Plant Crib

VIOLA

Species of *Viola* are, in the main, not difficult to identify, but careful examination of plants is often necessary. Specific pairs of taxa seem to consistently give problems.

1. Vegetative key to plants with floral axis present, but no open flowers

1	Plant with stipules lanceolate to ovate-lanceolate, not leaf-like	2
1	Plant with stipules leaf-like, pinnatifid, palmatifid, or at least deeply-lobed	7
2	Plant with leaves and pedicels all arising from the base (acaulous)	3
2	Plant with leafy flowering stems	5
3	Plant with leafy, procumbent, rooting stolons; leaves and petioles hairy	***V. odorata***
3	Plant without stolons; leaves and petioles glabrous or hairy	4
4	Plant with long, creeping rhizomes; leaves glabrous, orbicular-reniform; petiole sometimes hairy	***V. palustris***
4	Plant without rhizomes; leaves hairy, triangular-ovate to oblong-ovate; petiole hairy	***V. hirta***
5	Plant with a basal rosette of leaves (this dichotomy is likely to cause problems, but is usually clear on good material)	6
5	Plant without a basal rosette of leaves; all leaves cauline, ovate to ovate-lanceolate	***V. canina, V. lactea*** and ***V. persicifolia***
6	Leaves, petioles, and peduncles usually with fine pubescence (× 20 lens), rarely glabrous (small plants may appear acaulous); leaves shovel-shaped	***V. rupestris***
6	Plant largely glabrous; leaves heart-shaped	***V. riviniana*** and ***V. reichenbachiana***
7	Plant with long, slender, creeping rhizomes, producing solitary, unbranched flowering stems	***V. lutea***
7	Plant without rhizomes (or very short and not creeping), producing much-branched stems	8
8	Mid-lobe of stipule usually lanceolate, ± entire, not leaf-like	***V. tricolor***
8	Mid-lobe of stipule usually ovate-lanceolate or ovate, crenate-serrate, leaf-like	***V. arvensis***

2. *Viola odorata* varieties

The following key to varieties of *V. odorata* L. was prepared for Surrey but may be useful elsewhere.

1	Spurs violet-purple	2
1	Spurs pinkish-purple	5
2	Petals bluish- or violet-purple	3
2	Petals white (sometimes splashed with purple) or white suffused apricot	4
3	Petals bluish-purple; flowering starting in spring; lateral petals bearded or not; summer leaves obtuse	var. ***odorata***
3	Petals deep violet-purple; flowering starting during winter; lateral petals bearded or not; plant and flowers often smaller, especially at onset of flowering; summer leaves pointed	var. ***praecox*** Gregory

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4 Petals white (sometimes splashed purple); lateral petals usually bearded
var. ***dumetorum*** (Jordan) Rouy & Foucaud
4 Petals white suffused apricot, especially towards the base; lateral petals usually bearded
var. ***sulfurea*** (Cariot) Rouy & Foucaud

5 Petals white (sometimes splashed pinkish-purple); lateral petals not bearded
var. ***imberbis*** (Leighton) Henslow
5 Petals pinkish-purple throughout; lateral petals usually not beardedvar. ***subcarnea*** (Jordan) Partalore

The status of many *V. odorata* records is often difficult to assess: var. *praecox* and var. *sulfurea* are often said to be likely introductions, but no doubt all the various colour forms are deliberately introduced from time to time. A clear indication of the nature of the individual locality is thus obviously of value with each record. Some ecological differences between variants have been reported, notably regarding var. *imberbis* and var. *dumetorum*, so it is also useful to indicate soil type with the record.

There is also variation within some of these described varieties and it would be useful if recorders would indicate, for instance, whether white-flowered forms have pure white petals or petals with violet-purple or pinkish-purple splashing, or whether the lateral petals have tufts or hairs or not.

Author A. C. Leslie, 1988.

3. *Viola odorata / V. hirta*

Although these two species are relatively distinct, the hybrid *V.* × *scabra* (*V.* × *permixta* Jord.) may occur with them on edges of scrub and grassland. The hybrid is unfortunately quite variable and it is not easy to tell from either parent due to back-crossing. The absence of stolons is diagnostic for *V. hirta*

Leaves of *V. odorata* in the spring are shiny and ± glabrous. Leaves of both species may increase in size through the season, the appearance in late summer being very different from the spring. The difference in the hairs on the petioles is easily seen with a × 20 lens, though the measurements require a graduated lens.

