

1. *C. indica* L., *Sp. Pl.* 1 (1753). Plant up to 150 cm, glabrous. Leaves up to 50 × 25 cm, elliptical, acuminate; petiole very short or absent. Inflorescence lax, each branch with 2 shortly pedicellate flowers. Bracts 1.5 × 1 cm, pruinose. Sepals c. 1 cm, pruinose. Petals 3–4 cm, subequal, lanceolate, acuminate, erect, pale pink. Stamines 4, the outer three 4–6 × 1–1.5 cm, obovate-oblongate, pinkish-red, suberect and all standing on

adaxial side of flower, the fourth staminode and the semi-fertile stamen about as long but narrower, both twisted and somewhat deflexed abaxially, orange-yellow spotted with crimson. Capsule 3 × 2 cm. *Cultivated for ornament in the warmest parts of Europe, and locally naturalized.* [Az Si.] (*Tropical America and West Indies.*)

MICROSPERMAE

CCIII. ORCHIDACEAE¹

Perennial herbs with rhizomes, vertical stock or tuberous roots, terrestrial, sometimes saprophytic, usually with mycorrhiza. Stems sometimes swollen at base to form pseudobulbs. Leaves entire, spirally arranged or distichous, rarely subopposite, reduced to scales or sheaths in saprophytes. Inflorescence a spike or raceme. Flowers zygomorphic, epigynous, usually hermaphrodite. Perianth-segments 6, in 2 whorls; median inner segment (*labellum*) usually larger and of different shape from the others, usually directed downwards owing to the ovary or the pedicel twisting through 180°, often with basal spur. Anthers and stigma borne on a *column* formed from fused filaments and style; stamens 1, rarely 2, with sessile or subsessile, 2-locular anthers behind or at the summit of the column; pollen-grains single or in tetrads, bound by elastic threads in packets (*pollinia*) which may be narrowed into a sterile, stalk-like *caudicle*. Ovary inferior, 1-locular, with parietal placentation, rarely 3-locular; stigmas 3, all fertile, or with the median sterile and often consisting of a beak-like process (*rostellum*) between the anthers and fertile stigmas; rostellum often forming 1 or 2 viscid bodies (*viscidia*) to which the pollinia are attached; viscidia sometimes enclosed in 1(2), simple or 2-lobed, membranous, pocket-like outgrowths (*bursicles*) of the rostellum. Fruit a capsule, dehiscent by 3 or 6 longitudinal slits; seeds numerous, minute, with undifferentiated embryo and no endosperm.

Literature: E. G. Camus, *Iconographie des Orchidées d'Europe et du Bassin méditerranéen*. Paris. 1921; *Texte*. Paris. 1929. G. Keller, R. Schlechter & R. von Soó, *Monographie und Iconographie der Orchideen Europas und des Mittelmeergebietes 1–5*. Berlin. 1925–1944. H. Sundermann, *Europäische und mediterrane Orchideen*. Hildesheim. 1975.

- 1 Plant without green leaves
- 2 Spur long, slender
- 3 Labellum entire, directed downwards
- 3 Labellum 3-lobed, directed upwards
- 2 Spur very short or absent
- 4 Stem with numerous scales; labellum c. twice as long as other perianth-segments
- 4 Stem with 2–4 scales; labellum about as long as other perianth-segments
- 1 Plant with green leaves or green, bract-like scales on a green stem
- 5 Flowers without a spur
- 6 Labellum large, inflated, slipper-shaped
- 7 Plant with solitary pseudobulb and one foliage-leaf; anther 1
- 7 Plant with creeping rhizomes and 2–4 foliage-leaves; anthers 2
- 6 Labellum neither inflated nor slipper-shaped
- 8 Labellum with distinctively coloured and shaped central area (*speculum*)
4. *Limodorum*
5. *Epipogium*
6. *Neottia*
31. *Corallorhiza*
32. *Calypto*
1. *Cypripedium*
30. *Ophrys*

- 8 Labellum without speculum
- 9 Labellum directed upwards
- 10 Labellum shorter than outer perianth-segments; inner perianth-segments c. ½ as long as the outer
- 10 Labellum about as long as outer perianth-segments; inner perianth-segments as long as or slightly shorter than the outer
- 11 Outer perianth-segments not more than 3 mm; labellum densely tuberculate beneath towards apex; plant with 2 pseudobulbs borne one above the other
- 11 Outer perianth-segments at least 5 mm; labellum not tuberculate towards apex; plant with 2 pseudobulbs joined by short horizontal stolon
- 9 Labellum directed downwards
- 12 Labellum divided by a constriction into a concave basal part (*hypochile*) and a flat, downward- or forward-pointing distal part (*epichile*)
- 13 Plant with tubers; epichile pendent
- 13 Plant with rhizomes or stolons; epichile not pendent
- 14 Outer perianth-segments not more than 4 mm
- 14 Outer perianth-segments at least 7 mm
- 15 Flowers patent or pendent, pedicellate, in a ± second spike; column not longer than wide
- 15 Flowers suberect, sessile or subsessile, not in a second spike; column longer than wide
- 12 Labellum not clearly divided by a constriction into hypochile and epichile
- 16 Flowers white, arranged in 1–3 spiral rows or in a second spike
- 16 Flowers yellowish, greenish or purplish, neither arranged in spiral rows nor in a second spike
- 17 Leaves about equalling stem, linear; labellum entire or shallowly lobed
- 17 Leaves distinctly shorter than stem, oblong to linear-lanceolate; labellum conspicuously lobed
- 18 Plant with rhizomes; labellum 2-lobed
- 18 Plant with 1 or 2 tubers; labellum 3-lobed, the median lobe sometimes 2-fid
- 19 Plant with 1 tuber at anthesis; median lobe of labellum entire
- 19 Plant with 2 tubers at anthesis; median lobe of labellum deeply 2-fid
- 5 Flowers with a spur
- 20 Labellum with median lobe much exceeding the lateral and spirally twisted
- 21 Bracts equalling or shorter than flowers; outer perianth-segments connivent with inner lateral to form a galea
- 21 Bracts exceeding flowers; outer perianth-segments erectopatent, not connivent to form a galea
35. *Hammarbya*
34. *Microstylis*
33. *Liparis*
29. *Serapias*
9. *Goodyera*
2. *Epipactis*
3. *Cephalanthera*
8. *Spiranthes*
14. *Chamorchis*
7. *Listera*
11. *Herminium*
25. *Aceras*
26. *Himantoglossum*
27. *Barlia*

¹ Edit. D. M. Moore.

- 20 Labellum entire or with median lobe not much exceeding the lateral and not spirally twisted
- 22 Labellum divided by a constriction into a concave basal part (*hypochile*) and a flat distal part (*epichile*)
 - 3. **Cephalanthera**
- 22 Labellum not divided into hypochile and epichile
- 23 Labellum entire or crenulate
- 24 Spur not more than 2 mm 17. **Nigritella**
- 24 Spur more than 2 mm
- 25 Flowers greenish-white 13. **Platanthera**
- 25 Flowers white or pink to purple or brownish, not greenish-white
- 26 Spur 25–30 mm 13. **Platanthera**
- 26 Spur less than 25 mm
- 27 Bracts membranous 24. **Orchis**
- 27 Lower bracts herbaceous 19. **Dactylorhiza**
- 23 Labellum 3- or 5-lobed or 3-dentate at apex
- 28 Perianth-segments free, not forming a galea
- 29 Flowers yellowish-green; spur saccate 10. **Gennaria**
- 29 Flowers pinkish-lilac; spur cylindrical-conical 23. **Traunsteinera**
- 28 At least some perianth-segments connivent to form a galea
- 30 Spur more than 10 mm
- 31 Spur c. 1 mm wide
- 32 Labellum shallowly 3-lobed, without ridges at base; tubers palmately lobed 15. **Gymnadenia**
- 32 Labellum deeply 3-lobed, with 2 longitudinal ridges at base; tubers entire 28. **Anacamptis**
- 31 Spur more than 1 mm wide
- 33 All bracts membranous 24. **Orchis**
- 33 Lower bracts herbaceous 19. **Dactylorhiza**
- 30 Spur not more than 10 mm
- 34 Labellum 3-dentate at apex, the lateral teeth parallel and much longer than the median 18. **Coeloglossum**
- 34 Labellum 3- or 5-lobed, the lateral lobes not parallel
- 35 Lobes of labellum prolonged into long, filiform, ± spiral processes 21. **Comperia**
- 35 Lobes of labellum without long, filiform processes
- 36 All bracts membranous
- 37 Lateral lobes of labellum linear 22. **Neotinea**
- 37 Lateral lobes of labellum oblong, ovate or rhombic 24. **Orchis**
- 36 At least the lower bracts herbaceous
- 38 Outer perianth-segments connate almost to apex 20. **Steveniella**
- 38 Outer perianth-segments free, though sometimes connivent to form a galea
- 39 Perianth-segments at least 5 mm
- 40 Spike secund; lateral lobes of labellum linear-setaceous 12. **Neottianthe**
- 40 Spike not secund; lateral lobes of labellum oblong 19. **Dactylorhiza**
- 39 Perianth-segments not more than 3 mm
- 41 Spur 4–5 mm, as long as or slightly shorter than ovary; flower pinkish-lilac, purple or white 15. **Gymnadenia**
- 41 Spur not more than 2.5 mm, $\frac{1}{3}$ – $\frac{1}{2}$ as long as ovary; flower yellowish- or greenish-white 16. **Pseudorchis**

Subfam. **Cypripedioideae**

Fertile stamens 2; pollen not united in pollinia. Fertile stigmas 3.

1. **Cypripedium** L.¹

Plants with creeping rhizomes. Stems with 2–4 leaves. Flowers solitary, rarely 2(–3), large. Perianth-segments patent; outer median ovate to elliptical, erect, the outer lateral connate in basal half; inner oblong to lanceolate, often twisted. Labellum

¹ By D. M. Moore.

large, concave, inflated, slipper-shaped; spur absent. Column stout, surmounted by large petaloid sterile anther partly closing mouth of labellum. Stigmas peltate; rostellum absent. Viscidia absent; bursicles absent.

- 1 Stem with 2 leaves; median outer perianth-segment 1.8–2.8 cm 3. **guttatum**
- 1 Stem with 3–4 leaves; median outer perianth-segment 3.5–6 cm
- 2 Labellum yellow, distinctly shorter than other perianth-segments 1. **calceolus**
- 2 Labellum pinkish to purplish, not or slightly shorter than other perianth-segments 2. **macranthos**

1. **C. calceolus** L., *Sp. Pl.* 951 (1753). Rhizome long. Stem 15–50 cm, glandular-pubescent, with brown basal sheaths. Leaves 3–4, (7–)10–17 × 3.5–7(–10) cm, elliptical to ovate-oblong, acute to acuminate, sparsely pubescent. Flowers 1(–3), subtended by a large leaf-like bract. Perianth-segments 6–9 cm, reddish-brown, rarely yellow-green (f. *viridiflorum* Blytt); outer median 3.5–5 cm, ovate- to elliptic-lanceolate, the lateral forming a slightly narrower, downward-pointing bifid segment; inner 4–6 cm, asymmetrical, linear-lanceolate, acuminate. Labellum c. 3 cm, shorter than other perianth-segments, obovoid, rounded at apex, pale yellow, with reddish spots inside. $2n=20$. *Woods and meadows; calcicole. N., C., E. & S.E. Europe, westwards to Norway and the S.W. Alps; isolated stations in N. England and the E. Pyrenees. Much rarer than formerly over much of its range. Au Br Bu Cz Da Fe Ga Ge Gr He Hs Hu It Ju No Po Rm Rs (N, B, C, W, K, E) Su.*

2. **C. macranthos** Swartz, *Kungl. Svenska Vet.-Akad. Handl.* nov. ser., 21: 251 (1800). Like 1 but rhizome short; perianth-segments lilac, the outer median 4–6 cm, the inner ovate-lanceolate to lanceolate; labellum (4–)4.5–7 cm, slightly shorter to longer than other perianth-segments, pinkish to purplish. *Woods and clearings. U.S.S.R., from E. White Russia to C. & S. Ural. Rs (C).*

3. **C. guttatum** Swartz, *loc. cit.* (1800). Rhizome long. Stem 15–50 cm, glandular-pubescent, with brown basal sheaths, with 2 leaves at about the middle. Leaves 6–12 × 3.5–6 cm, elliptical to elliptic-ovate, acute to acuminate, sparsely pubescent. Flower solitary, subtended by large leaf-like bract. Median outer perianth-segment 1.8–2.8 cm, white, often with purple blotches or spots, the lateral outer shorter, green; inner c. 2 cm, panduriform. Labellum 2–2.3 cm, obovoid, rounded at apex, white, with large, more or less confluent lilac spots. *Woods and clearings. Russia, from c. 51° to c. 60° N. Rs (N, C, E).*

Subfam. **Orchidoideae**

Fertile stamen 1; pollen united in pollinia. Fertile stigmas 2, often confluent.

2. **Epipactis** Zinn¹
(*Helleborine* Miller)

Plants with horizontal or vertical rhizome and numerous fleshy roots. Stem leafy. Flowers pedicellate, patent or pendent, in more or less secund spikes. Perianth-segments free, patent or connivent, the inner similar to the outer but smaller. Labellum with concave or cupuliform basal part (*hypochile*) separated by narrow joint or fold from the flat, forward-directed distal part (*epichile*), with basal tubercles or ridges; spur absent. Column short. Rostellum usually large and globose, sometimes absent. Viscidia absent; bursicles absent.

A difficult genus, particularly with regard to those species (3–5, 7) which are largely or entirely autogamous.

Literature: J. Holub, *Preslia* 42: 330–349 (1970). A. & C. Nieschalk, *Abh. Ver. Naturk. Kassel* 63: 1–40 (1970). L. Reichling, *Arch. Inst. G.-D. Luxemb. (Sci. Nat.)* nov. ser., 22: 123–145 (1955). K. Senghas & H. Sundermann (edit.), *Jahresb. Naturw. Ver. Wuppertal* 23: 1–132 (1970). D. P. Young, *Watsonia* 2: 253–276 (1952); 5: 127–139 (1962); *Bot. Not.* 1953: 253–270 (1953); *Bull. Jard. Bot. Bruxelles* 28: 123–127 (1958).

- 1 Rhizome long, creeping; hypochile with 2 erect lateral lobes, connected to epichile by a narrow joint **1. palustris**
- 1 Rhizome short, horizontal or vertical; hypochile without lateral lobes, connected to epichile by 1 or more folds
- 2 Rhachis, pedicels and ovary densely pubescent
- 3 Leaves 4–10 cm, distichous; flowers deep purple **8. atrorubens**
- 3 Leaves 1–3 cm, spirally arranged; flowers greenish, with reddish tinge **9. microphylla**
- 2 Rhachis, pedicels and ovary ± glabrous to scabridulous
- 4 Leaves distichous; rostellum absent, at least at maturity; flowers frequently cleistogamous or partially so
- 5 Flowers patent or obliquely pendent; hypochile purplish or pinkish inside **(3–5). leptochila** group
- 5 Flowers pendent; hypochile greenish-white inside **7. phyllanthes**
- 4 Leaves spirally arranged; rostellum prominent and persistent; flowers not cleistogamous
- 6 Leaves greyish or purplish; epichile at least as long as wide **6. purpurata**
- 6 Leaves green; epichile not longer than wide **2. helleborine**

1. E. palustris (L.) Crantz, *Stirp. Austr.* ed. 2, 2: 462 (1769) (*Helleborine palustris* (L.) Schrank). Rhizome long, creeping. Stem 15–50(–70) cm, pubescent above, purplish below, with sheathing scales. Leaves spirally arranged, 4–8, 5–15 × 2–4 cm, oblong to oblong-lanceolate, subacute to acuminate, the upper smaller. Raceme 6–15(–20) cm, 7- to 14-flowered; bracts lanceolate, the lower equalling flowers, the others shorter. Flowers patent when mature; outer perianth-segments 8–12 mm, lanceolate to ovate-lanceolate, greenish, with faint violet stripes, the inner whitish, pinkish below. Labellum 10–12 mm; hypochile slightly concave, with an erect triangular lobe at each side, pinkish-white, with orange-yellow papillae and purplish lines inside; epichile connected by narrow joint, ovate, obtuse, as long as wide, white, with red veins, with undulate margin and lobed basal protuberance. Rostellum persistent. Ovary pubescent. $2n=40, 44, 46, 48$. *Marshes and other damp places. Most of Europe except the extreme north and parts of the Mediterranean region.* Al Au Be ?Bl Br Bu Cz Da Fe Ga Ge Gr Hb He Ho Hs Hu It Ju Lu No Po Rm Rs (N, B, C, W, K, E) Su Tu.

2. E. helleborine (L.) Crantz, *op. cit.* 467 (1769) (*Helleborine latifolia* (L.) Moench). Rhizome short, oblique or horizontal. Stem 35–80(–100) cm, pubescent above, often purplish below, with sheathing scales. Leaves spirally arranged, 4–10, 5–17 × 2.5–10 cm, ovate-elliptical to suborbicular, acute to shortly acuminate. Raceme (7–)10–40 cm, 15- to 50-flowered; bracts lanceolate to ovate-lanceolate, the lower equalling or exceeding flowers. Flowers obliquely pendent; outer perianth-segments 10–13 mm, elliptic-ovate, greenish, the inner pinkish-violet towards the base. Labellum 9–11 mm; hypochile cupuliform, greenish outside, dark reddish-brown inside; epichile cordate to broadly ovate, with recurved acute apex, shorter than to as long as wide, greenish-white, pink or purplish, with 2(–3) smooth or slightly rugose basal protuberances. Rostellum persistent. Ovary glabrous or sparsely hairy. $2n=36, 38, 40, 44$. *Woods and scrub; sometimes among maritime sand-dunes. Almost throughout Europe.* All except Az ?Bl Fa Is Sb.

(3–5). E. leptochila group. Rhizome short, vertical or oblique. Stem 20–70 cm, pubescent, especially above, usually purplish below, with sheathing scales. Leaves distichous, 4–10, ovate to lanceolate, acute, with more or less undulate margin. Bracts linear-lanceolate, the lower exceeding the flowers. Hypochile cupuliform, pale greenish, reddish-mottled inside.

A group of largely autogamous taxa which are probably derived from the allogamous facies of 3 and which are possibly conspecific. The distributions are not well-known and dubious records have been omitted below.

- 1 Epichile acuminate, with flat apex; outer perianth-segments acuminate **3. leptochila**
- 1 Epichile subobtusate, with recurved apex; outer perianth-segments obtuse **5. dunensis**
- 2 Epichile as long as wide; anther stipitate **4. muelleri**
- 2 Epichile wider than long; anther sessile

3. E. leptochila (Godfrey) Godfrey, *Jour. Bot. (London)* 59: 146 (1921). Leaves 5–10 × (1.5–)2–5 cm, dull yellow- or dark green. Raceme 7.5–25 cm, up to 25-flowered. Flowers patent or obliquely pendent; perianth-segments pale green, the outer 7–15 mm, lanceolate, acuminate. Labellum 4–9 mm; hypochile usually with nectar; epichile cordate, acuminate, with flat apex, as long as or longer than wide, somewhat concave and yellow-greenish with white margin, rarely flat and green (var. *cleistogama* (C. Thomas) D. P. Young), with 2 smooth or slightly rugose, white or pinkish basal protuberances. Rostellum absent at anthesis; anther prominently stipitate. Ovary tuberculate, with sparse, blackish hairs. $2n=36$. *Woods and scrub, usually in dense shade; calcicole.* ● *N.W. & C. Europe; one station in N. Greece.* Au Be Br Cz Da Ga Ge Gr He Ho Hu Ju.

4. E. muelleri Godfrey, *op. cit.* 106 (1921). Leaves 4–8(–10) × (1.5–)2–4 cm, yellowish-green. Raceme 5–12(–17) cm, (10–)15- to 25(–40)-flowered. Flowers patent or slightly erecto-patent; perianth-segments yellowish-green, the outer 7–11 mm, ovate-lanceolate. Labellum 7–9(–10) mm; hypochile without nectar; epichile cordate, subobtusate, usually with recurved apex, wider than long, pale pink or greenish, with 2(–3) smooth basal protuberances. Rostellum usually absent; anther sessile, attached almost directly above the stigma. *Open woods and clearings; calcicole.* ● *W. & C. Europe.* Au Be Cz Ga Ge He Ho Hu.

