the u.-s., dusky or b. Rather flat; not very wide; sides rounded. Rows of puncs. on e. very obsc. ♂ shining, almost glab.; ♀ dull, wrinkled. Fr. claws of ♂ equal, with an obsc. tooth at ba. 4 l. E. S. I. . . . . nebulosus

-. - - - -, ba. and fr. of th., and some obsc. clouds on e. and on the fem., b. or dusky. Like prec. in shape. Almost glab. exc. some very obsc. rows of puncs. In. claw of fr. tar. of ♂ wider than outer, and with a tooth. 3¾ l. B. . . . . conspersus

Shining r.-brown, often with obscure darker clouds. Almost glab. Short, wide, and conv. with rounded sides. E. with rather dist. rows of puncs. U.-s. b. The upper surface, an., and pal., nearly or quite unic. Hi. legs and ant. fem. more or less pit. Claws of fr. tar. of ♂ equal, el., and not dist. toothed. 4 l. E^{s}. . . . . *brunneus*

Dull r., more or less clouded with dusky. U.-s. b. Narrow, el., and pointed behind. Finely and thickly punc. E. with regular rows of larger puncs. Fr. claws of ♂ short, equal, and simple. 3¾ l. E. . Leiopterus ruficollis

11. Surface of e. *unif.* not very shining nor very smoothly wrinkled. Ba. 3 js. in ant. tar. of ♂ *strongly* dil. U.-s. b. 12

- - - shining and very smoothly wrinkled in fr., but dull and rough near ap. Rows of puncs. obsc. H. and th. test. more or less clouded with dusky. E. b.; mar. and some well def. lines and blotches yel. An. pal. and legs test. U.-s. dull test. Ant. claws of ♂ short and simple. Color varies. Th. and e. sometimes b. with a yellow mar. 3¾ l. B. . maculatus

12. Rather narrow, with parallel sides. H. dusky; fr. ⅓ test. Th. test.; ba. and fr. darker (rarely b. with pale mar.). E. dark test. or brown; mar. yel. An. pal. and legs test. Rows of puncs. on e. obs. In. claw of fr. tar. in ♂ short, broad, and with a blunt tooth in mid. 3½ l. B^{s}. . . . arcticus

Resembles prec. Broad with rounded sides. Not more than *extreme fr.* of h. test. Th. b.; mar. pale.

Fr. claws of ♂ equal and simple, but very long. Hi. legs often dusky. 3¾ l. B. . . . Sturmî

13. E. without well def. puncs. (exc. irreg. rows of large puncs.) or sharply def. markings. . . . 14

E. thickly and dist. (though finely) punc., and with dist. rows of larger puncs. Brassy. Fr. and back of h., sides of th. and e., an., pal., and legs, r. or reddish. Not very wide; sides rounded. Fr. claws of ♂ simple, el. Fr. fem. of ♂ set with long yel. hairs. 3 l. B. . . . . femoralis

Obs. punc. B. H., an., pal., legs, and sides of th., r. E. each with a consp. angulated tr. yel. fasc. near fr., and a spot behind mid. Some dist. rows of puncs. on e. Fr. claws of ♂ simple, but very el. Conv. Not very broad. Sides rounded. 3½ l. E. undulatus

14. Very shining. Glab. Rather broad and flat; sides little rounded. H. b.; fr. and 2 spots behind pale. Th. b. with pale mars. E. brown, paler at sides and in fr., with some irreg. rows of large puncs. An., pal., and legs, reddish or pit. Fr. claws of ♂ el. but simple. 3½ l. E. S. I. . . . . paludosus

Resembles prec. Broader and more conv. with more rounded sides. Very minutely but dist. punc. The rows of large puncs. more dist. Out. claw of fr. tar. of ♂ much broader than the in., with a strong tooth in the mid. 3⅓ l. Ex. . . . . uliginosus

Dytiscus.

1. U.-s. (at least partially) test. 2

Rather narrow, el. Finely punc. Coxæ of hi. legs (*i.e.*, a narrow el. plate on u.-s. reaching from breast backw. to ba. of hi. legs) rounded at hi. ap. B. An., pal., fr. of h., and side mars. of th. and of e., test. Fr. legs and a mark on h. more or less r. Hi. legs pit. 13 l. E.S.I. . . . . punctulatus

2. Sc. b. U.-s. entirely test. 3

\- yel. U.-s. spotted with b. Coxæ of hi. legs, long, narrow, and ac. pointed at ap. . . . 5

3. Coxæ of hi. legs pointed at ap. . . . 4

\- - - - round at ap. Dark b.-gr. An., pal., legs, fr. of h., side mars. of th. and of e., and often an obsc. fasc. near ap. of e., test. Fr. and ba. of th. obsc. pale. 16 l. E.E.F. . . . . *dimidiatus*

4. - - - - obt. pointed at ap. Very like prec. All the mars. of th. broadly test. 15 l. E. S. I. . . marginalis

\- - - very acutely pointed at ap. Very like prec. Narrower. 15 l. E.E.F. . . . . *circumcinctus*

5. Very like prec. exc. in the points already mentioned. 14 l. E. . . . . circumflexus

- - -. The test. mars. of th. much wider than in the other species, the mars. at fr. and ba. being together as wide as the space between them. E. with numerous fine longi. yel. lines. 12 l. S.I. . . *lapponicus*

Acilius.

Very wide and flat; sides very round. Closely and finely punc. Brown b. An., pal., some marks on h., mars. of th., a line on disc of th., mar. of e., u.-s. of th., fr. 4 legs (exc. part of up. side of ant. legs), r.-m. of e., some spots on u.-s. of each seg. (exc. 1st) of h.-b., and ap. part of hi. fem., test. E. of ♀ with 2 hairy fov. on th., and 4 on e. 7¾ l. E. S. I.! . . . . . sulcatus

Very like prec. Narrower. On u.-s. *all* segs of h.-b., marked (more plentifully) with test. Hi. fem. test. In ♀ no hairy fov. on th.; 3rd fov. on e. narrower. 7 l. B.S. . . . . canaliculatus

Hydaticus.

1. Not very wide. Widest about mid. of e. U.-s. dusky or b. Mid. tar. of ♂ with 3 strongly dil. js. Very minutely and closely punc., with dist. rows of larger puncs. 2

Wide. Widest behind mid. of e. U.-s. test. Mid. tar. of ♂ little dil. Finely and spar. punc. E. with obsc. rows of larger puncs. H. and th. test.; some marks on h., ba. of h., and ba. and fr. of th., b. E. test., very thickly sprinkled with b., exc. on mars. Legs, an., and pal., test. 7 l. E.F. . *cinereus*

2. B. Fr. of h., fr. and side mars. of th., mar. of e., pal., an., and fr. legs, test. 6¼ l. E. . . . seminiger

Very like prec. Less closely and evenly punc. Mars. of th. more widely test. A tr. yel. fasc. near ba. of e. 6 l. E. . . . . transversalis

Fifth Family—GYRINIDÆ. (2 genera.)

Shining. Last seg. of h.-b. rounded at ap., and flat. [Legs test.] . . . . . Gyrinus

Dull. Pub. Last seg. of h.-b. el., pointed at ap. [Legs test.] . . . . . Orechtochilus

Gyrinus.

1. U.-s. of h.-b. test. or pale brown . . . 2

- - - b. R.-m. of th. and e., and the claws, test. or r. [Shining b., bl., or gr. Breast and ap. of h.-b. often reddish. E. with about 11 longi. rows of puncs.] . 3

- (exc. legs) wholly b. Claws b. (ant. only at ba.) Otherwise as above. 6

2. El. Bluish or bl.-gr. E. unif. p.-s. U.-s. of h.-b. often dusky at ba. 2 l. E. S. I. . . . minutus
   Wide. Bl.-b. E. with obsc. longi. cop. clouds. E. with fine rows of puncs. which are obsc. near sut. 3½ l. E.N.E. . . . . *urinator*
3. Ints. of e. glab. Puncs. in rows near sut. much finer than towards mar. 4
   Rather broad; sides rounded. Puncs. in all the rows about equal, but in each row faint near ap. 2¼ l. E. S. . . . . *Suffriani*
   Not very wide. Ints. of e. finely punc. Puncs. in rows near sut. much finer than towards mar. 3 l. E. . . . . *colymbus*
4. Species dist. more than twice as long as wide and with only moderately rounded sides. . . . 5
   Not (or hardly) twice as long as wide. Sides strongly rounded. Rows of puncs. on e. variable, but always fine; those near sut. dist. the finest. Ap. of e. rounded. 2½-3 l. E. S. I. !! . . . natator
5. El.; sides nearly parallel. Rows of puncs. on e. strong, though finer near sut. Ap. of e. strongly rounded. 3⅓-4 l. E^N. . . . . bicolor
   Probably var. of prec. Sides less parallel. Ap. of e. less rounded. 2¾-3½ l. B. . . . distinctus
   Apparently resembles *bicolor* but is wider, with more rounded sides, and the ap. of e. almost quite straight. 3⅛ l. E. . . . . *caspius**
6. Not very broad. B.-bl. Legs test. E. with regular rows of strong puncs. between which the ints. are often slightly conv. Ints. of ♂ glab., of ♀ punc. 2½-3½ l. B. . . . . marinus
   Very like prec. Perhaps a var. Rows of puncs. on e. finer: those near sut. finer than near mar. 2⅓-3 l. B. . . . . opacus

ORECHTOCHILUS.

Narrow. El. Finely punc. B.-brown. Densely pub. U.-s reddish or test. 2⅞ l. B. . . . villosus

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TABLE OF FAMILIES OF PHILHYDRIDA.

1st j. of hi. tar. not longer than the rest—often very small. [Species occurring in water.] . . Hydrophilidæ
1st j. of hi. tar. evidently the longest. Tib. with numerous coarse spines. H. and th. thickly punc. Species occurring in rotten vegetable matter, sea-weed, manure, &c. . . . . Sphæridiadæ

* I have never met with an authentic specimen (British or foreign) of this insect. Types that I have seen do not answer to description.

First family—HYDROPHILIDÆ (17 genera.)

1.	An. with at least 7 js. Fr. of clyp. not emarginate .	2
	- - only 6 js. Fr. of h. deeply emarginate . .	Spercheus
2.	Th. broader at ba. than in fr.; its surface without consp. furrows or ridges. Less than 5 l. . .	3
	- - - - - - - ; - - - - - - - -. More than 6 l. .	10
	Not as above	11
3.	H.-b. consisting of more than 4 dist. segs. . .	4
	- - - only 4 dist. segs. [Not more than 1 l. A str. close to sut. in hi. part of e. is obs. in fr. An. 9 j. Pal. short]	Chætarthria
4.	Last j. of pal. longer than pen. . . .	5
	- - - - shorter than pen. An. 9 j. . . .	9
	Last 2 js. of pal. equal. Sut. str. as above (see *Chætarthria*). An. 9 j.	Enochrus
5.	Sut. str. as above. More than 2 l. An. 9 j. .	Hydrobius
	- - - -. Less than 2 l. An. 9 j. . . .	6
	- - either absent, or entire. An. 8 j. . .	7
6.	Th. very finely and rather ind. punc. Space between ins. of mid. and hi. legs flat. . . .	Anacæna
	- strongly and roughly punc. Space between ins. of mid. and hi. legs elev.	Paracymus
7.	E. not deeply p.-s.	8
	- deeply p.-s.	Berosus
8.	Pal. dist. longer than tar. of mid. legs. . .	Limnebius
	- not dist. longer than tar. of mid. legs . .	Laccobius
9.	Ap. j. of pal. not more than ½ as long as 2nd. Sut. str. as in *Chætarthria*. Space between ins. of mid. and hi. legs elev.	Philhydrus
	- - - - more than ½ as long as 2nd. Sut. str. obs. Space between ins. of mid. and hi. legs flat .	Helochares
10.	Sc. more than ½ as long as th. An. 9 j. . .	Hydrophilus
	- hardly ½ as long as th. An. 9 j. . . .	Hydrous
11.	Last j. of pal. cons. longer than pen.	12
	Pen. j. of the rather short pal. large and thick. Last j. much shorter and thinner. An. 9 j. . .	Ochthebius
12.	Pal. cons. shorter than h. and th.	13
	- about as long as h. and th. An. 9 j. . .	Hydræna
13.	Th. strongly tr. An. 9 j.	Helophorus
	- hardly (or not) tr. An. 7 j. . . .	Hydrochus

Hydrophilus.

	Smooth, shining. Pit. b. An., pal., and some fringes of hair on the legs, more or less r. E. with 4 rows of puncs.; a spine at ap. Ap. j. of ant. tar. of ♂ strongly dil. 18 l. E.	piceus

Hydrous.

Very minutely punc., shining. B. or bl.-b. Legs, an., and (often) fr. legs, more or less reddish. E. with 4 rows of large puncs. Ap. j. of fr. tar. of ♂ dil. 7½ l. E. . . . . caraboides

Hydrobius.

A short wide species. B. or brassy b. Legs (more or less), pal., and ba. of an., r. Thickly punc. On e. 10 consp. punc. str., which are faint in fr., very deep behind. An obsc. row of large puncs. on alt. ints. 3¾ l. E.S.I. ! ! . . . . . fuscipes

Very like prec. Longer. Narrower. The punc. str. on e. are represented by mere rows of puncs. 4 l. E.s.c. . . . . oblongus

Helochares.

Rather flat. Wide behind. Minutely and thickly punc.; more spar. behind. Faint traces of rows of larger puncs. on e. H. and th. test. E. test., more or less dusky on disc. Pal., legs and an. test. Extreme ap. of ap. j. of pal. dusky. 2¾ l. E ! . lividus

Very like prec. More unif. test. brown. More of ap. j. of pal. dusky. Rather strongly and very unif. punc. 2½ l. B. . . . . punctatus

Philhydrus.

1. H., th. and e. test. (chiefly). Last j. of pal. not consp. dark. Not less than 2⅔ l. . . . 2

   Not as above. Sut. (especially behind) broadly b., in dist. contrast to the brownish e. . . . 3

   Not as either of the prec. groups. . . . 4

2. Test. H. (behind), disc. of th. (often), cl. of an., 2nd j. of pal., and some obsc. clouds on e., dusky or b. Finely and closely punc., with very obsc. traces of rows of larger puncs. on e. 2⅞ l. E ! . . testaceus

   Very like prec. Narrower. More shining. Not quite so finely and thickly punc. Cl. of an. lighter. H. only a little dusky at ba. Pal. unic. test. E. with the rows of puncs. more dist. 2⅞. E^c. . maritimus

3. Rather el. Not very closely punc. H. b.; 2 pale spots in fr. Th. test.; dusky about mid. and ba. E. (exc. sut.) brown. Pal. test.; 2nd and 4th js. often a little darker. An. brown; test. at ba. Fem. b. Tib. lighter. Tar. test. 1⅞ l. E. S. I. suturalis

   Resembles prec. Rather more thickly punc. H. unspotted. Pal. with 1st and 3rd js. dull red; 2nd and 4th pit. b. 1½ l. B. . . . marginellus

4. Pal. unic. or with only obsc. dull clouds. . . 5
   Pal. test.; ap. part of last j. (and often 2nd j.) consp. pit. b. H. b. (often with 2 pale spots in fr.) Th. dusky; paler on mars. E. test. or brown; often paler near ap. Legs reddish. Rather thickly and strongly punc. 1¾-2½ l. E.S.I.! . . melanocephalus
5. Shining pit. b. Pal., an., tar., and mars. of th. and of e., yel. or yellowish. A rather short species, strongly and not very thickly punc. 2 l. E. . . ovalis
   Brown. Back of h., and cl. of an., dusky. Strongly and thickly punc. 2⅛ l. B. . . . nigricans

ENOCHRUS.

H. (exc. 2 yel. spots in fr.), ap. of pal., and u.-s., b. Th. and e. test. yel. (often with dusky clouds). An. and legs dusky r. or pit. Rather thickly punc. E. obsc. p.-s. behind. 2 1/5 l. E. . . . bicolor

PARACYMUS.

Short and conv. Strongly punc. Shining brassy, tending to r. on the sides. Legs, and ba. of an. and of pal., reddish. 1⅓ l. B. . . . æneus

ANACÆNA.

1. Thickly and finely punc. B. or pit. b. . . . 2
   H. dusky; 2 *large* test. spots in fr. Th. test.; disc dusky. E. test. with dusky clouds. Legs, and ba. of an. and of pal., test. Ap. of latter 2, dusky. Broad and rather conv. Spar. punc. 1 l. E. . bipustulata

(To be continued.)

PROCEEDINGS OF THE BERWICKSHIRE NATURALISTS' FIELD CLUB.

THE concluding portion of the volume for 1873-75 of the "History" of this Club has recently reached our hands, and a brief notice thereof will not, we think, be without profit to our readers.

The Club was founded in 1831, has had many distinguished naturalists on its roll, and now has 257 ordinary members. Its field of operation is the Borders, in different places of which the Club holds meetings during the summer. For example, the meeting-places this year are Dunbar, Selkirk, Norham, Rothbury, and Dunse.

The portion of the volume before us shows that there is no lack of vitality in the Club. The contents are mostly (as they should be) of a local character, but are not on that account devoid of interest or utility to naturalists elsewhere. Rather their restriction to locality enhances their value.

Amongst the contents we notice the anniversary address of the President, being a brief sketch of the work of the Club during the summer of 1875; obituary notices of several members and others, including a long and interesting account of the celebrated naturalist, Sir William Jardine; various valuable papers on local history and antiquities; reports of the experimental committee (to the Tweed Commissioners) on *Salmonidæ;* various zoological and botanical papers; and a variety of other matter, altogether making up this part of the volume to nearly 200 pages.

To show the pleasant manner in which some of the subjects are treated, we extract a few zoological miscellanea, by Mr. James Hardy, one of the energetic secretaries, to whom the Club owes so much:—

Fox's Antipathy to Jackdaws.—A Fox which frequented Siccar Point, in the beginning of May, took umbrage at the Jackdaws which nestle in the old rabbit holes, on the almost perpendicular sea-banks. It had killed two and buried them at separate spots; other two it had surprised on the adjacent field, and left exposed; while a fifth, after its head had been eaten off, was hid in a bunch of nettles. They had probably been rendering it too conspicuous by pursuing it like a thief, with cries and chatterings, when going forth to prey, or returning to its den, as I have often seen them do when a fox appeared among them.

Sheep.—A shepherd informs me that Sheep are very fond of eating moor-fowl's dung, if they can come at it. This is surely a perversion of taste.

Bottlenose.—Sometime in October, the newspapers recorded that a "whale," fourteen feet long, had come ashore at Burnmouth, near Berwick. I have ascertained that it was a Round-headed Porpoise, or Bottlenose *(Delphinus melas).* Droves of this animal pursue the herring shoals; and this individual had got stranded.

Kestrel *(Falco tinnunculus).*—About two pairs breed in the Lilburn Tower plantations. Like the Sparrow-hawk, they build in the old nest, which they clean out in spring. The

gamekeeper has seen the Kestrel carry off a small weak pheasant.

Song Thrush and Fieldfares.—On the 25th October last, Thrushes were numerous along with Blackbirds, under the cover of withering ferns, in the middle portion of Langleyford vale. Farther up, among the pretty groves and clumps of birches, below the Hope, many of the Thrushes were congregated into small flocks, preparatory to migration. When a Sparrow-hawk passed they flew off in concert, and alighted among the trees in a body. I afterwards saw another large party flying across the open waste far up the water. At the same time there were present other birds of the kind in search of food among the dense beds of brackens, not connected with those gatherings, which may have been aliens. Keeping in separate companies, there were also on the open hills many Fieldfares, new arrivals. I found some fresh killed by hawks. Mr. Hughes wrote me that about that period large assemblages of Fieldfares frequented the Cheviot Moors, as if collecting for dispersion elsewhere. At Oldcambus, December 2, during a frost, the local Thrushes formed a small scattered flock in a field near a plantation, where sheep had recently been pasturing; and for several days numerous Fieldfares and Starlings fed through among them, till a thaw enabled them to obtain food elsewhere. In former seasons I have frequently observed, at the close of autumn, Thrushes flying in flocks on the moors above Redheugh. They took refuge at night in furze bushes.

Skylark.—In the heavy snowstorm at the close of the year 1875 birds were reduced to great straits for a supply of food. On Dec. 20, when the workers were picking up some turnips in a fold for the sheep, a Lark followed them throughout the whole afternoon. Their legs were wrapped with straw bands, and want had so tamed it that it began picking at the straw; and having obtained two or three grains of oats, it evidently expected more by keeping behind them. When they stood it came up on their feet, and allowed itself to be stroked. They offered it crumbs, but it would not have them, but picked up whatever food the fresh turned-up earth revealed. I am informed that the Earl of Home's keeper, in 1875, observed a cream-coloured Lark on Drakemire Moor, but he could never catch a sight of it afterwards.

Bunting (*Emberiza miliaria*).—Whatever may be the case elsewhere, Buntings are seldom seen in North Northumberland during winter. On March 14th, 1876, I observed one at South

Middleton, in a thorn hedge, associated with Yellow-hammers and Chaffinches.