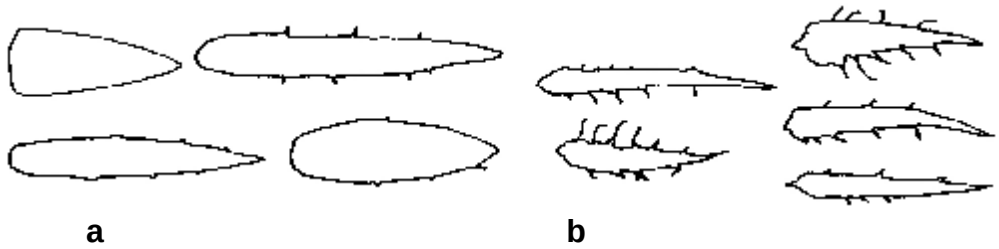
	V. odorata L.	*V.* × *scabra* F. Braun	*V. hirta* L.
Stolons	Present, plant sometimes forming extensive patches	Weak, short tends to form tight patches	Absent
Hairs on petioles	Very short (usually less than 0.25(-0.4) mm), deflexed to appressed	Intermediate	Longer (usually more than (0.25-)0.3 mm), patent to deflexed
Leaf shape	Broadly ovate to ovate-orbicular, obtuse to rounded at apex, deeply cordate	Variable	Ovate, obtuse at apex, shallowly cordate
Stipules	Ovate to ovate-lanceolate	Intermediate	Lanceolate to linear-lanceolate
Flowers	Scented or not scented, deep purple to pink white or blue	Weakly scented or not	Not scented; blue-violet, rarely white
Fertility	Fertile	Partially fertile	Fertile

4. *Viola hirta / V. riviniana*

In tightly grazed grassland vegetative leaves of these two species can be surprisingly similar, though in most cases there should be no difficulty separating them. In flower or fruit (cleistogamous flowers tucked around the base of the plants may be present until quite late in the year) they are readily distinguished (*V. hirta* has blunt sepals, *V. riviniana* has acute sepals).

V. hirta L.: Usually with abundant deflexed to patent hairs on petioles and leaflets (exceptionally glabrous); stipules pale, with or without weak, often glandular-tipped, lateral teeth (Fig. a); margins of stipules often hairy.

V. riviniana Rchb.: Usually glabrous, sometimes with sparse pubescence on leaf surfaces; stipules dark, usually with strong, thread-like, spreading, non-glandular-tipped lateral teeth (exceptionally lower ones glandular-tipped) (Fig. b); margins of stipules glabrous.



Stipules. (a)*V. hirta,* (b) *V. riviniana.*

5. *Viola rupestris / V. riviniana / V. hirta*

V. rupestris F.W. Schmidt is currently only known from limestone in northern England, but given its widespread occurrence on the continent could occur elsewhere in Britain and Ireland. Full details of all colonies of this *Red Data Book* species should be recorded.

The *Viola rupestris* form from the 'classic' locality on Widdybank Fell, Teesdale (V.c. 66) is easily distinguished, but the much less distinctive form on the south-east slopes of Ingleborough (V.c. 64), though abundant, remained undiscovered until recent years and may still await discovery in other parts of the Dales. It is still often overlooked or confused, for several reasons.

i) In most seasons it flowers very sparsely indeed, often less than 1% of plants flowering.
ii) Most plants are very small and insignificant.
iii) British texts give as diagnostic for this species the presence of very short pubescence on stems, petioles and capsules. However, many colonies on Ingleborough consist of largely glabrous plants, and thus are likely to be passed over as *V. riviniana.* The existence of ± glabrous forms of *V. rupestris* in Britain (Roberts 1977) is still not widely appreciated. Beware: *V. riviniana* may also have sparsely pubescent upper leaf surfaces (cf. below) and some forms can be densely hairy, though the hairs are longer than in *V. rupestris* and more reminiscent of those in *V. hirta*.

In flower, look for a narrow band of darker violet separating the violet on the lower lip from the white in the throat. This is usually present in *V. riviniana*, and absent in *V. rupestris*. The background colour in *V. rupestris* is often paler than that in *V. riviniana.* The spur in *V. riviniana* is long, stout, and often vertically grooved at the end, and often with a little sharp projection from its upper-side near the tip. The spur on *V. rupestris* is shorter, conical to a rounder tip without groove or projection. The colour of the spur in both species varies.