5. E. dunensis (T. & T. A. Stephenson) Godfrey, *op. cit.* 64: 68 (1926). Like 4 but epichile as long as wide; anther stipitate. *Maritime sand-dunes.* ● *N. England and N. Wales.* Br.

Records for continental Europe are probably referable to 4.

6. E. purpurata Sm., *Engl. Fl.* 4: 41 (1828). Rhizome short, vertical. Stem 20–70 cm, pubescent above, purplish below, with sheathing scales. Leaves spirally arranged, 5–10, 6–10 × 2–5 cm, ovate-lanceolate to lanceolate, acute to shortly acuminate, greyish or purplish. Raceme 15–25 cm, many-flowered; bracts linear, acuminate, the lower usually exceeding flowers. Flowers obliquely pendent when mature; outer perianth-segments 10–12 mm, lanceolate, subobtusate, green outside, whitish inside, the inner whitish, sometimes with pinkish tinge. Labellum 8–10 mm; hypochile cupuliform, greenish outside, usually mottled with violet inside; epichile triangular-cordate, acute, with recurved apex, as long as or longer than wide, whitish, with 2–3 smooth, confluent basal protuberances. Rostellum persistent. Ovary scabridulous. $2n=40$. *Woods; somewhat calcicole.* ● *N.W. & C. Europe, extending south-eastwards to Bulgaria.* Au Be Br Bu Cz Da Ga Ge ?Gr He Hu Ju Po Rm Rs (W).

7. *E. phyllanthes* G.E. Sm., *Gard. Chron.* 1852: 660 (1852). Rhizome short, horizontal or oblique. Stem (8-)20-45(-65) cm, glabrous or sparsely pubescent, green. Leaves distichous, 3-6, 3.5-7 × 3-5 cm, orbicular to lanceolate, acute to acuminate, often concave, the margin sometimes undulate. Raceme up to 15 cm, 15- to 35-flowered; bracts linear-lanceolate, acuminate, the lower usually exceeding flowers. Flowers pendent; outer perianth-segments 8-10 mm, lanceolate to ovate-lanceolate, acuminate, pale yellowish-green, the inner pale yellowish-green, sometimes with violet tinge. Labellum 6-8 mm; hypochile cupuliform to shallowly concave, whitish or greenish; epichile sometimes not clearly separated from hypochile, ovate-lanceolate to cordate, acute or acuminate, usually longer than wide, greenish-white to pinkish, often rugose or with two protuberances at base. Rostellum absent. Ovary more or less glabrous. $2n=36$. *Open woodland, scrub and among coastal dunes; calcicole.* ● *N.W. & W.C. Europe, extending to S. Sweden.* ?Au Br Da Ga Hb Su.

An autogamous species showing much variation, particularly in labellum shape, but intermediates are frequent and it is not possible to recognize categories above the varietal level.

Plants from Denmark and S. Sweden, which have been called *E. confusa* D. P. Young, *Bot. Not.* 1953: 263 (1953) (*E. persica* auct., non (Soó) Hausskn. ex Nannf.), seem to differ from 7 only in their smaller size and in chromosome number ($2n=40$) and do not merit recognition at specific rank.

8. *E. atropubens* (Hoffm.) Besser, *Prim. Fl. Galic.* 2: 220 (1809) (*E. atropurpurea* Rafin., *E. rubiginosa* (Crantz) Gaudin, *Helleborine atropurpurea* (Rafin.) Schinz & Thell.). Rhizome short, more or less horizontal. Stem (15-)20-60(-100) cm, glabrous or sparsely pubescent, violet below, with sheathing scales. Leaves distichous, 5-10, 4-10 × 1.5-4.5 cm, ovate to ovate-lanceolate, acute to acuminate. Raceme 7-25 cm, 8- to 18-flowered, the rhachis densely pubescent; bracts lanceolate, acute, the lowest equalling or sometimes exceeding flowers. Flowers patent; perianth-segments deep purple, the outer 6-7 mm, ovate, acuminate, the inner elliptical. Labellum 5.5-6.5 mm; hypochile cupuliform, green, with red margin, with red spots inside; epichile cordate-reniform, acute, with recurved apex, wider than long, deep reddish-purple, with 2(-3) rugose protuberances at base. Rostellum persistent. Ovary densely pubescent. $2n=40+0-7$ B. *Woods and rocky slopes; calcicole. Much of Europe, but rare in the Mediterranean region.* Al Au Be Br Bu Cz Da Fe Ga Ge Gr Hb He Ho Hs Hu It Ju No Po Rm Rs (N, B, C, W, K, E) Su Tu.

9. *E. microphylla* (Ehrh.) Swartz, *Kungl. Svenska Vet.-Akad. Handl. nov. ser.*, 21: 232 (1800) (*Helleborine microphylla* (Ehrh.) Schinz & Thell.). Rhizome short, vertical or oblique. Stem 15-40 cm, pubescent above, with basal sheathing scales. Leaves spirally arranged, 3-6, 1-2.5(-3) × c. 1 cm, shorter than internodes, lanceolate to linear-lanceolate, acuminate. Raceme 3-12 cm, 4- to 15-flowered, the rhachis densely pubescent; bracts lanceolate, acuminate, the lower as long as flowers. Flowers patent, outer perianth-segments c. 7 mm, elliptic-ovate, sub-obtuse, greenish with reddish tinge outside, whitish-green inside, the inner ovate, whitish-green. Labellum 6.5-7 mm; hypochile cupuliform, greenish-brown; epichile orbicular-ovate, subobtuse, whitish or pale pink, with crenate, slightly undulate margin and 2 rugose protuberances at base. Rostellum persistent. Ovary densely pubescent. $2n=40$. *Woods; calcicole. S. & C. Europe,*

extending to N.C. France. Al Au Be Bl Bu Co Cr Cz Ga Ge Gr He Hs Hu It Ju Po Rm Rs (K) Sa Si.

3. *Cephalanthera* L. C. M. Richard¹

Plants with short, creeping rhizome. Stem leafy. Flowers few, large, suberect, sessile or subsessile, in a lax spike, scentless. Perianth-segments similar, usually connivent to give campanulate flowers. Labellum constricted between the suberect concave basal part (*hypochile*) and the forward-directed distal part (*epichile*) which has a recurved apex and 3-9 interrupted longitudinal ridges above; spur absent or very short. Column long, erect. Rostellum absent. Viscidia absent; bursicles absent.

- 1 Spur present, short
- 2 Outer perianth-segments not more than 20 mm; spur 1-2 mm; epichile with 3-6 ridges 3. *cucullata*
- 2 Outer perianth-segments at least 25 mm; spur 3-4 mm; epichile with 7-9 ridges 4. *epipactoides*
- 1 Spur absent
- 3 Flowers pink or purplish; upper part of stem and ovaries pubescent; epichile acute 5. *rubra*
- 3 Flowers white; upper part of stem and ovaries glabrous; epichile obtuse
- 4 Lower leaves ovate to ovate-lanceolate; bracts exceeding the ovary; outer perianth-segments obtuse 1. *damasonium*
- 4 Lower leaves lanceolate; bracts much shorter than ovary; outer perianth-segments acute 2. *longifolia*

1. *C. damasonium* (Miller) Druce, *Ann. Scott. Nat. Hist.* 1906: 225 (1906) (*C. alba* (Crantz) Simonkai, *C. grandiflora* S. F. Gray, *C. pallens* L. C. M. Richard). Stem 15-60 cm, erect, angled, glabrous, with 2-3 brownish basal sheaths. Leaves 4-10 cm, subobtusely to acuminate, the lowest short, ovate-lanceolate, the middle oblong-ovate, the upper lanceolate. Spike up to 12 cm, 3- to 12(-16)-flowered. Flowers white or creamy-white, usually closed and tubular-campanulate, all but lowest much exceeded by bracts. Perianth-segments 15-20 mm, obtuse; outer oblong; inner lateral oblong-lanceolate, shorter than the outer. Labellum shorter than other perianth-segments, white, yellowish within, with an orange-yellow crescentic mark at base of hypochile; epichile with 3-5 orange-yellow ridges, obtuse; spur absent. Ovary glabrous. $2n=32$. *Woods and other shady places; somewhat calcicole. S., C. & W. Europe, northwards to England and S.E. Sweden, and extending eastwards to S.W. part of U.S.S.R.* Al Au Be Bl Br Bu Co Cz Da Ga Ge Gr He Ho Hs Hu It Ju Po Rm Rs (B, C, W, K) Sa Si Su Tu.

2. *C. longifolia* (L.) Fritsch, *Österr. Bot. Zeitschr.* 38: 81 (1888). Like 1 but stem slightly ridged above and with 2-4 whitish, sometimes greenish-tipped, basal sheaths; leaves 7-20 cm, lanceolate, the uppermost linear; flowers exceeding all but lowest bracts, usually more open; perianth-segments 10-16 mm, the outer lanceolate, acute. $2n=32$. *Woods and other shady places. Most of Europe except the extreme north and most of the north-east. All except Az Cr Fa Is Rs (N, E) Sb; extinct in Ho.*

3. *C. cucullata* Boiss. & Heldr. in Boiss., *Diagn. Pl. Or. Nov.* 2(13): 12 (1853). Stem 15-30 cm, erect, glabrous, with c. 4 whitish basal sheaths. Leaves 2.5-6 cm, oblong-lanceolate, acute, cucullate. Spike 4-15 cm, (4-)7- to 24-flowered. Flowers white or pinkish, open, all but the lowest exceeding the bracts. Outer perianth-segments 14-20 mm, oblong-lanceolate, acute; inner lateral 12-16 mm, ovate-oblong, subobtusely or acute. Labellum slightly shorter than other perianth-segments; hypochile with rounded lateral lobes; epichile cordate, subacute, with 3-6 ridges; spur 1-2 mm, conical, obtuse. Ovary glabrous. *Mountain woods and scrub. Kriti. Cr.*

¹ By D. M. Moore.

4. *C. epipactoides* Fischer & C. A. Meyer, *Ann. Sci. Nat.* ser. 4, 1: 30 (1854). Like 3 but stem 30–100 cm; spike 10- to 20-flowered; outer perianth-segments 25–36 mm, the inner 18–25 mm; hypochile with truncate lateral lobes; epichile triangular-lanceolate, with 7–9 ridges; spur 3–4 mm, subacute. *N. Aegean region.* Gr Tu. (*W. Anatolia.*)

Perhaps better treated as a subspecies of 3.

5. *C. rubra* (L.) L. C. M. Richard, *Orchid. Eur. Annot.* 38 (1817). Stem 20–60 cm, erect, striate and glandular-pubescent above, with a few brownish, sometimes green-tipped, basal sheaths. Leaves 5–8, 5–12 cm, acute, the lower oblong-lanceolate to lanceolate, the upper linear-lanceolate. Spike up to 12 cm, (2–)3- to 10(–12)-flowered. Flowers bright pink or purplish, open, exceeding most or all of the bracts. Outer perianth-segments 17–22(–25) mm, lanceolate, subacute, patent, glandular-pubescent outside; inner lateral 15–18(–20) mm, ovate-lanceolate, subacute, connivent. Labellum about as long as outer perianth-segments, white, the epichile acute, with purple margin and 7–9 narrow yellowish ridges; spur absent. Ovary glandular-pubescent. $2n=48$. *Woods; usually calcicole. Most of Europe, northwards to S. England and S. Finland.* Al Au Be Br Bu Co Cr Cz Da Fe Ga Ge Gr He †Ho Hs Hu It Ju Lu No Po Rm Rs (B, C, W, K, E) Sa Si Su Tu.

4. *Limodorum* Boehmer¹

Violet saprophytes with short rhizome. Stem clothed with scale-like sheaths. Green leaves absent. Flowers in an erect, spike-like raceme. Perianth-segments free, patent. Labellum entire. Spur long, slender, curved upwards. Column long. Viscidium solitary; bursicles absent.

1. *L. abortivum* (L.) Swartz, *Nova Acta Reg. Soc. Sci. Upsal.* 6: 80 (1799) (*Ionorchis abortiva* (L.) G. Beck). Rhizome densely covered with thickish roots. Stems 40–80 cm, erect, robust, rigid; scales numerous. Racemes (10–)15–33 cm, lax, 4- to 25-flowered. Perianth-segments *c.* 2 cm, the outer oblong-lanceolate, the inner slightly shorter and narrower, violet. Labellum 1.6–1.7 cm, triangular, with undulate margins, yellow and violet. Spur up to 1.5 cm, cylindrical. $2n=56$. *Woods and shady grassland; calcicole. C. & S. Europe, extending north-westwards to Belgium.* Al Au Be Bl Bu Co Cr Cz Ga Ge Gr He Hs Hu It Ju Lu Rm Rs (K) Sa Si.

Plants found in W.C. Portugal (N. of Lisboa), and also in N. Africa, have been distinguished as subsp. *trabutianum* (Batt.) Rouy, *Fl. Fr.* 13: 208 (1912), which has a very short spur, a sub-linear labellum and $2n=60$. It occurs intermingled with the typical form and probably merits no more than varietal status.

5. *Epipogium* R. Br.¹

Pinkish saprophytes with coralloid rhizomes; roots absent. Stem with few sheathing scales. Green leaves absent. Flowers pendent, in a raceme. Perianth-segments free, directed downwards. Labellum 3-lobed, directed upwards. Spur slender, directed upwards. Column short. Rostellum small. Viscidia 2, distinct; bursicles absent.

1. *E. aphyllum* Swartz, *Summa Veg. Scand.* 32 (1814). Rhizome whitish, with many short, lobed branches and 1–2 filiform stolons. Stem 5–20 cm, erect, pinkish, with many short reddish streaks, turgid, with swelling near base, with 2–5 short, brownish,

sheathing scales. Flowers 1–5(–7), pendent on short, slender pedicels. Perianth-segments subequal, curved downwards; outer linear, yellowish or reddish; inner lanceolate, obtuse, yellowish, with short violet lines. Labellum with 2 short, rounded, lateral lobes and a large concave, ovate to triangular, undulate middle lobe, white or pinkish, with violet spots and papillae. Spur *c.* 8 mm, rounded at apex, white tinged with yellow or reddish outside. *Woods. N. & C. Europe, extending southwards in the mountains to the Pyrenees, C. Appennini, N.W. Greece and Krym.* Au Be Br Bu Cz Da Fe Ga Ge Gr He Hu It Ju No Po Rm Rs (N, B, C, W, K) Su.

6. *Neottia* Ludwig¹

Yellowish-brown saprophytes, with short, creeping rhizome covered with thick, fleshy roots to form a nest-like mass. Green leaves absent. Stem covered with brownish scales. Flowers numerous, in a spike-like raceme, fragrant. Perianth-segments subequal or the inner somewhat shorter, somewhat convergent into an open galea. Labellum saccate at base, 2-lobed distally; spur absent. Column long, slender. Rostellum wide, flat. Viscidia absent; bursicles absent.

1. *N. nidus-avis* (L.) L. C. M. Richard, *Orchid. Eur. Annot.* 37 (1817). Stem 20–45 cm, erect; scales 3–5 cm, scarios, sheathing. Racemes 5–21 cm, rather lax below; bracts shorter than ovary, lanceolate-acuminate, scarios; pedicels 3–6 mm, twisted. Perianth-segments 4–6 mm, ovate- to elliptic-oblong, obtuse, yellowish-brown, rarely whitish or yellowish. Labellum 8–12 mm, obliquely pendent, greyish-brown, the undivided part oblong, with 2 small lateral teeth near base, the lobes cordate-oblong, obtuse, divergent. $2n=36$. *Shady woodland, especially on humus-rich soils. Most of Europe, but rare in the extreme north.* All except Az Cr Fa Is Sb.

7. *Listera* R. Br.¹

Plants with short rhizome and slender roots. Leaves usually 2, subopposite, sessile, borne just below middle of stem. Inflorescence a rather lax, spike-like raceme. Perianth-segments subequal, patent or somewhat convergent. Labellum 2–3 times as long as other segments, deeply 2-fid distally, rarely with 2 small basal lobes, secreting nectar in central furrow; spur absent. Column short, erect. Rostellum wide, flat. Viscidia absent; bursicles absent.

Leaves 5–20 cm; raceme 7–25 cm, many-flowered 1. *ovata*
Leaves 1–2.5 cm; raceme 1.5–6 cm, 4- to 12-flowered 2. *cordata*

1. *L. ovata* (L.) R. Br. in Aiton, *Hort. Kew.* ed. 2, 5: 201 (1813). Rhizome rather thick. Stem 20–60 cm, erect, glabrous below, pubescent above, with 2–3 brownish, membranous basal sheaths and 1–3 minute bract-like leaves distally. Leaves 2, 5–20 cm, broadly ovate-elliptical, obtuse or mucronate. Raceme 7–25 cm; flowers numerous, shortly pedicellate; bracts minute, ovate-lanceolate. Perianth-segments 4–5 mm; outer ovate, obtuse, green; inner narrowly oblong, yellowish-green. Labellum 7–15 mm, obcuneate, divided almost to middle into 2 narrowly oblong lobes, yellowish-green; basal lobes tooth-like, or absent. $2n=34+0-2B, 35, 36, 37, 38$. *Woods, scrub, grassland and marshy ground. Almost throughout Europe, but less common in the south.* All except Az Bl Fa Lu Sb Tu.

2. *L. cordata* (L.) R. Br., *loc. cit.* (1813). Rhizome slender, creeping. Stem (4.5–)6–20 cm, erect, glabrous below, sparsely pubescent above, with 1–2 brownish, membranous basal sheaths.

¹ By D. M. Moore.

Leaves 2(–4), 1–2.5 cm, ovate-deltate, mucronate. Raceme 1.5–6 cm; flowers 4–12, shortly pedicellate; bracts minute, triangular. Perianth-segments 2–2.5 mm, oblong-elliptical, obtuse; outer green, the median somewhat cucullate, the lateral and inner narrower, directed forward, green outside, reddish inside. Labellum 3.5–4.5 mm, obcuneate, divided to about the middle into 2 diverging linear lobes, purplish; basal lobes linear-lanceolate. $2n=38, 40$. *Damp woods (mainly coniferous) and moorland. N. & C. Europe, extending southwards to the Pyrenees, N. Appennini and S. Bulgaria.* Au Br Bu Cz Da Fa Fe Ga Ge Hb He Ho Hs Is It Ju No Po Rm Rs (N, B, C, W) Su.

8. *Spiranthes* L. C. M. Richard¹

Roots fleshy, more or less tuberous. Spike-axis twisted, so that flowers are arranged in one or more spiral rows. Perianth-segments subequal, free or variously connate or connivent. Flowers fragrant, geniculate or arcuate, the ovary suberect, the perianth and column horizontal. Labellum about equalling the other perianth-segments, oblong, entire. Spur absent. Rostellum deeply 2-fid, with narrow, acute lobes, between which lies the single viscidium; bursicles absent. Anther largely hidden behind rostellum.

- 1 Leaves ovate-elliptical, patent, in a basal rosette; cauline leaves reduced to scales **1. spiralis**
 1 Leaves linear-lanceolate to narrowly oblong, \pm erect, some of them cauline
 2 Flowers in one spiral row; bracts 6–7 mm; leaves obtuse **2. aestivalis**
 2 Flowers in 3 spiral rows; bracts 10–17 mm; leaves acute **3. romanzoffiana**

1. *S. spiralis* (L.) Chevall., *Fl. Gén. Env. Paris* 2: 330 (1827) (*S. autumnalis* L. C. M. Richard). Roots tuber-like, oblong-ellipsoid. Stem 6–20(–35) cm, glandular-pubescent, bearing 3–7 closely appressed, lanceolate scale-leaves. Foliage-leaves 2–3.5 cm, ovate-elliptical, acute, glabrous, glaucous, in a basal rosette, usually withered at anthesis, but next year's rosette appears during anthesis beside the flowering stem. Spike 3–10 cm, slender, with 6–20 flowers in one spiral row. Bracts 6–7 mm, acuminate. Perianth-segments 6–7 mm, oblong, white, the upper 3 connivent and forming with the labellum a tube enclosing the column, the outer lateral segments patent. Labellum 6–7 mm, with upwardly curved margins and undulate-crenulate apex, yellowish-green. Flowering in autumn or late summer. $2n=30$. *Grassland. S., W. & C. Europe, extending northwards to E. Denmark.* All except Az Fa Fe Is No Rs (N, B, C, K, E) Sb Su.