Black-Headed Bunting (*Emberiza schœniclus*).—A few, during severe winters, still frequent the stackyards on the higher farms. Now that the heaths and bogs are drained, this bird has become extremely scarce. I see that a few in summer frequent the borders of Coldmartin Loch, near Wooler; also, Woolerhaugh, near Earle; and on Doddington Hill, where they are called "Blackcaps." In June I saw one or two of these birds at Easington Grange, near Belford.

Chaffinch (*Fringilla cœlebs*).—July 17th, I observed in the garden a female Chaffinch chasing a young Blackbird, which fled chattering in alarm to escape being pecked.

Brambling (*Fringilla montifringilla*).—Mr. Brotherston remarks in a letter—"I believe beech mast is the staple food of this bird. I have seen them feeding on it in the middle of April, when there was no difficulty in getting other food. Some specimens that I obtained at that time had the head nearly black, the grey ends of the feathers being rubbed off."

Greenfinch (*Coccothraustes chloris*).—On the 14th April I noticed above a whinny bank one either fixing on the site of its nest, or serenading its partner. It kept hovering in the air with its gay wings spread out, or sailed round in a circuit; and then seated itself on a bush and uttered spree! spree! with apparent glee. Three days after it continued sailing backwards and forwards over this centre of attraction, ejaculating a variety of notes, as well as its brief, cheery song. About harvest it becomes very mischievous among early ripening patches of corn; and is at all seasons a common bird.

Siskins and Redpoles.—Siskins have been observed some years to frequent the old alder trees at the Pease Bridge; and also those at the sides of the Tower burn, near the Pease Mill. Mr. Ferguson informs me that the gamekeeper at Dunse Castle sees Siskins in the plantations there throughout the season; so that there is a likelihood of some of them breeding there. Of date March 8, 1876, Mr. Ferguson thus writes: "The gamekeeper at Dunse Castle tells me that, for several weeks past, he has seen almost daily during the winter months a flock of from 20 to 30 Siskins—invariably accompanied by a like number of Redpoles—feeding on the fruit of some alders growing at the margin of a pretty large pond or "damhead" near his house. So far as he can judge, the number of males and females seems

to be about equal. In the summer season they disappear; but he has more than once seen a solitary bird in the woods above Dunse Castle, and he is confident that a few pairs remain all the year through. If this be so, there can be no doubt that they breed about the place, although he has never succeeded in finding a nest. The Redpole is never seen except in winter." Mr. Brotherston, writing March 14, says: "We have the Siskin still here; I got a pair from Peatrig bog on the 9th. They are to be gotten there every winter." I was told that in January, 1876, among the alders by the Lill burn, on Ilderton Moor, 24 Siskins were shot; a very unnecessary piece of cruelty, in order to obtain a few specimens to stuff. Redpoles during winter visit the birch woods near Penmanshiel, to feed on the birch seeds. They remain only for a short time.

Starling.—Starlings are as plentiful nesting in old decayed alders on the upper part of Lill burn as in the Back Wood of Langleyford. There is no one to disturb them in that remote situation. There was a general scream of alarm when I approached their seclusion. A shepherd-boy who passing every day was accustomed to the noise calmly remarked, "Oh! its just the way o' them." In that neighbourhood they begin to collect the young in the tall hedges about June 4th; and afterwards feed together in bands, which alight in heaps and spread outwards like a fan; this system of flight and dispersion being constantly repeated. On Sept. 8th I observed a female Starling leisurely walking along a wall top, and picking up the numerous insects that had alighted on it, previous to a shower coming on. Cats kill Starlings but do not eat them.

Jay (*Garrulus glandarius*).—The Statistical Account of Cockburnspath and Oldcambus, when the Jay built in Penmanshiel Wood, is dated 1834. Considerably before that period, under the direction of gamekeepers, the number of "Jay Pyots" had become diminished, and the persecution lasted till all were either trapped or shot. Occasionally, when a boy, I have seen living birds there; but more frequently they were suspended like felons to a cross-stick, with a nail through their heads. There have not been any there for well nigh thirty years. I was told, a few years since, that there are still a few Jays in the Whitfield and Press Woods.

Sand Martin (*Hirundo riparia*).—Mr. S. H. Smith informed me that he on one occasion took notice of a great commotion among some Sand Martins near Norham, and found it was

owing to the presence of a weasel, which was perambulating the cliff and examining nest after nest.

Wood Pigeon (*Columba palumbus*).—When at Melrose on May 12th, Mr. John Freer mentioned that on the previous day he had shot six Wood Pigeons as they were returning from some distance to the woods, and he found in their crops crumpled leaves and a brown substance. These proved to be beech leaves and their scaly covering. They had been cropped as the buds were expanding. On Heddin Braes or Ilderton Hill, a most retired spot, I found Cushats nesting not 4 feet from the ground in low thorns, also in alders, and in juniper bushes, and even in thickets of wild roses. The Chaffinch had also built its nest in the lowly junipers. On June 5th, when proceeding to feed, they flew mostly in threes. On the 9th of July, at Penmanshiel, a band of Wood Pigeons set upon a thriving field of thinned Swedish Turnips, and stripped the leaves off in three days. March 19th I saw a pair of Cushats in a garden at Wooler, in full view of the window, cropping the tops of cabbages among the snow. They have been less numerous than usual this winter. Mr. John Anderson mentions that, during the winter of 1874, a white Wood Pigeon was seen among a flock of Cushats at Lintlaw. There was another for two or three years among the woods on the Marigold hills, where it was a very conspicuous object, when sitting on the top of a lofty spruce fir, a place it seemed to delight in. Unfortunately in the spring of 1869 it was shot by a crowherd.

Quail (*Coturnix vulgaris*).—Recently Mr. Clark informed me that Quails were not uncommon on Springfield farm, in the parish of Oldhamstocks, and that they breed there. In the summer evenings their call-note is a familiar sound coming from the grass and corn fields. Two nests have been cut over while mowing hay; there were about twelve eggs in the nest; and these were large for the size of the bird, and much resembled those of the grouse. The birds arrive in May, and the impression is that their flight is from the north, and that they are passing southwards. They fly rapidly, skimming off like a swallow, and require to be shot at immediately they rise. They are occasionally shot in the partridge season; usually after the 7th October on that farm. This being late several of the Quails may have then departed. In 1874 five or six birds were shot; in October 1875, two birds were started in a hedge between Branxton and Thurston. In the summer one had been heard in a haugh on

Cocklaw farm, near Oldhamstocks. Altogether at least ten have been shot within the last few years on Springfield; and during that period they have frequented the place. The fields there rest on a raised platform; the soil is gravelly and dry, and lies well to the sun. On the 2nd week of September, 1874, one of the Dunglass gamekeepers, when shooting partridges, shot a Quail at Whitburn on the Lammermoors. My friend Mr. Archibald Hepburn remarks that the Quail has long been a summer visitant in East Lothian, about Dirleton. Dr. Turnbull, "Birds of East Lothian," p. 22, says, "It has frequently been seen in the parishes of Dirleton and Athelstaneford." Some years since, during the partridge season, Mr. Henry Collingwood shot two Quails, in the vicinity of Lilburn Tower.

Dotterel (*Charadrius morinellus*).—Dotterels frequent, although in less numbers than formerly, the heights of most of the upland farms in the east of Berwickshire, bordering the moors. Their favourite resort is old leas ploughed up, where there are clods and stones to protect the glittering beetles that constitute their favourite food. They arrive about the 6th and 7th of May;—never before the 5th says one. The flocks are never large, and the birds at first are easily approached. They have now become less wary since they are not interfered with. Dotterels were once numerous at Penmanshiel, on the heights above Redheugh, Howpark, and Renton Bell. Again, on the west they frequented Ecklaw Hill, Blackburn Mill, and some of the high farms around Abbey St. Bathans. About two years since a small returning party of six or seven appeared in autumn on Redheugh hill, out of which two brace were shot. Last season Mr. James Clark shot one on the farm of Springfield, and has it stuffed. They appear to be scarce near Belford. Some years since one was shot out of a flock of five or six at Middleton Hall.

Heron (*Ardea cinerea*).—Three years ago, on a flat spot among some dangerously steep rocks, near Siccar Point, a Heron's nest was come upon. The young ones had been deserted, after being nearly full grown. The nest was made of large sticks, and had many fish bones about it. Dr. Charles Stuart informs me that he has discovered a heronry, with at least 50 nests, in the Pistol Plantation, Blackadder, situated due south from the forester's house on the Berwick turnpike.

Redshank (*Totanus calidris*).—A cowardly, suspicious bird. When alarmed head and neck continue to move up and down

while it keeps a listening attitude. If there is no danger apprehended its agitation quietens down.

Sandpiper (*Totanus hypoleucos*).—The male when singing carries his wings elevated. On May 25th I saw them seeking food in pairs, sometimes wading into the streams. If one was left alone it commenced plaining like a forsaken child. On May 20th I came upon a nest, below a heather bush, on a bank above the Coldgate Water, in Langleyford vale. It was a shallow depression, without any structure, among moss and fescue-grass, and about the size of the nest of a thrush. The eggs are larger than those of a missel thrush, reddish white, with brown blotches and dots. The startled bird shuffled along the ground with its wings spread out, and every white patch on the tip of its tail feathers displayed; and it emitted a wheepling cry. Then it stood up, and glided away towards the track of the stream. Next day I came on another nest with four eggs among gravel beneath a thicket of hazel and thorns. The bird again spread out its wings, and trailed its fan-shaped tail. There was more of a nest, which was constructed of leaves, and grass, and twigs. On April 29th a pair was seen on the Blackadder, above Greenlaw; the first for the season.

Black-headed Gull (*Larus ridibundus*).—There is such a love of precision in the popular mind that little allowance is made for seasons and circumstances. About the famous Pallinsburn Gull, the common opinion is that its return is true to a day in each year; and that it withdraws in like manner for good and all at one fixed period. On this subject I have been favoured with a note from Mr. Askew. "The Gulls," he says, "usually come here the first week in March, but do not remain at night for a fortnight or so until the weather is spring-like. They remain till the young are on the wing, and depart one by one—all having gone by the middle of July." I learn that some of the gulls have been shot on Wooler water during the winter, near Wooler Bridge. On March 11th, 1876, I observed four or five flying backwards and forwards over the water at Earle Mill; but they never returned during the subsequent snowy weather."

Hoodie *v.* Sparrow Hawk.—Dr. Stuart, of Chirnside, writes Feb. 21st, 1876. "When driving along the Hutton Road the other day I saw an animal in difficulties in an adjoining field. Three hooded Crows had surrounded it, stepping up and giving it a peck in turn. I thought it might be a wounded hare or

rabbit. On my approaching the object the crows flew off to a safe distance, when to my surprise I found a Sparrow-hawk with its talons grasping a newly killed partridge; so that the crows were in the most persistent manner disputing possession of the game with the hawk, which had in turn to deliver up the coveted tit-bit to myself. I noticed that although the crows were most anxious for the prize, they did not attack simultaneously; but took it in turn to assault the hawk, which most reluctantly had to beat a retreat."

Hoodie *v.* Shepherd's Dog.—Mr. John Ferguson writes, March 8th, 1876:—"When coming from Swinton the other day, I witnessed a rather amusing exhibition of pugnacity on the part of a common "Hooded Crow' (*Corvus cornix*), not far from Mount Pleasant. One of these birds was picking up some garbage from the road, when a shepherd's dog, which was passing at the time, halted quite close to it, and surveyed it for a minute with a puzzled and rather suspicious air. Whether the dog had never seen a pied crow before, and may therefore be presumed to have felt a scientific interest in the individual in question, or whether he had theftuous designs upon the crow's meal, is uncertain. The bird apparently came to the latter conclusion, for it speedily put itself in fighting attitude, and the dog thinking no doubt that in this case discretion was the better part of valour immediately turned tail and scampered off. His plucky antagonist watched his retreat for a moment, and then, with a triumphant croak, took wing and quickly disappeared."

Cecidomyia Persicariae, L.—The larva, which is found in the leaves of *Polygonum amphibium* is orange coloured, and its presence occasions the margins of the leaves to roll inwards. Sometimes the roll is on both leaf-margins, and then the leaf acquires a fantastic twist, and looks as if contorted by a caterpillar. There are three or four larvæ in each roll. The rolls are pale green and crimson, making the affected leaves very conspicuous. I observed it at Turvielaws, Northumberland; at the side of the loch in Holy Island in June; near Tyningham, and Beltonford, East Lothian, July 14th. Mr. Walker, Dipt. Brit. iii. p. 79, describes the fly from a German source, but it is questionable if the perfect insect has been observed in Britain. It is only one line long.

Cecidomyia Tillæ, Schr.?—This has a gall very different from the minute mite-gall infesting the leaves. It is oval, round,

or oblong, pale green, or purple checked, smooth, of the size of a pea, or larger, situated on the twigs, chiefly those issuing from the main stem. The inside is fleshy or fibrous, and is occupied by colonies of slender orange spindle-shaped maggots, from ten to twenty in number. The maggot is scarcely a line long, puckered along the edges, truncate behind, where it is trilobate, the middle lobe projecting. The mouth is indicated by a decided black spot; the two front spiracles are prominent like a pair of horns; the underside is roughish. When extracted it is very lively, rolls about, and leaps repeatedly. The oral hooks being caught in the anal lobe a circle is produced, which snaps, and up it springs. I first observed it in Ladykirk Churchyard, June 28th; again in the manse garden at Cockburnspath; and a few days afterwards in Tynningham Woods. The gall-midge has not been described.

Sirex Gigas.—An example of this fine insect was captured at Houndwood by Miss Coulson. It is the second instance for Berwickshire, and the fourth for the district.

Hornet *(Vespa crabro).*—Mr. J. S. Dudgeon writes that when shooting near Gordon in autumn he noticed a Hornet, of which he was certain, from his acquaintance with it during a residence in the south of England. Wallis records it for Northumberland, but it is singular that it should evade the systematic observation of modern times.

There are many other notes in the volume which we would have liked to have extracted, but as we have already trespassed upon the space which should have been otherwise occupied, we must refrain.

Additional Localities for Scotch Coleoptera.—*Cymindis vaporariorum* L., Tay (♀). *Pterostichus strenuus* Panz., Dee (♀). *Pterostichus vitreus* Dej., Forth (♀) on the Pentlands at about 1800 ft. *Amara fulva* Dej., Forth (♀). *Harpalus latus* L., Dee (♀). *Trechus obtusus* Er., Forth (♀). *Hydroporus melanocephalus* Steph., Argyle; *Agabus bipustulatus* L., Argyle (♀); *Agabus congener* Thunb., Argyle—Ben Nevis. *Homalota oblongiuscula* Sharp, Forth (♀), moss on Corstorphine Hill. *Quedius tristis* Grav., Forth, common on Arthur's Seat, Edinburgh. *Quedius semiæneus* Steph., Forth (♀), Arthur's Seat. *Ocypus olens* Mull., Forth (♀) common on Arthur's Seat. *Philonthus debilis*, Dee, Braemar. *Xantholinus linearis* Ol., Forth, Arthur's Seat: common under stones. *Othius melanocephalus* Grav., Forth (♀) Pentland Hills.—W. A. Forbes, 32 Gower Street, London.

PHYTOLOGY.

NOTES ON CRYPTOGAMIC PLANTS.

1. *Octaviania Stephensii.* Tul.—This species occurs frequently in a wood near Helensburgh on the Clyde.

2. *Hydnangium carneum* Wallr.—Subglobose, irregular, and smooth; pale brown in colour, cells of same colour, immutable; basidia prominent, spores spherical, covered with long spines. *Tulasne Hypogaei*, p. 75 to 21, fig. 3. Occurs in the Glasgow Botanic Gardens, in pots along with the gum trees *(Eucalypti).*

3. *Torula splendens* Cooke.—Covering the bark of trees with dense black velvety patches. Flocci attenuated upwards, rarely branching; joints subglobose, compressed, dark brown. The flocci do not tend to break up. On trees at the foot of Ben Lomond.*

4. *Torula pinophila* Ch.—Covering the branches and leaves of the yew trees at Luss, Loch Lomond, with a minute black powder.

5. *Dothidea sambuci* Fr.—This species occurs here and there on dead branches of *Sambucus niger* at Kilfinan, Argyleshire. This species is new to Britain.

6. *Schizothyrium Ptarmicae* Desm. (*Ann. des Sci. Nat.*, xi., 1849, p. 560).—This plant was gathered by the Rev. M. J. Berkeley in England, on specimens of *Achillæa*, which were brought from France, and which were infected with the fungus. My specimens must be native, however, as they were gathered in Kilfinan, Argyleshire.†

* First found by the Rev. J. Keith at Forres. I saw it last summer on trees near Loch Rannoch. It is doubtful whether it is a true *Torula.*—EDITOR, *Sc. Nat.*

† See *Sc. Nat.*, iii., p. 273, under *Labrella Ptermicæ.*

7. *Mitrula alba* W. G. Sm.—Differs from *M. paludosa*, in being white in colour, and in having a globular head and stuffed stem. Frequent among leaves in water-holes, Ben Lomond.

8. *Peziza rubella* Pers.—A minute, soft, and waxy species, spreading over blocks of decaying wood, Kilfinan.

9. *Peziza palustris* P.—Very minute. Occurring here and there on the leaves and stems of a species of *Scirpus*, on the hills, Kilfinan, Argyleshire.

10. *Macrospora scirpi* Fckl.—Found growing on the leaves of a species of *Scirpus* at Bowling. This species is new to Britain.

Besides these fungi, I have to record a new station for *Dicampia Hookeri*, namely, hills above Kilfinan. This plant was for a long time considered to be the fruit of a lichen. It is now decided to be a fungus growing upon the thallus of a lichen. The only other place where I am aware it has been found is Ben Lawers.

On paying a visit to Ben Lomond this year, I found about twenty capsules of the moss *Leucobryum glaucum*. The spot is in a little gully on the left-hand side of Rowardennan pier. As far as I am aware, this is the first time it has been found in fruit in Scotland.—R. H. Paterson, 6 Windsor Place, Glasgow.

Botanical Notes.—Happening to spend an hour or two one day lately on the Fifeshire bank of the Firth of Tay, about four miles below Newburgh, I met with one or two plants perhaps worth noting. *Raphanus raphanistrum* occurred in its white flowered form, which is common enough in England, but rarely seen in Scotland. The downy form of *Silene inflata*, sometimes called *S. puberula* Jord., was as common or commoner than the glabrous form. *Anthemis cotula* occurred in corn-fields, separated only by the river (here between one and two miles broad) from Perthshire, in which county I have never seen this plant. *Honkeneja peploides* was, as might be expected, common enough on the shore, but on the Perthshire side it seems (so far as my knowledge goes) very rare, if it occurs at all. What appears to be the var. *horridus* of *Carduus arvensis* was common enough on the road sides, and *Scirpus Tabernæmontani* at the edge of the river.—F. Buchanan White.

INSECTA SCOTICA.

THE LEPIDOPTERA OF SCOTLAND.

(Continued from p. 276.)

EDITED BY F. BUCHANAN WHITE, M.D., F.L.S.

HIMERA Dup.

PENNARIA L. Not very common (or overlooked). Nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay ♀ Moray o o o
WEST. Solway Clyde ♀ West-Ross o

LAT. 54°40′-57°40′. RANGE IN EUROPE. Central (Sweden, &c.) TYPE. Central. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. September-November. LARVA. May, June. FOOD-PLANT. Oak, &c.

AMPHIDASIDÆ.*

PHIGALIA Dup.

PEDARIA F. (1787); *pilosaria* Hb. (after 1793). Not uncommon. Nemoral.

DISTRIBUTION—EAST. Solway Forth Tay Dee ♀ o o o
WEST. Solway Clyde ♀ ♀ o

LAT. 54°40′-57°10′. RANGE IN EUROPE. Central (Sweden, &c.) TYPE. Central. TYPE IN BRITAIN. British.

TIME OF APPEARANCE.—IMAGO. January-March. LARVA. May, June. FOOD-PLANT. Oak, &c.

A dark infuscated form occurs with the type in Tay.

* This family should have come before the preceding—Eugoniidæ.

NYSSIA Dup.

LAPPONARIA B. Very rare. Nemoral.

DISTRIBUTION—EAST. o o Tay o o o o o o
WEST. o o o o o

LAT. 56°40′. RANGE IN EUROPE. Lapland, Eastern Switzerland (Upper Engadine), and Scotland. TYPE. Boreal and alpine. TYPE IN BRITAIN. Scottish.

TIME OF APPEARANCE.—IMAGO. March. LARVA. ——— FOOD-PLANT. ———

A single specimen has been reported from Rannoch, and by many is considered of doubtful authenticity. I think it is probable that some insect was really captured, but whether the specimen in question belongs to *lapponaria*, or whether it was the commoner *pomonaria*, I am not in a position to decide.