However, *V. rupestris* is perhaps most easily found in summer, when plants have finished flowering but are well-grown and more conspicuous. *Viola rupestris* and *V. riviniana* (especially its dwarf variety var. *minor* (Murb. ex Greg.) Valentine) have an almost identical growth form with central non-flowering leaf-rosette and decumbent flowering/fruiting stems arising from below the rosette, although *V. rupestris* is more condensed. The form of the leaves is diagnostic in well-grown plants. The leaves of *V. rupestris* are shovel-shaped, blunt-tipped, with a slightly cordate or ± truncate base, whilst those of *V. riviniana* are pointed and heart-shaped, with a strongly cordate base. In *V. rupestris* the sides of the mature leaves are often curled upwards (making the leaf 'scoop-shaped'), whereas in *V. riviniana* the basal lobes are often up-curled. *Viola rupestris* plants are often deep green, grey-green, or tinged deep red (the latter can be virtually invisible); *V. riviniana* is a constant dull mid-green. Basal leaves of *Campanula rotundifolia* can also often catch the eye, being of a similar shape and colour (although paler), and occurring in the same habitat.

The hybrid between the two, *V.* × *burnatii* Gremli, has been recorded in Durham but has not yet been found elsewhere. It is generally intermediate between the parents in leaf and flower characters and the pubescence is even finer than in typical *V. rupestris*. No seed is set. It should form conspicuous vigorous spreading patches.

Viola rupestris grows in a few distinctive habitats, for which one can soon develop an eye. On Ingleborough these are:

- thin soils (clayey or peaty) in gravelly areas on the exposed summits of plateaux;
- fine screes of pea-gravel where these are intermixed with clayey soil;
- bare sides or tops of hummocks of gravelly calcareous boulder clay;
- very rarely in *Sesleria* on the limestone bedrock itself.

In all these places the main feature is the open and exposed character of the community, usually consisting only of sparse *Sesleria*, *Festuca ovina* and *Carex flacca* with much open ground.

By contrast *V. riviniana* grows either in crevices between larger stones, in the richer soil in the grykes of pavements, or in dense *Agrostis/Festuca* turf. The two species never seem to occupy the same habitat in V.c. 64, although in other areas of the Dales, *V. riviniana* crops up in habitats similar to those occupied on Ingleborough by *V. rupestris*. In Teesdale, the colonies are in thin, open *Festuca/Carex* turf over the crumbly 'sugar' limestone outcrops, or in open areas of calcareous sand from the eroding limestone.

Pubescent plants of *V. rupestris* may be confused with *V. hirta*, which does grow rarely in higher altitude limestone turf. *Viola hirta* has longer - almost bristly - hairs, a longer and larger leaf with a ± pointed leaf-apex, and obviously blunt sepals; it mostly grows in closed turf. Both species may sometimes have white flowers.

References Roberts, F. J. (1977). *Watsonia* **11**: 385-386.
Valentine, D. H. & Harvey, M. J. (1961). *Proc. BSBI* **4**: 129-135.

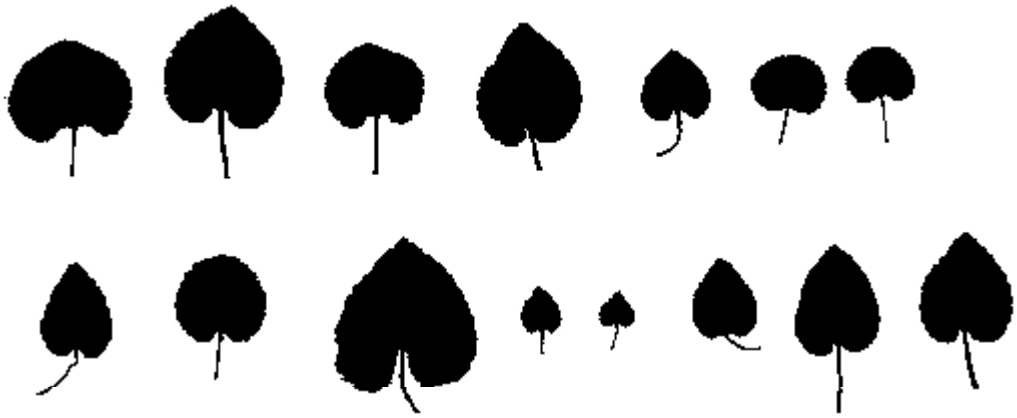
Author F. J. Roberts, December 1997.