Even among orchids this species is noteworthy for the irregularity of its flowering; in certain regions, especially in the northern part of its range, populations often do not flower for many seasons.

2. *S. aestivalis* (Poiret) L. C. M. Richard, *Orchid. Eur. Annot.* 36 (1817). Roots cylindrical-conical or fusiform. Stem 12–30 (–40) cm, glandular-puberulent above. Leaves 5–12 cm \times 4–9 mm, linear-lanceolate, obtuse, suberect, mostly basal but 1–2 on lower part of stem, passing into lanceolate scales above, present at anthesis. Spike 3–10 cm, slender, with 6–20 flowers in one spiral row. Bracts 6–9 mm, acuminate. Perianth-segments free, suberect, white, the outer 6–7 mm, lanceolate, the inner 5–6 mm, oblong. Labellum 6–7 mm, with upwardly-curved margins, deflexed at apex, white. Flowering in mid-summer. *Wet meadows and marshes. S., W. & C. Europe, but rare in the Mediterranean region.* Au Be †Br Co Cz Ga Ge ?Gr He Ho Hs Hu It Ju †Lu Sa.

¹ By D. A. Webb.

² By D. M. Moore.

A diminishing species, especially in the northern part of its range.

S. sinensis (Pers.) Ames, *Orchidaceae* 2: 53 (1908) (*S. amoena* (Bieb.) Sprengel, *S. australis* auct. ross., non (R. Br.) Lindley), which is found throughout temperate Asia, may perhaps occur just inside the limits of Europe in C. Ural. It resembles 2 in most characters, but the perianth-segments are bright pink and the labellum has 2 callosities near its base.

3. *S. romanzoffiana* Cham., *Linnaea* 3: 32 (1828). Roots cylindrical, relatively slender. Stem 12–25 cm, sparsely glandular-puberulent above. Leaves basal and cauline, linear-lanceolate to narrowly oblong, acute, suberect, the lower 7–12 cm \times 5–13 mm, the upper cauline smaller but not reduced to scales, present during anthesis. Spike 3–6 \times 2 cm, dense, with 12–35 flowers in 3 spiral rows. Bracts 10–17 mm, ovate, acuminate. Perianth c. 12 mm, white tinged with green or cream, all segments, including the labellum, connate in lower half. Labellum somewhat constricted below the sharply deflexed, crenulate apex. Flowering in mid- to late summer. $2n=60$. *Damp, peaty ground and lake-shores. Ireland, W. Scotland, S.W. England.* Br Hb. (*North America.*)

9. *Goodyera* R. Br.¹

Like *Spiranthes* but with stolons and without tubers; leaves conspicuously net-veined; spiral arrangement of flowers less marked or absent; labellum shorter than outer perianth-segments, the basal part (*hypochile*) strongly concave, the distal part (*epichile*) triangular, flat.

1. *G. repens* (L.) R. Br. in Aiton, *Hort. Kew.* ed. 2, 5: 198 (1813). Stolons branched, slender, overground; roots few and short. Plant 10–25 cm, glandular-pubescent, at least in inflorescence. Lower leaves 3–6, 1.5–3 \times 1–2 cm, ovate, narrowed abruptly to a sheathing petiole, with 5 longitudinal and numerous transverse veins; upper leaves reduced to sheaths, sometimes with a small linear lamina, a transitional leaf with well-developed, narrowly oblong lamina often present. Spike 3–7 cm, slender, lax, secund, often with a slight spiral twist. Flowers white, fragrant. Perianth-segments 3–4 mm, ovate to lanceolate, obtuse, the 3 uppermost forming a galea. $2n=30, 40$. *Coniferous or mixed woods. Europe, southwards to the Pyrenees, the Alps and Bulgaria.* Au *Be Br Bu Cz Da Fe Ga Ge He Ho Hs Hu It Ju No Po Rm Rs (N, B, C, W, K) Su.

10. *Gennaria* Parl.²

Tuber oblong. Stem bearing 2 alternate leaves in upper half. Flowers in a dense spike. Perianth-segments free. Labellum 3-lobed. Spur short. Rostellum short. Stigmas shortly stipitate. Viscidia small; bursicles absent.

1. *G. diphylla* (Link) Parl., *Fl. Ital.* 3: 405 (1860) (*Orchis cordata* Willd., *O. diphylla* (Link) Samp.). Stem 15–30 cm. Lower leaf 40–70 \times 25–70 mm, the upper much smaller, both elliptical- to triangular-ovate, cordate at base. Flowers many, yellowish-green, shortly pedicellate, in a spike up to 10 cm. Perianth-segments convergent or slightly divergent, campanulate; outer oblong, obtuse, slightly concave; inner slightly larger, rhombic, obtuse. Labellum ovate-oblong, green; lobes linear-lanceolate, obtuse, the middle somewhat larger. Spur saccate, obtuse, slightly dorsally compressed. *Shady places. S. & C. Portugal, S.W. Spain; N. Sardegna.* Hs Lu Sa. (*N. Africa; Madeira, Islas Canarias.*)

11. *Herminium* Guett.¹

Tubers globose. Cauline leaves present. Perianth-segments erecto-patent or somewhat convergent, but not forming a distinct galea. Labellum conspicuously 3-lobed, slightly longer than the other perianth-segments; spur absent. Viscidia distinct; bursicle very rudimentary.

1. *H. monorchis* (L.) R. Br. in Aiton, *Hort. Kew.* ed. 2, 5: 191 (1813). Tuber solitary at anthesis, 2-4 others appearing later on slender, underground stolons. Plant 7-25 cm. Lower leaves 2-3(-4), 20-70 × 3-10 mm, elliptic-oblong to linear-lanceolate, the upper 0-2, linear-subulate, bract-like. Spike 1.5-9 cm, slender, sometimes secund, usually rather lax. Flowers yellowish-green, honey-scented. Outer perianth-segments 2.5-3 mm, ovate-lanceolate, obtuse, the inner c. 3.5 mm, oblong-lanceolate, often shallowly lobed near base. Labellum 3.5-4 mm; lobes oblong, the 2 lateral projecting at right angles or curved forwards, much shorter than the middle. $2n=40$. *Grassland. Much of Europe, but absent from the extreme north and most of the Mediterranean region and the south-west.* Au Be Br Bu Cz Da Fe Ga Ge He Ho †Hu It Ju No Po Rm Rs (N, B, C, W, E) Su.

12. *Neottianthe* Schlechter¹

Tubers usually ellipsoid. Basal leaves 2. Perianth-segments more or less equal, connivent into a galea. Labellum deeply 3-lobed, densely papillose. Spur conical, curved, shorter than ovary, directed downwards and forwards. Viscidia close together, above the stigma; bursicles absent.

1. *N. cucullata* (L.) Schlechter, *Feddes Repert.* 16: 292 (1919) (*Gymnadenia cucullata* (L.) L. C. M. Richard). Tubers ellipsoid to subglobose, sometimes emarginate or shortly 2-lobed. Plant 10-30 cm, glabrous. Basal leaves 5-7 × 1.5-3 cm, elliptical; cauline leaves 1-2, small and bract-like. Spike 3-8 cm, secund, rather lax. Flowers lilac-pink. Perianth-segments 6-8 × 1-1.5 mm, acuminate. Labellum 7-9 mm, somewhat deflexed; lateral lobes linear-setaceous; middle lobe longer, linear-oblong. Spur c. 5 mm, slightly dilated at apex. *Damp woods and mountain meadows. U.S.S.R. and Poland, from c. 57° N. in Latvia and C. Ural southwards to 49° 30' N. in W. Ukraine.* Po Rs (B, C, W).

13. *Platanthera* L. C. M. Richard¹

Stock usually with tubers. Leaves few, usually only the lowest 1-3 well developed, the upper reduced to sheaths or with a small, bract-like lamina. Flowers white or green, in a usually fairly dense spike. Outer lateral perianth-segments patent, the inner lateral shorter, connivent with the outer median to form a galea. Labellum linear-oblong to rhombic-lanceolate, entire. Spur more or less cylindrical. Stigma single, flat; rostellum inconspicuous. Viscidia distinct; bursicles absent.

1 Spur 18-30 mm, longer than ovary

2 Anther-lobes parallel, almost contiguous; spur acute

1. *bifolia*

2 Anther-lobes convergent above, but widely separated below; spur somewhat dilated at apex

2. *chlorantha*

1 Spur 2-8 mm, shorter than ovary

3 Stem with 1 well-developed leaf; spike with 3-6 flowers

5. *obtusata*

3 Stem with at least 2 well-developed leaves; spike with numerous flowers

4 Lowest 2 leaves much larger than the others

3. *micrantha*

4 Lowest 2 leaves not contrasting markedly with the others, the second and third from the base being usually the largest

4. *hyperborea*

1. *P. bifolia* (L.) L. C. M. Richard, *Orchid. Eur. Annot.* 35 (1817) (*Orchis bifolia* L.). Tubers 2, more or less conical, attenuate at apex. Plant 25-50 cm. Foliage-leaves 2, 7-16 × 2.5-8 cm, basal, subopposite, oblanceolate-oblong to obovate or broadly elliptical. Cauline leaves 2-5; lamina usually 1-3 cm, occasionally larger but always much narrower than that of basal leaves. Spike up to 20 cm; flowers white, slightly tinged with green, fragrant. Perianth-segments of the galea 5-7 mm; outer lateral segments 8-10 mm. Labellum 8-12 mm, linear-oblong, pendent. Spur 25-30 mm, slender, subulate, more or less horizontal, much longer than ovary. Anther-cells parallel, almost contiguous. $2n=42$. *Open woods, meadows and damp heaths. Almost throughout Europe, but rarer in the Mediterranean region.* All except Az Cr Is Rs (K) Sb.

2. *P. chlorantha* (Custer) Reichenb. in Moessler, *Handb.* ed. 2, 2: 1565 (1828) (*Orchis montana* auct., vix F. W. Schmidt). Like 1 but flowers more strongly tinged with green, less fragrant, and with slightly larger perianth-segments; spur 18-27 mm, slightly dilated at apex; anther-cells convergent above but widely separated below. $2n=42$. *Woods, meadows and damp heaths. Much of Europe, but absent from parts of the north, east and south-west.* All except Az Bl Cr Fa Is Lu Rs (N, E) Sa Sb.

3. *P. micrantha* (Hochst.) Schlechter, *Feddes Repert.* 16: 378 (1920). Tubers 2, ovoid-ellipsoid. Plant 20-50 cm. Lowest 2 leaves 6-15(-17) × 2-6.5 cm, oblanceolate-oblong to elliptical, usually one distinctly above the other but rarely subopposite; above them 2-6 much smaller leaves passing into the bracts. Spike 8-13 cm; flowers green. Perianth-segments 2-4 mm. Labellum 2-4 mm, narrowly oblong to oblong-elliptical, horizontal. Spur 2.5-8 mm, obtuse, $\frac{1}{3}$ - $\frac{1}{2}$ as long as ovary. *Mountain grassland. ● Azores. Az.*

Variable, especially in length of spur; in most plants this is 2-3.5 mm, but in some it is 5-8 mm. The long-spurred variants have been distinguished as *P. azorica* Schlechter, *loc. cit.* (1920) (*Habenaria longibracteata* Hochst.), but as variation in other characters shows little correlation and as there is no clear geographical or ecological separation, they are best treated as a variety of 3.

4. *P. hyperborea* (L.) Lindley, *Gen. Sp. Orchid.* 287 (1835). Roots cord-like, or forming very slender, conical tubers. Plant 6-35 cm. Leaves 4-7, distributed evenly on the stem, the 2-3 lowest 3-13 × 0.6-2 cm, lanceolate to oblong or ovate-elliptical, obtuse, the others acute and diminishing in size upwards but not contrasting sharply with the lower. Spike (2-)3-9 cm; flowers numerous, greenish, fragrant. Perianth-segments 3-4 mm. Labellum 3-7 mm, broadly lanceolate, obtuse, horizontal. Spur 3.5-4.5 mm, obtuse, curved, shorter than ovary. $2n=84$. *Meadows and moorland. Iceland. Is. (Arctic and subarctic America.)*

5. *P. obtusata* (Pursh) Lindley, *op. cit.* 284 (1835). Roots cord-like, fleshy but scarcely tuberous. Plant 6-20 cm. Foliage-leaf solitary, basal, 4-6 × 1.5-2 cm, elliptical, tapered to a sheathing base which is largely enclosed in a hyaline sheath representing a second basal leaf; a third leaf, small and bract-like, is present on upper part of stem. Spike short, rather dense; flowers 3-6, greenish-white. Perianth-segments 2-3 mm. Labellum 3-3.5 mm, rhombic-lanceolate, horizontal or somewhat deflexed. Spur 2.5-3 mm, curved, half as long as ovary. $2n=126$. *Calcareous*

¹ By D. A. Webb.

mountain heaths. *Arctic Fennoscandia*. No Su. (E. & E.C. Asia, North America.)

The European plant belongs to subsp. *oligantha* (Turcz.) Hultén, *Lunds Univ. Årsskr. nov. ser.*, 39(1): 481 (1943) (*P. oligantha* Turcz., *Lysiella oligantha* (Turcz.) Nevski), which is also found in E. Siberia. Subsp. *obtusata*, which is confined to America, has an obovate leaf, a laxer spike, a longer, narrower labellum and a longer spur. Plants from E. North America are very distinct from those from Europe and Asia, but intermediates are found in Alaska.

14. *Chamorchis* L. C. M. Richard¹

Tubers 2, ellipsoid. Leaves all basal; stem without scale-leaves. Perianth-segments connivent into a galea, the three outer equal, somewhat longer than the inner. Labellum slightly longer than the other perianth-segments, ovate, entire or shallowly 3-lobed. Spur absent. Rostellum inconspicuous. Viscidia distinct; bursicle simple.

1. *C. alpina* (L.) L. C. M. Richard, *Orchid. Eur. Annot.* 35 (1817) (*Herminium alpinum* (L.) Lindley). Glabrous. Stem 4–10 cm. Leaves 4–8, about equalling stem, linear, erect. Flowers 3–10 in a short, rather lax spike. Perianth-segments greenish-yellow, variably tinged with purplish-brown, the outer 3.5 mm, broadly oblong, the inner narrower and slightly shorter. Labellum 4 mm, yellowish-green. $2n=42$. *Mountain pastures; calcicole*. ● *Fennoscandia; Alps; Carpathians*. Au Cz Fe Ga Ge He It Ju No Po Rm Rs (N) Su.

15. *Gymnadenia* R. Br.²

Tubers laterally compressed, palmately lobed. Stem leafy. Flowers in a spike. Outer lateral perianth-segments patent or curved downwards, the outer median connivent with the inner lateral to form a galea. Labellum shallowly 3-lobed, directed downwards. Spur long, slender. Column short, erect. Rostellum long. Viscidia 2, long, linear; bursicles absent.

Spur 11–18 mm, longer than ovary
Spur 4–5 mm, not longer than ovary

1. *conopsea*
2. *odoratissima*

1. *G. conopsea* (L.) R. Br. in Aiton, *Hort. Kew. ed. 2*, 5: 191 (1813). Tubers with 3–6 obtuse lobes. Stem 15–65 cm, erect, glabrous, with 2–3 brownish basal sheaths. Leaves 4–8, linear-lanceolate, denticulate, the lower 6–20(–25) cm, slightly concuplicate and keeled, obtuse or subacute, the upper smaller, acuminate, bract-like. Spike (3–)6–16 cm, cylindrical, sometimes pyramidal at first, many-flowered. Flowers pinkish- or reddish-lilac, rarely purple or white, usually fragrant. Perianth-segments 4–5 mm, obtuse; outer oblong-ovate, patent or curved downwards, the median concave; inner broadly ovate. Labellum 3.5–5 mm, rhombic, the lobes subequal, rounded. Spur 11–18 mm, $1\frac{1}{2}$ –2 times as long as ovary, somewhat arcuate, acute, rarely obtuse. $2n=40, 80, c. 97, c. 117, c. 119$. *Grassland, marshes, fens and scrub; somewhat calcicole*. *Most of Europe except for parts of the south-west and south-east*. Al Au Be Br Bu Cz Da Fe Ga Ge Gr Hb He Ho Hs Hu It Ju Lu No Po Rm Rs (N, B, C, W, K, E) Si Su.

Three subspecies have been recognized by J. Bisse, *Feddes Repert.* 67: 187–188 (1967), based primarily on material from Germany and utilizing leaf-width and -disposition, spike-density, diameter and odour of the flowers, and spur-width. It is un-

¹ By D. A. Webb.

² By D. M. Moore.

certain whether the characters used are valid over the whole range of the species and further study is required.

2. *G. odoratissima* (L.) L. C. M. Richard, *Orchid. Eur. Annot.* 35 (1817) (*Orchis odoratissima* L.). Like 1 but stem 15–30(–45) cm; leaves linear, acute; perianth-segments 2.5–3 mm, the outer lateral patent; labellum 2.3–3 mm, the lateral lobes much shorter than the middle; spur 4–5 mm, obtuse, as long as or slightly shorter than ovary. $2n=40$. *Grassland; calcicole*. *From S. Sweden and W.C. Russia southwards to N. Spain, N. Italy and C. Jugoslavia*. Au Be Cz Ga Ge He Hs Hu It Ju Po Rm Rs (B, C, W) Su.

A record from N. England requires confirmation.

16. *Pseudorchis* Séguier² (*Leucorchis* E. H. F. Meyer)

Like *Gymnadenia* but with outer and inner perianth-segments more or less connivent to form a galea. Spur short.

Tubers divided to base; leaves 4–6; bracts 3-veined; spur $\frac{1}{2}$ – $\frac{1}{2}$ as long as ovary, cylindrical, obtuse
Tubers divided to about $\frac{1}{2}$ way to base; leaves 3–4; bracts 1-veined; spur c. $\frac{1}{2}$ as long as ovary, filiform, acute

1. *albida*
2. *frivaldii*

1. *P. albida* (L.) Á. & D. Löve, *Taxon* 18: 312 (1969). (*Leucorchis albida* (L.) E. H. F. Meyer, *Gymnadenia albida* (L.) L. C. M. Richard). Tubers divided to base, with the slender cylindrical divisions thickened distally. Stem 12–30(–40) cm, erect, glabrous, with 2–3 membranous sheathing scales at base. Lower leaves c. 4, 2.5–8 × 1–1.5 cm, obtuse; upper leaves 1–2, narrower, acute. Spike 3–7 cm, cylindrical, dense, many-flowered; bracts 3-veined. Flowers 2–3 mm, yellowish- or greenish-white. Outer perianth-segments obtuse, the lateral obliquely ovate, the median ovate, concave; inner slightly shorter, oblong-ovate, obtuse. Labellum 3-lobed; lateral lobes linear-lanceolate, acuminate; middle lobe larger, rather obtuse. Spur 2(–2.5) mm, $\frac{1}{2}$ – $\frac{1}{2}$ as long as ovary, cylindrical, obtuse, thickened distally and somewhat curved downwards. *Damp meadows, pastures and grassy heaths. Europe, southwards to the Pyrenees, S. Appennini and S. Bulgaria, but absent from the U.S.S.R. except the extreme north and west*. Au Be Br Bu Cz Da Fa Fe Ga Ge Hb He †Ho Hs Is It Ju No Po Rm Rs (N, W) Su.

(a) Subsp. *albida*: Lower leaves usually oblong-spathulate, erect. Spike very dense; bracts equalling ovary, with minutely denticulate margin. Lateral outer perianth-segments 2–3 mm. ● *Throughout most of the range of the species, northwards to C. Sweden*.

(b) Subsp. *straminea* (Fernald) Á. & D. Löve, *loc. cit.* (1969) (*Leucorchis albida* subsp. *straminea* (Fernald) Á. Löve): Lower leaves usually ovate-oblong, more or less patent. Spike often shorter and less dense than in subsp. (a). Bracts exceeding ovary, with entire or minutely crenulate margin. Lateral outer perianth-segments more than 3 mm. $2n=40, 42$. *N. Europe, southwards to S. Norway*.