Mr. J. B. Hodgkinson records (in *Zoologist*, 686) the occurrence of larvæ, supposed to be those of *Nyssia zonaria*, feeding on burdock on the summit of Ben Beckley, Skye. Perhaps some one who has the opportunity will try and solve this enigma by finding and rearing the larvæ in question.

BISTON Leach.

HIRTARIUS Cl. Rare or local. Nemoral.

DISTRIBUTION—EAST. o o Tay o o o o o o
WEST. o o o o o

LAT. 56°40′. RANGE IN EUROPE. TYPE. Centro-meridional. TYPE IN BRITAIN. English.

TIME OF APPEARANGE—IMAGO. April, May. LARVA. June-August. FOOD-PLANT. Birch, &c.

AMPHIDASIS Tr.

BETULARIUS L. Common. Nemoral.

DISTRIBUTION—EAST. Solway Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde Argyle ♀ ♀

LAT. 54°40′-57°40′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May, June. LARVA. August, September. FOOD-PLANT. Birch, &c.

The aberration *Doubledayaria* Mill (nearly entirely black) is not uncommon in some parts of England, but I have no record of its occurrence in Scotland.

(To be continued.)

THE COLEOPTERA OF SCOTLAND.

(Continued from p. 280.)

EDITED BY D. SHARP, M.B.

COCCINELLA.

OBLITERATA Lin. Not common. On fir trees

DISTRIBUTION—EAST. Tweed Forth ♀ Dee o o o o
WEST. Solway ♀ o o o

BIPUNCTATA Lin. Common.

DISTRIBUTION—EAST. ♀ ♀ ♀ ♀ ♀ o o o
WEST. Solway ♀ ♀ o o

UNDECIMPUNCTATA Lin. Common.

DISTRIBUTION—EAST. ♀ Forth ♀ ♀ ♀ o o o
WEST. Solway ♀ o o o

SEPTEMPUNCTATA Lin. Common.

DISTRIBUTION—EAST. ♀ ♀ ♀ Dee ♀ o o o
WEST. Solway ♀ o o o

QUINQUEPUNCTATA Lin. Local.

DISTRIBUTION—EAST ♀ ♀ Tay Dee Moray o o o
WEST. Solway ♀ o o o

HIEROGLYPHICA Lin. Highland, lowland. Amongst heather.

DISTRIBUTION—EAST. Tweed Forth Tay Dee o o o o
WEST. Solway ♀ o o o

VARIABILIS Ill. Common.

DISTRIBUTION—EAST. ♀ Forth Tay Dee Moray o o o
WEST. Solway ♀ o o o

OCTODECIMGUTTATA Lin. Rare.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway o o o o

OBLONGOGUTTATA Lin. Highland, lowland. Common on fir trees.

DISTRIBUTION—EAST. ♀ Forth Tay Dee Moray o o o
WEST. Solway ♀ o o o

OCELLATA Lin. Local.

DISTRIBUTION—EAST. Tweed ♀ Tay Dee Moray o o o
WEST. ♀ ♀ o o o

QUATUORDECIMGUTTATA Lin. Rather common.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway ♀ o o o

SEXDECIMGUTTATA Lin. Rare. On birches.

DISTRIBUTION—EAST. ♀ Forth Tay Dee Moray o o o

WEST. Solway o o o o

DUODECIMPUNCTATA Lin. Very rare.

DISTRIBUTION—EAST. o o o o o o o o

WEST. Solway o o o o

"Raehills, Rev. W. Little," Murray Cat.

CHILOCORUS Muls.

BIPUSTULATUS Lin. Rare.

DISTRIBUTION—EAST. o Forth o o o o o o

WEST. Solway o o o o

EXOCHOMUS Muls.

QUADRIPUSTULATUS Lin. Local.

DISTRIBUTION—EAST. Tweed o Tay o Moray o o o

WEST. Solway o o o o

HYPERASPIS Muls.

REPPENSIS Herbst. Local. Amongst moss in plantations of larch and fir.

DISTRIBUTION—EAST. o Forth Tay o Moray o o o

WEST. Solway Clyde Argyle o o

LASIA Muls.

GLOBOSA Sch. Rare.

DISTRIBUTION—EAST. Tweed o o o o o o o

WEST. Solway o o o o

SCYMNUS Muls.

NIGRINUS Kug. Local. On Scotch fir.

DISTRIBUTION—EAST. o Forth Tay Dee o o o o

WEST. Solway o o o o

LIMBATUS Steph. Local. Amongst moss.

DISTRIBUTION—EAST. Tweed o o o o o o o

WEST. Solway o o o o

DISCOIDEUS Ill. On fir. Common.

DISTRIBUTION—EAST. Tweed Forth o o o o o o

WEST. Solway o o o o

RHIZOBIUS Muls.

LITURA Fab. Rather scarce. Lowland.

DISTRIBUTION—EAST. ♀ Forth o o o o o o

WEST. Solway o o o o

COCCIDULA Muls.

RUFA Herbst. Lowland. Not common.

DISTRIBUTION—EAST. ♀♂ Forth o o o o o o
WEST. Solway o o o o

SILPHIDÆ.

CALYPTOMERUS Redt.

DUBIUS Marsh. Not common. Amongst straw in outhouses.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway o o o o

CLAMBUS Redt.

PUBESCENS Redt. Not common.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

MINUTUS Sturm. Not common.

DISTRIBUTION—EAST o o o o o o o o
WEST. Solway o o o o

ARMADILLO De Geer. Not common.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway o o o o

AGATHIDIUM Lac.

NIGRIPENNE Fab. At the oozing sap of trees. Rare.

DISTRIBUTION—EAST. o Forth o o o o o o
West. o Clyde o o o

LÆVIGATUM Er. Lowland, highland. Amongst moss. Common.

DISTRIBUTION—EAST ♀♂ Forth Tay Dee Moray o o o
WEST. Solway o o o o

ATRUM Payk. Lowland, highland. Not scarce amongst moss.

DISTRIBUTION.—EAST. Tweed Forth Tay o o o o o
WEST. Solway. o o o o

VARIANS Beck. Lowland. Rare.

DISTRIBUTION.—EAST. o Forth o o o o o o
WEST. Solway o o o o

ROTUNDATUM Gyll. Under bark. Lowland, highland. Not rare.

DISTRIBUTION—EAST. o o Tay Dee o o o o
WEST. Solway o o o o

CONVEXUM Sharp. Lowland, highland. Amongst moss. Rare.

DISTRIBUTION—EAST. o o Tay Dee o o o o
WEST. Solway o o o o

MARGINATUM Sturm. Lowland. Very rare.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

NIGRINUM Sturm. Lowland, highland. Under bark. Rare.

DISTRIBUTION—EAST. o Forth Tay o Moray o o o
WEST. Solway

RHINOCEROS Sharp. Highland. Very rare.

DISTRIBUTION—EAST. o o Tay o Moray o o o
WEST. o o o o o

LIODES Lac.

HUMERALIS Fab. Lowland, highland. In fungi under bark. Common.

DISTRIBUTION—EAST. Tweed Forth Tay Dee ♀ o o o
WEST. Solway Clyde o o o

GLABRA Kug. Highland. Under bark of fir. Local.

DISTRIBUTION—EAST. o o Tay Dee Moray o o o
WEST. o o o o o

CASTANEA Herbst. Highland. Under bark of fir. Local.

DISTRIBUTION—EAST. o o Tay Dee Moray o o o
WEST. o o o o o

COLENIS Lac.

DENTIPES Gyll. Lowland. Scarce.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway Clyde o o o

CYRTUSA Lac.

MINUTA Ahr. Lowland. Very rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

ANISOTOMA Lac.

CINNAMOMEA Panz. Very rare.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

TRIEPKII Schdt. Very rare.

DISTRIBUTION—EAST. o Forth Tay o o o o o
WEST. o o o o o

PICEA Ill. Very rare.

DISTRIBUTION—EAST. o Forth Tay o o o o o
WEST. o Clyde o o o

SILESIACA Kr. Very rare.

DISTRIBUTION—EAST. o o o o Moray o o o
WEST. o o o o o

DUBIA Kug. Rather common.

DISTRIBUTION—EAST. Tweed Forth Tay ○ Moray o o o
WEST. Solway ○ o o o

OVALIS Schdt. Scarce.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. Solway o o o o

CALCARATA Er. Common.

DISTRIBUTION—EAST. ○ Forth ○○ Dee Moray o o o
WEST. Solway ○○ o o o

SCITA Er. Local. Scarce.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

PARVULA Sahl. Rare.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway o o o o

LITURA Steph. Lowland. Rare.

DISTRIBUTION—EAST. o Forth o Dee o o o o
WEST. Solway o o o o

HYDNOBIUS Lac.

[PERRISI Fair. Doubtful as Scottish.

"Believed to have come from Scotland." Ent. Ann. 1865 p. 62.

PUNCTATISSIMUS Steph. Very rare.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o

PUNCTATUS Sturm.

"Scotland." Ent. Ann. 1865 p. 63.

COLON Lac.

VIENNENSE Herbst. Very rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

APPENDICULATUM Sahl. Very rare.

DISTRIBUTION—EAST. o o o o o o o
WEST. Solway o o o o

DENTICULATUM Kr. Very rare.

DISTRIBUTION—EAST. Tweed o o o o o o o

WEST. o o o o o

ANGULARE Er. Very rare.

DISTRIBUTION—EAST. o o o o o o o o

WEST. Solway o o o o o

SERRIPES Sahl. Rare.

DISTRIBUTION—EAST. o o o o o o o o

WEST. Solway Clyde o o o

BRUNNEUM Lat. Not rare.

DISTRIBUTION—EAST. Tweed Forth o o Moray o o o

WEST. Solway Clyde o o o

LATUM Kr. Very rare.

DISTRIBUTION—EAST. o o o o o o o o

WEST. o Clyde o o o

CHOLEVA Lac.

ANGUSTATA Fab. Rare.

DISTRIBUTION—EAST. o Forth o o o o o o

WEST. o o o o o

CISTELOIDES Fröh. Local.

DISTRIBUTION—EAST. o Forth o o o o o o

WEST. o o o o o

SPADICEA Sturm. Rare.

DISTRIBUTION—EAST. o o Tay o o o o o

WEST. o o o o o

AGILIS Ill. Rare.

DISTRIBUTION—EAST. o o o o o o o

WEST. o Clyde o o o

FUSCA Panz. In outhouses. Not common.

DISTRIBUTION—EAST. Tweed Forth o o o o o o

WEST. Solway Clyde o o o

NIGRICANS Spence. Not common.

DISTRIBUTION—EAST. o Forth o o o o o o

WEST. Solway o o o o

CORACINA Kell. Not uncommon.

DISTRIBUTION—EAST. oo Forth oo Dee Moray o o o

WEST. Solway oo o o o

MORIO Fab. Scarce.

DISTRIBUTION—EAST. Tweed o o o o o o o o
WEST. Solway Clyde o o o

NIGRITA Er. Scarce.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

TRISTIS Panz. Lowland, highland. Very common in decaying animal and vegetable matter.

DISTRIBUTION—EAST. Tweed Forth ♀♂ Dee Moray Sutherland o o
WEST. Solway Clyde ♀♂ o o

GRANDICOLLIS Er. Local.

DISTRIBUTION—EAST. ♀♂ Forth ♀♂ Dee o o o o
WEST. Solway Clyde o o o

KIRBYI Spence. Local.

DISTRIBUTION—EAST. ♀♂ Forth ♀♂ Dee o o o o o
WEST. Solway ♀♂ o o o

LONGULA Kell. Rare. In dead birds.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. Solway o o o o

CHRYSOMELOIDES Panz. Not common.

DISTRIBUTION—EAST. Tweed Forth ♀♂ Dee Moray o o o
WEST. Solway ♀♂ o o o

WATSONI Spence. Not common.

DISTRIBUTION—EAST. ♀♂ Forth ♀♂ Dee ♀♂ o o o
WEST. Solway ♀♂ o o o

FUMATA Spence. Common.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway Clyde o o o

VELOX Spence. Among dead leaves. Not uncommon.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. Solway Clyde o o o

WILKINI Spence. Not common.

DISTRIBUTION—EAST. ♀♂ Forth o o o o o o
WEST. Solway ♀♂ o o o

ANISOTOMOIDES Spence. Local. Amongst moss.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. ♀♂ ♀♂ o o o

SERICEA Panz. Abundant.

DISTRIBUTION—EAST. ♀ Forth ♀♀ ♀♀ Moray o o o
WEST. Solway ♀♀ o o o

LEPTINUS Lac.

TESTACEUS Müll. Very rare. About the nests of Bombi.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o Clyde o o o

NECROPHORUS Lac.

HUMATOR Fab. Very common in carcases.

DISTRIBUTION—EAST. ♀ Forth ♀♀ Dee Moray o o o
WEST. Solway ♀♀ o o o

RUSPATOR Er. Common in carcases.

DISTRIBUTION—EAST. ♀ Forth Tay ♀♀ ♀♀ o o o
WEST. Solway ♀ o o o

MORTUORUM Fab. In decaying fungi. Common.

DISTRIBUTION—EAST. ♀ ♀ Tay Dee Moray o o o
WEST. Solway ♀ o o o

VESPILLO Lin. In carcases. Not common.

DISTRIBUTION—EAST. ♀ Forth ♀♀ ♀♀ Moray o o o
WEST. Solway ♀♀ o o o

SILPHA Lac.

LITTORALIS Lin. Maritime and riparial. In carcases.

DISTRIBUTION—EAST. ♀♀ ♀♀ ♀♀ ♀♀ Moray o o o
WEST. Solway ♀♀ o o o

THORACICA Lin. In carcases. Common.

DISTRIBUTION—EAST. ♀ Forth Tay Dee Moray o o o
WEST. Solway ♀♀ o o o

RUGOSA Lin. Very abundant in carcases.

DISTRIBUTION—EAST. ♀ Forth Tay Dee Moray ♀ o o
WEST. Solway ♀♀ ♀♀ o o

DISPAR Herbst. Rare. Maritime and riparial. In dead fish.

DISTRIBUTION—EAST. o Forth o o Moray o o o
WEST. Solway o o o o

SINUATA Fab. Rare.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. Solway o o o o

(To be continued.)

ZOOLOGY.

ILLUSTRATIONS OF ANIMAL REASON.

(Continued from p. 299.)

By W. LAUDER LINDSAY, M.D., F.R.S.E., F.L.S.

THERE is a whole series of Natural Histories—by *Anonymous* compilers—that deserve special notice as types of "Popular" Scientific works. They are mostly intended for the use of youth of both sexes—more especially of boys—in the form of Gift-Books, Birthday Presents, or School Prizes. They are handsomely got up outside and in; the bindings are showy—gorgeous sometimes in gold and colour; the illustrations are copious—by Harrison Weir, T. W. Wood, and other adepts in the representation of Animal life; they are printed on good paper and in a good type; while their price—frequently as much as 5s. or 7s. 6d.—is sufficient to purchase scientific works of the very best kind—for instance, the volumes of the "International Scientific Series," the cost of none of which exceeds five shillings.

Illustrations of such *Anonymous* Popular Natural Histories are to be found in "Beeton's Boy's Own Library," published by Ward, Lock, and Tyler, of London. Of one of the most recently published volumes of the said "Library" it appears desirable to make the following remarks; regarding it simply as a fair type of a very popular, large, and important class of publications. The volume in question is entitled, "Wild Animals in Freedom and Captivity," with "illustrations by Harrison Weir, T. W. Wood, and other artists,—principally from Drawings made in the Zoological Gardens, Regents Park," London (demy 8vo). Though no date is given on the title-page—a common defect of such "popular" publications—the book appears to have been issued during the present year, and to have been quite new when, a few months ago, I found it figuring conspicu-

ously in the shops of those Edinburgh booksellers who specially lay themselves out for the sale of School Prizes. Beyond the facts that the compiler confesses himself (p. 259) to being a Forfarshire man, and that he appears to be as familiar with Edinburgh and its vicinity as with London and its suburbs, there is no clue to the discovery of the name or occupation of the author. Nor is any author's name given on the title-page or elsewhere.

Notwithstanding its handsome binding, good paper and type, and many excellent wood engravings, there are certain evidences of careless "getting up" for sale, that are probably not chargeable, however, against the compiler. For instance, at p. 254 there are two pictures—exact duplicates—of the Aye-aye, facing each other. Now there is always ground for suspicion as to the originality or freshness of an illustrated work, when we find the same engravings doing duty more than once, or the same illustrations appearing that have appeared elsewhere—perhaps repeatedly; and nothing short of gross carelessness can be inferred when the same drawing is reproduced on an opposite page!

This, however, is a bagatelle compared with the faults of the letterpress. An *Embarras des richesses* may be held to account for the confusion of the printer in arranging his plates. But the same excuse can scarcely be made for our critical friend, the compiler. For he professes to be highly *critical* and discriminating; pointing out to ingenuous youth the metaphysical or other pitfalls from which his acumen is supposed to save them.

In his preface (p. ix.) he takes the very unnecessary trouble of assuring us that "pains have been taken to assert nothing as a *Fact* which is as yet merely matter of *Surmise*." It would have been well had he confined himself to proven Fact, and omitted matters of Surmise; for so frequently do we find the phrase "It is said"* prefixed to his anecdotes, that it is impossible to distinguish the Fact from the Fiction, or from that, at least, which remains to be proven Fact. He himself ridicules (p. 329) the use of the saving clause "it is said,"—in connection with the publication by others of what he denounces as "absurd notions"—"to be ascribed to the love of the marvellous"—

* Such a phrase is tantamount to a confession of non-authenticity, or doubtful authenticity, of the facts recorded in the narratives to which it is prefaced.

contained in "several modern works of considerable standing." Did our critic never hear of "Satan reproving Sin?" His critical faculty, however, is so keen and so tender, that he thrusts forth from the category of *Fact* everything that he regards as *Incredible*—oblivious of what is itself a well-known Fact, that—

. . . "*Truth is always strange,*
Stranger than fiction." . . . .

The volume of the "International Scientific Series"—by Professor Bernstein, of Halle—on "The Five Senses of Man," has for its motto Goethe's saying, that "Man must persist in believing that the *Inconceivable is Conceivable*, or he will never make a Discoverer." Our compiler, on the other hand, holds that what he, with his obviously limited knowledge and erroneous preconceptions, considers *improbable must be untrue.* He professes to "select only those incidents which bear upon their face the Stamp of Truth." His ideas of what is, or constitutes, the "Stamp of Truth," and of Untruth, are, however, peculiar; and the whole book is vitiated by the author's own assumptions and preconceptions.

In reviewing the works of others he—unwittingly—expresses various opinions that have the most apposite application to his own book. Thus he speaks of "people who are evidently innocent of the faculty of testing Evidence," and who "keep alive purposeless discussions as to whether animals are guided by *Reason or Instinct*, most of the disputants being incapable of judging how far acts, which are merely Instinctive, may approach or surpass the Lower Reasoning faculties" (preface, p. ix). Unfortunately all that the author says *in propria persona* leads to the conclusion that he himself is one of these incompetent disputants! Here is another most pertinent remark of his, that might form an appropriate motto to his own book: "Works on Natural History are studded with *stories* and assertions which are destitute of Truth and Probability—as the slightest consideration would show. Yet we have them repeated again and again; and what is worse, the Habit or Incident, which to the original narrator was a mere Report or Conjecture, is given as an ascertained Fact, by some careless successor" (p. 297).

In illustration he quotes three "Stories— . . which have a place in a recent work on Natural History of considerable magnitude and importance"—as incredible—as mere "travellers' tales"—that have found their way into "ambitious books on

Natural History, but which no reasonable man, with any knowledge of the subject on which he was writing, would be induced to receive" (preface, p. vi.) One of the stories that stagger his credulity relates to a sagacious Donkey, that not only opened a certain gate, but "cautiously shut it after him:" it also refastened various other doors or gates. In another case, he laughs at the idea of a man making a bargain with a Donkey, to the effect that the latter was to keep to a given path in a garden; ridicules the notion of the animal reflecting on the "circumstances which led to the discovery of his offence"—intruding, against orders, on certain flower-beds; and scouts the suggestion of an Ass—quadrupedal at least—profiting by its own reflections, so as to endeavour to hide the evidences of his guilt, by scraping the earth over his footmarks the next time he walked on forbidden ground. Our critic goes the length of asserting that man, experienced in the ways of animals, "never saw or heard of an animal who had the wit to hide the Evidences of its own Wrong-doing."

Now, there are many perfectly well-authenticated instances, both of—

(1.) Horses, donkeys, cows, monkeys or apes, and other animals opening and shutting doors or gates.

(2.) Cats, dogs, and other animals hiding, or endeavouring to hide, the Evidences of guilt or crime; distinguishing readily what is forbidden from what is permitted; and when they do what they know to be forbidden, trying to frustrate detection of their felt disobedience or disregard of a master's order or wish.

(3.) Dogs, horses, mules, cows, monkeys or apes, elephants, and other animals being parties to Bargains with man; having a very distinct appreciation of the nature of the work man calls upon them to perform; reflecting on the causes of failure or detection; and profiting by Experience.