6. *Viola riviniana / V. reichenbachiana / V. ´ bavarica*

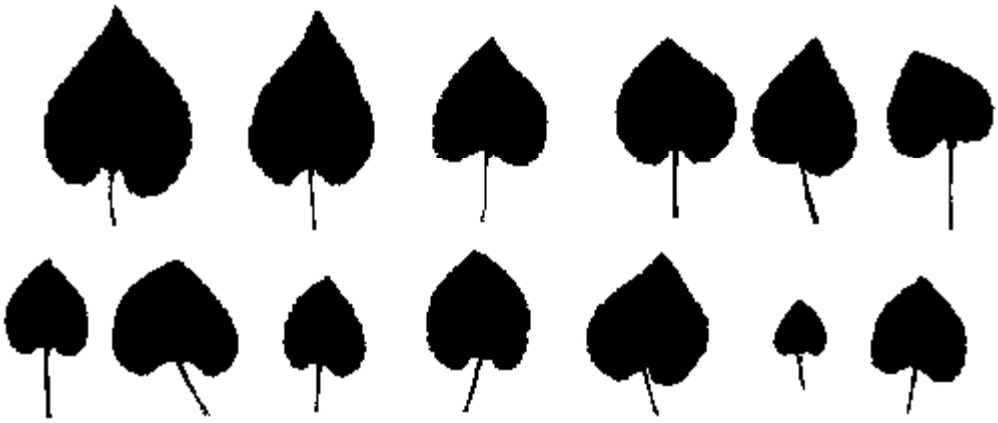
The Table has been compiled from a number of sources including Valentine (1950), Stace (1975) and Stace's *New Flora.*

	V. riviniana Rchb.	*V.* × *bavarica* Schrank	*V. reichenbachiana* Jord. ex Boreau
Leaves	Obtuse to rounded at apex, thicker, changing very little in size through the season (Fig. a)	Intermediate	Obtuse to acuminate at apex, thinner, increasing in size in late season (Fig. b)
Adventitious buds on roots	Present or absent	Probably absent	Absent
Sepals	Appendages 1.5 mm or more and enlarging in fruit (Fig. c); those of non-cleistogamous flowers appressed (note 1) in fruit	Intermediate	Appendages 1.5 mm or less and remaining so in fruit (Fig. d); those of non-cleistogamous flowers divergent in fruit
Flowers	Slatey-blue, lower petals broader	Colour and shape intermediate	Lilac, lower petals narrower
Spurs	White to yellow or purplish, paler than petals, stout, usually notched or furrowed at apex	Colour intermediate but shape nearer *V. riviniana*	Lilac, darker than petals, slender, sometimes weakly notched at apex
Fertility	Pollen and seeds highly fertile; *c.* 19 seeds per capsule, lighter brown, larger and heavier	Pollen and seeds low fertility, *c.* 1%; often high proportion of white or pale seeds in ripe, erect pods	Pollen and seeds highly fertile; *c.* 11 seeds per capsule, dark brown, smaller

Cleistogamous flowers have sepals appressed in fruit in both species. Sepals of cleistogamous flowers may be similar and small in both species. With practice it may be possible to separate *V. riviniana* and *V. reichenbachiana* vegetatively using differences between the leaves (Phillips 1982). The leaves differ in shape and proportions (more pointed in *V. reichenbachiana*) and texture (thinner and less opaque in *V. reichenbachiana*). Although somewhat difficult to define, the characters require careful comparisons, but there is much variation in both species. As the season progresses the very large leaves of *V. reichenbachiana* show the differences even more clearly. Basal rosette leaves of both species tend to be broader and less pointed at the apex, and they may be slightly pubescent on the upper and sometimes lower surfaces (×10 lens). Some populations of *V. riviniana* are able to form clonal patches by adventitious buds on the roots; this character has not been reported in *V. reichenbachiana*. The best characters are however those of the flowers and fruit; *V. riviniana* has broader larger pale blue flowers with a pale spur and the sepals enlarge noticeably in fruit.