2. *P. frivaldii* (Hampe ex Griseb.) P. F. Hunt, *Orchid Rev.* 79: 141 (1971) (*Leucorchis frivaldii* (Hampe ex Griseb.) Schlechter). Like 1 but leaves 3–4, narrower, the upper bract-like; spike shorter; bracts 1-veined; flowers rather larger, white (rarely pale pink). ● *Mountains of Balkan peninsula, from Crna Gora to N. Greece; one station in S. Carpathians*. ?Al Bu Gr Ju Rm.

17. *Nigritella* L. C. M. Richard²

Tubers digitate. Stem with numerous leaves. Flowers in a dense spike, vanilla-scented. Perianth-segments free, subequal.

Labellum entire. Spur short. Column short. Rostellum small. Viscidia small; bursicle very rudimentary. Ovary straight.

Literature: G. Beauverd, *Bull. Soc. Bot. Genève* ser. 2, 17: 335-338 (1926).

1. *N. nigra* (L.) Reichenb. fil., *Icon Fl. Germ.* 13-14: 102 (1851) (*Gymnadenia nigra* (L.) Reichenb.). Stems 5-30 cm, somewhat angled, rather slender. Leaves 3-20 cm, linear to linear-lanceolate, acute to subobtusate, canaliculate, with denticulate margins. Spike 10-25 cm, many-flowered. Flowers 5-10 mm. Perianth-segments lanceolate to sublinear, acute. Labellum subtriangular to lanceolate-ovate, acuminate, entire or sometimes crenulate. Spur saccate, obtuse, violet or whitish. $2n=64$. *Meadows; somewhat calcicole. Norway and Sweden; mountains of Europe southwards to N. Spain, C. Appennini and S. Greece.* Al Au Bu Ga Ge Gr He Hs It Ju No Rm Su.

- 1 Lateral inner perianth-segments c. $\frac{1}{2}$ as wide as the outer; flowers usually blackish-crimson (a) subsp. **nigra**
- 1 Lateral inner perianth-segments about as wide as the outer; flowers red to whitish
- 2 Spike \pm cylindrical; basal leaves 7-12 (b) subsp. **rubra**
- 2 Spike conical; basal leaves 12-18 (c) subsp. **corneliana**

(a) Subsp. **nigra**: Basal leaves 7-10. Spike conical, later elongating somewhat. Flowers blackish-crimson, rarely red, white or yellowish. Inner perianth-segments 2- to 3-veined, the lateral c. $\frac{1}{2}$ as wide as the outer. *Throughout the range of the species.*

(b) Subsp. **rubra** (Wettst.) Beauverd, *Bull. Soc. Bot. Genève* ser. 2, 17: 337 (1926) (*N. rubra* (Wettst.) K. Richter): Basal leaves 7-10. Spike more or less cylindrical. Flowers red. Inner perianth-segments 3-veined, the lateral about as wide as the outer. *C. & E. Alps; mountains of Romania.*

(c) Subsp. **corneliana** Beauverd, *op. cit.* 336 (1926): Basal leaves 12-18. Spike conical, later elongating somewhat. Flowers white, tinged with pink. Inner perianth-segments 1-veined, the lateral about as wide as the outer. ● *S.W. Alps.*

18. *Coeloglossum* Hartman¹

Tubers 2, ovoid, palmately lobed. Basal and cauline leaves present. Flowers in a lax spike. Outer lateral perianth-segments erecto-patent, the outer median connivent with the inner lateral to form a galea. Labellum 3-dentate at apex. Spur very short. Column short. Rostellum 3-angled, with 2 lateral lobes. Viscidia 2, oblong; bursicle very rudimentary.

1. *C. viride* (L.) Hartman, *Handb. Skand. Fl.* 329 (1820). Tubers with 2-4 tapering segments. Stem 6-35(-40) cm, angled above, with brownish, sheathing basal scales. Leaves 2-5, 3-8(-11) cm, the basal suborbicular to elliptic-ovate or lanceolate, obtuse, the upper smaller, lanceolate, acute. Spike 2-10 (-15) cm, cylindrical, 5- to 25-flowered. Flowers inconspicuous, greenish, sometimes with reddish or purplish-brown tint. Perianth-segments 4.5-6(-7) mm, subequal; outer ovate, subobtusate, the median concave; inner narrower, linear, subobtusate. Labellum 6-8(-9) mm, obcuneate, flat, yellowish or yellowish-brown, the middle apical tooth shorter than the lateral. Spur c. 2 mm, saccate, obtuse, greenish-white. $2n=40$. *Grassland and wood-margins. Europe southwards to C. Spain, S. Appennini, S. Bulgaria and Krym, but only on mountains in the south.* Al Au Be Br Bu Cz Da Fa Fe Ga Ge Hb He Ho Hs Hu Is It Ju No Po Rm Rs (N, B, C, W, K) Su.

¹ By D. M. Moore.

² By R. de Soó.

19. *Dactylorhiza* Necker ex Nevski²

Tubers 2-3, usually palmately 2- to 5-fid, more or less elongated at the apex, rarely oblong-cylindrical and shallowly 2(-4)-fid. Perianth-segments free, equal or the inner smaller, patent or deflexed, rarely convergent. Labellum porrect or slightly decurved. Spur present. Lower bracts herbaceous. Rostellum 3-lobed, the middle lobe short, lamelliform. Viscidia in one simple bursicle.

A taxonomically difficult genus in which many species show marked variation within and between different populations and in which interspecific hybrids are both frequent and of generally high fertility. Amongst the commonest hybrids are 8×4 , $8 \times 6(e)$, 8×12 , $6(d) \times 4$, $6(d) \times 12$, $6(e) \times 11(b)$ and $12 \times 11(b)$; hybrid plants can be more frequent, and more vigorous, than the parent species in a population, especially in the cases of $6(e) \times 11(b)$ and $6(e) \times 12$. In some instances populations of more or less stabilized hybrid segregates are known, as in $6(e) \times 12$, while it has been suggested that some taxa, such as some subspecies of **6**, have originated in this way. Intergeneric hybrids are known between **6(d)** and **6(e)** and both *Coeloglossum viride* and *Gymnadenia conopsea*.

Literature: J. Heslop-Harrison, *Trans. Proc. Bot. Soc. Edinb.* 35: 26-66 (1948); *Svensk Bot. Tidskr.* 45: 608-635 (1951); *Watsonia* 2: 371-391 (1953); *Ber. Geobot. Inst. Rübel (Zürich)* 1953: 53-82 (1954). E. Nelson, *Monographie und Ikonographie der Gattung Dactylorhiza*. Zürich. 1976. R. von Soó, *Bot. Arch. (Leipzig)* 23: 61-83 (1928); *Ann. Univ. Sci. Budapest. Rolando Eötvös* 3: 335-357 (1960); *Jahresb. Naturw. Ver. Wuppertal* 25: 37-48 (1972). P. Vermeulen, *Studies on Dactylorchids*. Utrecht. 1947. K. Senghas, *Jahresb. Naturw. Ver. Wuppertal* 21-22: 32-67 (1968).

- 1 All 5 perianth-segments convergent into a galea; stem with stolons **1. iberica**
- 1 Lateral outer perianth-segments not forming part of galea; stolons absent
- 2 Tubers shallowly 2- to 4-fid or -dentate at apex, rarely subentire
- 3 Stem with 4-5 distant leaves in lower half; spur not more than 15 mm **2. sambucina**
- 3 Stem with up to 10 leaves in a lax basal rosette; spur 12-25 mm **3. sulphurea**
- 2 Tubers deeply 2- to 5-fid
- 4 Lateral outer perianth-segments patent; stem usually solid **(11-13). maculata group**
- 4 Lateral outer perianth-segments suberect; stem usually hollow **(4-10). incarnata group**

1. *D. iberica* (Bieb.) Soó, *Nom. Nov. Gen. Dactylorhiza* 3 (1962) (*Orchis iberica* Bieb.). Tubers cylindrical to napiform, long-attenuate, 2- to 3-fid at apex. Stem 25-50 cm, erect, with 3-5 distant leaves in lower half, with stolons. Leaves erecto-patent to suberect, linear-lanceolate, without dark spots. Raceme ovoid or cylindrical. Bracts narrowly lanceolate, as long as or longer than ovary. Flowers pink; labellum with purple spots; spur white towards the base. Perianth-segments oblong or ovate-lanceolate, acute, all convergent into a galea; outer 8-10 mm, 3-veined, the inner up to 8 mm, 1-veined. Labellum up to $10 \times 7-8$ mm, patent, obovate, cuneate-flabellate at base, 3-lobed (rarely entire) at apex, minutely papillose-puberulent; lobes equal, the middle narrowly triangular, the lateral broadly triangular, crenulate. Spur narrowly cylindrical, curved, up to c. $\frac{1}{2}$ as long as ovary. *Marshes. Mountains of Greece and Krym.* Gr Rs (K) ?Tu. (*S.W. Asia.*)

2. *D. sambucina* (L.) Soó, *loc. cit.* (1962) (*Orchis sambucina* L.). Tubers oblong-cylindrical, subterre or shortly lobed. Stem 10–30 cm, usually with 4–5 distant leaves in lower half. Leaves without dark spots; lower obovate-oblancheolate to narrowly oblanceolate, more or less obtuse; upper lanceolate; uppermost often reaching the base of inflorescence. Raceme ovoid or shortly cylindrical, many-flowered. Bracts lanceolate, longer than ovary. Flowers pale yellow or purple, rarely bicoloured. Outer perianth-segments 7–10 mm, oblong, obtuse, the 2 lateral patent, the median convergent into a galea with the shorter, obliquely ovate inner perianth-segments; inner segments not enlarged towards the base. Labellum 7–8 × 7–8 mm, porrect, suborbicular, 3-lobed; lobes short, ovate-triangular, obtuse. Spur 8–15 mm, deflexed or horizontal. $2n = ?40, 42$. *Meadows, scrub and open woods. Much of Europe, but absent from many of the islands and most of the U.S.S.R.* Al Au Bu Co Cz Da Fe Ga Ge Gr He Hs Hu It Ju Lu No Po Rm Rs (B, C, W) Sa Si Su.

(a) Subsp. *sambucina*: Raceme dense. Spur up to 15 mm, deflexed, conical-cylindrical, somewhat curved upwards, shorter than to about as long as ovary. *Almost throughout the range of the species except for parts of the south-west.*

(b) Subsp. *insularis* (Sommier) Soó, *loc. cit.* (1962): Raceme lax. Spur 8–10 mm, patent, cylindrical, straight, distinctly shorter than ovary. $2n = 60$. ● *From Portugal to W.C. Italy.*

3. *D. sulphurea* (Link) Franco, *Bot. Jour. Linn. Soc.* 76: 336 (1978) (*Orchis sulphurea* Link, *O. sambucina* Ten., non L.). Like 2 but stem with a basal rosette of up to 10 leaves; leaves narrowly oblong; lateral inner perianth-segments enlarged towards base; labellum broadly obovate in outline, the lateral lobes oblong-ovate, the middle lobe oblong-rectangular or almost square to suborbicular; spur 12–25 mm, horizontal. *S. Europe.* ?Al ?Bl Bu Cr Gr Hs It Ju Lu Rm Rs (K) Sa Si Tu.

- 1 Middle lobe of labellum longer than lateral lobes (a) subsp. *sulphurea*
- 1 Middle lobe of labellum shorter than lateral lobes
- 2 Spur longer than ovary (b) subsp. *pseudosambucina*
- 2 Spur not longer than ovary (c) subsp. *siciliensis*

(a) Subsp. *sulphurea*: Middle lobe of labellum longer than the lateral, oblong-rectangular. Spur cylindrical, shorter than ovary. ● *N. Portugal, W. Spain.*

(b) Subsp. *pseudosambucina* (Ten.) Franco, *loc. cit.* (1978) (*Orchis mediterranea* subsp. *pseudosambucina* (Ten.) Klinge, *O. pseudosambucina* Ten.): Middle lobe of labellum shorter than the lateral, almost square to suborbicular. Spur cylindrical, distinctly longer than ovary. *Throughout the range of the species.*

(c) Subsp. *siciliensis* (Klinge) Franco, *op. cit.* 367 (1978) (*Orchis mediterranea* subsp. *siciliensis* Klinge): Like subsp. (b) but spur conical or saccate-cylindrical, rarely cylindrical, shorter than to as long as ovary. ● *Italy, Sicilia, Sardegna.*

(4–10). *D. incarnata* group. Stem usually hollow. Lower bracts usually as long as or longer than flowers, lanceolate. Lateral outer perianth-segments, suberect, the middle convergent into a galea with the inner segments.

- 1 Lower leaves not more than 4 times as long as wide, ± elliptical, usually widest at or below the middle
- 2 Stem not more than 20 cm; outer perianth-segments and labellum 6–7 mm 5. *pseudocordigera*
- 2 Stem (10–)20–60(–75) cm; outer perianth-segments 6–12 mm; labellum 5–12 mm
- 3 Leaves 4–8, the uppermost often reaching base of inflorescence 6. *majalis*
- 3 Leaves 2–5, the uppermost seldom reaching inflorescence 7. *cordigera*

- 1 Lower leaves more than 4 times as long as wide, usually lanceolate, gradually attenuate from base
- 4 Labellum 5–7.5(–9) mm; outer perianth-segments 5–6(–9) mm 4. *incarnata*
- 4 Labellum 5.5–16 mm; outer perianth-segments (6–)7–13 mm
- 5 Outer perianth-segments 7–8(–10) mm
- 6 Flowers purple; labellum with deflexed margin 8. *traunsteineri*
- 6 Flowers pink; labellum flat 9. *russowii*
- 5 Outer perianth-segments 8–13 mm
- 7 Stem not more than 30 cm; leaves usually with dark spots 7. *cordigera*
- 7 Stem 30–110 cm; leaves without dark spots 10. *elata*

4. *D. incarnata* (L.) Soó, *Nom. Nov. Gen. Dactylorhiza* 3 (1962) (*Orchis incarnata* L.). Tubers deeply 3- to 5-fid, more or less elongated at apex. Stem up to 70 cm, erect, broadly fistular, with 4–5 distant leaves. Leaves lanceolate, gradually attenuate from the wide base, acute, sometimes cucullate at apex; uppermost often as long as or longer than the inflorescence. Raceme cylindrical, dense, many-flowered. Flowers red, pinkish, white or purple; labellum with spots, rarely yellowish-white. Outer perianth-segments 5–6(–9) mm, ovate-oblong, obtuse. Labellum 5–7.5(–9) × 5–9.5 mm, slightly recurved, minutely papillose, ovate-rhombic to orbicular, entire to 3-lobed, shallowly crenulate. Spur deflexed, conical to conical-cylindrical, attenuate, up to $\frac{1}{2}$ as long as ovary. $2n = 40$. *Marshes, fens and bogs. Most of Europe, but rare in the Mediterranean region.* Al Au Be Br Bu Cz Da ?Fa Fe Ga Ge ?Gr Hb He Ho Hs Hu It Ju No Po Rm Rs (N, B, C, W, K, E) Su.

- 1 Flowers pinkish to lilac, rarely white (a) subsp. *incarnata*
- 1 Flowers red or purple
- 2 Flowers deep crimson (b) subsp. *coccinea*
- 2 Flowers purple, often streaked with red
- 3 Leaves erect, cucullate, usually without spots (c) subsp. *pulchella*
- 3 Leaves erecto-patent, not cucullate, usually with dark spots on both surfaces (d) subsp. *cruenta*

(a) Subsp. *incarnata*: Stems up to 70 cm. Leaves erect, often cucullate, usually without spots. Flowers pinkish to lilac, rarely white. *Throughout the range of the species.*

(b) Subsp. *coccinea* (Pugsley) Soó, *op. cit.* 4 (1962): Stems up to 70 cm. Leaves erect, often cucullate, usually without spots. Flowers deep crimson. ● *Britain and Ireland.*

(c) Subsp. *pulchella* (Druce) Soó, *loc. cit.* (1962): Stems up to 70 cm. Leaves erect, often cucullate, usually without spots. Flowers purple, often streaked with red. ● *Britain and Ireland.*

(d) Subsp. *cruenta* (O. F. Mueller) P. D. Sell, *Watsonia* 6: 317 (1967) (*Dactylorhiza cruenta* O. F. Mueller): Stems 12–30 cm. Leaves erecto-patent or gradually arcuate-patent, not cucullate, usually with dark spots on both surfaces. Flowers purple, often streaked with red. $2n = 40$. *N. & E. Europe; Alps.*

Variants with brownish-purple spots on the leaves occur sporadically in N. & C. Europe and have been named subsp. *haematodes* (Reichenb. fil.) Soó, *Nom. Nov. Gen. Dactylorhiza* 4 (1962). Variants with 3–4 narrowly lanceolate leaves 1–1.5 cm, slender stem and few-flowered racemes have been named subsp. *serotina* (Hausskn.) Soó & D. Moresby Moore, *Bot. Jour. Linn. Soc.* 76: 367 (1978), (*O. incarnata* var. *borealis* Neuman, var. *dunensis* Druce, var. *cambrica* Pugsley). They occur sporadically throughout W., N. & N.C. Europe. Variants with yellowish-white flowers have been named subsp. *ochroleuca* (Boll) P. F. Hunt & Summerhayes, *Watsonia* 6: 130 (1965); they occur sporadically throughout a large part of the range of the species.

5. *D. pseudocordigera* (Neuman) Soó, *Nom. Nov. Gen. Dactylorhiza* 4 (1962). Like 4(c) but stem not more than 20 cm; leaves erecto-patent, the lower elliptical, with dense, dark spots;

flowers purplish-red; perianth-segments and labellum 6–7 mm; spur conical, $\frac{1}{2}$ as long as ovary. *Fens and calcareous grassland.*
● Norway and N. Sweden. No Su.

6. *D. majalis* (Reichenb.) P. F. Hunt & Summerhayes, *Watsonia* 6: 130 (1965) (*D. latifolia* (L.) Soó pro parte). Tubers deeply 2- to 5-fid, somewhat elongated at apex. Stem up to 75 cm, with 4–8 distant leaves. Leaves erecto-patent, with or without brown spots, the upper reaching or exceeding the base of the inflorescence. Raceme ovoid to cylindrical. Outer perianth-segments 6–12 mm, ovate- to oblong-lanceolate, obtuse. Inner perianth-segments obliquely lanceolate to ovate. Labellum 5–14 × 6–15 mm, suborbicular or wider than long, entire, or 3-lobed with lateral lobes ovate-triangular, rounded or truncate, crenulate, and middle lobe triangular, shorter to longer than the lateral. Spur deflexed, conical-cylindrical, $\frac{1}{2}$ as long as to almost as long as ovary. $2n=80$. *Damp meadows and fens. W. & C. Europe; Baltic region and N. Russia.* Au Be Br Cz Da Ga Ge Hb He Ho Hs Hu It Ju Po Rm Rs (N, B, C, W) Su.

- 1 Leaves with small dark spots near apex or unspotted; labellum subentire or obscurely 3-lobed
- 2 Outer perianth-segments 6–7 mm; labellum 5–7 mm, with irregular dark lines or spots (d) subsp. *purpurella*
- 2 Outer perianth-segments 9–10 mm; labellum 10–12 mm, with a central cluster of small spots (e) subsp. *praetermissa*
- 1 Leaves usually with large or irregular spots
- 3 Lower leaves elliptical or obovate, widest at or above the middle; labellum usually subentire (c) subsp. *alpestris*
- 3 Lower leaves lanceolate to oblong-ovate, widest at or below the middle; labellum usually distinctly 3-lobed
- 4 Flowers purplish-lilac; middle lobe of labellum without markings (a) subsp. *majalis*
- 4 Flowers deep violet-purple; middle lobe of labellum with broken loop or line markings (b) subsp. *occidentalis*

(a) Subsp. *majalis* (*O. latifolia* L. pro parte): Stem up to 60 cm. Lower leaves broadly lanceolate, oblong or oblong-ovate, usually widest at or below the middle, with large or irregular spots. Flowers purplish-lilac. Labellum 9–10 mm, usually 3-lobed, rarely subentire; middle lobe without markings. Early-flowering. *Throughout most of the range of the species.*

(b) Subsp. *occidentalis* (Pugsley) P. D. Sell, *Acta Fac. Rer. Nat. Univ. Comen. Bot.* 14: 19 (1968): Stem up to 25 cm. Lower leaves broadly lanceolate, oblong or oblong-ovate, usually widest at or below the middle, usually with large or irregular spots. Flowers deep violet-purple. Labellum 9–10 mm, 3-lobed or subentire; middle lobe with broken loop or line markings. Early-flowering. $2n=80$. ● Britain and Ireland.