I have notes innumerable in illustration of all these mental qualities or aptitudes; but this is neither the proper time nor place to introduce them.

The author of "Wild Animals in Freedom and Captivity" is therefore greatly in error when he says, for instance, "The conjecture that the Ass reflected on the cause which led to the discovery of his Fault is as wonderfully absurd as that he attempted to remove the Traces of his Misdoing" (preface, p. ix).

The absurdity, if there be any, certainly attaches itself to the compiler, and neither to the donkey nor the historian of his exploits. In truth, *Incredulity* regarding the truthfulness of such incidents is usually in proportion to a man's ignorance of the habits of animals and of the science of Comparative Psychology. The man of cultivated intelligence and of generous sympathy with all classes of his fellow-creatures, who has devoted much time and trouble to the observation of animal character, becomes credulous of assertions concerning their mental or moral capacities to a degree that ignorant, unsympathetic men cannot appreciate—simply because these students of Comparative Psychology have verified abundantly, by means of their own senses and reason, the correctness of the adage that represents *Truth* as "*stranger than Fiction.*" The credulity of the Comparative Psychologist merely leads him, however, to regard an incident as possible or probable; not to accept it as a Fact until he is furnished with proper Evidence. Caution and Credulity co-exist in his highly trained mind; and both of them are necessary—the one checking or supplementing the other—to the proper prosecution of his studies.

The whole subject of so-called *Incredible*—but yet true—*Stories* of Animal Intelligence is so interesting and important that I hope fully to discuss it on some future occasion.

Our author obviously regards himself as more than a match for the great Evolutionists of these times—Darwin, Huxley, Wallace, Spencer. He has no hesitation in ascribing all the feats, tricks, or performances of other animals than man to *Instinct or Automatism;* and yet, as if "convinced against his will," he makes occasional, most unfortunate and perplexing use of the term *Intelligence.* For instance, with delicious inconsistency in a professed scientific critic—even on the very same page (p. 310), he makes use of the following contradictory expressions: "There is no animal so low in the scale of *Intelligence** as to be unable to provide for its own safety;" and "The *Instinct* in animals is unerring in the use of means for self-preservation"! What is the relation of Instinct to Intelligence is evidently a puzzle to him—as it has for ages been a problem to other philosophers—genuine or would-be. And, like so many others, he appears to have cut the Gordian knot, simply by the lazy, stupid, old practice of calling all *Intelligence in other animals*

* He also describes the Chinchilla as "very low in the scale as regards *Intelligence*" (p. 334).

than man, Instinct. The extraordinary ideas of Instinct and Intelligence broached by the compiler of "Wild Animals" are worthy of the attention of the Rev. James Wardrop for the next instalment of his "Animal Psychosis;" and the notice of both writers may be profitably directed to the following works :—

(1.) "Man and Beast, here and hereafter," by the Rev. J. G. Wood, M.A., F.L.S., the writer of many a well-known book of Popular Natural History.

(2.) "The Reasoning Power in Animals," by another English clergyman—the Rev. J. S. Watson, M.A.

(3.) "The History of the Conflict between Science and Religion," by Professor Draper of New York ; and

(4.) "The Study of Sociology," by Herbert Spencer : the two latter works constituting volumes of the "International Scientific Series."

(5.) The latest work on Insects, by Maurice Girard, Paris, 1873-6 ; which devotes a section to their "Instinct *and Intelligence.*"

Here are samples of the kind of *Errors in Comparative Psychology* that are now being taught to boys of 16 or 18, in our Academies or High Schools, by Popular Naturalists and their publishers :—

"The lower animals, left to themselves, are but living Mechanisms, and move in their appointed courses with as little Deviation as the ball which is impelled from a gun" (p. 345).

"What faculties they have that resemble those of man, are Imitative, and are always purely Mechanical. If they have any notion or thought of Results, they are incapable of producing them, if the merely mechanical effort, to be successful, necessitates the lowest effort of the Reasoning brain" (p. 219, speaking of the Quadrumana).

"The Reasoning faculty allows its possessor too much freedom of action to enable him to act with such unerring Sagacity"* (p. 90).

"The Tricks which a Domestic Animal can be taught, and the Knowledge and Cunning it may acquire from Observation are no more Evidence that it is guided by Reason than the knowledge possessed by the most ignorant man, that if he slips

* His illustration here is a Dog finding its way home—an exceptional case. He fails to explain how "unerring sagacity" should lead to the infinitely more numerous instances of its losing its way!

over a precipice he will fall to the bottom, can be accepted as a proof that he is thoroughly acquainted with the Laws of Gravity" (Preface, p. ix.)

It would be difficult to talk greater nonsense or display crasser ignorance; and yet these are but average specimens of the absurdities that are propagated in hosts of books—treating of the "Instinct" of the lower animals—that emanate from the "popular" pen and press.

But our critical friend does not confine his peculiar statements to metaphysical disquisition on Instinct in contrast with Reason. He commits sins of omission, in so far as he gives no Scientific Names of the animals, whose characteristics are described; so that the proper identification of many of the species and genera is impossible. For, what is the "Colocolo" of Guiana,—apparently some kind of Wild-Cat (p. 56)? or the "Tupaia ferrugineous" (p. 305)?

He speaks of "Reagh-mehl" instead of "Berg-mehl," and describes it as made up of "Animalculæ," whereas it is Diatomaceous. Obviously the compiler has much need to study what Dr. Carpenter says on the subject in his well-known Manual of the Microscope, or what is stated more shortly in Chambers's Encyclopædia concerning "Mountain Meal." He classes what he calls the "Asse or Caama" among the Foxes (p. 120); while it is—according to Chambers's Encyclopædia—an Antelope (*Antilope caama*), the familiar Hartebeest of the Dutch colonists. He describes Hares as "Lepindæ," meaning, no doubt, "Leporidæ" (pp. 350 and 360); and he says, "The genus *Capri are*" so and so (p. 44). There is a beautiful and famous island of that name in the Bay of Naples—an island that, with its "blue grotto," I visited only a few months ago. But there is no such genus of quadruped, so far as I am aware. No doubt charity might suggest our transferring all such blunders to the shoulders of the Printer,—who has always sins enough of his own to answer for, however. But a straw or a feather shows how the wind blows; and such blemishes in a professedly Zoological work give rise to a suspicion at least of its writer's competence as a Zoological author.

On the whole, "Beeton's Boy's Own Library" volume on "Wild Animals" is a curious mélange of—

(1.) Useless "old stories," hackneyed and unauthenticated, that have been perpetually quoted for the last half-century.

(2.) Useless extracts from not very modern works that are not reliable.

(3.) Useful quotations from other more modern works of Travel or Natural History; the titles and dates of publication, however, never being satisfactorily given.

(4.) Useful records of original and interesting personal observation in Scotland on the one hand, and in the Zoological Gardens of London on the other.

And this personal Experience leads its Author to make admissions that are singularly incompatible with his "unerring" instinct ideas—unless, to be sure, we are to regard the *sense of Fun or Humour* as itself an "unerring" instinct, and "mechanical." "Close observers," he here says—and he is right—"cannot fail to be struck by the development of the *Humorous* in certain classes of animals, which have been for a considerable time in confinement" (preface p. ix): though all that "confinement" has to do with such development is that it permits of its notice by unobservant man. "There is as much genuine *Fun* to be got out of a visit to the Zoological Gardens as out of a visit to a dozen of one's most amusing Human friends" (p. x). Having only a few weeks ago paid two special visits to the Gardens in question,† I can quite endorse the writer's opinion; and I rejoice that there *are* some points on which I can cordially agree with him. Nevertheless, it does not follow that animals, which are capable of inspiring a sense of Fun in man, themselves possess such a sense. Not a few animals, however, are not only full of Fun themselves, but can produce it in, or communicate it to, man; they are arrant "wags" or practical jokers, enjoying their own jokes, pranks, or play, quite as much as human on-lookers can do.

My general conclusions as to the value of *Anonymous* writings on Animal Instinct and Intelligence are as follows:—

(1.) That many of them are by perfectly competent authors —experienced both in observation and narrative; in which case, however, there is no good reason for

† So far as I know, or have seen, these Gardens are the best in the world, as concerns the collection of animals, and the provision made for their comfort and exhibition; and I say so after having visited the Zoological Gardens of Florence, Brussels, Berlin, Dresden, Paris, and other continental cities; as well as those of Dublin and of Edinburgh,—the latter unfortunately long since defunct.

the authors not appending their Names to their productions.

(2.) That a larger number are the work of mere literary or scientific Hacks, who do not observe for themselves, and are careless in narrative,—their object being attractive, remunerative, "popular" writing, not accuracy of statement or information.

(3.) That, as regards records of common virtues or qualities, —such as Fidelity, Courage, Natural Affection, and so forth—it will not repay the student to ascertain whether the narratives are true or the reverse; inasmuch as perfectly authentic, recorded instances of such mental or moral qualities are superabundant, and their trustworthiness may be verified at any time, in any place, and by any person. Such qualities, in other words, are indubitable and undisputed.

(4.) But all records of incidents bearing on the possession of the *Higher* mental faculties—such for instance as the Religious Feeling or the Moral Sense, or the various qualities that form their essence, basis, or constituents—are well worthy of the student's attention; and it may repay his time and trouble to institute inquiry as to the authorship of the narratives and truth of the Facts.

(5.) As a rule, all *Anonymous* works or contributions should be considered worthless, as bases for scientific generalisation, so long as they remain *Anonymous*. In the absence of any proper guarantee of the accuracy of the statements they contain, it is safe to regard such statements—of apparent Facts—as at least "Not Proven."

The late Dr. Pouchet of Rouen, in the preface to his well-known work on the "Universe" (3d English edition, of 1876,) remarks: "If a work is not worthy of having the *Author's Name*, it is not fit to see the light . . . When an author consents to publish, it is because he believes his work to be useful, and therefore he ought not to be afraid of placing his *Name* upon it."

(To be continued.)

Note on the Woodcock.—A Woodcock's (*Scolopax rusticola*) nest was found here in a plantation this spring by the keeper. The young were safely hatched. A considerable number of Woodcocks visited this district last autumn, after having apparently almost deserted it; formerly they were very common.—W. D. Robinson Douglas, B.A., F.L.S., Orchardton, Castle-Douglas. August, 1876.

OUTLINE DESCRIPTIONS OF BRITISH COLEOPTERA.

(Continued from p. 261.)

By Rev. T. BLACKBURN, B.A.

Owing to my somewhat sudden departure for the Sandwich Islands, I shall be obliged to suspend the issue of these papers at the close of the *Philhydrida*, and shall even have to entrust to others the work of correcting the proofs in this the concluding part—a difficult task I fear.

July, 1876. Thomas Blackburn.

2. B. Side mars. of th. and of e. and ba. of an. and of pal. test. Legs reddish. Broad and very conv. Tar. stout. 1½ l. E.S.I!! . . . . limbata

H. b. (often with 2 *small* pale spots in fr.) Th. dusky, paler at sides. E. pit. or brown. Legs and ba. of an. and of pal. brown. Ap. of latter 2 dusky. Rather narrow. Tar. thin. 1¼ l. E.S.I! . variabilis

Laccobius.

Broad, round and conv. Dist. and rather thickly punc. H. b.; 2 pale spots in fr. Th. b.; side mars. irreg. test. E. test. clouded with dusky lines and spots. Legs, pal. and ba. of an. test. Cl. of an. dusky. The puncs. on e. are confused, only here and there forming irreg. rows. 1⅔ l. E.S.I! nigriceps

Very like prec. Not quite so broad. The puncs. on e. form regular rows throughout. 1⅓ l. E.S.I! minutus

Berosus.

1. Ap. of e. simple. Ints. of e. pretty unif. punc. . 2

- - - -. Finely punc. E. deeply p.-s.; 3d and 5th ints. with some large consp. puncs. among the fine ones. H. brassy gr. Th. dull test.; 2 obsc. met. lines down mid. E. dirty test., with some dusky clouds. Pal., legs, and an., dull test. 2⅔ l. E. . . . . signaticollis

- - - each with 2 spines. Test. or brown, more or less dusky. Finely punc. E. p.-s.; the ints. very flat, finely punc.; some consp. large puncs. on 3d and 5th ints. 2¾ l. E.s.c. . . . . spinosus

2. very conv. Strongly punc. E. deeply p.-s. Ints. rather conv.; each with one or 2 very irreg. rows of puncs. H. brassy. Th. brassy; test. on mars. E. brown, with some dusky clouds. Pal. (exc. extreme ap.), an., and legs yel. 2¼ l, E.S.I. . . luridus

Rather finely punc. E. gently p.-s. Ints. flat, each with 3 or 4 very irreg. rows of puncs. H. brassy or gr.

Th. test., with a met. cloud on disc. E. test. with some dusky clouds. Legs., pal., and an., yel. Ap. of pal. often dusky. 2¼ l E! . . . affinis

LIMNEBIUS.

1. Not less than 1 l. E. b. or pit. b., not closely punc. Pen. j. of pal. not much thicker than ap. j. . 2

\- - - -. E. dull brown, minutely and closely punc. Pen. j. of pal. abruptly and consp. thicker than ap. j. H. and th. dusky, sides of th. pale. An., pal., and legs test. 1⅛ l. E. . . . . papposus

Less than 1 l. 3

2. B. or pit. b. Sides of th. and of e. (more or less) pale. An., pal., and legs, dusky, or reddish. Rather a narrow el. species, strongly narrowed behind. E. spar. and rather dist. punc. Tib. of ♂ strongly bent and dil. ♂ 1⅓ l. ♀ 1 l. E. S. I! . truncatellus

Very like ♀ of prec. Dist. shorter, broader, and less narrowed behind. Th. less contr. in fr. Punctuation not close, but varying somewhat in intensity. 1 l. E. S. I. . . . . marginalis * Steph.

3. Shining b. Obsc. and not closely punc. Not broad; narrowed behind. Mars. of th., ap. of e., the pal., and legs, reddish. ¾ l. B. . . nitidus

\- -. Without dist. puncs. Not broad; narrowed behind. Sides of th., and ap. of e., pale. Ba. part of pal., and the legs, reddish. Ap. j. of pal. pit. ½ l. E.[N.] . . . . . picinus

CHÆTARTHRIA.

Very conv. and strongly rounded. Very faintly punc. Shining b. Sides of th., and sides and ap. of e., pale. Legs reddish. ⅞ l. B. . . . seminulum

SPERCHEUS.

Roughly punc. Some elev. ridges on e., especially behind. A broad rounded species. Test. brown, spotted or clouded with dusky. Legs pal., and ba. of an., reddish. Cl. of an. dusky. 3¼ l. E.[S.] . *emarginatus*

HELOPHORUS. †

1. Deep. b. E. uneven, with consp. polished tubercles on

* This species being omitted in Dr. Sharp's Catalogue, I append the author's name. Stephens' description is, I think, sufficient to identify the insect; I know no other to which it would apply.

† Several species in this genus have been determined as British since the publication of Dr. Sharp's Catalogue. They were introduced by Mr. Rye and myself in the E. M. M. of July, 1876. I have appended the author's name to the descriptions of these.

the 2nd, 4th, and 6th ints. 1⅔ l. Scarborough and Manchester . . . . . tuberculitus

Not as above. A short punc. str., or row of puncs., at ba. of e., between 1st and 2nd str. . . 2

- - -. The str. unif. at ba. 5

2. Alt. ints. of e., and a ridge beside the *short* str., elev. into sharp high keels. 3

- - - - at most gently conv. 4

3. Broad. H. and th. test. r. E. test. yel. Pal., an. and legs reddish. E. more or less spotted with b. H. and th. gran. Mars. of th. elev. and serr. Surface of th. with numerous irreg. furrows and ridges. E. very strongly p.-s. 2⅓ l. B. . rugosus

Resembles prec. Narrower. H. dusky. Th. with 6 *less irreg.* longi. ridges. Puncs. in str. of e. not so large. 1⅔ l. B. . . . . nubilus

4. H. and th. cop. or gr., closely and consp. granulose. Th. with a well def. furrow in the centre, and two on each side, besides an irreg. furrow along the side mars. The mar. furrow is not well def. and is of uneven width. The sides of the th. are rounded in fr. and contr. behind the mid., making the th. appear cordate. An., pal., legs, and e., test. E. with some b. marks. Behind the ba. the e. are transversely impressed; they are p.-s., and the ints. are gently conv., the alt. ints. most so. The r.-m. of the e. is narrow. The fr. tib. have a fringe of bristles on their ex. mar., in which several bristles are very consp. larger than the rest. The 2nd (longest) j. of the hi. tar. is less than twice as long as the 3rd. The ap. of the last seg. of the h.-b. is minutely serrated on the u.-s. 3-3½ l. E.S.I. . aquaticus

Very like prec. Smaller and often darker in colour. Th. with sides less rounded in fr. and less contr. behind, its surface less closely granulose. E. with the tr. impression less dist. The alt. ints. of the e. are not dist. more elev. than the rest. Hi. tar. with 2nd j. about twice as long as 3rd. The fringe on the fr. tib. is nearly unif., and the ap. of the last seg. of h.-b. is smooth. 2½-3 l. E.I. . . . æqualis Thoms.

Resembles *aquaticus*. Mar. furrow on th. wide consp. and unif. (as wide as ints. of str. on e.) Sides of th. gently and unif. contr. backw. from in fr. of mid. Alt. ints. of e. consp. elev. R.-m. of e. wide, (the space beyond the last str. being as wide as the prec. ints.) 2½ l. E.s.c. . . . . intermedius

5. Spaces between the furrows on th. dist. gran. . . 6

These spaces not dist. gran., shining; the furrows nearly

straight. H. shining, faintly gran. E. deeply p.-s.; ints. conv. H. and th. cop. E. dark test. Legs, an. and pal. pale test. Ap. of tr. and of pal. dusky. 1⅓ l. E.[s] . . . . . nanus

6. Int. between 1st and 2nd punc. str: on e. not dist. narrower in fr. than the puncs. in those str. . 7

H. and th. cop. E. test. with some b. spots. An. and pal. dusky. Legs test. Ap. j. of pal. short and thick. E. very strongly p.-s.; the puncs. in 1st and 2nd str. in fr. broader than the space between those str. Ints. (especially between 2nd and 3rd str.) much elev. 1⅔ l. B.[N.] . . . arvernicus

7. The longi. furrow at the ba. of the h. widens forwards, towards its junction with the bent furrow that runs tr. across the h. 8

- - - is narrow and of even width. H. and th. brassy. E. brown, with darker marks. An., pal., and legs test. Sides of th. regularly rounded. Interm. furrows on th. gently bent. E. strongly p.-s.; the puncs. in the str. large and not close. Ints. (especially 2nd, 4th, and 6th) narrow and elev. Sides of e. strongly dil.; the space beyond the last str. about as wide as prec. ints. Pal. long. 1⅛ l. S.I. . strigifrons Thoms.

8. Ap. j. of pal. el., and blunt at ap., widest in fr. of mid., not much thicker than prec. j. . . . 9

- - - - short, pointed at ap., widest at or behind mid., cons. thicker than prec. j., gen. dusky brown. H. and th. cop. or gr. E. dusky or test., with b. marks. Pal. gen. dusky. Legs test. Interm. furrows on th. angulated. E. strongly p.-s.; the puncs. in the str. large and not close. Ints. rather wide, and not flat, the alt. ints. rather dist. elev. A rather broad species. 1¼ l. E.S.I!! . . . . granularis

9. H. and th. cop or gr. E. test. or brown, gen. with some b. marks. 10

Narrrow, el. E. strongly p.-s.; the puncs. in the str. large and not close. Ints. little elev. H. and th. cop. or gr. E. brassy brown, each with some rather obs. round pale spots. Pal., legs, ba. of an., and ap. of e., test. 1¾ l. E. . . . dorsalis

10. Mar. furrow on th. not sharply def. and not of unif. width. 11

- - - -, sharply def., and (unif.) wide. H. and th. gr. E. very pale test., with a few dark marks. Pal., an., and legs, test. Ints. of e. dist. conv. 2¼ l. E.[N.W.] . . . . . Mulsant

11. Ints. of e. quite flat, each with a single well def. row of fine puncs. H. and th. cop. or gr. An., pal.,

and legs, test. E. test. with b. marks. E. p.-s.; the puncs. in the str. close and not large. 1¼-1⅔ l. E. . . . . griseus

- - - gently conv. H. and th. dull brassy. E. brassy or brassy brown. An., pal. and legs test.; b. half of fem. dusky. Central fov. of th. with a dist. pit in fr. E. p.-s.; the puncs. in the str. close and not large. A narrow el. species. Th. not conv. 1⅔ l. S.I. . . . . planicollis Thoms.

- - - - -. H. and th. dull brassy. E. obsc. brassy test. An., pal., and legs, test. Th. somewhat conv. longi. E. p.-s.; the puncs. in the str. large and not close. 1⅔ l. B. . . . , æneipennis

- - - narrow and elev. H. and th. cop. or gr. E. test. with some b. marks. An., pal., and legs, test. Interm. furrows on th. only slightly bent. E. p.-s.; the puncs. in the str. close and not large. A narrow species; pointed behind. 1⅛ l. I. . . brevicollis Thoms.