(a) Leaves of *V. riviniana*



(b) Leaves of *V. reichenbachiana*

In Europe and Britain, the two parents tend to be partially ecologically separated, *V. riviniana* in the open and *V. reichenbachiana* in calcareous woodland though there is considerable overlap in their ecological requirements. Where their habitats are fragmented they come into contact regularly, and this may have resulted in extensive hybridisation. *Viola reichenbachiana* generally comes into flower a week or two before *V. riviniana* and finishes earlier which may help pick out good *V. reichenbachiana* in early spring, but there is much overlap.

a

b

Sepal appendages in fruit
(c) V. riviniana,
(d) V. reichenbachiana.

Not only are the two species much confused by botanists, but the status of their hybrid seems unclear. There are two possible scenarios:

i) hybrids are rare and *V. riviniana* is very variable, the position adopted by those with a broad species concept (cf. Valentine 1941).
ii) hybrids are common and *V. riviniana* should be treated more strictly. Continental authors tend to regard 'good' *V. riviniana* as having yellow spurs and plants with broad purplish spurs as hybrids. These hybrids tend to be highly fertile, disagreeing with the experimental evidence from hybridisation of British plants (Valentine 1950).

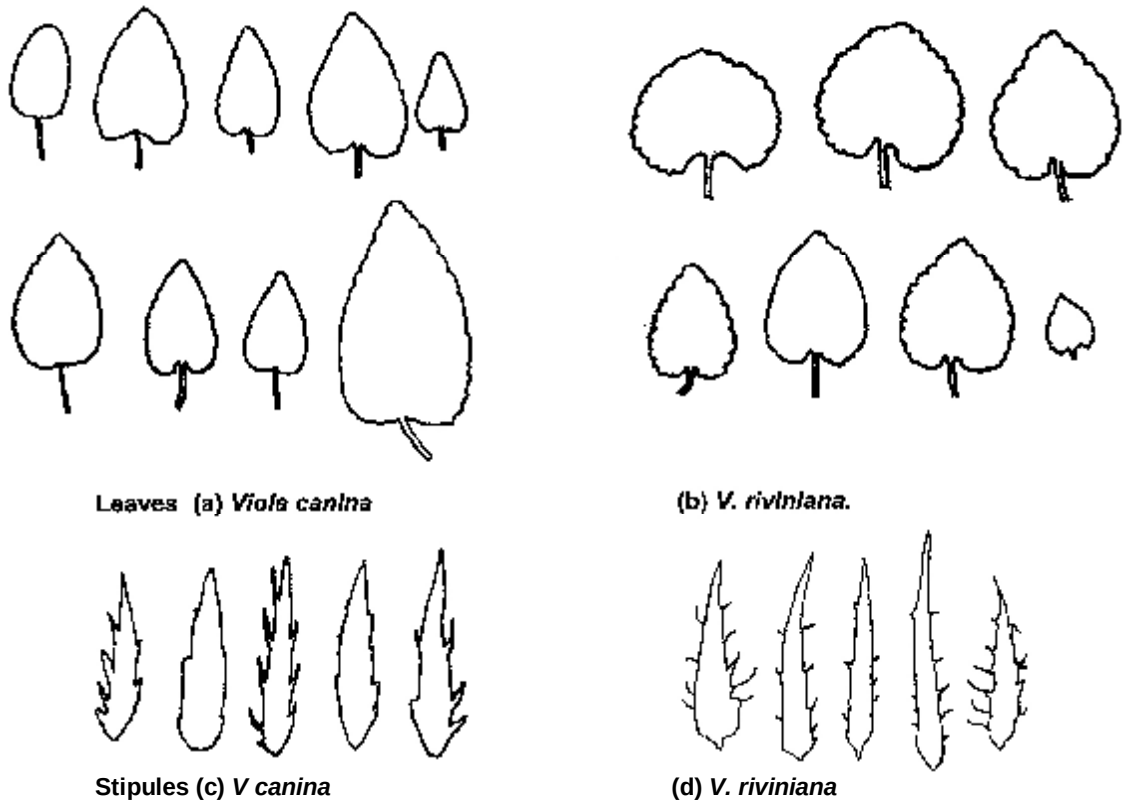
Hybrids are reported to be common and widespread in Britain and Ireland yet are rarely recorded. They tend to be vigorous, and are best determined in the field by comparing local populations. On the whole they resemble *V. riviniana* more closely on floral characters. Individual herbarium specimens tend to be more like *V. riviniana* and are difficult to determine.