(c) Subsp. *alpestris* (Pugsley) Senghas, *Jahresb. Naturw. Ver. Wuppertal* 21–22: 51 (1968): Stem up to 30 cm. Lower leaves elliptical or obovate, widest at or above the middle, with large or irregular spots. Flowers purplish-lilac. Labellum 9–10 mm, subentire, rarely 3-lobed; middle lobe without markings. Late-flowering. ● Alps, Pyrenees.

(d) Subsp. *purpurella* (T. & T. A. Stephenson) D. Moresby Moore & Soó, *Bot. Jour. Linn. Soc.* 76: 367 (1978) (*Orchis purpurella* T. & T. A. Stephenson, *Dactylorhiza purpurella* (T. & T. A. Stephenson) Soó): Stem 20–45 cm. Lower leaves lanceolate, widest below the middle, without spots or with small dark spots near the apex. Flowers bright or deep reddish-purple. Labellum 5–9 mm, subentire or shallowly and equally 3-lobed, with irregular dark lines or spots. $2n=80$. ● N.W. Europe.

(e) Subsp. *praetermissa* (Druce) D. Moresby Moore & Soó, *loc. cit.* (1978) (*Orchis praetermissa* Druce): Stem up to 75 cm. Lower leaves lanceolate, widest below middle, without spots. Flowers pale or dull reddish-purple. Labellum 10–14 mm, shallowly and equally 3-lobed, with a central cluster of small spots. $2n=80$. ● N.W. Europe.

D. baltica (Klinge) Orlova in Min., *Konsp. Fl. Pskovsk. Obl.* 57 (1970) (*Orchis latifolia* subsp. *dunensis* Soó), from parts of N., C. & E. Europe, is like subsp. (d) but has narrower leaves, the labellum 5–8 mm and 3-lobed, and the spur usually $\frac{2}{3}$, not $\frac{1}{2}$ as long as the ovary. It may perhaps merit subspecific status.

7. *D. cordigera* (Fries) Soó, *Nom. Nov. Gen. Dactylorhiza* 5 (1962). Tubers deeply 2- to 4-fid, somewhat elongated at apex. Stem up to 30 cm, erect or slightly flexuous, with 2–5 distant leaves. Leaves usually with dark spots on both surfaces; lower lanceolate to obovate, patent; upper lanceolate, erect; uppermost seldom reaching the inflorescence. Raceme ovoid to oblong. Bracts longer than ovary. Flowers purple; labellum dark purple. Outer perianth-segments 8–12 mm, oblong-lanceolate, obtuse. Labellum 7–11 × 8–16 mm. Spur deflexed. $2n=80$. *Mountain grassland. S.E. Europe.* Al Bu Gr Ju Rm Rs (W).

- 1 Spur 8–11 mm, conical-cylindrical, up to $\frac{3}{4}$ as long as ovary (c) subsp. *siculorum*
- 1 Spur 6–8 mm, saccate, not more than $\frac{1}{2}$ as long as ovary
- 2 Labellum \pm abruptly cuneate at base, \pm suborbicular, sometimes shortly 3-lobed at apex (b) subsp. *bosniaca*
- 2 Labellum widest towards base, broadly rhombic (a) subsp. *cordigera*

(a) Subsp. *cordigera*: Inner perianth-segments oblong. Labellum broadly rhombic, widest at the base, subentire or 3-lobed. Spur 6–8 mm, saccate, up to $\frac{1}{2}$ as long as ovary. *Throughout the range of the species.*

(b) Subsp. *bosniaca* (G. Beck) Soó, *loc. cit.* (1962): Inner perianth-segments obliquely ovate. Labellum abruptly cuneate at the base, more or less suborbicular, sometimes shortly 3-lobed at apex. Spur 6–8 mm, saccate, less than $\frac{1}{2}$ as long as ovary. ● Albania, Jugoslavia, Bulgaria.

(c) Subsp. *siculorum* (Soó) Soó, *loc. cit.* (1962): Inner perianth-segments obliquely lanceolate. Labellum suborbicular, entire to deeply 3-lobed. Spur 8–11 mm, conical-cylindrical, up to $\frac{3}{4}$ as long as ovary. ● Romania and W. Ukraine.

8. *D. traunsteineri* (Sauter) Soó, *loc. cit.* (1962) (*Orchis traunsteineri* Sauter). Tubers deeply 2- to 4-fid, filiform-elongated at apex. Stem 20–50 cm, more or less flexuous, narrowly fistular, with distant leaves. Leaves linear- to oblong-lanceolate, acute or obtuse. Raceme cylindrical, more or less lax, many-flowered. Bracts longer than ovary. Flowers purple. Outer perianth-segments 7–8 mm, oblong-lanceolate, obtuse, inner segments obliquely ovate. Labellum 5.5–9 mm, porrect, obcordate, subdeltate or suborbicular, subentire to 3-lobed, with deflexed margin; lateral lobes ovate or obovate, rounded, crenulate, middle lobe oblong, obtuse, at least as long as the lateral. Spur pendent, conical-cylindrical, $\frac{1}{2}$ as long to nearly as long as ovary. $2n=80, 122$. *Fens and marshes. N. & C. Europe.* Au Br Cz ?Da Fe Ge Hb He †Ho It Ju No Po Rs (N, B, C, W) Su.

- 1 Raceme few-flowered; labellum 5.5–7 mm, the lateral lobes longer than the middle; spur c. $\frac{2}{3}$ as long as ovary (c) subsp. *lapponica*
- 1 Raceme many-flowered; labellum 7–9 mm, the middle lobe at least as long as the lateral; spur c. $\frac{1}{2}$ as long as ovary
- 2 Leaves erecto-patent, slightly introrsely curved; labellum with middle lobes distinctly longer than the lateral (a) subsp. *traunsteineri*
- 2 Leaves often arcuate-patent, strongly curved; labellum subentire to shallowly 3-lobed, with middle lobe slightly longer than the lateral (b) subsp. *curvifolia*

(a) Subsp. *traunsteineri* (*O. ruthei* M. Schulze): Leaves 3–5, erecto-patent, somewhat introrsely curved, usually without spots. Labellum 7–9 mm, 3-lobed; middle lobe longer than lateral

lobes. *Throughout most of the range of the species, but rare in parts of the north.*

(b) Subsp. *curvifolia* (Nyl.) Soó, *op. cit.* 6 (1962): Leaves 2-4, often arcuate-patent and strongly curved, keeled on upper surface. Labellum 7-9 mm, subentire to shallowly 3-lobed; middle lobe slightly longer than lateral lobes. *Sweden, Finland, N. Russia.*

(c) Subsp. *lapponica* (Laest. ex Hartman) Soó, *Bot. Jour. Linn. Soc.* 76: 367 (1978) (*Orchis lapponica* Laest. ex Hartman): Leaves 2-3, the lower patent, the upper erect. Labellum 5.5-7 mm, 3-lobed; lateral lobes longer than the middle lobe. ● *N. Fennoscandia.*

9. *D. russowii* (Klinge) J. Holub, *Preslia* 36: 253 (1964). Like 9(a) but tubers not elongated at apex; stem more or less erect, with 4-5 leaves; raceme dense; flowers pink; labellum flat, the middle lobe triangular, acute; spur slightly shorter than ovary. $2n=120$. ● *From E. Germany to C. Russia. Ge Po Rs (B, C).*

10. *D. elata* (Poiret) Soó, *Nom. Nov. Gen. Dactylorhiza* 7 (1962). Tubers deeply 2- to 4-fid, more or less elongated at apex. Stem 30-110 cm, erect, narrowly fistular, with 6-10 distant leaves. Leaves erecto-patent, linear- to ovate-lanceolate, without spots, the uppermost bract-like. Raceme cylindrical, many-flowered, lax or dense. Bracts longer than the ovary. Flowers violet-purple, rarely pink. Outer perianth-segments 10-13 mm, lanceolate or ovate-lanceolate; inner segments obliquely lanceolate. Labellum 9-16 × 12-24 mm, porrect, flat or slightly convex, ovate, suborbicular or flabellate, subentire to 3-lobed, minutely papillose; lateral lobes often deflexed. Spur cylindrical or conical-cylindrical, about as long as ovary. $2n=80$. *Wet meadows and marshes. S.W. Europe, extending eastwards to Sicily. Co Ga Hs Lu Si.*

Only subsp. *sesquipetalis* (Willd.) Soó, *loc. cit.* (1962), occurs in Europe. Subsp. *elata*, from N. Africa, is distinguished by its smaller flowers, the labellum being as long as or slightly longer than wide, and its saccate-cylindrical spur.

(11-13). *D. maculata* group. Tubers deeply 3- to 4-fid, more or less elongated at apex. Stem up to 60 cm, erect or slightly flexuous, usually solid. Leaves erecto-patent. Upper leaves bract-like. Raceme conical, becoming ovoid or oblong. Bracts lanceolate. Flowers yellowish-white, pink, lilac, reddish or purple. Outer perianth-segments ovate to oblong, obtuse, the 2 lateral patent, the median convergent into a galea with the obliquely ovate or ovate-lanceolate inner segments. Labellum 7-11 × 9-13 mm, flat, 3-lobed; lateral lobes oblong-triangular, ovate, or inconspicuous. Spur shorter than to as long as ovary.

The distribution of 12 and 13 is difficult to ascertain because of frequent misidentification of specimens.

1 Middle lobe of labellum much narrower than the lateral

11. *maculata*

1 Middle lobe of labellum about as wide as the lateral

2 Lower bracts usually shorter than flowers; spur 6-9 mm, cylindrical

12. *fuchsii*

2 Lower bracts usually longer than flowers; spur 7-13 mm, saccate or conical-cylindrical

13. *saccifera*

11. *D. maculata* (L.) Soó, *loc. cit.* (1962) (*Orchis maculata* L.). Stem with 5-12 distant leaves. Leaves with or without dark spots; lower linear-lanceolate to ovate or oblong, acute to obtuse. Bracts mostly shorter than the flowers. Outer perianth-segments 7-11 mm. Middle lobe of labellum shorter than to as long as (rarely longer than) and much narrower than the lateral lobes. Spur 3-11 mm, cylindrical, shorter than to as long as ovary. $2n=40, 60, 80$. *Moorland, grassland and damp woods; mainly on*

acid soils. Much of Europe, but absent from most of the south-east. ?Al Au Be ?Bl Br Co ?Cz Da Fa Fe Ga Ge Hb He Ho Hs ?Hu Is It Ju Lu No Po Rm Rs (N, B, C, W) Si Su.

1 Flowers yellowish-white; leaves without dark spots

(e) subsp. *transsilvanica*

1 Flowers pink, lilac, reddish or purple; leaves with or without dark spots

2 Lower leaves broadly lanceolate to ovate

3 Stem not more than 60 cm, solid; spur $\frac{3}{4}$ as long to as long as ovary

(a) subsp. *maculata*

3 Stem 10-20 cm, hollow; spur shorter than ovary

(d) subsp. *islandica*

2 Lower leaves linear- to oblong-lanceolate or narrowly oblong

4 Lower leaves narrowly oblong; middle lobe of labellum at least as long as lateral lobes

(c) subsp. *schurii*

4 Lower leaves linear- to oblong-lanceolate; middle lobe of labellum much shorter than to as long as lateral lobes

(b) subsp. *elodes*

(a) Subsp. *maculata*: Stem up to 60 cm, solid. Cauline leaves 6-10, usually with spots, the lower ovate to oblong. Flowers purplish; labellum with middle lobe shorter than to as long as the lateral lobes. Spur $\frac{3}{4}$ - $\frac{3}{4}$ as long to as long as ovary. *Throughout most of the range of the species.*

(b) Subsp. *elodes* (Griseb.) Soó, *loc. cit.* (1962): Stem up to 30 cm, solid. Cauline leaves 4-8, with or without spots, the lower oblong to linear-lanceolate. Flowers pink, pale lilac or reddish; labellum with middle lobe shorter than to as long as the lateral lobes. Spur *c.* $\frac{1}{2}$ as long as ovary. $2n=40, 80$. *Throughout the range of the species, except parts of the south-east.*

(c) Subsp. *schurii* (Klinge) Soó, *Rev. Roum. Biol. (Bot.)* 12: 229 (1967): Like subsp. (b) but cauline leaves with a few spots, the lower narrowly oblong; middle lobe of labellum as long as or longer than the lateral lobes. ● *Carpathians.*

(d) Subsp. *islandica* (Á. & D. Löve) Soó, *Nom. Nov. Gen. Dactylorhiza* 7 (1962): Stem 10-20 cm, hollow. Cauline leaves 5-7, without spots, the lower ovate, elliptical or broadly lanceolate. Flowers pink, pale lilac or reddish; labellum with middle lobe as long as the lateral lobes. Spur shorter than ovary. $2n=80$. ● *Iceland.*

(e) Subsp. *transsilvanica* (Schur) Soó, *loc. cit.* (1962): Stem up to 60 cm, solid. Cauline leaves 6-10, without spots, the lower oblong-lanceolate or narrowly oblong. Flowers yellowish-white; labellum with middle lobe as long as to much longer than the lateral lobes. Spur shorter than ovary. *S.E. & S.C. Europe.*

12. *D. fuchsii* (Druce) Soó, *op. cit.* 8 (1962) (*D. maculata* subsp. *fuchsii* Hyl.). Leaves obovate-oblong to elliptical, usually erecto-patent. Bracts usually shorter than flowers. Outer perianth-segments 6-9 mm. Labellum deeply 3-lobed, the middle lobe at least as long as and about as wide as the lateral lobes. Spur 6-9 mm, cylindrical. *Grassland and open woods; mainly on base-rich soils. Much of Europe but absent from most of the south. Au Be Br Co Cz Da Fe Ga Ge Hb He Ho Hu Is It Ju No Po Rm Rs (N, B, C, W, E) Su.*

1 Flowers white, except for numerous purple markings on the labellum

(c) subsp. *sooana*

1 Flowers pink, pale lilac or reddish-purple, rarely entirely white

2 Stem not more than 25 cm, with 1-2 leaves

(b) subsp. *psychrophila*

2 Stem not more than 60 cm, with 7-12 leaves (a) subsp. *fuchsii*

(a) Subsp. *fuchsii*: Stem up to 60 cm, with 7-12 leaves. Flowers pink, pale lilac or reddish-purple, rarely white. $2n=40$. *Throughout most of the range of the species.*

(b) Subsp. *psychrophila* (Schlechter) J. Holub, *Preslia* 36: 252 (1964): Stem up to 25 cm, with 1-2 leaves. Flowers pink to reddish-purple, rarely white. ● *C. Europe and Fennoscandia.*

(c) Subsp. *sooana* (Borsos) Borsos, *Ann. Univ. Sci. Budapest. Rolando Eötvös* 4: 76 (1961): Stem up to 60 cm, with 7–12 leaves. Flowers white except for stripes or spots on the labellum.
● Hungary.

13. *D. saccifera* (Brongn.) Soó, *Nom. Nov. Gen. Dactylorhiza* 8 (1962) (*Orchis maculata* subsp. *macrostachys* (Tineo) Hayek). Leaves without spots, the lower obovate to elliptical. At least the lower bracts usually distinctly (up to 2 times) longer than the flowers. Outer perianth-segments up to 10 mm. Labellum deeply 3-lobed, the middle lobe about as long and as wide as the lateral lobes. Spur 7–13 mm, saccate- or conical-cylindrical. $2n=40$, 80. *Damp meadows and woods. S. Europe. Al Bu Gr Hs It Ju Lu Rm ?Sa Si ?Tu.*

20. *Steveniella* Schlechter¹

Tubers 2, orbicular or oblong, entire. Outer perianth-segments connate almost to apex; inner small, about as long as the anther. Labellum patent, papillose, 3-lobed. Spur short. Rostellum 3-lobed; middle lobe erect, cucullate. Viscidia in one 2-lobed bursicle.

1. *S. satyrioides* (Steven) Schlechter, *Feddes Repert.* 15: 295 (1918). Stem 25–40 cm, erect, with 1 leaf just above base and 2 acute, leaf-like sheaths above. Leaf oblong-ovate to oblanceolate. Spike cylindrical. Bracts erecto-patent, lanceolate to ovate, acuminate. Perianth-segments greenish, tinged with brown or purple; outer 6–8 mm, erect, oblong-ovate, acute; inner c. 4 mm, linear-ligulate, obtuse. Labellum 6–7 × 4–4.5 mm, deeply 3-lobed, brownish-green; lateral lobes small, square or rhombic; middle lobe long, oblong, obtuse, decurved. Spur 2–2.5 mm, conical or oblong-conical, directed downwards. *Open woods and mountain meadows. Krym. Rs (K). (S.W. Asia.)*

21. *Comperia* C. Koch¹

Tubers 2, ovoid. Perianth-segments all connivent into a galea. Labellum convex, papillose, 3-lobed, the lobes prolonged into filiform, somewhat spiral processes. Spur present. Rostellum 3-lobed, the middle lobe short, lamelliform. Viscidia in one simple bursicle.

1. *C. comperiana* (Steven) Ascherson & Graebner, *Syn. Mitteleur. Fl.* 3: 620 (1907) (*C. taurica* C. Koch). Stem 25–55 cm, erect, with 3–4 leaves and 2–3 leaf-like sheaths above. Leaves oblong to oblong-ovate. Spike cylindrical, lax or dense. Bracts linear to linear-lanceolate, equalling or somewhat exceeding the ovary. Galea brownish-purple. Outer perianth-segments 12–15 mm, elliptical; inner c. 10 mm, obliquely lanceolate, with 1–2 long teeth on each side. Labellum up to 4 cm, cuneate at base, convex, pale pink; lateral lobes 1–1.3 cm wide at base, lanceolate, with apical process 2.5–2.7 cm; middle lobe triangular-ovate, with 2 filiform processes up to 2.8 cm. Spur shorter than ovary, directed downwards, cylindrical. *Open woods. S.W. Krym. Rs (K). (Anatolia.)*

22. *Neotinea* Reichenb. fil.²

Tubers ellipsoid, entire. Basal leaves 2–4. Perianth-segments more or less equal, connivent into a galea. Labellum scarcely longer than other perianth-segments, 3-lobed. Spur very short. Stigmas approximated at base, diverging above in the form of a V. Viscidia distinct, enclosed in a 2-lobed bursicle.

¹ By R. de Soó.

² By D. A. Webb.

1. *N. maculata* (Desf.) Stearn, *Ann. Mus. Goulandris* 2: 79 (1974) (*N. intacta* (Link) Reichenb. fil., *Aceras densiflorum* (Brot.) Boiss.). Tubers c. 20 × 12 mm. Plant 8–25(–40) cm, glabrous, somewhat glaucous. Leaves 3–6, the basal 3–12 × 1–3 cm, oblong, mucronate, patent, the cauline smaller and erect, all usually with small, purplish-brown spots in longitudinal lines. Spike 2–6 cm, dense, sometimes secund. Flowers never opening fully and usually self-pollinated, dull pink or greenish-white. Perianth-segments 3–4 mm, acute to acuminate. Labellum horizontal; lateral lobes linear; middle lobe longer, oblong, often 2- or 3-lobed at apex. Spur 1.5–2 mm, broadly conical, obtuse. $2n=40$. *Woods, scrub and stony grassland. Mediterranean region and Portugal; Ireland and Isle of Man. Bl Br Co Cr Ga Gr Hb Hs It Ju Lu Sa Si.*

23. *Traunsteinera* Reichenb.¹

Tubers 2, ovoid, entire. Perianth-segments ovate to ovate-lanceolate, acuminate or sometimes with spatulate apex. Labellum patent, 3-lobed, glabrous. Spur short. Rostellum 3-lobed, the middle lobe erect, linear-cucullate. Viscidia in a somewhat rudimentary, 2-lobed bursicle.