- - - - - -. Coloured much as *æneipennis*, but less brassy. Th. conv. longi. E. not dil. behind mid., p.-s.; the puncs. in the str. strong and not very close. Th. as wide as the e. Ap. j. of pal. sometimes b. 1⅞ l. E.S. . . . . laticollis Thoms.

Hydrochus.

1. Some of the ints. of e. strongly elev. . . . 2

   The ints. hardly elev. E. fully twice as long as together wide, with rows of large puncs. H. and th. strongly punc. Surface of th. uneven. Brassy or gr. Legs pal. and an. more or less r. 1¾ l. B. angustatus

2. Sut. and alt. ints. regularly elev. . . . 3

   - - 2nd, 3rd, 4th, 6th, and 8th ints. of e. elev.: 2nd and 4th only in fr., 3rd only behind. Th. with 5 deep fov. Otherwise resembles *angustatus*. 1⅞ l. elongatus

3. E. consp. less than twice as long as together wide; widest behind mid.; with rows of strong puncs. H. and th. strongly punc. Th. with 5 consp. fov. B. Tib., tar., an. and pal. often pit. r. 1⅜ l. E.N. S. *brevis*

   Very like prec. E. parallel, quite twice as long as together wide. 1½ l. E.F . . . *carinatus*

Ochthebius.

1. The 5th int. of e. not consp. elev.. . . . 2

   Brassy or gr. Legs r. Th. contr. behind; with some furrows. E. strongly p.-s.; 5th and 7th ints. consp. elev. A wide species; sides strongly rounded. 1 l. B.N . . . . . exsculptus

2. E. p.-s., or with very regular rows of puncs. . . 3

Narrow, el. Shining brassy. Leg, an. and pal. r. Densely pub. H. and th. ind. punc., with some furrows. E. coarsely punc., the puncs not in rows. Ba. angs. of th. transparent. 1⅛ l. E.I.[c] . punctatus

3. Less than ¾ l. 4

Not less than ¾ l. 6

4. E. coarsely p.-s. ; the ints. not wider than the puncs. . 5

Brassy b. Mars. of th. and ap. of e. often paler. Legs r. Pal. pit. or r. Th. with some tr. furrows, contr. behind, punc. ; its hi. angs. transparent. E. with rows of fine puncs. in faint str. ⅔ l. E.[c] ! . margipallens

5. Dull. Th. strongly contr. behind, not very tr., thickly punc., dil. on sides, with a central channel and 4 fov. Pit. Legs brown. ⅔ l. E.[sc] . . Poweri

Shining. Th. hardly contr. behind, very tr., not dist. punc. dil. on sides with 2 tr. furrows. Brassy b. Legs, pal. and an. dark brown. ⅔ l. E.[sc] . exaratus

6. Th. not dist. punc. 7

- dist. and strongly punc. (with a dist. central channel). 8

7. El. Brassy brown. H. and th. greenish. An., pal., legs and gen. mars. and ap. of e. test. Th. not much contr. behind, its hi. angs. transparent ; without a central channel ; with 2 tr. fov. E. p.-s. 1 l. B.[c] . . . . . marinus

Brassy. Legs pal. and an. r. Th. not much contr. behind, with a central channel and some dist. fov. ; its hi. angs. transparent. E. pub., with rows of fine puncs. ⅛ l. E.[c] . . . . æratus

8. Th. not dist. contr. behind. 9

- dist. contr. behind. 10

9. Th. very strongly furrowed, its sides widely dil. E. with rows of large puncs. in faint str. Pit. r. H. and th. often darker than e. Legs r. An. and pal. dusky. Sides of th. often obsc. r. 1 l. E.S.I. . bicolon

Resembles prec. Shorter and wider. E. more strongly str. Sides (at least) of th. broadly and consp. r. E. often r.-brown. An. and pal. r. ⅛ l. E.S. rufimarginatus

10. Rather el. Th. with a deep furrow on each side, its hi. angs. transparent. E. p.-s. ; the str. almost *deep* on the sides ; ints. wrinkled. Pit. brass, or greenish. Legs and ba. of an. and of pal. r. Ap. of e. often test. 1 l. E.S.I. . . . pygmæus

Th. with 2 tr. furrows, and a deep fov. in fr. on each side, its. hi. angs. transparent. E. with rows of fine puncs. obs. on sides. H. and th. gr., the latter with pale mars. E. test., palest at ap. An., pal., and legs test. 1 l. E.[s] . . . . *æneus*

HYDRÆNA.

1. E. each with about 10 well def. rows of puncs. . 2

\- - - only about 6 well def. *rows* of puncs; the puncs. near mar. not forming rows. . . . 6

2. E. with rows of fine puncs.; ints. not sharply elev. Th. dist. tr. 3

Narrow el. D. with rows of very large deep puncs.; the ints. very narrow and sharply ridged. Th. not dist. tr., thickly and unif. punc. H. dusky; th. dusky pale at fr. and ba. E. dull test. Legs, pal., and an., test. 1 l. B. . . . . testacea

3. Less than 1 l. 4

Not less than 1 l. 5

4. Short, broad; e. almost twice as wide as th. Th. thickly punc. on sides, more spar. on disc. B. or pit. E. often brown. Pal., an., and legs, test. ¾ l. B.N nigrita

Narrow el.; e. dist. less than twice as wide as th. Th. thickly and unif. punc. H. b. Th. dusky, fr. and ba. test. E. pale. Pal., an., and legs pale. ¾ l. E.N . . . . . *palustris*

5. Not very narrow; e. dist. less than twice as wide as th. Th. thickly punc.; often a little less so on disc. H. dusky. Th. dusky, often paler at fr. and ba. E. pit. or brown. Pal., an., and legs, pale. 1⅛ l. E.S.I.! . . . . . riparia

Very like prec. Gen. of a paler color. Consp. longer, narrower, and more parallel. E. very little wider than th.; more than twice as long as together wide. 1⅛ l. E.S.I. . . . . *angustata*

6. The rows of puncs. on e. reach the ba. . . 7

\- - - - - - are dist. only on disc. Th. punc., gently tr. H. dusky. Th. dusky, fr. and ba. test. E. test. brown; sut. pit. Pal., an., and legs, test. ⅞ l. B.N . . . . . pulchella

7. Ap. j. of pal. with a consp. blunt tooth on in. side. Legs of ♂ simple. Th. gently tr., thickly punc. exc. on disc. E. rather parallel, hardly wider than th. Shining brown. H. and (often) disc. of th. darker. Pal., an., and legs, test. ¾ l. B.N . . atricapilla

\- - - - simple. Fem. of ♂ thickened. Hi. tib. of ♂ with a bunch of hairs. Th. not tr., with a very deep fov. on each side, punc. thickly on sides, spar. on disc. E. very parallel, toothed at ap. 1⅛ l. B.N . . . . . gracilis

\- - - - -. Legs of ♂ simple. Th. tr., much narrowed behind, spar. punc. on disc., hardly punc. on sides. e. (with rounded sides) cons. wider than th. Mars.

of e. strongly dil. R.-brown. H. pit. An., pal., and legs, test. ¾ l. B.ˣ . . . . pygmæa

Second Family—SPHÆRIDIADÆ. (5 genera).

1. More than 1¾ l. A str. close to the sut. exists only in the hi. part of e. 2
   Not more than 1¾ l. Sutural str. not as above. [An. 9 j. Sc. much shorter and narrower than cl. of an.] 3
2. An. 9 j. Sc. shorter but (at ba.) wider than cl. of an. Very conv. strongly and unif. but not very closely punc. . . . . Cyclonotum
   - only 8 j. Sc. narrower but not shorter than cl. of an.; not very conv. Finely and closely punc. e. very obsc. str. . . . . Sphæridium
3. Outer edge of fr. tib. pretty regularly rounded off towards ap. 4
   - - - - - with a large and consp. notch near ap. Space between mid. legs flat. . . . . Megasternum
4. E. deeply p.-s. with strongly conv. ints. Space between mid. legs flat. . . . . Cryptopleurum
   Not as above. Space between mid. legs forming an elev. ridge. . . . . Cercyon

CYCLONOTUM,

Shining b. Legs, pal. and an. r. or pit. 1⅞ l. B.! orbiculare

SPHÆRIDIUM.

h. Ap. of e. broadly and consp. test. . . . 2
   Unif. punc. B. Legs. and (often) some obsc. marks near ba. and ap. of e., r. Side mars. of th. and of e. more or less test. Hi. angs. of th. test. 2⅛ l. B.! . . . . . marginatum
2. E. with some rows of puncs. larger than the rest. B. Side mars. of th. and of e. (narrowly) ap. of e. (very broadly) and the legs, test. A large spot near ba. of e. (gen.) r. Hi. angs. of th. ac. 2⅓ l. E.! . bipustulatum
   Very like prec. E. unif. punc. Colors gen. brighter. Th. rectang. at ba. 3 l. E.S.I.!! , . scarabæoides

CERCYON.

1. Ba. of th. without a consp. fov. in the centre . . 2
   - - - with a consp. fov. in centre. Pit. b. Legs, ap. of e. and (often) disc. of e., more or less r. E. strongly p.-s. Ints. thickly punc. and conv. behind. A wide conv. species with rounded sides; narrowed behind. 1⅝ l. E.S.I.! . . . . hæmorrhoidale
2. Th. (across ba.) depressed backw. and e. (across fr.) depressed forw., so as to form a tr. furrow where they meet. Rather broad conv., little contr. behind. E. strongly p.-s.; ints. thickly punc., more or less conv. behind. Pit. b. Pal., ba. of an., tar., and ap. of e., r. or test. 1½ l. B. . . . hæmorrhoum

Not as above. Ints. of e. strongly punc. in fr., only very obsc. behind. A rather narrow species. E. finely p.-s. H. and th. b. E. b. pit. or r., with paler ap. Legs r. Pal. pit. ⅔ l. B.! . . pygmæum

- - -. - - - pretty thickly, unif. and quite dist. punc. 3

- - -. - - - spar. and not very dist. punc. [short, very conv. species, with rounded sides.] . . 12

3. Ba. of th. not mar. More than ¾ l. Pal. b. or pit. b. * 4

- - - - -. Not as above. 6

Side mar. of th. carried delicately round the ba. H., th. (exc. side mars.), cl. of an., ap. j. of pal., sut., a large spot about centre of sut., and the u.-s., b. Rest of the insect test. or pale. E. strongly p.-s.; ints. thickly and dist. punc. 1¼ l. B.! . . unipunctatum

Ba. of th. not mar. Ba. of pal. and of an. pale; ap. of both b. H., th., and e., deep b. Sides of th. pale. Sides and ap. of e. consp. test. Legs r. A moderately broad species with sides dist. rounded. E. p.-s.; ints. strongly punc. 1¼ l. B. . . *aquaticum*

4. Moderately wide species. 5

Short, and very broad and conv. B. or pit. Legs and ap. of e. r. E. finely p.-s.; ints. finely and thickly punc. 1⅔ l. B. . . . . obsoletum

5. Mar. of e. emarginate near ap., so that the ap. appears prod. E. finely p.-s.; ints. finely and thickly punc. Widest in fr. of mid., narrowed behind. H. and th. b. E. pit.: ap. and some obsc. marks near ba. r. Legs reddish. 1¼—½ l. E.S.I.!! . . flavipes

Resembles *flavipes* in shape and punctuation. E. test. or r. with a large b. triangular blotch at ba. of sut. 1⅓ l. E.S.I.!! . . . . melanocephalum alum

6. El. species, not very conv., with rather parallel sides, and the e. not wider in fr. of mid. than *at* mid. . 7

Not as above. 9

7. The punc. str. on e. are faint near mars. and obsc. near ap. 8

E. strongly p.-s., very deeply behind. Ints. finely and not closely punc., elev. behind. H. and cl. of an. dusky. Th. pit. or r. E. vary from dull r. with test. ap. to b. with test ap. In some specimens the e. are test. with dusky clouds; in others b. with pale mars. and spots. Ap. always test. Legs and pal. test. or dusky r. 1⅓-1⅔ l. E.S.I.[c] ! . littorale

8. Shining pit. b. Mars. of th. and e. (gen.) pale. Ap. of e. test. cl. of an dusky. Pal., legs, and rest of an. r. E. finely p.-s.; ints. finely and spar. punc. 1¼ l. E.S.[c] . . . . . depressum

*In some specimens of *littorale* and *depressum* (which occur in sea-weed) the pal. are pit. r. They might possibly be confused with this group.

H. th. (exc. mars., which are often pale), and cl. of an. dusky. Pal., e. and rest of an. test. Legs pit. r. E. finely p.-s; ints. very finely and spar. punc. 1⅛ l. B.! . . . . . quisquilium

9. Elev. space between mid. legs oval, not very narrow, and separated from the elev. space behind it. Str. of e. strong and deep near ap. . . . 10

- - - - - el., narrow and joined to the elev. space behind it. E. with rows of puncs.. in str. which are faint to ap. Ints. strongly but not closely punc. Broad. Sides rounded. B. Pal. and legs and ap. of e. r. 1 l. B.! . . . . . anale

10. Less than 1¼ l. 11

Broad. Contr. behind. Consp. widest in fr. of mid. of e. Str. on e. faint in fr., deep behind; ints. thickly and strongly punc. H., and th. (exc. mars.), b. or pit. b. E. pit.; ap. and (gen.) some marks near ba. r. An., pal., legs, and mars. of th. test. or r. 1½ l. E.S.I. . . . . laterale

11. Rather narrow and el. Very conv. E. p.-s.; ints. strongly and thickly punc. H. and th. b.; side mars. of th. often paler. E. pit. b.; its side mars., sut., and ap. test. An., pal., and legs test. ¾ l. B. . . . . terminatum

Short, broad and flat. E. strongly p.-s.; ints. very finely and closely punc. H. dusky. Th. pit. or r.; gen. palest on sides. E. test. obsc. clouded with fuscous. An., pal., and legs test. or r. ¾ l. B. nigriceps

12. E. unic. or only very ind. paler near ap. Space between mid. legs oval. 13

Space between mid. legs el. and narrow. E. finely p.-s., the str. deeper near ap.; ints. not shining and only very obs. punc. H., th. and e. b. or. pit. b., exc. ap. of e. which is test. An. pal. and legs more or less r. ⅝ l. B. . . . . lugubre

13. Very like prec. E. more shining. The puncs. in the str. on e. wider apart. The 2nd j. of the pal. is more thickened. ⅝ l. E. . . . . *granarium*

Very like the 2 prec. Pal. with 2nd j. much thickened. E. not shining; puncs. in str. close. Differs from prec. 2 in being less contr. behind, and having the punc. str. on e. obs. near ap. 1⅛ l. E.S.I. . . . . minutum

MEGASTERNUM.

Short and conv.; sides rounded. Shining. E. with rows of puncs., which are confused near ap.; ints. finely and not closely punc. B., pit. or r. An., pal., and legs r. ¾ l. E.S.I.! . . . boletophagum

CRYPTOPLEURUM.

Broad; much contr. behind. E. strongly p.-s.; inst. elev. and strongly punc. H. and th. pit. Pal. and an. pit. b. or pit. r. E. pit. or r.; ap. always r. 1 l. B.!	atomarium

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Velvet Scoters in Scotland in summer.—On the 16th June, when driving from Bunessan to Salen in Mull, Mr. J. J. Dalgleish and I saw two Velvet Scoters swimming on Loch Scriedan close to shore. They were male and female, and evidently paired birds. A large flock of Scoters has also frequented St. Andrews Bay all summer; I saw them there at the end end of April, and I have just been informed that they are still in the Bay, and may be seen almost every day from the back of the Club House or from Gillespie Terrace. Are these barren birds, immature birds not breeding, or what? In July, immense flocks of Scoters are to be seen in the White Sea, and also in the Petchora Gulf in Northern Russia, strong on wing, and apparently mostly, if not entirely, adult birds. Mr. Robert Gray has also lately informed me that he has seen a large flock of Scoters frequenting the Firth of Forth in the same way. Perhaps Mr. Walker may have observed these ducks in St. Andrews Bay, and will be willing to give us his ideas upon the subject. I am not aware whether or not they appear in St. Andrews Bay regularly in this manner, but I do not remember having seen records anywhere, and I think their presence somewhat unaccountable. —J. A. HARVIE BROWN, Dunipace House, Larbert.

The Tunny (*Scomber thynnus* Linn.)—A specimen of the above was taken off Newtonhill, Kincardineshire, on 17th August last. It weighed six pounds, was two feet two inches long; its greatest depth was five inches, and greatest thickness three inches. The colour above the lateral line was a dark blue, through which ran convoluted stripes of shining silvery white; below the lateral line, silvery white. The colouring matter of this fish is differently placed from that of any other species with which I am acquainted, it being in the dermal covering, which passes over the scales, being thus *outside the true skin*, whereas other fishes have the colouring pigment within the true skin. The flesh of this species is of a dark red colour, and when cooked, of a gross, tough consistancy, reminding one of an old grouse cock—dry, and of little taste. It is interesting to note the differences in the figures of this fish as given by various authors. As an instance, take those of Yarrell and Couch. Judging of the two from the specimen now noted, the figure given by Yarrell is in every way superior to that of Couch, a superiority all the more to be wondered at, considering the difference in time of publication of the two works. In Couch's figure the first dorsal fin differs in form completely from my specimen, so much so, that one would at first be inclined to doubt its being intended to represent the species named above. On the other hand, Yarrell's figure is an exact representation of it. Again, the markings above and below the lateral line, caused by the disposition of the scales on these parts, are clearly and correctly represented in Yarrell's figure, but have received no notice in that of Couch. As above indicated, the specimen referred to is now in my possession, and may be seen by those interested in matters icthyological.—GEORGE SIM, Aberdeen, September 1876.

PHYTOLOGY.

NOTES OF A BOTANICAL EXCURSION TO LOCH CLUNIE, PERTHSHIRE.

LOCH CLUNIE has had for many years a kind of vague botanical reputation, founded chiefly, perhaps, on the occurrence there of *Callitriche autumnalis*, and of other plants, some of which were introduced by the Rev. Mr. M'Ritchie, minister of the parish about the beginning of this century, who seems to have taken considerable interest in the local botany. Since his time Clunie has been visited by several distinguished botanists—amongst others, I believe, by the celebrated Robert Brown. Just a year ago, however, Clunie was the scene of what, I think, may be called an amazing discovery—amazing, that is to say, when it is considered how many botanical collectors have visited the place without finding the plant—viz., that of *Naias flexilis*, by Messrs. Sturrock and Robb of Rattray. As a British plant, *Naias* was only previously known to occur in one lake in Ireland, where Professor Oliver discovered it about twenty years ago. That it has been introduced either intentionally or accidentally into Loch Clunie, I do not think there is the slightest reason to imagine.

Having only once previously paid a *botanical* visit to Loch Clunie, and that of scarcely one hour's duration, I have, of course, been very desirous since the discovery of *Naias* of paying a more lengthy visit to this loch, and of seeing this rare plant in its own home. Accordingly, I arranged with some botanical friends that we should explore Clunie on 2nd September. So on that day we met, at Blairgowrie, the Rev. W. Herdman and Mr. A. Sturrock, who had kindly promised to pilot us; and I now offer to the readers of the *Scottish Naturalist* a short account of our expedition.

Soon after leaving Blairgowrie, our attention was directed to a small quarry, now abandoned, in the middle of a field. This quarry was first opened not many years ago, and contains a small pool of water. In this pool about three or four years

ago *Typha latifolia* appeared, and now fills the whole pool. Whence it came no one knows. It is a rare plant in Perthshire—the nearest locality being Loch Clunie, about six miles distant. In this quarry it grows most luxuriantly—many of the plants being ten feet high. In this quarry I found a few specimens of *Trichobasis cirsii*, Lasch—a fungus only added to the British list last year *(vide Sc. Nat.* III., p. 272).

The chief plants of interest observed before reaching Clunie were *Lythium salicaria* (a rare species in Perthshire), in a marsh near Marlee, *Lepidium Smithii*, *Anchusa sempervirens*, and *Malva moschata.*

On arriving at the loch, we were met by Mr. Duff, the superintendent of Low Airlie's property in this district, who had kindly prepared a boat for us.

Loch Clunie is a beautiful little lake, with undulated banks richly wooded and cultivated, beyond which rise the rocky, wooded, and heather-covered slopes of the Grampians. Near one side of the lake is a small wooded island, on which is the old castle of Clunie, not now inhabited, but still in good repair—a reputed birthplace of the "Admirable Crichton."

The first plant that attracted us on reaching the shores of the loch was a large bed of *Callitriche autumnalis* in good fruit. This star-wort, besides being one of the rarer species of the genus, is also, in a living state, one of the handsomest—the rich, glossy, dark green foliage showing to great advantage through two or three feet of water. At about thirty feet from the shore, and about at a depth of six feet we found the special object of our search—*Naias flexilis*—growing also in large beds, and forming, as we subsequently saw, in many parts of the lake the chief vegetation.