References Phillips, E. N. M. (1982). *BSBI News* **31**: 19.
Stace, C. A. (1975). *Hybridisation and the flora of the British Isles.* Academic Press, London.
Valentine, D. H. (1941). *New Phytologist* **40**: 189-209.
Valentine, D. H. (1950). *New Phytologist* **49**: 193-212.

7. *Viola canina / V. riviniana / V. × intersita*

Viola canina appears to be declining inland on heaths and now seems most common on sand dunes and also occurs rarely in the uplands and in fens. It may be over-recorded for several reasons:
i) Beginners who know of 'dog-violets' associate the name *canina* with the commonest violet which is *V. riviniana.*
ii) Variation in spur colour from white to yellow to purple within populations of *V. riviniana* (cf. above) may make it appear that two species are present rather than one.
iii) Historically *V. riviniana* was included in *V. canina*.
The parents, once known, are easily distinguished. The hybrid between the two occurs rarely where the parents grow together - it forms vigorous ± sterile patches and is obviously intermediate.

	Viola canina L.	*V.* × *intersita* Beck	*V. riviniana* Rchb.
Habit	Basal rosette absent, all leaves on stems	Basal rosette absent	Basal rosette present in addition to leaves on stems
Leaves	± Lanceolate, mostly shiny, strongly reticulate below, dark green, thick, glabrous (Fig. a)	Intermediate	Orbicular-ovate to ovate, shiny or dull, not strongly reticulate below, mid-green, thinner; sometimes sparsely hairy (Fig. b)
Stipules	Teeth triangular, strong, pointing forwards (Fig. c)	Intermediate	Teeth slender, pointed sideways (Fig. d)
Flowers	Spur yellow, notched or not	Spur white to yellow or pale purple	Spur white to yellow or pale purple
Fertility	Fertile	± Sterile	Fertile



8. *Viola lactea / V. canina*

V. lactea is most closely related to *V. canina*, from which it can be distinguished as below (Moore 1957).

	V. lactea Sm.	*V. canina* L.
Habit	Subglabrous; stems ascending	Glabrous or sparingly pubescent; stems decumbent to erect
Leaves	Lanceolate to ovate-lanceolate *c.* 1.4-2.5 times as long as wide; apex subacute; base cuneate to truncate; margin shallowly crenate-serrate; foliage sometimes purplish	Ovate to ovate-lanceolate *c.* 1-1.5 times as long as wide; apex obtuse or subacute; base truncate or shallowly and widely cordate; margin crenate or crenate-serrate
Stipules	Large (except the lower), equalling or somewhat longer than the petiole, lanceolate to ovate-lanceolate, coarsely and irregularly fimbriate-serrate or dentate	Rather small, about half as long as the petiole, ± lanceolate, distantly serrate-dentate, with few short and stout teeth
Corolla	Petals narrow (3-4 times as long as broad), creamy to pale lilac	Petals obovate (1.5-2 times as long as broad), blue with little or no violet tint
Flowering	May to June	April to June
Typical habitat	Heaths, especially near the sea	Downs, dunes and sandy heaths / grassland

Many early authorities (e.g. Gregory 1912) considered hybrids between these species to be frequent in Britain. However, despite the reasonable pollen-fertility of artificial F1 hybrids, which are morphologically intermediate between the parents, natural occurrences are rare. Only occasional massive habitat disturbance breaks down the strong edaphic factors separating the species. Floral features (Moore 1957) are the only sure morphological guides to recognition of the hybrids.

References Gregory, E. S. (1912). *British Violets*. Cambridge.
Moore, D. M. (1957). The status of *Viola lactea* pp. 97-101 in *Progress in the Study of the British flora*. BSBI, London.
Moore, D. M. (1958). *Journal of Ecology* **46**: 527-535.
Moore, D. M. (1959). *Evolution* **13**: 318-332.

Author D. M. Moore, January 1998.

9. *Viola lactea / V. riviniana*

Distinguishing features of these species can be deduced from the Tables in **7** and **8** above. Whilst the artificial interspecific hybrid, which is morphologically intermediate between the parents, is of low pollen-fertility (see Moore 1959, cited above), the species come into rather close contact throughout much of the range of *V. lactea*. Natural hybrids, with various admixtures of the parental characters, occur widely in Britain (and Portugal). Introgressive hybridisation leads to increased predominance of *V. riviniana* characteristics as its more closed habitats encroach on the open heathlands favoured by *V. lactea*.