1. *T. globosa* (L.) Reichenb., *Fl. Saxon.* 87 (1842). Stem 15–65 cm, erect, curved, with 2–3 leaves and 2–3 pinkish bracts above. Leaves oblong-lanceolate or subobovate. Spike pyramidal-globose, becoming ellipsoid. Bracts lanceolate, 1- to 3-veined, as long as or longer than the ovary. Flowers pinkish-lilac; inner perianth-segments and labellum with purple spots. Outer perianth-segments 5–6 mm; inner slightly shorter. Labellum c. 4.5 × 3 mm, almost square, widened at the base, deeply 3-lobed to c. $\frac{1}{2}$ -way; lateral lobes ovate, obtuse or acute; middle lobe broadly oblong, the apex sometimes denticulate. Spur $\frac{1}{3}$ – $\frac{1}{2}$ as long as ovary, cylindrical-conical, directed downwards. $2n=42$. *Meadows, mainly in the mountains. From the Vosges and S. Poland southwards to N. Spain, N.C. Italy and S. Bulgaria. ?Al Au Bu Cz Ga Ge He Hs Hu It Ju Po Rm Rs (W, K).*

24. *Orchis* L.¹

Tubers 2–3, globose to ellipsoid, entire. Perianth-segments free, equal, or sometimes the inner smaller, all convergent into a galea or the outer patent and deflexed. Labellum correct or slightly decurved, entire to 3-lobed, glabrous or papillose. Spur present. Bracts membranous. Rostellum 3-lobed, the middle lobe short, lamelliform. Viscidia in a 2-lobed bursicle.

Literature: R. von Soó, *Bot. Arch. (Leipzig)* 23: 35–61 (1928); *Jahresb. Naturw. Ver. Wuppertal* 25: 37–48 (1972).

- 1 At least the lateral outer perianth-segments patent or deflexed, the median sometimes convergent into a galea with the 2 inner perianth-segments
- 2 Flowers at apex of spike opening first
- 2 Flowers at base of spike opening first
- 3 Leaves linear or lanceolate, narrowed towards apex, patent
23. *laxiflora*
- 3 Leaves oblong to oblong-lanceolate or -ovate, rarely lanceolate, gradually narrowed towards base, appressed or in a basal rosette
- 4 Spur filiform or linear-conical, attenuate towards apex
- 5 Spur linear-conical, wider towards mouth; inner perianth-segments oblong-ovate, subobtuse
21. *anatolica*
- 5 Spur filiform, not wider towards mouth; inner perianth-segments ovate, obtuse
22. *quadripunctata*
- 4 Spur cylindrical or saccate
- 6 Two lateral outer perianth-segments erecto-patent or patent-deflexed; spur directed downwards; bracts 5- to 7-veined

- 7 Labellum undivided **15. saccata**
 7 Labellum 3-lobed
 8 Spike long-cylindrical; spur saccate; base of labellum with 2 inconspicuous ridges **16. patens**
 8 Spike ovoid or shortly cylindrical; spur conic-cylindrical; base of labellum with 2 conspicuous ridges **17. spitzelii**
 6 Two lateral outer perianth-segments deflexed, rarely erecto-patent; spur patent; bracts 1- to 3-veined
 9 Flowers pink to purple; outer perianth-segments ovate or oblong-lanceolate, obtuse to acuminate **18. mascula**
 9 Flowers pale yellow; outer perianth-segments ovate-oblong, obtuse
 10 Spur slightly shorter than ovary; spike dense; leaves oblong or oblong-obovate, distributed along lower half of stem **19. pallens**
 10 Spur as long as or longer than ovary; spike lax to dense; leaves lanceolate or oblong-lanceolate, crowded at base of stem **20. provincialis**
- 1 All 5 perianth-segments \pm convergent into a galea
 11 Labellum entire **1. papilionacea**
 11 Labellum 3-lobed
 12 Spur patent or somewhat curved upwards; labellum about as wide as or somewhat wider than long
 13 Spur filiform; flowers at apex of spike opening first **2. boryi**
 13 Spur cylindrical; flowers at base of spike opening first
 14 Spur about as long as to slightly longer than labellum **3. morio**
 14 Spur much longer than labellum **4. longicornu**
 12 Spur directed downwards; labellum longer than wide
 15 Middle lobe of labellum entire or denticulate, without purple spots
 16 Stem with 4-7 leaves; leaves linear to narrowly lanceolate; spur conical, slightly incurved and not narrowly attenuate towards apex **5. coriophora**
 16 Stem with sheaths only; leaves oblong-lanceolate; spur subhamate-incurved, narrowly attenuate towards apex **6. sancta**
 15 Middle lobe of labellum deeply emarginate to 2-fid, usually with purple spots
 17 Bracts somewhat shorter than to about as long as ovary; median lobe of labellum not apiculate between the lobules
 18 Outer perianth-segments 3-3.5 mm; spike ovoid, becoming cylindrical; spur $\frac{1}{4}$ - $\frac{1}{2}$ as long as ovary **7. ustulata**
 18 Outer perianth-segments 6-12 mm; spike conical, becoming ovoid; spur at least $\frac{1}{2}$ as long as ovary
 19 Stem 15-45 cm; flowers pale violet-lilac; middle lobe of labellum cuneate-obovate, emarginate; spur $\frac{1}{2}$ as long as ovary **8. tridentata**
 19 Stem 7-20 cm; flowers white or greenish-pink; middle lobe of labellum orbicular-obovate, usually not emarginate; spur sometimes longer than ovary **9. lactea**
 17 Bracts much shorter than ovary; middle lobe of labellum with an apiculum, teeth or laciniae between the lobules
 20 Lobules of middle lobe of labellum linear, with teeth or linear laciniae between them
 21 Base of labellum with 2 triangular lamellae, scarcely papillose; lateral lobes and lobules of the middle lobe of the labellum \pm flat, acute **10. italica**
 21 Base of labellum without lamellae, minutely papillose; lateral lobes and lobules of middle lobe of labellum subfalcate, obtuse **11. simia**
 20 Lobules of middle lobe of labellum ovate or oblong, with an apiculum or teeth between them
 22 Perianth-segments brownish-purple **14. purpurea**
 22 Perianth-segments pink, whitish or yellowish-green
 23 Spur narrowly cylindrical, $\frac{1}{2}$ as long as ovary; galea whitish- or greyish-pink; labellum purple, white at base **12. militaris**

- 23 Spur broadly cylindrical, $\frac{1}{4}$ - $\frac{1}{2}$ as long as ovary; galea and labellum yellowish-green **13. punctulata**

1. O. papilionacea L., *Syst. Nat.* ed. 10, 2: 1242 (1759). Tubers globose. Stem 20-40 cm, erect, with basal rosette of leaves and sheaths above. Leaves lanceolate to linear-lanceolate. Spike ovoid, lax, few-flowered, rarely cylindrical and rather dense. Bracts lanceolate, 3- to 4-veined, longer than ovary. Flowers purple, rarely red or brownish. All perianth-segments convergent into a galea; outer 10-15(-18) mm, ovate-oblong, the inner similar. Labellum 12-16(-25) \times 12-16(-25) mm, undivided, unguiculate, suborbicular or obcordate, constricted at the base, rarely ovate-flabellate or obscurely 3-lobed. Spur deflexed, cylindrical, shorter than ovary. $2n=32$. *Grassland; calcicole. S. Europe.* ?Al Bl Bu Co Cr Ga Gr Hs It Ju Lu Rm Sa Si Tu.

Var. *grandiflora* Boiss., from Spain, has the labellum 20-25 \times 20-25 mm.

2. O. boryi Reichenb. fil., *Icon. Fl. Germ.* 13: 19 (1851). Tubers globose. Stem 20-45 cm, with a basal rosette of leaves and crowded sheaths above. Leaves lanceolate to oblong-obovate. Spike short, often capitate, dense, the distal flowers opening first. Bracts lanceolate, $\frac{1}{2}$ as long as ovary. Flowers violet. Outer perianth-segments c. 7 mm, oblong-ovate, more or less patent; inner 4-5 mm, ovate. Labellum c. 8 \times 8 mm, suborbicular, with 3 subequal lobes; middle lobe entire, longer than the lateral. Spur c. 15 \times 2 mm, filiform, obtuse, somewhat shorter than ovary, patent or somewhat curved upwards. ● *S. Greece, Kriti.* Cr Gr.

3. O. morio L., *Sp. Pl.* 940 (1753). Tubers subglobose or ellipsoid. Stem 5-50 cm, erect, with a basal rosette of leaves and crowded sheaths above. Leaves broadly lanceolate to oblong-ovate. Spike shortly oblong or pyramidal, rarely cylindrical, the basal flowers opening first. Bracts lanceolate, with several veins, shorter to slightly longer than ovary. Flowers purplish-violet, red, pink, green or white. All perianth-segments convergent into a galea; outer oblong-ovate, rarely divaricate, the inner somewhat smaller. Labellum up to 10 \times 10 mm, usually glabrous, suborbicular to reniform, shallowly 3-lobed, sometimes with darker spots; middle lobe dilated, truncate, sometimes emarginate, usually longer than the lateral. Spur cylindrical, almost equalling to slightly longer than the labellum, patent or somewhat curved upwards. $2n=36$. *Europe, northwards to N. England, S. Norway and Estonia, and eastwards to C. Russia.* All except Az Cr Fa Fe Is Rs (N, E) Sb.

- 1 Tubers 3 (1 subsessile, 2 long-stipitate); labellum plicate; spur clavate, wider towards the apex, truncate or emarginate

(c) subsp. *champagneuxii*

- 1 Tubers 2, shortly stipitate; labellum flat; spur not clavate, narrowed towards apex, obtuse or acuminate

- 2 Spur usually shorter than ovary; outer perianth-segments 8-10 mm (a) subsp. *morio*

- 2 Spur usually as long as ovary; outer perianth-segments 6-8 mm (b) subsp. *picta*

(a) Subsp. *morio*: Tubers 2, shortly stipitate. Outer perianth-segments 8-10 mm. Labellum flat. Spur narrowed towards apex, obtuse or acuminate, usually shorter than ovary. $2n=36$. *Throughout most of the range of the species, but absent from much of the south-east.*

(b) Subsp. *picta* (Loisel.) Arcangeli, *Comp. Fl. Ital.* ed. 2, 167 (1894): Tubers 2, shortly stipitate. Outer perianth-segments 6-8 mm. Labellum flat. Spur narrowed towards apex, obtuse or acuminate, usually as long as ovary. *S. Europe.*

(c) Subsp. *champagneuxii* (Barn.) Camus, *Icon. Orchid. Eur.*

154 (1929) (*O. champagneuxii* Barn.): Tubers 3 (1 subsessile, 2 long-stipitate). Outer perianth-segments 6–8 mm. Labellum plicate. Spur clavate, wider towards apex, truncate or emarginate, shorter than to as long as ovary. ● *S.W. Europe*.

4. *O. longicornu* Poiret, *Voy. Barb.* 2: 247 (1789). Tubers subglobose, shortly stipitate. Stem 10–30 cm, erect, with basal rosette of leaves, and with crowded sheaths above. Leaves oblong-lanceolate. Spike shortly oblong, rarely cylindrical, rather dense, the basal flowers opening first. Bracts lanceolate, with several veins, about as long as ovary. All perianth-segments convergent into a galea; outer *c.* 6 mm, oblong, white or pale pink; inner somewhat smaller, white. Labellum about as wide as long, broadly reniform, purplish-violet, minutely punctulate, shallowly 3-lobed; middle lobe broadly triangular, usually somewhat shorter than the lateral. Spur *c.* 16 mm, cylindrical, becoming clavate and wider towards the apex, patent or somewhat curved upwards, much longer than labellum. $2n=36$. *W. Mediterranean region*. Bl Co Ga It ?Lu Sa Si.

5. *O. coriophora* L., *Sp. Pl.* 940 (1753). Tubers subglobose or ellipsoid. Stem 15–40 cm, erect, with 4–7 leaves below and sheaths above. Leaves linear to narrowly lanceolate. Spike oblong or cylindrical, dense. Bracts lanceolate, 1-veined, as long as or longer than ovary. All perianth-segments convergent into a galea; outer 5–10 mm, ovate-lanceolate or oblong, acute or acuminate, the inner somewhat longer; galea violet-brown. Labellum longer than wide, purplish-green, without spots, 3-lobed; lateral lobes sub-rhombic, entire, crenate or denticulate; middle lobe oblong, entire. Spur conical, directed downwards, slightly incurved towards the apex, $\frac{1}{2}$ to twice as long as ovary. $2n=36$. *S., C. & E. Europe, northwards to Belgium and Lithuania*. Al Au Be Bl Bu Co Cr Cz Ga Ge Gr He †Ho Hs Hu It Ju Lu Po Rm Rs (B, C, W, K, E) Sa Si Tu.

- 1 Spur $\frac{1}{2}$ as long as labellum (a) subsp. *coriophora*
 1 Spur as long as or longer than labellum
 2 Labellum (6–)8–10 mm; flowers fragrant or inodorous (b) subsp. *fragrans*
 2 Labellum 5–6(–8) mm; flowers fetid (c) subsp. *martrinii*

(a) Subsp. *coriophora*: Galea acute. Labellum 6–8 mm, the middle lobe scarcely longer than the lateral. Spur $\frac{1}{2}$ as long as labellum. Flowers fetid. *Throughout the range of the species except for parts of the Mediterranean region.*

(b) Subsp. *fragrans* (Pollini) Sudre, *Fl. Toulous.* 187 (1907): Galea acuminate. Labellum (6–)8–10 mm, the middle lobe distinctly longer than the lateral. Spur about as long as or longer than labellum. Flowers fragrant (rarely inodorous). $2n=20, 38$. *S., S.C. & S.E. Europe.*

(c) Subsp. *martrinii* (Timb.-Lagr.) Nyman, *Consp.* 691 (1882) (incl. *O. coriophora* var. *carpetana* Willk.): Like subsp. (b) but labellum 5–6(–8) mm; spur about twice as long as labellum; flowers fetid. *W.C. Spain and Portugal.*

6. *O. sancta* L., *Syst. Nat.* ed. 10, 2: 1242 (1759). Like 5 but stem with a rosette of leaves clasping the base, with sheaths above; leaves oblong-lanceolate; lower bracts 3- to 5-veined; flowers larger, pale lilac; perianth-segments 9–12 mm, long-acuminate; labellum with lateral lobes acutely dentate to sinuately serrate, the middle lobe entire or denticulate; spur subhamate-incurved, strongly narrowed towards the apex. *Islands of Aegean region*. Cr Gr.

7. *O. ustulata* L., *Sp. Pl.* 941 (1753). Tubers subglobose or ellipsoid. Stem 12–35 cm, erect, with 2–3 basal leaves, 1–3 leaves in the lower half and sheaths above. Leaves oblong.

Spike ovoid, becoming cylindrical, dense. Bracts ovate-lanceolate, 1-veined, shorter than to about as long as ovary. All perianth-segments convergent into a galea; outer 3–3.5 mm, ovate, brownish-purple on outer surface; inner narrowly oblong, pink. Labellum 4–8 mm, longer than wide, white or pale pink with purple spots, 3-lobed; middle lobe dilated at apex, 2-lobed, rarely entire; lateral lobes oblong, obtuse. Spur cylindrical, directed downwards, $\frac{1}{2}$ – $\frac{1}{3}$ as long as ovary. $2n=42$. *From N. England and the Leningrad region southwards to N. Spain, S. Italy, Macedonia and C. Ukraine*. Al Au Be Br Bu Cz Da Ga Ge Gr He †Ho Hs Hu It Ju Po Rm Rs (?N, B, C, W, E) Su.

8. *O. tridentata* Scop., *Fl. Carn.* ed. 2, 2: 190 (1772). Tubers ellipsoid or ovoid. Stem 15–45 cm, erect, with 3–4 leaves at or above the base, and with sheaths above. Leaves oblong. Spike conical at first, becoming ovoid. Bracts lanceolate, acuminate, 1-veined, shorter than to about as long as ovary. Flowers pale violet-lilac. All perianth-segments convergent into a galea; outer ovate or ovate-oblong; inner oblong. Labellum longer than wide, with purple spots, 3-lobed; lateral lobes oblong, truncate, oblique and denticulate at apex; middle lobe twice as long as the lateral, cuneate-obovate, emarginate, with 2 obliquely square lobules, often with apiculum in sinus. Spur cylindrical, directed downwards, $\frac{1}{2}$ as long as ovary. $2n=42$. *C. & S. Europe*. Al Au Bl Bu Co Cr Cz Ga Ge Gr He Hs Hu It Ju Lu Po Rm Rs (K) Sa Si Tu.

(a) Subsp. *tridentata*: Plant often robust. Spike dense. Outer perianth-segments 6–8(–10) mm, acute. Labellum 6–9 mm, the middle lobe entire at apex. *Throughout much of the range of the species, but absent from the Mediterranean region.*

(b) Subsp. *commutata* (Tod.) Nyman, *Consp.* 691 (1882): Plant often slender. Spike lax. Outer perianth-segments 8–10 (–12) mm, acuminate. Labellum 8–10 mm, the middle lobe sometimes denticulate at apex. *S. & S.C. Europe.*

9. *O. lactea* Poiret in Lam., *Encycl. Méth. Bot.* 4: 594 (1798). Like 8 but stem 7–20 cm; flowers white or greenish-pink; labellum with squarish-oblong or linear lobes and orbicular-obovate middle lobe, denticulate at apex, usually not emarginate; spur sometimes longer than ovary. $2n=42$. *Mediterranean region and Balkan peninsula*. Bu Co Cr Ga Gr Hs It Ju Sa Si Tu.

10. *O. italica* Poiret in Lam., *op. cit.* 600 (1798) (*O. longicruris* Link). Tubers ovoid or ellipsoid. Stem 20–40 cm, erect or slightly flexuous, with 5–8 leaves in basal rosette and with sheaths above. Leaves oblong-lanceolate, with undulate margin. Spike conical at first, becoming globose or ovoid. Bracts ovate, 1-veined, $\frac{1}{4}$ – $\frac{1}{3}$ as long as ovary. Perianth-segments *c.* 10 mm, ovate-lanceolate, acuminate, all convergent into a galea; galea pale pink-lilac with purple veins. Labellum 12–16 mm, longer than wide, pink, often with purple spots, 3-lobed; lateral lobes linear, acute; middle lobe divided into 2 acute, elongate-linear lobules, with short, narrowly linear laciniae between; all segments more or less flat; base of labellum with 2 triangular lamellae, scarcely papillose. Spur cylindrical, directed downwards, $\frac{1}{2}$ as long as ovary. $2n=42$. *Mediterranean region, C. & S. Portugal*. ?Al Bl Cr Gr Hs It Ju Lu Si.

11. *O. simia* Lam., *Fl. Fr.* 3: 507 (1779). Tubers ovoid or ellipsoid. Stem 20–45 cm, erect or subflexuous, with 3–5 leaves near base or in lower half and with sheaths above. Leaves oblong-lanceolate or -ovate, flat. Spike ovoid or broadly cylindrical. Bracts ovate-lanceolate, usually $\frac{1}{2}$ as long as ovary. Perianth-segments *c.* 10 mm, ovate-lanceolate or oblong, acuminate, all convergent into a galea; galea pale greyish-pink. Labellum 14–16 mm, longer than wide, pinkish-purple with

purple spots, 3-lobed; lateral lobes linear, obtuse; middle lobe divided into 2 narrowly linear, obtuse lobules, with short teeth between; all segments subfalcate; base of labellum without lamellae, minutely papillose. Spur cylindrical, directed downwards, $\frac{1}{2}$ as long as ovary. $2n=42$. *S. & W. Europe, northwards to S. England and S.W. Hungary.* ?Al Be Br Bu Cr Ga Ge Gr He Ho Hs Hu It Ju Rm Rs (K) Tu.