The *Naias* seems to prefer water of from five to twelve feet in depth; whether it grew in deeper water we had no means of ascertaining. Its foliage is of rather a paler green than the above mentioned *Callitriche.* We found the female plant alone (which is the only form that has been found in Ireland), and saw abundance of fruit. Probably the male plant would also reward a careful search. After duly admiring the beautiful Naiad, we next proceeded to investigate the rest of the aquatic flora.

Growing in dense masses, in water of four or five feet, was *Potamogeton heterophyllus*, whose brown foliage was in strong contrast to that of the *Naias* and *Callitriche.* The majority of

plants of this were barren, and had no floating leaves; but in a shallow part of the lake we found both fruit and floating leaves. One of the commonest pond weeds was *P. obtusifolius*, often two feet or more in length, and very graceful, with its brown and green foliage. It was flowering and fruiting freely. Much less common, and much resembling the last on a smaller scale, was *P. pusillus*, also with plenty flowers and fruit. Still rarer, and only found in a barren state, was *P. crispus*, with its beautiful dark-green and crisped leaves. Though not seen commonly in Loch Clunie, it is by no means a scarce Perthshire plant. In deeper water, but reaching the surface, and growing in beds by itself, was *P. perfoliatus*, many feet in length. It also was abundantly in fruit. Then, likewise fruiting freely, and with long stems, was *P. natans;* while in another part of the lake we found *P. prælongus*, growing in large beds in deepish water. The upper leaves in many of the fruiting specimens were shortly petioled, subcoriaceous, and almost floating, a state of the plant of which I can find no mention. Finally, a great part of the north-west corner of the lake was occupied by beds of what I think is a form of *P. lucens*, but not altogether agreeing with the description of that plant. It accords well enough with the var. *acuminatus* Schum. in its acuminate leaves and long peduncles, but the margins of the leaves appear to be entire and not serrulate. Many of the plants had floating leaves.

Of the Batrachian *Ranunculi*, two or perhaps three species were found. One was remarkable for having flowers fully expanded a foot or more below the surface of the water, which did not appear to have increased in depth since the plants came into flower. Another had floating leaves, but no submerged ones, which perhaps, however, had decayed, as it is one of the species which should have capillary leaves. I will not, however, attempt to determine the species we found till I have had an opportunity of examining them more carefully.

Littorella lacustris of course formed a green turf in many parts, but appeared not to fruit; along with it was *Subularia aquatica*, with abundance of pods. Where the water was shallower, *Lobelia Dortmanna* grew, the plants being more scattered, and not forming a continuous bed like *Littorella*. Another species of *Callitriche*, with distant, long, narrow leaves, was also found, but as there was no fruit, it is difficult to say to what species it ought to be referred.

Growing singly in muddy places, an *Isoetes* was seen, but on examination proved to be only *lacustris*, instead of the hoped-for *echinospora*.

Elatine hexandra grew in little patches here and there, and amongst *Nuphar* the pale green leaves of a *Sparganium* tried in vain to reach the surface. Failing by a long way to do so, the plants refused to flower, but appeared from the character of the leaves to belong to *S. minimum*. A few plants of *Utricularia* were fished up, but to what species they belong puzzles me to say. It is certainly not *intermedia*, and besides being too stout for *minor*, has the segments of the leaves furnished with spines. Possibly it may be *vulgaris*, but it is much less robust than that plant. In Perthshire I have met with at least three species of *Utricularia*, viz., *minor*, which is not very uncommon, but which I have only once found in flower; *intermedia*, which is much scarcer, and of which I have not found the flowers; and a third species (also not found in flower, and hence difficult to refer to its proper position) much stouter than *minor*, and with spiny teeth on the segments of its leaves. This species is less (usually very much) robust than lowland *vulgaris* and inhabits small lochs and pools on the hills, often at an elevation of about 2000 feet, Loch Clunie being the lowest situation in which I have seen it. I have not seen typical *vulgaris*, nor indeed any species but *minor* (and in one locality *intermedia*), in lowland Perthshire.

In the *Journal of Botany* for May, 1876 (p. 142), Mr. F. M. Webb has an article "on *Utricularia neglecta*, Lehman; and on *U. Bremii* Heer, as a British Plant," in which he arrives at the conclusion that *U. Bremii* (which was described from Switzerland) has been found in the Moss of Inshoch, Nairnshire, and in Loch Spynie, in Moray. Referring to this plant, Dr J. T. Boswell, in the "Botanical Exchange Club Report for 1876," impresses on botanists visiting Moray the desirability of searching for the Loch Spynie plant. I cannot say whether our plant has any connection with *U. Bremii*, but it is desirable that attention should be called to it, in hope that some one may find flowers.

Taken as a whole, the great feature of Loch Clunie is the richness and variety of its aquatic vegetation. The margins of the loch are occupied with great beds of *Phragmites*, *Scirpus lacustris*, *Equisetum fluviatile*, *Nymphæa alba* var. *minor*, *Nuphar lutea*, *Menyanthes*, *Polygonum amphibium*, &c.,

all growing most luxuriantly. In a marsh near the loch are to be found *Ranunculus lingua*, *Typha latifolia* and *Butomus* (if not now extinct); but it is very doubtful whether all of these have not been introduced.

It is probable that other Potamogetons, besides the eight mentioned above, grow in the loch, and will yet be found.

F. Buchanan White.

Rumex conspersus (Hartm.) on Tweedside.—I suspect that this interesting dock will be more plentiful, and more widely spread than is generally supposed, as there are comparatively few botanists who pay the attention to this family that it deserves. Within the last four years three new ones have been added to the British Flora, viz., *R. maximus* Schreb., *R. rupestris* Le Gal., and *R. sylvestris* Wallr., besides some other varieties of *R. obtusifolius* and *crispus*. In the beginning of August last, in company with Mr. F. M. Webb, I first got acquainted with *R. conspersus* in a living state. It was growing plentifully on Tweedside, near Roxburgh Barnes, on a gravelly place liable to be flooded every time the river rose three or four feet. The other docks growing along with it were—*R. obtusifolius*, *aquaticus*, *crispus*, *pratensis*, and *viridis*. I have since observed it, both higher up and lower down the river than Barnes, both in gravelly and grassy places, but always near the river side. Unlike most plants in an uncultivated state, the docks appear to hybridize somewhat freely, as both *R. conspersus* and *R. pratensis* are considered by some of the highest authorities to be hybrids; and from what I have seen of these two in this neighbourhood, I believe that such is the case. The reputed parents of *R. conspersus* are *R. obtusifolius* and *R. aquaticus;* some of the plants inclining to one parent, and some to the other. The prevailing form, which is exactly similar to specimens that I received through the Exchange Club last year, which were gathered by Dr. Boswell at Cowdenbeath, Fife, and Crook of Devon, Kinross, is easily known by its habit at a distance. It is more erect and rather taller than *obtusifolius*, but there are others which it is difficult to say what they are until close to them, being much closer and more compact than the usual form. Some specimens have a good deal the appearance of *R. crispus* var. *subcordatus* Warren., a plant which, if I understand it rightly, is more common than the type on Tweedside. The period when *conspersus* is in flower comes also between *aquaticus* and *obtusifolius*, the first-named being earliest, and *obtusifolius* latest. Although *R. conspersus* has been known in this country for some time, it is scarcely noticed in any of the Floras. In the 6th Ed. of "Babington's Manaul," all we find about it is—"*R. conspersus* (Hartm.?), which has membranous netted broadly cordate toothed enlarged petals, is found by Dr. Arnott in Kinross-shire;" and the Students' Flora has the following under *R. acutus* L.—"*R. conspersus* Hartm. which has more crisped leaves, otherwise agrees with this; it was found in Kinross-shire by Dr. Walker Arnott, who suspected it to be a hybrid between *R. obtusifolius* and

aquaticus." Now that it has been found in such widely-separated localities as Kinross, Fife, and Roxburgh, it deserves a place in the British Flora. *R. pratensis* is common in this district wherever *crispus* and *obtusifolius* grow near each other. Like *conspersus* it also varies, sometimes approaching one parent, sometimes the other. Unlike hybrids generally, these two docks are fertile, as Dr. Boswell has raised them from seed. Both have one characteristic in common—viz., very few of the fruit coming to perfection, while in their parents it is the opposite, as nearly every one gets fully developed.

It may be worth mentioning here, that on some plants of *S. aquaticus*, may be found a few of the enlarged petals bearing small tubercles, the absence of which being considered a characteristic of that species.—ANDREW BROTHERSTON, Kelso.

Carex aquatilis var. Watsoni Syme.—Along the whole course of the Tweed with which I am acquainted—from its mouth to Caddonfoot in Selkirkshire—this is, in many parts, the commonest sedge, occurring in long narrow beds close to the edge of the river. The farthest up that I have seen it is between Yair Bridge and Caddonfoot. in Selkirk; but, if looked for, I have no doubt that it will be found higher up. It grows in great plenty at Makerstoun in Roxburghshire. I have seen it also in both the counties of Berwick and Northumberland (Cheviot-land), which extends the comital census of this plant—as given in the last (7th) edition of the "London Catalogue"—from five to nine. It is very probable that its range will be yet extended, as it has frequently been confounded with *C. acuta*, from which it may be distinguished by the leaves being *involute* at the margin, those of *acuta* being *revolute*—best seen when dry. In the latter (*C. acuta*) the fruit is *veined*, in *Watsoni* it is *without veins*. *Watsoni* has obtuse glumes, while those of *acuta* are longer and acute. By noticing the above characters, these two are easily separated.—ANDREW BROTHERSTON, Kelso.

NOTES.

WE have received the circular of a new Botanical Exchange Society situated at Buda-Pesth. The subscription is 4s. Botanists desirous of obtaining European plants, especially of the East, may be glad to know of this Society, and may learn further particulars by writing to M. Richter Sajos ("Hungary, Budapest, Erzherzogin Marie Valerie Gasse, No. 1").

The second Annual Conference of the Cryptogamic Society of Scotland took place on Sept. 26-29th, at Killin. From the scarcity of fungi, it was determined that there should be no public show this year, so the time not occupied by the business meeting was devoted to excursions. Altogether a very successful and pleasant meeting was held. We shall give a longer report in our next.

GEOLOGY.

THE EARN VALLEY:

An "Ancient" and "Modern" Level of the River Earn.

By F. SMITH F. G. S. E.

IN the *Scottish Naturalist* for 1874 will be found a paper on the "Earn Valley" in two parts, accompanied by a map and a plate of sections. This paper treated of the River Earn, and certain deposits that form a lower and a higher "haugh," that were declared to be the newest geological formation in the valley, and to be entirely the work of the river. Rivers are common things, and haughs are so frequently found in the valleys through which they run, that they are considered to be somewhat elementary in their construction, and the mere supernumeraries of strata looking for a place in the geological system, and therefore a little beneath the notice of the matured observer. And yet, curiously enough, it does not seem to be a settled quèstion as to whether the higher haughs were formed by the rivers *in their present position* or no.

When this subject (after making new observations) was placed before the Geological Society of Edinburgh, this question arose in discussion; and it was then kindly explained to me by David Milne Home, Esq., LL.D., who occcupied the chair, that it was the generally received opinion that the higher haugh simply denoted a higher flooding power of the river, and that no alteration in the level of the stream had taken place; and advised me to prosecute further examinations, as it was an interesting question that had been for a long time unsettled.

I had most distinctly and unhesitatingly spoken of the *ancient* and *modern* levels of the stream, and had been led by the most unbiased observations so naturally to do this, that the question on this head took me altogether by surprise. I have unfortunately had no opportunity of exploring the valley towards its upper end, as I had hoped this summer to do, but, so far as the portion of valley considered in the *Scottish Naturalist* is concerned, I will endeavour to show why I so

decidedly spoke of an "ancient" and the present or "modern" level of the channel of the river.

There are only two sides to this question. On the one, there is a necessity for a much larger quantity of water to have been constantly coming down the valley; or, the river, being much what it now is in volume, was once on a time at a higher level than it at present occupies. Let us consider the aspect of the first proposition, viz., that of a vastly greater body of water coming down the valley. Such a body of water is not a mere hypothesis, for the melting of the last of the glaciers probably let loose a superabundance of water quite sufficient to submerge both the lower and the higher haughs. But did this water come down in the guise of a river as *gentle* in its operations as is the present river Earn? We should rather, if the high haugh is the work of such an erratic, ice-supplied stream, look for pebbles and boulders to be scattered in its clays and sands in an eccentric manner. This is, however, not at all the case; no ice-borne fragment occurs in its bed, or, allowing certain stones to be ice-borne, they have been *re-arranged* since they were dropped by travelling fragments of icebergs; indeed if coarseness of material be an indication of anything whatever, there is greater coarseness in the deposits of the lower, than of the upper haugh. The glaciers *may* have melted so gradually, that no indication of ice was conveyed down the valley, but such a slow melting would not have supplied the enormously larger body of water. And if the receding glaciers did not yield the floods, where was the extra watershed? One can hardly assume that the rain-fall was so much greater when the Earn was first a river, than it is now. The difference in the height of modern floods of the Earn, and those necessary for the formation of the higher haugh, is not less than 26 feet, and is possibly greater. Were this presumed higher state of flood in the Earn valley again to come about, it would no doubt soon raise the surface of the lower haugh to the height of that of the higher; and then we should have a river-deposit, from the bottom of the stream to the top of the haugh, 40 feet at least in thickness, and this deposit undoubtedly would exhibit a fluviatile construction throughout its entire thickness (see nature of this in former paper, commencing on pp. 264 and 314, vol. II. *Scottish Naturalist*); and, therefore, supposing our higher haugh to have been originally thus deposited, it also should exhibit a similar arrangement of coarse pebbles and sands at its very bottom,

and variable sands and clays towards its upper part. But by turning to the plate of sections, p. 264, Vol. II., it will be seen that the coarse sands and pebbles of the higher haugh do not coincide with the position of similar beds in the lower haugh, but are found to rest upon a bed of well-stratified red and blue clay bands, that may be seen (within the great curve immediately below "Mailer" on the map that also accompanies p. 264, Vol. II.) boldly standing up twelve feet above low-water mark, and therefore occupying exactly the same position with regard to the present river that the coarse accumulations of the *lower* haugh do. How then were the beds of the upper haugh placed in their present position? Is it to be assumed that when the waters were first let loose from their icy bondage, they first cut a channel through the boulder material and clays that filled the lowland to the present channel's depth, and after sweeping the red and blue clay deposits clean of all *purely* glacial *debris*, supplied their place with *purely* fluviatile pebble beds, and sands, and clays; which must have been first rolled and ground in the channel below, and by some phenomenon that is now not to be found, lifted over the cliffs, first the big pebble beds, and then the gravel and sand, and finally, the clays, or brick-earths, at the top. There is no evidence in the upper beds of the heterogeneous scattering incidental to such powerful floodings, but they bear in their mode of deposition, in their well-rolled pebbles, carefully grouped into extensive beds, in the lines and angles, conformable and unconformable, synclinal and anticlinal, that are met with in every foot of the gravels and sands, an evidence, not to be mistaken, of constant *running* water—not of a whole deluge, but of a stream not more significant than that of the river Earn; sorting and arranging, and re-assorting and re-arranging for an enormous period of time (historically speaking), and winding and twisting from side to side of the valley, pulling down and building up, and making all fair and level again, just as *the* river Earn is now wandering about, pulling down and reconstructing the lower haugh (see former paper) when clays predominated where sands now obtain, when a wider flat was at the mercy of the stream, whose efforts were not opposed by civilised man. That ancient river flowed along what is now the top of the red and blue clay deposit, *i.e.*, some 16 or 20 feet higher than the bottom of the present stream; and it there has left its autobiography, that like an old edition is lying upon

the shelf whilst a newer is being proceeded with. The newer edition differs from the old only in the fact that it is made up of *coarser* materials, the natural result of the thousands of years' sortings to which they have been subjected. Countless millions of tons of the finer sediment have been conveyed to the German Ocean, and by this quantity the floor of the valley has been lowered; and by this same river action the whole of the high haugh may be reduced to a level with the lower haugh, and even to lower still, geographical conditions remaining as they now exist.

The May, a stream that enters the valley above Forteviot, has distributed an immense layer of pebbles upon the top of the lower haugh. This pebble bed is therefore higher in position than the pebble beds proper to the lower haugh. This is a natural consequence upon the May descending from the flanks of the Ochils *upon* the alluvial flat. This stream was without doubt at a higher level, for a bed of pebbles similar to that that it is now placing upon the lower level is found on the top of the higher, 20 feet at least above the present bed. While this small stream has thus reduced its level, has the Earn bed remained stationary? There has been again, either the enormous reduction in the volume of the Earn, or it has reduced its bed in the exact proportion of that of the May. It is the natural province of rivers to scoop out all yielding material, and to carry it away. The Earn valley is filled with detrital matter, most of which was in the valley before the present river ran; and the river is still at least in many places working into the primæval clays.

There is a band of peat in the high haugh forming a zone that possibly represents the mean height of the ancient river. The very presence of the peat would seem to suggest, that even low water mark was not much beneath its zone. Here once more we have the necessity for the swollen state of the Earn to have been *constantly* maintained for a very long period. Such an exceptional condition of the river is hardly likely to have been so constant, but if we more naturally place our stream at a higher level, it has but to reduce its bed one foot in a thousand years or less, and there is ample time for all that it has done to have been accomplished.

To conceive that any river can wear and tear away its surroundings, and come down annually, laden with mountain masses in a pulverised condition, and thus act for thousands of

years, and yet maintain its original level, is to believe that "matter does not exist except in the imagination." The high banks in the Almond valley, and in the wonderful valley of the Tay, testify to the denuding power of water. Men can conceive much more easily the power of a steam-engine than the power of a river. For this we are not culpable; we are only weak in our humanity, appreciating only those things that are immediately of human origin, or of special utility,—with these we come and with these we go; the river was old when the first snort of the engine was heard, and it will still be creeping along the valley long after the last of the iron wheels has rusted again to its earth. A long, long chapter is this of the rivers, full of hard lines and blank pages that would tax the short life, but for poems that breathe from the whole in reward for the toil that it gives.

NOTICES OF NEW BOOKS.

"*Rambles of a Naturalist in Egypt and other Countries.*" By G. J. H. Gurney, jun., F.Z.S. London: Jarrold & Sons.

THE title of this work would imply that it was rather beyond the field to which the *Scottish Naturalist* is restricted; but, as it includes notes and remarks on British birds, it may fairly claim the attention of any ornithologist (if such there be) who restricts his studies to the birds of Britain. For example, at p. 58, Vol. II., of this magazine is mentioned the occurrence of an eagle-owl in Perthshire, of which Mr. Gurney says in the work under review that it "had come from the stock of Mr. Fountaine, the noted breeder of these birds, and had been purposely set at liberty on an estate in that country" (p. 253). To the ornithologist who spends a winter in Egypt, this work will be of great utility, while all may read it with pleasure and profit.

"*Proceedings of the Natural History Society of Glasgow, Vol. II., Part 2.*" Glasgow: Published by the Society.

As usual, this volume is well got up, with good type and paper, and contains many articles of interest. Of actual proceedings there are 180 pages, containing reports of the meetings from October, 1871, to April, 1875. Surely a flourishing Society like this might publish a yearly volume or part, or at least not allow such a long interval (upwards of a year) to elapse between the publication of the part and the date of the last meeting reported. Some of the papers, too, to judge from their titles, might have been given at greater length with advantage—little more than their titles appearing. The Part contains papers in many branches of natural history, the majority of them, we are glad to see, relating to the district, or at least to Scotland. Amongst others may be noticed articles on Ornithology by Messrs. Angus, R. Gray, J. Lumsden. Bateson, Harvie Brown, &c.; on Insects, by Messrs. King, Chapman, Cameron, and Prof. Young; on Geology and Palæontology, by Prof. Young, Messrs. J. Young, Coutts, &c. There are three plates, illustrating a paper on "New Species of Glauconome from Carboniferous Limestone Strata of the West of Scotland," by Prof. J. Young and Mr. J. Young.

INSECTA SCOTICA.

THE LEPIDOPTERA OF SCOTLAND.

(Continued from p. 276.)

EDITED BY F. BUCHANAN WHITE, M.D., F.L.S.

GEOMETRIDÆ.

GEOMETRA L. ; Boisd.

PAPILIONARIA L. Not uncommon. Nemoral. Ascends to upwards of 1200 feet.

DISTRIBUTION—EAST. Solway Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde ♀ ♀ o

LAT. 54°40′-57°50′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. July. LARVA. August-June. FOOD-PLANT. Birch, Alder, &c.

PSEUDOTERPNA H.S.

PRUINATA Hufn. (1767); *cythisaria* Schiff. (1776). Local Amongst broom.

DISTRIBUTION—EAST. ♀ ♀ Tay o o o o o
WEST. Solway Clyde o o o

LAT. 54°40′-56°30′. RANGE IN EUROPE. Central and south-eastern. TYPE. Centro-meridional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE.—IMAGO. July. LARVA. August-June. FOOD-PLANT. Broom.