Author D. M. Moore, January 1998.

10. *Viola canina / V. persicifolia*

Two subspecies of *Viola canina* L. occur in the British Isles. Subsp. *canina* is widespread in Britain and Ireland on dry and wet heaths, on fens and in sand dunes whilst subsp. *montana* is confined to fens in Huntingdonshire (V.c. 31) and Cambridgeshire (V.c. 29). The most useful characters for separating the three taxa are given in the Table below.

In England, *Viola persicifolia* (*V. stagnina* Kit.) is now found only at Woodwalton Fen (V.c.31), Wicken Fen (V.c. 29) and Otmoor (V.c. 23) although previously it was more widespread, occurring as far north as south-west Yorkshire. In Ireland it is found in fens around the edges of turloughs in at least six vice-counties.

Hybrids between *V. canina* and *V. persicifolia* are frequent at some sites (e.g. Woodwalton Fen). Plants are intermediate between the parents in leaf characters but the flowers resemble more the *V. canina* parent. They usually have creeping underground stems and in this character resemble *V. persicifolia*. The hybrid is vigorous, often taller than either parent and is thought to be quite sterile.

In Ireland, Praeger (1932) noted that while *V. persicifolia* occupies the lowest and wettest position around the edges of the turloughs, the hybrid with *V. canina* is found on slightly drier ground. Woodell (1965) noted a similar distribution of plants at the Oxfordshire site, *Viola canina* occupying the drier parts of fields, *V. persicifolia* and hybrids occupying the wetter areas.

Gregory (1912) noted that "intermediates (which have the appearance of hybrids) abound at Woodwalton". She described *V. canina* × *montana* and *V. montana* × *stagnina* and went on to say that "a goodly number of these fen plants show traces of being intermediates (or hybrids) between *V. canina, V. stagnina* and *V. montana*".

	V. canina L. subsp. *canina*	*V. canina* L. subsp. *montana* (L.) Hartm.	*V. persicifolia* Schreb.
Habit	Stems decumbent to erect	Stems erect	Rhizomes/roots creeping underground and sending up stems at intervals
Leaves	Ovate to ovate-triangular, less than 2 × as long as wide	Ovate-lanceolate to triangular, *c.* 2 × as long as wide	Triangular-lanceolate, less than twice as long as wide
Leaf colour	Bright green	Dark green	Light green
Leaf texture	Thick	Thick	Thin (translucent)
Stipules	Rarely long, on middle leaves less than 1/3 as long as petiole	Middle leaf stipules ½ as long as petiole	Stipules usually ½ as long as petiole, but variable
Corolla	7-18 mm, deep or bright blue; petals obovate	15-22 mm, pale blue; petals oblong, large	10-15 mm, appearing almost circular in front view; white or pale blue; petals obovate-orbicular
Corolla spur	Usually yellowish, *c.* twice as long as calyx appendages	Usually greenish, curved upwards	Greenish, obtuse; not or scarcely longer than calyx appendages

Hybrids between *V. canina* and *V. persicifolia* are frequent at some sites (e.g. Woodwalton Fen). Plants are intermediate between the parents in leaf characters but the flowers resemble more the *V. canina* parent. They usually have creeping underground stems and in this character resemble *V. persicifolia*. The hybrid is vigorous, often taller than either parent and is thought to be quite sterile.

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References Gregory, E. S. (1912). *British Violets*. Cambridge.
Praeger, R. Ll. (1932). *Proc. Roy. Irish Acad.* **41B**: 37-45.
Woodell, S. R. J. (1965). *Proc. BSBI* **6**: 32-36.

Author T. C. E. Wells, January 1998.

11. *Viola palustris* subspecies

Two subspecies can be recognised within *V. palustris* L. though they are connected by intermediates. Plants clearly referable to either subspecies should be recorded as such, and intermediate plants as 'intermediate'. Subsp. *palustris* is widespread. Subsp. *juressi* occurs mainly in the south and west of England and Wales, and in Ireland (see *Critical Supplement*).

	Subsp. *palustris*	Subsp. *juressi* (Link ex Wein) P. Fourn.
Leaves	All obtuse	Summer leaves subacute, or shortly and bluntly acuminate
Petioles	Glabrous	Usually with spreading hairs
Bracts	Below middle of peduncle	At about the middle of peduncle
Spur	Slightly longer than sepal appendages	Longer than sepal appendages