12. *O. militaris* L., *Sp. Pl.* 941 (1753). Tubers ovoid or ellipsoid. Stem 20–45 cm, erect, with 3–5 leaves near base and with sheaths above, naked in the uppermost part. Leaves oblong-lanceolate or -ovate, flat. Spike conical at first, becoming cylindrical. Bracts ovate-lanceolate, often violet, usually much shorter than ovary. Perianth-segments all convergent into a galea; outer 10–15 mm, ovate or ovate-lanceolate, acute, pink; inner linear; galea whitish- or greyish-pink, with purple veins inside. Labellum 12–15 mm, longer than wide, purple, white at the base, 3-lobed; lateral lobes linear, obtuse; middle lobe narrow, transversely oblong at the apex, 2-lobed, the lobules ovate or oblong, rarely linear, with short teeth between; all segments flat, very rarely arcuate or revolute. Spur narrowly cylindrical, directed downwards, usually $\frac{1}{2}$ as long as ovary. $2n=42$. *From S. England and N.W. Russia southwards to N.C. Spain, C. Italy and Bulgaria.* Au Be Br Bu Cz Ga Ge He Ho Hs Hu It Ju Po Rm Rs (B, C, W, K, E) Su Tu.

13. *O. punctulata* Steven ex Lindley, *Gen. Sp. Orchid.* 273 (1835). Tubers ellipsoid. Stem 25–60 cm, erect, with 4–7 leaves in lower half, usually with sheaths above. Leaves oblong. Spike cylindrical, many-flowered. Bracts ovate, much shorter than ovary. Perianth-segments all convergent into a galea; outer 8–15 mm, oblong-ovate, more or less obtuse, pink; inner shorter, linear-oblong; galea yellowish-green. Labellum longer than wide, yellowish-green, often with purple spots, 3-lobed; lateral lobes oblong, truncate; middle lobe narrowed toward the base, widened and subreniform at the apex, 2-lobed, the lobules with short apiculum between. Spur broadly cylindrical, directed downwards. *E. part of Balkan peninsula; Krym.* ?Bu Gr Rs (K) Tu. (*Caucasus, S.W. Asia.*)

(a) Subsp. *punctulata*: Galea up to 8 mm. Labellum up to 10 mm; lateral lobes narrowly oblong; lobules of middle lobe broadly oblong. Spur *c.* $\frac{1}{3}$ as long as ovary. *Krym.*

(b) Subsp. *sepulchralis* (Boiss. & Heldr.) Soó, *Feddes Repert.* 24: 28 (1927) (*O. sepulchralis* Boiss. & Heldr.): Galea up to 15 mm. Labellum up to 15 mm; lateral lobes and lobules of middle lobe broadly oblong. Spur *c.* $\frac{1}{2}$ as long as ovary. *Balkan peninsula.*

14. *O. purpurea* Hudson, *Fl. Angl.* 334 (1762). Tubers ellipsoid or subglobose. Stem 30–80 cm, erect, with 3–6 leaves in the lower half, and sheaths above, naked in the uppermost part. Leaves oblong or oblong-ovate. Spike cylindrical, many-flowered. Bracts ovate-lanceolate, usually much shorter than ovary. Perianth-segments all convergent into a galea; outer 12–14 mm, ovate, acute, brownish-purple on the outside; inner somewhat shorter, linear-lanceolate; galea brownish-purple, or pink and with dense purple spots. Labellum (8–)10–15 mm, longer than wide, white or pink with purple spots, 3-lobed, rarely indistinctly lobed or subentire; lateral lobes oblong-linear, truncate; middle lobe usually obcordate, sometimes triangular, often rather orbicular, 2-lobed, the lobules usually obovate-oblong, truncate, crenate-dentate, rarely rounded or acuminate, with a rather large tooth between. Spur shortly cylindrical, directed downwards, $\frac{1}{3}$ – $\frac{1}{2}$ as long as ovary. $2n=40$, 42. *From Denmark southwards to N. Spain, Sardegna, N.*

Greece and Krym. Al Au Be Br Bu Co Cz Da Ga Ge Gr He Ho Hs Hu It Ju Po Rm Rs (W, K) Sa Tu.

15. *O. saccata* Ten., *Fl. Nap.* 1, *Prodr.* 53 (1811) (?*O. collina* Solander ex A. Russell). Tubers ovoid. Stem 12–35 cm, erect, with basal rosette of 2–4 leaves and with dense sheaths above. Leaves oblong-ovate, usually with dark spots. Spike oblong or cylindrical, often few-flowered. Bracts ovate-lanceolate, 5- to 7-veined, the lower longer than ovary. Flowers brownish- or greenish-purple. Outer perianth-segments 10–12 mm, ovate-oblong, obtuse, the 2 lateral erecto-patent or patent-deflexed, often dark olive-green, the median curved forward; inner lanceolate-oblong. Labellum *c.* 10 mm, entire, ovate or orbicular, obtuse, more or less crenulate at apex. Spur saccate-conical, directed downwards, $\frac{1}{2}$ as long as ovary. $2n=36$. *Mediterranean region.* Al Bl Cr Ga Gr It Sa Si Tu.

16. *O. patens* Desf., *Fl. Atl.* 2: 318 (1799) (*O. brevicornis* Viv.). Tubers ovoid. Stem 25–70 cm, erect, with a basal rosette or cluster of 3–5 leaves and with sheaths above. Leaves oblong-ovate to lanceolate. Spike long-cylindrical. Bracts linear-lanceolate, 5- to 7-veined, *c.* $\frac{1}{2}$ as long to as long as ovary. Flowers purple. Outer perianth-segments 8–10 mm, oblong, obtuse, greenish towards the base, the 2 lateral patent-deflexed, the median curved forward or erecto-patent; inner lanceolate-oblong. Labellum 9–10 mm, ovate, spotted, 3-lobed; lateral lobes obliquely oblong, truncate; middle lobe broadly obcordate, emarginate, with 2 truncate, crenulate lobules; base of labellum with 2 inconspicuous ridges. Spur saccate, directed downwards, shorter than labellum, *c.* $\frac{1}{2}$ as long as ovary. *W. Mediterranean region.* Bl Hs It Si.

17. *O. spitzelii* Sauter ex Koch, *Syn. Fl. Germ.* 686 (1837). Tubers ovoid. Stem 20–40 cm, erect or slightly flexuous, with a basal rosette or cluster of 2–4 leaves and with sheaths above. Leaves oblong-ovate to ovate- or oblong-lanceolate. Spike ovoid or shortly cylindrical, dense. Bracts linear-lanceolate or lanceolate, 5- to 7-veined, slightly longer than or as long as ovary. Flowers purple. Outer perianth-segments 7–10 mm, oblong-ovate, obtuse, the 2 lateral patent-deflexed, the median convergent with the ovate-lanceolate inner perianth-segments into a galea. Labellum 8 × 10 mm, broadly ovate, spotted, deeply 3-lobed; lateral lobes ovate, obtuse; middle lobe widened, obovate, emarginate, crenulate; base of labellum with 2 conspicuous ridges. Spur longer than labellum, $\frac{1}{3}$ – $\frac{2}{3}$ as long as ovary. *E. Alps, N. & C. Italy and Balkan peninsula; isolated stations in Sweden (Gotland), E. Spain, S.E. France and Kriti.* Al Au Bu Cr Ga †Ge Gr Hs It Ju Su.

(a) Subsp. *spitzelii*: Leaves dull. Outer perianth-segments brownish inside, without spots, without a pale margin. Spur conic-cylindrical, more or less horizontal. $2n=42$. *Throughout the range of the species except Kriti.*

(b) Subsp. *nitidifolia* (Teschner) Soó, *Bot. Jour Linn. Soc.* 76: 368 (1978): (*O. patens* subsp. *nitidifolia* Teschner): Leaves shining. Outer perianth-segments greenish inside, sometimes with red spots, pale pink at the margin. Spur slender but widened at base, curved or directed downwards. $2n=40$. ● *Kriti.*

18. *O. mascula* (L.) L., *Fl. Suec.* ed. 2, 310 (1755). Tubers subglobose or ellipsoid. Stem 20–60 cm, erect, with 3–5 leaves in lower half and with sheaths above. Leaves oblong-obovate to narrowly oblong, sometimes with purple spots. Spike ovoid or cylindrical. Bracts lanceolate, 1- to 3-veined, usually as long as ovary. Flowers purple to pink. Outer perianth-segments 6–8 mm, ovate or oblong-lanceolate, the 2 lateral deflexed, the median more or less erect; inner obliquely ovate-lanceolate.

Labellum 8–15 mm, somewhat longer than wide, broadly ovate to obovate, 3-lobed; lateral lobes ovate or orbicular, obtuse, crenulate towards the apex; middle lobe almost square, truncate to 2-lobed, crenulate. Spur cylindrical, patent. $2n=42$. *Much of Europe, but absent from E. Fennoscandia and the E. half of U.S.S.R.* All except Az Cr Is Rs (N, E) Sb.

- 1 Spur longer than ovary; lateral lobes of labellum deflexed (d) subsp. *olbiensis*
- 1 Spur shorter than to about as long as ovary; lateral lobes of labellum not deflexed (c) subsp. *signifera*
- 2 Perianth-segments aristate-acuminate; middle lobe of labellum up to twice as long as lateral lobes (c) subsp. *signifera*
- 2 Perianth-segments obtuse to shortly acuminate; middle lobe of labellum not more than $1\frac{1}{2}$ times as long as lateral lobes
- 3 Perianth-segments erecto-patent, obtuse; labellum with small protuberances (e) subsp. *hispanica*
- 3 Perianth-segments deflexed; labellum without protuberances
- 4 Perianth-segments obtuse, lilac, the outer with brownish-purple veins; spur shorter than ovary; spike lax, few-flowered (b) subsp. *wanjkowii*
- 4 Perianth-segments obtuse, acute or shortly acuminate, usually purple; spur usually as long as ovary; spike dense, many-flowered (a) subsp. *mascula*

(a) Subsp. *mascula* (incl. subsp. *occidentalis* O. Schwarz, var. *obtusifolia* Koch): Spike dense, many-flowered. Perianth-segments usually purple, obtuse, acute or shortly acuminate. Lateral lobes of labellum not deflexed; middle lobe up to $1\frac{1}{2}$ times as long as the lateral. Spur usually as long as ovary. *Mainly W. & W.C. Europe.*

(b) Subsp. *wanjkowii* (Wulf) Soó in R. Keller, Schlechter & Soó, *Monogr. Icon. Orchid. Eur.* 2: 170 (1932): Spike lax, few-flowered. Perianth-segments lilac, the outer with brownish-purple veins, obtuse. Lateral lobes of labellum not deflexed; middle lobe up to $1\frac{1}{2}$ times as long as the lateral. Spur shorter than ovary. ● *Krym.*

(c) Subsp. *signifera* (Vest) Soó, *Feddes Repert.* 24: 28 (1927): Spike dense, many-flowered. Perianth-segments purple, aristate-acuminate, the outer often deflexed at apex. Lateral lobes of labellum not deflexed; middle lobe up to twice as long as the lateral. Spur as long as ovary. $2n=42$. C., S. & E. Europe.

(d) Subsp. *olbiensis* (Reuter ex Grenier) Ascherson & Graebner, *Syn. Mitteleur. Fl.* 3: 703 (1907): Spike lax, few-flowered. Perianth-segments pale pink or reddish, obtuse. Lateral lobes of labellum deflexed; middle lobe up to $1\frac{1}{2}$ times as long as the lateral. Spur longer than ovary. *W. Mediterranean region.*

(e) Subsp. *hispanica* (A. & C. Nieschalk) Soó, *Jahresb. Naturw. Ver. Wuppertal* 25: 45 (1972): Spike lax, many-flowered. Perianth-segments obtuse, purple. Lateral lobes of labellum not deflexed; middle lobe slightly longer than the lateral. Spur shorter than to as long as ovary. *C. Pyrenees and mountains of S.W. Spain.*

19. *O. pallens* L., *Mantissa Alt.* 292 (1771). Tubers subglobose or ovoid, more or less stipitate. Stem 15–35 cm, erect, with leaves in lower half and sheaths above, naked in the uppermost part. Leaves oblong or oblong-obovate, gradually narrowed towards the base. Spike ovoid or oblong, dense. Bracts lanceolate, 1-veined, as long as or longer than ovary. Flowers pale yellow, with odour of *Sambucus nigra*. Outer perianth-segments 7–9 mm, ovate-oblong, obtuse, the 2 lateral deflexed, the median erect; inner perianth-segments obliquely oblong. Labellum 6–8 × 6–8 mm, suborbicular-rhombic, 3-lobed; lateral lobes orbicular, obtuse; middle lobe almost square, truncate or emarginate. Spur cylindrical, patent, slightly shorter than ovary. $2n=40$. C. & S.E. Europe, extending to the S.W. Alps and C. Appennini. Al Au Bu Cz Ga Ge Gr He Hu It Ju Po Rm Rs (K).

20. *O. provincialis* Balbis, *Mém. Acad. Sci. (Turin)* 1805–1808: 20 (1806). Tubers subglobose or ovoid. Stem 15–35 cm, erect, with 2–5 leaves at the base and sheaths above. Leaves lanceolate or oblong-lanceolate. Spike cylindrical. Bracts lanceolate, 1- to 3-veined, at least as long as ovary. Flowers pale yellow, or white with deep yellow labellum, with slight odour. Outer perianth-segments 9–11 mm, ovate-oblong, obtuse, the 2 lateral deflexed, the median erect; inner smaller, obliquely oblong. Labellum suborbicular, 3-lobed; lateral lobes rounded; middle lobe small, orbicular-truncate, scarcely longer than the lateral. Spur cylindrical, patent, as long as or longer than ovary. $2n=42$. S. Europe. Al Bu Co Cr Ga Gr He Hs It Ju Rs (K) Sa Si.

(a) Subsp. *provincialis*: Leaves usually with dark spots. Spike dense, with 5–20 flowers. Labellum 8–12 × 8–12 mm. *Almost throughout the range of the species.*

(b) Subsp. *pauciflora* (Ten.) Camus, *Monogr. Orchid. Europ.* 160 (1908): Leaves usually without spots. Spike lax, with 3–7 flowers. Labellum 13–15 × 13–15 mm. *Balkan peninsula and E. & C. Mediterranean region.*

21. *O. anatolica* Boiss., *Diagn. Pl. Or. Nov.* 1(5): 56 (1844). Tubers subglobose or ovoid, sessile or shortly stipitate. Stem 15–40 cm, erect or slightly flexuous, with a basal rosette of 2–5 leaves and with sheaths above, naked in upper part. Leaves lanceolate or oblong, gradually narrowed towards the base. Spike ovoid, lax, few-flowered. Bracts lanceolate or linear-lanceolate, 1- to 3-veined, usually somewhat shorter than ovary. Flowers purple or pale pink. Outer perianth-segments 8–10 mm, oblong-ovate or -lanceolate, obtuse, the 2 lateral patent, the median oblong-lanceolate, directed downward or recurved; inner perianth-segments oblong-ovate, subobtuse. Labellum 10–14 (–17) × 10–14 (–17) mm, obovate, 3-lobed; lateral lobes rhombic, truncate; middle lobe squarish, truncate or excised, longer than the lateral. Spur linear-conical, widened towards the mouth, longer than ovary. *Islands of S. Aegean region. Cr Gr. (S.W. Asia.)*

Plants from Kriti, with larger, greenish-violet flowers, an elongated labellum and the spur conspicuously curved upwards, have been named subsp. *sitiaca* Renz, *Feddes Repert.* 30: 100 (1932). Their status requires investigation.

22. *O. quadripunctata* Cyr. ex Ten., *Fl. Nap.* 1, *Prodr.* 53 (1811). Tubers subglobose or ovoid. Stem 10–30 cm, erect or slightly flexuous, with a basal rosette of 2–4 leaves and with sheaths above, naked in upper part. Leaves oblong-lanceolate or linear. Spike ovoid or cylindrical, many-flowered. Bracts lanceolate, 1- to 3-veined, shorter than to as long as ovary. Flowers purple-violet or pinkish. Outer perianth-segments 3–5 mm, patent, ovate, obtuse, the median oblong to ovate, recurved; inner 2–5 mm, obliquely ovate, obtuse. Labellum orbicular or rhombic, white at the base, with purple spots, 3-lobed (rarely entire); lateral lobes 4–7 mm, convergent, cruciform or divergent, oblong, ovate or rhombic; middle lobe oblong or squarish, truncate. Spur filiform, not widened towards the mouth, about as long as ovary. *Mediterranean region, from Sardegna eastwards. Al Cr Gr It Ju Sa Si.*

23. *O. laxiflora* Lam., *Fl. Fr.* 3: 504 (1779). Tubers subglobose or ellipsoid, subsessile or shortly stipitate. Stem 30–80 cm, erect or slightly flexuous, with 3–8 patent leaves. Leaves linear or lanceolate. Spike ovoid or cylindrical, lax. Bracts lanceolate, 3- to 7-veined, shorter to longer than ovary. Flowers purple. Outer perianth-segments 7–10 mm, oblong, obtuse, the 2 lateral deflexed, the median more or less erect; inner shorter, obliquely oblong. Labellum 6–12 × 8–12 mm, suborbicular, obovate or

triangular-obovate, cuneate at the base; lateral lobes oblong or oblong-orbicular, deflexed after anthesis; middle lobe entire to shallowly 2-lobed. Spur cylindrical. *W.*, *C.* & *S. Europe*, extending northwards to *Gotland* and eastwards to *S. Russia*. Al Au Be Bl Bu Co Cr Cz Ga Ge Gr He Hs Hu It Ju Lu Po Rm Rs (C, W, E) Sa Si Su Tu.

- 1 Labellum subentire or indistinctly 3-lobed; leaves 1.5–2.5 cm wide (c) subsp. *elegans*
- 1 Labellum distinctly 3-lobed; leaves usually 1–2 cm wide
- 2 Middle lobe of labellum usually shorter than the lateral; spur widened at apex (a) subsp. *laxiflora*
- 2 Middle lobe of labellum as long as or longer than the lateral; spur usually narrowed at apex or of uniform width (b) subsp. *palustris*

(a) Subsp. *laxiflora*: Labellum up to 7(–10) mm, distinctly 3-lobed; middle lobe usually shorter than the lateral. Spur widened at apex, $\frac{1}{2}$ – $\frac{2}{3}$ as long as ovary. $2n=36$. *W.* & *S. Europe*.

(b) Subsp. *palustris* (Jacq.) Bonnier & Layens, *Fl. Fr.* 311 (1894) (*O. palustris* Jacq.): Labellum up to 10 mm, distinctly 3-lobed; middle lobe at least as long as the lateral. Spur narrowed at apex or of uniform width, rarely widened at apex, slightly to much shorter than ovary. $2n=42$. *Mainly in the northern and western parts of the range of the species.*

(c) Subsp. *elegans* (Heuffel) Soó, *Notizbl. Bot. Gart. Berlin* 9: 910 (1926) (*O. pseudolaxiflora* Czerniakovska pro parte): Labellum up to 12 mm, subentire or indistinctly 3-lobed; middle lobe at least as long as the lateral. Spur narrowed at apex, shorter than to almost as long as ovary. *E.* & *E.C. Europe*.

25. *Aceras* R. Br.¹

Tubers 2, ovoid to subglobose, entire. Stem with numerous leaves. Flowers in a dense spike. Perianth-segments all connivent to form a semi-globose galea over the column. Labellum shaped like a man, with linear lateral lobes at base and a long middle lobe distally divided into two slender segments. Spur absent. Column very short. Rostellum minute. Viscidia 2, more or less globose, often coherent, in one simple bursicle.

1. *A. anthropophorum* (L.) Aiton fil., *Epit. Hort. Kew.* 281 (1814). Stem 10–40(–60) cm, glabrous, with brownish, sheathing basal scales. Lower leaves 5–12 cm, oblong to oblong-lanceolate, obtuse, canaliculate, erect, later erecto-patent, the upper smaller or bract-like. Spike narrowly cylindrical, many-flowered; bracts membranous. Flowers greenish-yellow, often with reddish streaks and margins. Outer perianth-segments 6–7 mm, ovate-lanceolate, obtuse, the inner shorter and narrower. Labellum 12–15 mm, pendent, yellowish, often reddish-brown; lateral lobes *c.* $\frac{1}{2}$ as long as the middle. $2n=42$. *Grassland, rarely scrub; calcicole. Mediterranean region and W. Europe, northwards to C. England and the Netherlands.* Be Bl Br Co Cr Ga Ge Gr He Ho Hs It Ju Lu Sa Si.

Frequently hybridizes with species of *Orchis*, especially *O. militaris*, *O. purpurea* and *O. simia*.