IODIS Hubn.

LACTEARIA L. Not common. Nemoral.

DISTRIBUTION—EAST. ♀ o o o o o o o
WEST. Solway Clyde o o o

LAT. 54°40′-56°. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. August, September. FOOD-PLANT. Birch.

Hemithea thymiaria was reported from Tay by the late Mr. Dale, who told me, however, that he had made a mistake.

ZONOSOMATIDÆ.

ZONOSOMA Led.

(*EPHYRA* Dup.?)

PENDULARIA Cl. Common. Nemoral. Ascends to upwards of 1400 feet.

DISTRIBUTION—EAST. ♀♀ ♀♀ Tay Dee Moray ♀♀ o o
WEST. Solway Clyde ♀♀ ♀♀ o

LAT. 54°40′-57°50′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June. LARVA. August, September. FOOD-PLANT. Birch.

PORATA F. Local. Nemoral.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. [Solway] Clyde o o o

LAT. [55°]-56°30′. RANGE IN EUROPE. Central and southern. TYPE. Centro-meridional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. June. LARVA. August, September. FOOD-PLANT. Oak.

PUNCTARIA L. Local. Nemoral.

DISTRIBUTION—EAST. ♀♀ ♀♀ Tay Dee Moray o o o
WEST. Solway Clyde o o o

LAT. 56°40′-57°40′. RANGE IN EUROPE. Central and southern. TYPE. Centro-meridional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June. LARVA. August, September. FOOD-PLANT. Oak.

The above three species are, I think, only single-brooded in Scotland. *Z. triliniaria* has been reported from Clyde, but requires to be verified.

ACIDALIIDÆ.

TIMANDRA Dup.

AMATA L. (1758); *amataria* L. (1761). Not common.

DISTRIBUTION—EAST. ♀♀ ♀♀ Tay o [Moray] o o o
WEST. ♀♀ ♀♀ o o o

LAT. 56°30′-[57°40′.] RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. English.

TIME OE APPEARANCE.—IMAGO. June, July. LARVA. September. FOOD-PLANT. Dock and other low plants.

ACIDALIA Tr.

INORNATA Hw. Not common, or overlooked. Nemoral.

DISTRIBUTION—EAST. ♀ ♀ Tay ♀ Moray o o o
WEST. ♀ ♀ ♀ ♀ o

LAT. 56°30′-97°40′. RANGE IN EUROPE. Central (Finland, &c.) TYPE. Central. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. May. FOOD-PLANT. Low plants and willow.

From its similarity to *aversata* (from which it may be distinguished by its fainter markings and the absence of the black spots at the base of the fringes) this is probably frequently overlooked.

AVERSATA L. Abundant. Agrestal and nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde ♀ ♀ o

LAT. 54°40′-57°50′. RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APEARANCE—IMAGO. June, July. LARVA. April, May. FOOD-PLANT. Low plants.

According to Dr. Staudinger, the typical form is the banded one (*lividata* Gn.), but the common form is the one with a broad central band (ab. *spoliata* Stdg.). The latter is our common form.

FUMATA Stph. Locally common. Ericetal. Ascends to 1500 feet.

DISTRIBUTION—EAST. o ♀ Tay Dee Moray ♀ o o
WEST. ♀ Clyde Argyle West-Ross ♀

LAT. 55°-57°50′. RANGE IN EUROPE. Northern (Germany, Alps, &c.), TYPE. Septentrional and alpine. TYPE IN BRITAIN. Scottish.

TIME OF APPEARANGE—IMAGO. June, July. LARVA. ——? FOOD-PLANT. Heather.

REMUTATA Hb. Local. Nemoral.

DISTRIBUTION—EAST. ♀ ♀ Tay Dee Moray o o o
WEST. Solway Clyde ♀ ♀ o

LAT. 54°40′-57°40′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May, June. LARVA. ——? FOOD-PLANT. ——?

IMMUMATA L. Local. Nemoral.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

LAT. 54°50′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. ——? FOOD-PLANT. ——?

SUBSERICEATA Hw. Local. Pascual.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o o

LAT. 54°40′ RANGE IN EUROPE. Britain, France, Germany, &c. TYPE. Centro-meridional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. June. LARVA. ——? FOOD-PLANT. ——?

VIRGULARIA Hb.; *incanaria* Hb. (non L.). Local. Hortensal and agrestal.

DISTRIBUTION—EAST. ♀ Forth Tay o o o o o
WEST. Solway Clyde o o o

LAT. 54°50′-56°30′. RANGE IN EUROPE. Central and southern. TYPE. Centro-meridional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. June-August. LARVA. ——? FOOD-PLANT. ——?

TRIGEMINATA Hw. Not common. Nemoral.

DISTRIBUTION—EAST. Tweed o o o o o o o
WEST. Clyde o o o o

LAT. 55°30°-56′. RANGE IN EUROPE. Central (or south-central). TYPE. Centro-meridional. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. July. LARVA. ——? FOOD-PLANT. ——?

BISETATA Hufn. Common. Nemoral.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway Clyde ♀ West-Ross o

LAT. 54°40′-57°50′. RANGE IN EUROPE. Central (Finland; Sweden? &c.). TYPE. Central. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. August-May. FOOD-PLANT. Dandelion &c.

DIMIDIATA Hufn. (1769); *scutulata* Bkh. (1794). Local. Nemoral.

DISTRIBUTION—EAST. ♀ Forth Tay ♀ Moray o o o
WEST. Solway Clyde o o o

LAT. 54°40′-57°40′. RANGE IN EUROPE. Central (Finland). TYPE. Central. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. June, July. LARVA. August-June. FOOD-PLANT. Umbelliferæ, &c.

There are probably several more *Acidaliæ* in Scotland, but the above are all that at present my information enables me to include with certainty in this list. The following have been reported, but I have not seen examples:—*emarginaria* (in Solway), *osseata* and *promutata* in Clyde.

CABERIDÆ.

CABERA Tr.

PUSARIA L. Abundant. Nemoral. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ ♀ o
WEST. Solway Clyde ♀ West-Ross ♀

LAT. 54°40′-57-50′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May, June. LARVA. September. FOOD-PLANT. Birch and other trees.

ROTUNDARIA Hw. Rare. Nemoral.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o o o o o

LAT. 56°30′. RANGE IN EUROPE. Britain and Germany. TYPE. Occidental? TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. May. LARVA. September. FOOD-PLANT. Birch.

By some considered to be a form of the last species. I have a specimen from Tay, which seems to be *rotundaria*.

EXANTHEMATA Sc. Common. Nemoral. Ascends to 1200 feet.

DISTRIBUTION—EAST. Solway Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde ♀ West-Ross ♀

LAT. 54°40′-57°50′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May, June. LARVA. September. FOOD-PLANT. Sallow, &c.

ZERENIDÆ.

ABRAXAS Leach.

GROSSULARIATA L. Locally common. Hortensal, &c.
DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway Clyde ♀ West-Ross o
LAT. 54°40′-57°40′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. July, August. LARVA. September-June. FOOD-PLANT. Currant, Sloe, &c.; more rare on *Sedum Telephium* and *Cotyledon*.

SYLVATA Sc. (1763); *ulmata* F. (1775). Local. Nemoral.
DISTRIBUTION—EAST. Tweed o o o o o o o
WEST. Solway o o o o
LAT. 55°-56.° RANGE IN EUROPE. Central (Sweden, &c.) TYPE. Central. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. June. LARVA. September. FOOD-PLANT. Elm.

LOMASPILIS Hubn.

MARGINATA L. Common. Nemoral.
DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde Argyle West-Ross ♀
LAT. 54°40′-57°50′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May-July. LARVA. August, September. FOOD-PLANT. Sallow.

FIDONIIDÆ.

SCODIONA Boisd.

BELGARIA Hb. Not common. Ericetal. Ascends to about 1800 feet.
DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀
Orkney o
WEST. Solway Clyde Argyle ♀ o
LAT. 55°-59°10′. RANGE IN EUROPE. West-central. TYPE. Occidento-central. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO.—June. LARVA. August-May. FOOD-PLANT. Heather.

Rather a variable species in Britain. The Scottish form seems to be the var. *favillacearia* Hb., but some of my southern English examples appertain, I think, to the ab. (var.) *albidaria* Stdg. ; north English ones are the same as the Scottish.

HALIA Dup.

WAVARIA L. Common. Hortensal. Ascends to 1200 feet.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde ♀ West-Ross o

LAT. 54°40′-57°-40′. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. July. LARVA. May, June. FOOD-PLANT. Currant and gooseberry.

STRENIA Dup.

CLATHRATA L. Not common. Ericetal.

DISTRIBUTION—EAST. Tweed o o o o o o o
WEST. Solway ♀ o o o

LAT. 55°-56°. RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. May, June. LARVA. September-May. FOOD-PLANT. Medicago &c.

PANAGRA Gn.

PETRARIA Hb. Local. Amongst bracken.

DISTRIBUTION—EAST. ♀ ♀ Tay o o o o o
WEST. Solway Clyde o o o

LAT. 54°40′-56°30.′ RANGE IN EUROPE. Central. TYPE. Central. TYPE IN BRITAIN. English.

TIME OF APPEARANCE—IMAGO. May, June. LARVA. June, July. FOOD-PLANT. Bracken (Pteris).

NUMERIA Dup.

PULVERARIA L. Not common. Nemoral.

DISTRIBUTION—EAST. ♀ ♀ ♀ ♀ Moray o o o
WEST. Solway Clyde ♀ West-Ross o

LAT. 5°50′-47°40. RANGE IN EUROPE. Central and northern. TYPE. Centro-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May, June. LARVA. July. FOOD-PLANT. Sallow.

BUPALUS Leach.

PINIARIA L. Common. Pinetal. Ascends to 1400 feet.
DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ o o
WEST. Solway Clyde ♀ West Ross o
LAT. 54°40′-57°50′. RANGE IN EUROPE. Central and northern. TYPE. Central-septentrional. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May-July. LARVA. August, September. FOOD-PLANT. Scots-fir.

Scottish examples have the pale markings of the wings pure white, the majority of south English ones have the same parts decidedly yellow. Moreover, I think the English race is rather larger, especially the ♀ insects, which are also more highly coloured than the Scottish ones. As the white marked is, I believe, the typical form, I would suggest the name *var.* (*et ab.*) *flavescens* for the southern form.

FIDONIA Tr.

LIMBARIA F. (1775); *conspicuata* Schiff. (1776). Not common. Amongst broom.
DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o o o o o
LAT. 56°30′-56°40′. RANGE IN EUROPE. Britain, Belgium, Germany, France, Switzerland &c. TYPE. Occidento-central. TYPE IN BRITAIN. British?

TIME OF APPEARANCE—IMAGO. June, July. LARVA. August, September. FOOD-PLANT. Broom.

ATOMARIA L. Ericetal. Ascends to 2000 feet.
DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray ♀ Orkney ♀
WEST. Solway Clyde Argyle West-Ross Hebrides.
LAT. 54°40′-59°10′. RANGE IN EUROPE. Nearly throughout. TYPE. European. TYPE IN BRITAIN. British.

TIME OF APPEARANCE—IMAGO. May-July. LARVA. August, September. FOOD-PLANT. Heather &c.

CARBONARIA Cl. Very local. Ericetal. From 1000 to 1600 feet or upwards.
DISTRIBUTION—EAST. o o Tay Dee ♀ ♀ o o
WEST. o o ♀ [West-Ross] o
LAT. 56°40′-57°. RANGE IN EUROPE. Alps and northern. TYPE. Alpine and septentrional. TYPE IN BRITAIN. Scottish.

TIME OF APPEARANCE—IMAGO. April, May. LARVA. July. OOD-PLANT. *Arctostaphylos uva-ursi.* Will eat birch and sallow?

(To be continued.)

THE COLEOPTERA OF SCOTLAND.

(Continued from p. 328.)

EDITED BY D. SHARP, M.B.

HISTERIDÆ.

HISTER Er.

[UNICOLOR L.

DISTRIBUTION—EAST. o o o Dee o o o o
WEST. o o o o o

Recorded by Murray as occasional, and by Mac Gillivray from Aberdeen, but I have never seen a Scottish specimen.

CADAVERINUS E.H. Rare.

DISTRIBUTION—EAST. ♀ ♀ ♀ ♀ Moray o o o
WEST. Solway ♀ o o o

SUCCICOLA Th. Lowland, highland. Common in decaying vegetable matter.

DISTRIBUTION—EAST. ♀ ♀ Tay ♀ ♀ o o o
WEST. Solway ♀ o o o

NEGLECTUS Germ. Occasional.

DISTRIBUTION—EAST. ♀ Forth Tay ♀ ♀ o o o
WEST. Solway ♀ o o o

CARBONARIUS E.H. Scarce.

DISTRIBUTION—EAST. ♀ ♀ ♀ ♀ ♀ o o o
WEST. Solway ♀ o o o

PURPURASCENS Payk. Rare. Lowland. In sandy places.

DISTRIBUTION—EAST. ♀ ♀ ♀ ♀ Moray o o o
WEST. ♀ Clyde o o o

MARGINATUS Er. Very rare. Lowland.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

[DUODECIMSTRIATUS Schr. Doubtful as Scottish.

DISTRIBUTION—EAST. o o o o o o o o
WEST. o o o o o

"Raehills, Rev. W. Little." Murray Cat.

BIMACULATUS Lin. Rare. Lowland.

DISTRIBUTION—EAST. ♀ Forth ♀ ♀ ♀ o o o
WEST. Solway Clyde o o o

DENDROPHILUS Er.

[PUNCTATUS Hbst. Doubtful as Scottish.

DISTRIBUTION—EAST. o o o o o o o
WEST. o o o o o

"Under bark of trees at Cramond." Murray Cat.

PYGMÆUS Lin. Very local in nests of *Formica rufa.*

DISTRIBUTION—EAST. o o Tay Dee ♀♂ o o o
WEST. o o o o o

MYRMETES Th.

PICEUS Pk. Very local. In nests of *Formica rufa.*

DISTRIBUTION—EAST. o o o Dee o o o o
WEST. o o o o o

GNATHONCUS Th.

ROTUNDATUS Ill. Rare.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o Clyde o o o

SAPRINUS Er.

NITIDULUS Payk. Local. Lowland.

DISTRIBUTION—EAST. ♀♂ Forth o o o o o o
WEST. Solway ♀♂ o o o

ÆNEUS Fab. Local. Lowland.

DISTRIBUTION—EAST. ♀♂ Forth ♀♂ ♀♂ Moray o o o
WEST. Solway ♀♂ o o o

MARITIMUS Steph. Very rare. Maritime.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

ONTHOPHILUS Er.

STRIATUS F. Common in vegetable refuse and dung.

DISTRIBUTION—EAST. o Forth ♀♂ ♀♂ ♀♂ o o o
WEST. Solway ♀♂ o o o

ABRÆUS Er.

GLOBOSUS E.H. Very rare.

DISTRIBUTION—EAST. o Forth o Dee o o o o
WEST. o o o o o

ACRITUS Er.

[MINUTUS Payk. Doubtful as Scottish.

DISTRIBUTION—EAST. o o o o o o o o
WEST. o o o o o

I think I saw this species near Edinburgh, and the species recorded in Murray's Catalogue, under the name of *Abræus nigricornis*, as found at Raehills, would probably be this species.

PHALACRIDÆ.

PHALACRUS Er.

CORRUSCUS Payk. Local.

DISTRIBUTION—EAST. Tweed o o o o o o o
WEST. Solway o o o o

SUBSTRIATUS Gyll. Rare. Lowland.

DISTRIBUTION—EAST. Tweed o o o o o o o
WEST. Solway o o o o

OLIBRUS Er.

CORTICALIS Panz. Very rare.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

ÆNEUS Fab.

DISTRIBUTION—EAST. Tweed oo o o o o o o
WEST. oo oo o o o

Recorded by Murray as generally distributed, but the only spot where I can recollect to have seen the species was in the Cheviot district.

NITIDULIDÆ.

CERCUS Er.

PEDICULARIUS Lin. Very rare.

DISTRIBUTION—EAST. Tweed Forth o o o o o o
WEST. o o o o o

[BIPUSTULATUS Payk.

DISTRIBUTION—EAST o o o o o o o o
WEST. o o o o o

Recorded by Murray as "occasional," but I do not know of its occurrence.

BRACHYPTERUS Er.

PUBESCENS Er. Rare.

DISTRIBUTION—EAST. ♀ ♀ o o o o o o
WEST. Solway o o o o o

URTICÆ Fab. Abundant on nettles in flower.

DISTRIBUTION—EAST. ♀ ♀ Tay ♀ Moray o o o
WEST. Solway ♀ o o o

[CARPOPHILUS Er.

[HEMIPTERUS Lin. Not an indigenous species.

DISTRIBUTION—EAST. o o o o o o o o
WEST. o o o o o

"Edinburgh, a single specimen introduced from abroad." Murray Cat.

[QUADRISIGNATUS Er. Not an indigenous species.

DISTRIBUTION—EAST. o o o o o o o o
WEST. o o o o o

"Edinburgh, in a box of figs from Smyrna." Murray Cat.

EPURÆA Er.

DIFFUSA Bris. Very rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

A single specimen found in fungus on an oak stump at Eccles. D. S.

ÆSTIVA Lin. Common.

DISTRIBUTION—EAST. ♀ Forth ♀ Dee Moray o o o
WEST. Solway ♀ o o o

MELINA Er. Rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

SILACEA Hbst. Very rare. Highland. At sap of birch trees.

DISTRIBUTION—EAST. o o Tay Dee o o o o
WEST. o o o o o

VARIEGATA Hbst. Very rare. Highland. In fungus.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o o o o o

IMMUNDA Er. Very rare. Highland. At sap of birches.

DISTRIBUTION—EAST. o o o o Moray o o o
WEST. o o o o o

DELETA Er. Local. In fungus.

DISTRIBUTION—EAST. ꝏ Forth o o o o o o
WEST. ꝏ ꝏ o o o

NEGLECTA Heer. Very rare.

DISTRIBUTION—EAST. o o o o Moray o o o
WEST. o o o o o

OBSOLETA Fab. Common under bark and in fungus. Lowland and highland.

DISTRIBUTION—EAST. ꝏ Forth Tay Dee Moray o o o
WEST. Solway ꝏ o o o

ANGUSTATA Ev. Very rare. Highland. In the burrows of *Xyloterus lineatus* in Scots fir.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o o o o o

PUSILLA Hbst. Common. Under the bark of Scots fir.

DISTRIBUTION—EAST. Tweed Forth Tay Dee Moray o o o
WEST. Solway ꝏ o o o

OBLONGA Hbst. Very rare. Under bark of Scots fir.

DISTRIBUTION—EAST. Tweed o o Dee o o o o
WEST. o o o o o

FLOREA Er. Not common. On the flowers of mountain ash.

DISTRIBUTION—EAST. ꝏ ꝏ ꝏ Dee Moray o o o
WEST. Solway ꝏ o o o

MELANOCEPHALA Marsh. Very rare.

DISTRIBUTION—EAST. o Forth o o Moray o o o
WEST. o o o o o

LIMBATA Fab. Very rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

Found in flood refuse at Kelton, below Dumfries, by Mr. Lennon.

NITIDULA Er.

BIPUSTULATA Fab. Common in carcases. Lowland, highland.

DISTRIBUTION—EAST. ꝏ ꝏ ꝏ Dee Moray o o o
WEST. Solway ꝏ o o o

SORONIA Er.

PUNCTATISSIMA Ill. Local. At trees infested by Cossus.

DISTRIBUTION—EAST. Tweed ♀ Tay Dee Moray o o o
WEST. o o o o o

GRISEA Lin. Scarce.

DISTRIBUTION—EAST. ♀ Forth ♀ ♀ Moray o o
WEST. Solway ♀ o o o

OMOSITA Er.

DEPRESSA Lin. Local. In carcases. Lowland, highland.

DISTRIBUTION—EAST. ♀ Forth Tay Dee Moray o o o
WEST. Solway o o o o

COLON Lin. Common. In carcases and old bones.

DISTRIBUTION—EAST. ♀ ♀ ♀ ♀ Moray o o o
WEST. Solway ♀ o o o

DISCOIDEA Fab. Scarce. In carcases and bones.

DISTRIBUTION—EAST. ♀ ♀ ♀ ♀ ♀ o o o
WEST. Solway ♀ o o o

THALYCRA Er.

SERICEA Sturm. Very rare.

DISTRIBUTION—EAST. o o o o Moray o o o
WEST. o o o o o

MELIGETHES Er.

RUFIPES Gyll. Occasional.

DISTRIBUTION—EAST. o o o o o o o o
WEST. o o o o o

This species is perhaps not uncommon, but no localities are recorded for it.

LUMBARIS Sturm. Rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

ÆNEUS Fab. Very common on flowers of *Cruciferæ*.

DISTRIBUTION—EAST. ♀ ♀ ♀ ♀ Moray Sutherland Orkney o
WEST. Solway Clyde ♀ ♀ ♀

VIRIDESCENS Fab. Very common. With the preceding species.

DISTRIBUTION—EAST. ♀ ♀ ♀ ♀ Moray o o
WEST. Solway Clyde o o o

SUBRUGOSUS Gyll. Very rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

VIDUATUS Sturm.

DISTRIBUTION—EAST. ♀ ♀ o o o o o o
WEST. Solway ♀ o o o

Not uncommon about Thornhill.

UMBROSUS Sturm.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

SENICULUS Er. In flowers of Echium vulgare. Local.

DISTRIBUTION—EAST. ♀ Forth o o o o o o
WEST. ♀ ♀ o o o

PICIPES Sturm. Not uncommon.

DISTRIBUTION—EAST. ♀ Forth o o o o o o
WEST. Solway ♀ o o o

DISTINCTUS Sturm. Rare.

DISTRIBUTION—EAST. ♀ Forth o o o o o o
WEST. ♀ ♀ o o o

ERYTHROPUS Gyll. Local.

DISTRIBUTION.—EAST. ♀ Forth o o o o o o
West. ♀ Clyde o o o

EXILIS Sturm. Very rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

POCADIUS Er.

FERRUGINEUS Fab. Rare. In fungi, especially puff balls.

DISTRIBUTION—EAST. Tweed Forth ♀ ♀ Moray o o o
WEST. ♀ ♀ o o o

CYCHRAMUS Er.

LUTEUS Fab. In fungi.

DISTRIBUTION—EAST. ♀ ♀ o o o o o o
WEST. Solway Clyde o o o

FUNGICOLA Heer. In fungi.

DISTRIBUTION—EAST. o o o o Moray o o o
WEST. Solway o o o o

BYTURUS Latr.

TOMENTOSUS Fab. Common on the flowers of raspberry and mountain ash.

DISTRIBUTION—EAST. ○ Forth Tay ○ Moray o o o
WEST. Solway ○ o o o

IPS Er.

QUADRIPUNCTATA Hbst. Scarce.

DISTRIBUTION—EAST. Tweed ○ Tay Dee o o o o
WEST. Solway Clyde o o o

QUADRIPUSTULATA Fab. Common under bark of Scots fir. Lowland, highland.

DISTRIBUTION—EAST. Tweed ○ Tay Dee Moray o o o
WEST. Solway Clyde o o o

FERRUGINEUS Fab. Under bark of Scots fir. Not uncommon.

DISTRIBUTION—EAST. Tweed ○ Tay Dee Moray o o o
WEST. Solway ○ o o o

RHIZOPHAGUS Er.

DEPRESSUS Fab. Common under bark of Scots fir.

DISTRIBUTION—EAST ○ ○ Tay Dee Moray o o o
WEST. Solway ○ o o o

FERRUGINEUS Payk. Common under bark of fir.

DISTRIBUTION—EAST. ○ ○ Tay Dee Moray o o o
WEST. Solway ○ o o o

PERFORATUS Er. Rare. Amongst old wood.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

PARALLELOCOLLIS Gyll. Rare.

DISTRIBUTION—EAST. o o o o o o o o
WEST. Solway o o o o

DISPAR Payk. Very common under bark of conifers and sap trees. Highland and lowland.

DISTRIBUTION—EAST. ○ Forth Tay Dee Moray o o o
WEST. Solway Clyde o o o

BIPUSTULATUS Fab. Common under bark.

DISTRIBUTION—EAST ○ Forth Tay Dee ○ o o o
WEST. Solway ○ o o o

TROGOSITIDÆ.

TROGOSITA Er.

[MAURITANICA Lin. Not indigenous.

DISTRIBUTION—EAST. o o o o o o o o
WEST. o o o o o

Found in the town of Edinburgh.

THYMALUS Er.

LIMBATUS Fab. Very rare. Under bark.

DISTRIBUTION—EAST. o o Tay Dee o o o o
WEST. o o o o o

COLYDIIDÆ.

SARROTRIUM Er.

CLAVICORNE Lin. Maritime. Local.

DISTRIBUTION—EAST. o Forth o o o o o o
WEST. o o o o o

DITOMA Er.

[CRENATA Hbst. Doubtful as Scottish.

DISTRIBUTION—EAST. o Forth? o o o o o o
WEST. o o o o o

"Duddingstone and south of Scotland." Ent. Edin.

CERYLON Er.

HISTEROIDES Fab. Local. Under bark,

DISTRIBUTION—EAST. o o Tay Dee o o o o
WEST. o o o o o

ANGUSTATUM Er, Rare. Under bark.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o o o o o

DEPLANATUM Gyll. Rare. Under bark.

DISTRIBUTION—EAST. o o Tay o o o o o
WEST. o o o o o

(To be continued.)

END OF VOLUME III.

No. XVII. JANUARY, 1875. Vol. III.

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☞ This Circular should have formed part of, as an Appendix to, the last (or January) number of the "Scottish Naturalist;" but was inadvertently omitted by the Binder.

UNIVERSITY OF EDINBURGH

BUILDINGS EXTENSION SCHEME.

FUNDS REQUIRED

Are estimated at £150,000. Of this sum £70,000 has already been privately subscribed: **£80,000 is still required by private subscription**; while £50,000 is expected, as a grant from Government, when £100,000 shall have been obtained from private sources.

OBJECT FOR WHICH THE FUNDS ARE REQUIRED

Is generally to place the University of Edinburgh on a par with other Universities in Scotland (especially that of Glasgow), and England (for instance, the Owens College, Manchester), and to adapt it to the growing requirements of the age, by the

1. Establishment of a separate **MEDICAL SCHOOL** in the vicinity of the New General Hospital.
2. Adaptation of existing Building to the present or prospective necessities of the Faculties of **ARTS, LAW and DIVINITY.**
3. Erection of a **UNIVERSITY HALL** for general purposes, such as Graduation examinations and ceremonials, or Rectorial addresses.
4. Accommodation for Professors at present without class-rooms.
5. Provision of—

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MUSEUMS in the departments of Anatomy, Zoology, Geology, Pathology, Materia Medica, and Natural Philosophy.

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6. Extension of the **GENERAL UNIVERSITY LIBRARY.**

7. Renovation of the **exterior** of present Building; with

8. Alteration of its **interior** to adapt it to new and increasing needs.

GROUNDS OF APPEAL.

1. That the University of Edinburgh is a **National** Institution, and the present scheme, therefore, one of **National** importance. Not only does the University of Edinburgh attract the largest number of students (about 2000 annually) of any Scottish University—these students coming **from all parts of Scotland**; but its **Medical School** is still by far the most important in the three kingdoms, drawing its pupils not from Scotland merely, but from England, Ireland, all the British Colonies, the United States, India, Japan, China, and many other foreign countries.

2. That it is eminently a **popular** University—a College for the **People**, in a sense which does not apply to the aristocratic Universities of Oxford and Cambridge.

3. That the University of Edinburgh is far behind other Universities of more modern construction, at home and abroad, as regards the completeness of its arrangements for tuition, in the departments especially of the **Natural and Experimental Sciences**—in other words, for **Practical Science Teaching.**

4. That of late years several **new** Chairs have been created, and others are likely to be added in the course of years; while even for old established Professorships there is at present **Inadequate accommodation.**

5. That the University of Edinburgh has long suffered from pecuniary difficulties. It has not, and never had, any of the rich Endowments possessed by the sister Universities of Oxford and Cambridge. Its whole history, on the contrary, has been one of struggle against want of funds. Even the present Building has never for this reason—want of funds—been completed.

6. Other Universities are making, or have made, munificent expenditure on the extension or improvement of their Buildings: other cities have erected, or contemplate the erection of, costly new College Edifices. By the time it is finished, Glasgow will have spent at least £450,000 on its new University. At present a single London merchant (Mr. Holloway, who has already, moreover, expended £100,000 on another equally useful public institution,) is arranging to build, near that city, and at his own expense, a College for Ladies, the estimated cost of which is £150,000. Oxford lately spent £120,000 on a Museum and attached Laboratories: while the Uni-

versities of Berlin and Bonn have devoted, in each case, a sum of about £30,000 to the construction of Chemical Laboratories alone. Dundee contemplates building, at a cost of £150,000, a College to be affiliated to the ancient University of St. Andrews. Yorkshire has just established a College of Science at Leeds; and the Northern Counties of England have recently opened another at Newcastle.

ADVOCACY OF THE SCHEME

Includes—

1. **Speeches** at a Public Meeting in Edinburgh in April, 1874, by

The Duke of Buccleuch.
The Lord Justice-General, Chancellor of the University.
Dr. Lyon Playfair, M.P. for the University.
Duncan M'Laren, Esq., senior M.P. for the City.
James Cowan, Esq., junior M.P. for the City, and lately Lord Provost thereof.
Charles Cowan, Esq. of Loganhouse, formerly M.P. for the City.
Lord Curriehill, one of the Judges of the Court of Session.
The Right Rev. Dr. Cotterill, Bishop of Edinburgh.
Mr. Campbell Swinton of Kimmerghame.
Rev. Dr. Taylor, Secretary of the Education Board for Scotland.
Rev. Dr. Macgregor of Edinburgh.

2. The **support**, by handsome **Subscriptions**, of

Many of the Nobility of Scotland, including two Dukes, two Marquises, five Earls, ten Baronets, and six Knights.
Most, or all, of the Judges of the Court of Session.
The Rector of the University, Sir William Stirling-Maxwell, of Keir and Pollok.
The Principal of the University, Sir Alexander Grant.
The Professors of the University.
Many of the leading non-titled landowners of the east of Scotland.
Many of the leading representatives of the professions of Medicine, Law, and Divinity in Edinburgh, and throughout Scotland.
Several present or former Scottish Members of Parliament.
Many of the Sheriffs of Counties in Scotland.
The Lord Provost of Edinburgh, and the Provosts of several other towns in Scotland.
Certain Public Bodies in Edinburgh, such as the Royal College of Physicians, Royal Medical Society, and the Merchant Company.
Many of the leading Merchants of Edinburgh, such as those representing the Publishing, Printing, and Bookselling Trades.

3. Leading and other articles in the **Press**, not only of Edinburgh, but of the Provinces: such as an article on "University Development in Scotland," in the *Perthshire Constitutional* in November, 1874.

TO WHOM APPEAL IS MADE.

To all who, either abroad or at home, are interested in—

1. The Educational eminence and prosperity of **Edinburgh.**

2. The maintenance of the fame of its University, and especially of its **Schools of Medicine and the Sciences.**

3. The promotion of the Higher Education in **Scotland.**

SUBSCRIPTIONS

From Perth City and County already amount to £2142 13s; but a single Dundee merchant—the late Sir David Baxter of Kilmaron—contributed nearly ten times as much—viz., £20,000.

The most convenient mode of remitting Subscriptions—which may be spread in instalments over four years, if preferred—is by the medium of the **Union Bank of Scotland, Edinburgh,** or any of its Branches or Agencies.

W. LAUDER LINDSAY, M.D.,
One of the Honorary Local Secretaries.

PERTH, January, 1875.

No. XVIII. APRIL, 1875. Vol. III.

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SAMUEL COWAN AND CO., STRATHMORE PRINTING WORKS, PERTH.

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FUNGUS SHOW

AND

Conference of Cryptogamic Botanists,

AT PERTH,

September 29th & 30th, and October 1st, 1875.

THE CRYPTOGAMIC SOCIETY OF SCOTLAND will hold its FIRST ANNUAL CONFERENCE at PERTH, on September 29th and 30th, and October 1st, 1875.

President—Sir T. MONCREIFFE, of Moncreiffe, Bart., President of the Perthshire Society of Natural Science.

Vice-President—GEO. DICKIE, M.D., F.L.S., Professor of Botany, University of Aberdeen.

Secretary—F. BUCHANAN WHITE, M.D., F.L.S., Editor of *Scottish Naturalist.*

Treasurer—Rev. J. STEVENSON, M.A., Glamis, Forfarshire.

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J. ROY, Secretary of the Natural History Society, Aberdeen.
Colonel DRUMMOND HAY, C.M.Z.S., of Seggieden, Perthshire.
G. OGILVIE, M.D., Professor of Institutes of Medicine, University of Aberdeen.
C. HOWIE, Secretary of the Largo Naturalists' Field Club, Largo, Fife.

The following arrangements have been made:—

Wednesday, Sept. 29th. Field-Excursions. Localities will be intimated hereafter.

Thursday, Sept. 30th. Arrangement and examination of specimens. Business Meeting. Fungus Dinner.

Friday, Oct. 1st. Show of Fungi and other Cryptogamic Plants in the City Hall, Perth.

Detailed arrangements will be announced hereafter.

NOTICE TO EXHIBITORS.

The Society requests the co-operation of every one interested, in obtaining specimens of mushrooms, toadstools, and other fungi, ferns, mosses, lichens, and other cryptogamic plants, for exhibition; and requests the attention of intending contributors to the following points :—

1. Fungi may be found in all sorts of places, fields or woods, moors or mountains, on the ground or on trees; and every kind, however common they may appear to be, will be acceptable. Fresh, undecayed specimens should be selected, and gathered not more than three or four days before the Show. Each should be wrapped up in a piece of paper, and packed with straw, moss, or bracken, in a box or hamper.
2. Ferns must be sent either growing in pots or as dried specimens.
3. Mosses, lichens, &c., may be sent either fresh or dried.
4. All fungi, &c., intended for exhibition must be delivered (addressed to the care of the "Keeper of the City Hall, Perth,") not later than 10 a.m. on Thursday, Sept. 30th. Ferns in pots must be delivered between 8 and 10 a.m. on Friday, Oct. 1st.
5. With each consignment for exhibition must be sent a card stating by whom the specimens are sent and from what district, and whether the exhibitor wishes the specimens to be returned to him after the Show.
6. To the *inside* of the lid of each hamper or box sent (when the sender wishes these to be returned to him) must be affixed a label with the name and address of the sender. In cases where no such label is sent, the Society will not be responsible for the safe return of the hamper or box.

NOTICE TO VISITORS.

Botanists in distant localities who purpose attending the Conference are requested to give early intimation of their intention, in order to facilitate arrangements.

For the benefit of visitors from nearer localities, it is hoped that the railway companies will issue tickets at reduced fares.

Further information may be obtained on application to the General Secretary,

Dr. BUCHANAN WHITE, Rannoch, Perthshire;

or the Local Secretary,

Mr. J. YOUNG, C.E., Tay Street, Perth;

or to any member of the Council or Local Committee.

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THE EARN VALLEY (Third Paper)—CORRECTION.—Page 118, line 5 from top. For "Mid-Lothian" read "the Middle Lomond Hill."

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AND

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FIRST ANNUAL CONFERENCE

OF THE

CRYPTOGAMIC SOCIETY OF SCOTLAND.

PROGRAMME.

WEDNESDAY, 29TH SEPTEMBER.

FIELD EXCURSIONS.

1. To Moncreiffe. Conducted by Sir T. Moncreiffe, Bart. Proceed by train leaving Perth at 9.35 A.M. to Bridge of Earn Station, when a Guide will meet the Party.

2. To Scone Woods. Conducted by Colonel Drummond Hay and Dr. Buchanan White. Meet in the Rooms of the Perthshire Society of Natural Science, St. Ann's Lane, at 10 A.M.

3. Dupplin. Information may be had from the Secretary.

N.B.—Every Member of the Excursion Parties should bring a basket and some old newspapers with him.

THURSDAY, 30TH SEPTEMBER.

10 A.M. Meet in the City Hall to arrange and examine specimens.

2.30 P.M. Annual Meeting of the Cryptogamic Society of Scotland, in the Committee Room of the City Hall. Papers—M. C. Cooke, LL.D.; Rev. J. Stevenson, M.A.; and Rev. J. Fergusson—will be read.

7 P.M. Dinner in the Salutation Hotel. Sir T. Moncreiffe, of Moncreiffe, Bart., President of the Society, in the chair.

N.B.—Edible Fungi will be well represented at the dinner.

FRIDAY, 1ST OCTOBER.

GRAND EXHIBITION OF CRYPTOGAMIC PLANTS IN THE CITY HALL.

HOURS AND PRICES OF ADMISSION.

12 to 3 p.m.,	-	One Shilling.
3 to 5 p.m.,	-	Sixpence.
7-30 to 10 p.m.,		Threepence.

Tickets for the Dinner, Price 5s. 6d., may be had, not later than Tuesday, 28th September, from the Local Secretary, Mr. J. YOUNG, C.E.; from Mr. WOOD, Bookseller, George Street and High Street; Mr. RICHARDSON, Bookseller, George Street; Mrs. PATON and Mr. STEWART, Booksellers, St. John Street, or at the Hotel.

Tickets for the Exhibition may also be had from the above-mentioned Booksellers.

*** *Members of the P. S. N. S. are Associates for the time being of the Cryptogamic Society, and are at liberty to attend the Excursions, Annual Meeting, and Dinner, and to introduce friends.*

No. XXI. JANUARY, 1876. Vol. III.

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SAMUEL COWAN AND CO., STRATHMORE PRINTING WORKS, PERTH.

To our Friends.

FIVE years have come and gone since the First Number of our Magazine was published. Thanks to the kind support it has met with, and to the careful management of our friend, Mr. Scott, it has during that period been self-supporting (we had almost written, contrary to our expectation!)

From what we have heard, however, from various friends, we think that "The SCOTTISH NATURALIST" is not so well known as (*they* say) it deserves to be, and that many would be glad to become Subscribers if it was brought under their notice.

We need not point out the advantage an increased Circulation of the Magazine would be to the present Subscribers, but we would ask every one of them to try and secure one other Subscriber. We are sure that they have only to try, to succeed.

Trusting, then, that all our kind friends will do their best to help us, we beg to wish them heartily

A HAPPY NEW YEAR!

NOTICE.

Subscriptions to the "Scottish Naturalist" for 1876 (4s., post free, payable in advance), are now due. Single numbers, 1s. 2d. Annual Subscription not paid in advance, not including postage, 4s. 6d.

Orders to be sent to Mr. A. T. SCOTT, Clydesdale Bank, Perth.

COMMUNICATIONS intended for the April number must be sent not later than March 10th.

All communications to be addressed to the Editor, Dr. BUCHANAN WHITE, Perth.

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Communications intended for the January number must be sent not later than 1st December.

NOTE.—The Index and Title Page to Volume III. will appear in the number for January 1877.

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TO NATURALISTS AND OTHERS.

As I am at present working at the Hemiptera of the world, I should be very much obliged for specimens from any part. For the benefit of those who may kindly wish to help, I give a few hints on the collection and preservation of this neglected order of insects. Hemiptera (which include the various insects popularly known as Plant-bugs, Tree-hoppers, Cicadas, Fireflies, Aphides, &c.,) resemble in general appearance Beetles, but have more membranous upper wings (or wing cases), and are usually of softer consistence, besides having their mouth provided with a rostrum, or proboscis, instead of jaws. In size Hemiptera vary from an inch or more to less than one line in length. In colour they are also variable, some being exceedingly brilliant, others very obscurely coloured. They inhabit trees, shrubs, and low plants; some run about on the damp margins of streams and lakes, some inhabit the surface of the water, and others swim in the water or crawl on the mud below. A few live under the dead bark of trees, and are usually flat and dull coloured. The best mode of catching those on trees and shrubs is by shaking the branches over an inverted umbrella; those that are found on or under low plants (grass or other herbage) may be collected by sweeping the herbage with a net (which can easily be made out of a ring—12-18 inches in diameter—of stout wire, attached to a stick, and having a bag of canvas sewn on to it). They may also be found by searching on flowers and leaves. Those at the margin of the water may be found by searching; those on and in the water by using a net similar to the sweeping one, but with canvass open enough to allow the water, but not the insects, to pass through. Rather shallow, still water, among weeds, or in open places among weeds, are the best situations. Many species fly into houses at night, attracted by the lights. In habits these insects are variable: some move slowly, others run or fly with celerity, and others (tree-hoppers, &c.,) jump with great activity. As many species closely resemble each other, it is desirable that *all* specimens met with should be secured. It is also desirable that *small* species as well as large ones should be collected, as it is among the former that most undescribed forms may be expected. To kill and preserve these insects all that is necessary is that on capture they are put in a bottle filled with spirits of wine (rum, whisky, &c., will do). Care must be taken, however, that the bottle is kept filled with fluid, otherwise the specimens will be shaken about and broken. So in transit great care must be taken to guard against the evaporation of the spirit. The bottles, if not filled to the top with specimens, should have the empty space filled with crumpled pieces of paper, then filled with spirit, and tightly corked—all the bottles may then be packed into a larger one, or jar, also filled with alcohol, and tightly corked.

In return for any specimens (few as well as many) kindly sent to me I shall be happy (if wished) to return named specimens, or to give in return named British Lepidoptera, Coleoptera, Hemiptera, or Flowering plants; or in certain cases I shall be glad to buy specimens.

Communications may be addressed to

DR. BUCHANAN WHITE,
PERTH,
SCOTLAND.