26. *Himantoglossum* Koch¹

Tubers 2, ovoid to subglobose, entire. Stem with numerous leaves, clothed with brownish fibres at base. Flowers in a long spike. Bracts equalling or shorter than flowers. Outer perianth-segments connivent with inner lateral to form a galea. Labellum 3-lobed, much exceeding other perianth-segments, the middle lobe much exceeding the lateral and spirally twisted. Spur present.

¹ By D. M. Moore.

Column rather short. Rostellum prominent, beak-like. Viscidium solitary, hemispherical or ellipsoid, bearing 2 pollinia bursicle simple.

Literature: H. Sundermann, *Acta Bot. Acad. Sci. Hung.* 19: 367–374 (1973).

1. *H. hircinum* (L.) Sprengel, *Syst. Veg.* 3: 694 (1826) (*Loroglossum hircinum* (L.) L. C. M. Richard, *Orchis hircina* (L.) Crantz). Stem 20–90 cm, stout, glabrous, with indistinct purplish blotches. Lower leaves 4–6, 5–15 × 3–5 cm, elliptic-oblong, obtuse, the upper smaller, acute, amplexicaul. Spike 10–30(–50) cm, cylindrical, rather lax. Flowers large, with a strong odour. Perianth-segments 7–10 mm, subequal, pale green, with purplish spots and streaks, the outer ovate, obtuse, the inner linear. Labellum 30–50 mm, whitish, with purple spots and papillose towards base, darker green and smooth distally; lateral lobes linear, acute, curled, often purplish; middle lobe *c.* 2 mm wide, lorate, somewhat undulate; spur obtuse, slightly curved downwards. $2n=?24, 36$. *Grassland, scrub and open woods; usually calcicole. S., S.C. & W. Europe, northwards to C. England and the Netherlands.* Au Be Br Bu ?Co Cr Cz Ga Ge Gr He Ho Hs Hu It Ju Rm Rs (K) ?Sa Si Tu.

- 1 Middle lobe of labellum deeply divided into 2 apical lobules *c.* 15 mm; galea ovoid (c) subsp. *caprinum*
- 1 Middle lobe of labellum shallowly emarginate or 2- to 4-dentate; galea subglobose
- 2 Lateral lobes of labellum 5–10 mm; spur *c.* 4 mm, conical (a) subsp. *hircinum*
- 2 Lateral lobes of labellum 12–20 mm; spur 7–12 mm, sub-cylindrical (b) subsp. *calcaratum*

(a) Subsp. *hircinum*: Tubers ovoid to subglobose. Spike 15- to 80-flowered; bracts linear-lanceolate. Galea subglobose. Labellum distinctly papillose towards base; lateral lobes 5–10 mm, the middle truncate and shallowly emarginate or 2- to 4-dentate; spur *c.* 4 mm, conical. *Throughout the range of the species except for parts of the south-east.*

(b) Subsp. *calcaratum* (G. Beck) Soó, *Bot. Arch. (Berlin)* 23: 90 (1928): Like subsp. (a) but lateral lobes of labellum 12–20 mm; spur 7–12 mm, subcylindrical. *S.E. Europe.*

(c) Subsp. *caprinum* (Bieb.) Sundermann, *Acta Bot. Acad. Sci. Hung.* 19: 373 (1973): Like subsp. (a) but tubers ellipsoid; spike (9–)15- to 20(–24)-flowered, with linear bracts; galea ovoid; labellum minutely papillose at base, the middle lobe deeply divided into 2 apical lobules *c.* 15 mm. ● *Krym.*

27. *Barlia* Parl.¹

Like *Himantoglossum* but bracts exceeding flowers; outer perianth-segments erecto-patent, not connivent to form a galea; labellum not more than twice as long as other perianth-segments.

1. *B. robertiana* (Loisel.) W. Greuter, *Boissiera* 13: 192 (1967) (*Aceras longibracteatum* Reichenb. fil., *Loroglossum longibracteatum* Moris ex Ardoino, *Orchis longibracteata* Biv., non F. W. Schmidt). Tubers ovoid. Stem 25–50(–80) cm, stout, glabrous. Lower leaves 8–25 × 4–10 cm, ovate to oblong or elliptical, obtuse to subacute, mucronate, the upper smaller or bract-like. Spike 8–20 cm, ovoid, becoming cylindrical, dense, many-flowered. Flowers fragrant. Outer perianth-segments 20–25 mm, elliptical to ovate, concave, obtuse, purple; inner lateral connivent, slightly shorter than the outer, linear-lanceolate, obtuse, green with purplish spots. Labellum up to 20 mm, crenulate, pinkish-violet, greenish or white, with purple spots in centre; lateral lobes linear, falcate; middle lobe $1\frac{1}{2}$ –2 times as long as the lateral, divided to *c.* $\frac{1}{2}$ -way into 2 diverging, obtuse

lobules, often with a small tooth in the sinus. Spur short, stout, conical. $2n=36$. *Grassland, open woodland and scrub. Mediterranean region, Portugal.* Bl Co Cr Ga Gr Hs It Ju Lu Sa Si.

28. *Anacamptis* L. C. M. Richard¹

Tubers usually 2, ovoid or subglobose, entire. Stem with numerous leaves. Flowers in a dense spike. Outer lateral perianth-segments patent, the outer median connivent with the inner lateral to form a galea. Labellum deeply 3-lobed, with 2 longitudinal ridges at the base. Spur long, directed downwards. Column short. Rostellum small. Viscidium solitary, transversely elongate, bearing 2 pollinia; bursicle simple.

1. *A. pyramidalis* (L.) L. C. M. Richard, *Orchid. Eur. Annot.* 33 (1817) (*Orchis pyramidalis* L.). Stem 20–60(–75) cm, slender, with 2–3 brownish, sheathing basal scales. Lower leaves 8–25 cm, linear- to oblong-lanceolate, acute, canaliculate, entire, the upper smaller, or bract-like. Spike 2–8 cm, conical to shortly cylindrical, many-flowered; bracts linear-lanceolate. Flowers purplish-red, rarely pink or white. Perianth-segments 4–6 mm, subequal, broadly lanceolate, the outer median elliptic-ovate, concave. Labellum 6–8(–9) mm, broadly cuneate, the lobes c. 4 mm, subequal, oblong, more or less entire. Spur 12–14 mm, filiform, acute. $2n=36$. *Grassland and scrub; calcicole. W., C. & S. Europe, extending northwards to the Baltic islands and eastwards to C. Ukraine.* All except Az Fa Fe Is No Rs (N, E) Sb.

Plants with small leaves and short spikes, from mountainous regions of the E. Mediterranean region, have been named var. *brachystachys* (D'Urv.) Boiss.

29. *Serapias* L.¹

Tubers 2–5, ovoid to globose, entire. Leaves narrow, canaliculate, acute, entire, usually shiny. Flowers in a spike. Outer perianth-segments ovate-lanceolate, acute, partially connate, connivent with the linear-lanceolate, acuminate inner lateral to form a galea. Labellum large, constricted into basal hypochile, with two indistinct lateral lobes, and prominent, pendent epichile. Spur absent. Column long. Rostellum small. Viscidium solitary; bursicle simple.

Literature: P. Christian, *Quart. Bull. Alp. Gard. Soc.* 43: 189–198 (1975). P. Gözl & H. R. Reinhard, *Orchidee* 28: 108–116 (1977). E. Nelson, *Monographie und Ikonographie der Orchidaceen-Gattungen Serapias, Aceras, Loriglossum, Barlia.* Chernez-Montreux. 1968.

All species appear to hybridize readily with each other and with species of *Anacamptis*, *Dactylorhiza*, *Ophrys* and *Orchis*.

- 1 Epichile of labellum usually cordate, at least as wide as hypochile
- 2 Labellum with 2 divergent ridges at base; lateral lobes of hypochile c. $\frac{1}{3}$ as wide as epichile; bracts shorter than flowers **1. cordigera**
- 2 Labellum with 2 parallel ridges at base; lateral lobes of hypochile c. $\frac{1}{2}$ as wide as epichile; bracts equalling or exceeding flowers
- 3 Epichile directed \pm downwards **3. vomeracea**
- 3 Epichile directed \pm upwards or forwards **2. neglecta**
- 1 Epichile of labellum narrowed towards base, narrower than hypochile
- 4 Bracts much exceeding flowers; lateral lobes of labellum reddish, black distally **3. vomeracea**

¹ By D. M. Moore.

- 4 Bracts equalling or slightly exceeding flowers; lateral lobes of labellum black or dark purple
- 5 Labellum with solitary black ridge at base, violet to reddish; tubers 2–5, 1 sessile, the others on stolons **4. lingua**
- 5 Labellum with 2 ridges at base, brownish-red; tubers 2(–3), sessile **5. parviflora**

1. *S. cordigera* L., *Sp. Pl.* ed. 2, 1345 (1763). Tubers 2–3, 1 sessile, the other(s) on stolons, ovoid to globose. Stem 15–50 cm, with purplish, usually spotted basal sheaths. Spike short, ovoid, dense, 2- to 10-flowered; bracts shorter than flowers, purplish. Flowers 20–35 mm; outer perianth-segments subequal, ovate-lanceolate, acuminate, free at apex, purple, rarely white; inner lateral about as long as the outer. Labellum twice as long as the other segments, with two deep purple to black divergent ridges at base; lateral lobes purplish-black, rarely pink or white, rounded, partly hidden by galea; epichile as wide as hypochile, acuminate, hairy, reddish-purple, with darker veins, rarely yellowish. $2n=36$. *Open woodland and scrub, grassland and stream-margins. S. & W. Europe, northwards to N.W. France.* Al Au Az Bl Co Ga Gr Hs It Ju Lu Sa Si Tu.

***S. azorica* Schlechter, *Feddes Rept.* 19: 44 (1923),** described from Açores (San Miguel), is said to differ from **1** in having the epichile distinctly wider than the hypochile and smaller flowers in a shorter spike. These characters are found in high altitude variants of **1** in the Açores, plants at lower elevations having larger flowers; they do not merit formal recognition above varietal status.

2. *S. neglecta* De Not., *Rept. Fl. Ligust.* 423 (1844). Tubers 2, sessile, ovoid to globose. Stem 10–30 cm, with green, unspotted basal sheaths. Spike short, dense, 2- to 8-flowered; bracts equalling or slightly exceeding flowers, green, often tinged with purple. Flowers 25–40 mm; outer perianth-segments ovate-lanceolate, acuminate, concave, free at apex, lilac; inner lateral slightly shorter than the outer. Labellum c. 3 times as long as the other segments, with two dark purple parallel ridges at base; lateral lobes rounded, red or purplish, partly hidden by galea; epichile as wide as hypochile, cordate, acuminate, hairy, pale to deep yellow, rarely orange. *Damp grassland, on sandy soils, usually coastal. C. Mediterranean region.* Co Ga Gr It Ju Sa ?Si.

3. *S. vomeracea* (Burm.) Briq., *Prodr. Fl. Corse* 1: 378 (1910) (*S. longipetala* (Ten.) Pollini, *S. pseudocordigera* Moric.). Tubers 2, ovoid, sessile. Stem (5–)10–55 cm, with green, unspotted basal sheaths. Spike 2- to 10-flowered; bracts pale red, with darker veins. Flowers 15–30 mm; perianth-segments subequal, pale red, with darker veins, the outer lanceolate, acuminate, free at apex, the inner ovate-lanceolate. Labellum $1\frac{1}{2}$ times as long as the other segments, with 2 pale, slightly divergent ridges at base; lateral lobes rounded, sometimes erect, reddish, black distally, partly hidden by galea; epichile triangular-lanceolate, acute, narrowed at base, narrower than hypochile, hairy, reddish or brownish, rarely white. $2n=36$. *Woodland, scrub and grassland. S. Europe.* Al Bl Bu Co Cr Ga Gr He Hs It Ju Lu Sa Si Tu.

(a) Subsp. *vomeracea*: Stem up to 55 cm. Spike elongate, lax, 3- to 10-flowered. Bracts much exceeding flowers. Outer median perianth-segments directed upwards. Labellum with middle lobe 9–11 mm wide. *Throughout the range of the species except for parts of the south-east.*

(b) Subsp. *orientalis* W. Greuter, *Florist. Rep. Cretan Area* 19 (1972): Stem not more than 25(–30) cm. Spike short, rather dense, (2–)3- to 4(–6)-flowered. Bracts equalling or slightly exceeding flowers. Outer median perianth-segments horizontal.

Labellum with middle lobe 11–23 mm wide. *E. Mediterranean region.*

Plants from the E. Mediterranean region, here included in subsp. (a), have been distinguished as subsp. *laxiflora* (Soó) Gözl & Reinhard, *Orchidee* 28: 114 (1977) (*S. parviflora* subsp. *laxiflora* Soó, *S. columnae* (Ascherson & Graebner) Fleischm., *S. hellenica* Renz), on account of their shorter perianth-segments and labellum, narrower hypochile and often reflexed epichile.

4. *S. lingua* L., *Sp. Pl.* 950 (1753). Tubers 2–5, 1 sessile, the others on stolons, ovoid to subglobose. Stem 10–25(–60) cm, with green, unspotted basal sheaths. Spike elongate, 2- to 9-flowered; bracts equalling flowers, purple, rarely greenish. Flowers 15–25 mm; outer perianth-segments ovate-lanceolate, acute, concave, free at apex, violet or purple, rarely white, sometimes with greenish markings; inner lateral slightly shorter than the outer. Labellum about twice as long as the other segments, with solitary black ridge at base; lateral lobes rounded, dark purple, hidden by galea; epichile ovate-lanceolate, acuminate, narrowed at base, narrower than hypochile, sometimes directed forwards, violet to reddish, rarely yellow or white. *Damp grassland, marshes and maritime sands. Mediterranean region and S.W. Europe.* Al Bl Co Cr Ga Gr Hs It Ju Lu Sa Si.

5. *S. parviflora* Parl., *Gior. Sci. Sic.* 59: 66 (1837) (*S. occultata* Gay). Tubers 2(–3), sessile, ovoid. Stem 10–35 cm, with green, frequently spotted basal sheaths. Spike elongate, 3- to 10(–12)-flowered; bracts equalling or slightly exceeding flowers, red to reddish-green, usually with dark purple veins. Flowers 15–20 mm; perianth-segments subequal; outer linear-lanceolate, acute, free except at base, lilac; inner lateral ovate-lanceolate, greenish or reddish. Labellum about as long as the other segments, with 2 dark purple parallel ridges at base; lateral lobes rounded, sometimes erect, blackish, partly hidden by galea; epichile lanceolate, acute, narrowed at base, narrower than hypochile, brownish-red, rarely white. $2n=36$. *Grassland and maritime sands. Mediterranean region, C. & S. Portugal.* Al Bl Co Cr Ga Gr Hs It Ju Lu Sa Si Tu.

S. olbia Verguin, *Bull. Soc. Bot. Fr.* 54: 599 (1908) (*S. gregaria* Godfery), which occurs on maritime sands and lake-margins in S.E. France (Var), is probably a hybrid between 4 and 5. It has 3–4 tubers, 1 sessile, the others on stolons, a short, 2- to 6-flowered, pale violet to purple, dark-veined spike, with bracts equalling or slightly exceeding the flowers. The outer perianth-segments are as in 5 but are pale violet to purple, while the labellum is as in 5 except that it is about twice as long as the other segments and has a hairy, dull red to purple epichile.

30. *Ophrys* L.¹

Tubers 2(–3), globose or ovoid, entire. Leaves usually in a basal rosette, sometimes also present on stem. Perianth-segments more or less patent, unequal; outer oblong or ovate, obtuse; inner lateral smaller, often hairy. Labellum entire to 3-lobed, often convex and gibbous, sometimes with an apical appendage which is often deflexed, glabrous or velutinous, variably marked, with usually glabrous central area (speculum); spur absent. Rostellum minute. Viscidia in 2 simple bursicles.

Many species of *Ophrys* can cross to produce hybrids, which are often fertile, and most interspecific combinations have been reported, although generally not as often as might be expected from the frequency with which 2 or more species occur sym-

patrically. This has been attributed to the high fidelity to particular *Ophrys* species of the pollinating bees and wasps. Nevertheless, certain species, especially 1–6 and 15–20, seem to hybridize more than others and there is clear evidence that some crosses (3 × 4, 6 × 9, 15 × 16) can give rise to fertile hybrid swarms and even stabilized hybrid segregates, sometimes involving introgression, which are eco-geographically and reproductively differentiated from their parents.

Literature: H. Baumann, *Orchidee* 26: 132–140, 222–230 (1975). O. & E. Danesch, *Ophrys-Hybriden*. Bern. 1972. O. & E. Danesch, F. & K. Ehrendorfer, *Pl. Syst. Evol.* 124: 79–123 (1975). P. Gözl & H. Reinard, *Ber. Schweiz. Bot. Ges.* 85: 31–56 (1975). E. Nelson, *Gestaltwandel und Artbildung, erörtert am Beispiel der Orchidaceen Europas und der Mittelmeerlande mit einer Monographie und Ikonographie der Gattung Ophrys*. Chernet-Montreux. 1962. R. von Soó, *Acta Bot. Acad. Sci. Hung.* 5: 437–471 (1959); 16: 373–392 (1970); 18: 379–384 (1973). H. Sundermann, *Jahresb. Naturw. Ver. Wuppertal* 19: 9–17, 63–70 (1964). W. Vöth & F. Ehrendorfer, *Pl. Syst. Evol.* 124: 279–290 (1976).

- 1 Anther-connective obtuse
- 2 Inner perianth-segments white, yellowish or green
- 3 Labellum with flat margin, and a yellow, glabrous or hairy marginal zone **3. lutea**
- 3 Labellum with ± deflexed margin, and a velutinous, sometimes yellow, marginal zone
- 4 Inner perianth-segments green; labellum 13–23 mm **4. fusca**
- 4 Inner perianth-segments white to pale green; labellum 7–9 mm **5. pallida**
- 2 Inner perianth-segments purplish or blackish-violet, at least at base
- 5 Labellum deeply 3-lobed, the lateral lobes gibbous and deflexed so that the labellum appears globose-inflated **20. bombyliflora**
- 5 Labellum entire to deeply 3-lobed, the lateral lobes not gibbous or deflexed
- 6 Outer perianth-segments purplish; labellum entire, rarely slightly 3-lobed **18. tenthredinifera**
- 6 Outer perianth-segments green or yellowish; labellum distinctly 3-lobed
- 7 Inner perianth-segments linear, velutinous; middle lobe of labellum deeply emarginate or 2-lobed; speculum small, pale bluish-violet **1. insectifera**
- 7 Inner perianth-segments ovate to lanceolate, hairy; middle lobe of labellum entire or slightly emarginate; speculum large, blue, with yellow margin **2. speculum**
- 1 Anther-connective acute or acuminate
- 8 Lateral lobes of labellum with basal protuberances; speculum usually with a whitish or yellowish margin
- 9 Outer perianth-segments green
- 10 Labellum entire
- 11 Speculum without a coloured margin; inner perianth-segments at least $\frac{1}{2}$ as long as the outer **6. sphogodes**
- 11 Speculum with a whitish, yellowish or greenish margin; inner perianth-segments $\frac{1}{3}$ – $\frac{1}{2}$ as long as the outer **16. fuciflora**
- 10 Labellum 3-lobed
- 12 Lateral lobes of labellum glabrous
- 13 Speculum without a marginal zone; labellum 5–15(–17) mm **6. sphogodes**
- 13 Speculum with a white marginal zone; labellum 10–13 (–15) mm **7. spruneri**
- 12 Lateral lobes of labellum hairy
- 14 Labellum blackish-purple; speculum H-shaped, scutelliform or of small spots, white or bluish, with white margin **13. cretica**
- 14 Labellum brown; speculum scutelliform, blue or dark brownish-violet, with yellow margin **14. carmeli**
- 9 Outer perianth-segments pink or purplish

¹ By R. de Soó.

- 15 Inner perianth-segments $\frac{2}{3}$ as long as the outer; speculum crescentic, without a coloured margin **10. lunulata**
- 15 Inner perianth-segments usually up to $\frac{1}{2}$ as long as the outer; speculum not crescentic, with a whitish or yellowish margin
- 16 Labellum entire or subentire
- 17 Basal protuberances of the labellum up to 3 mm; appendage of the labellum large, 3-dentate **16. fuciflora**
- 17 Basal protuberances of the labellum short, inconspicuous; appendage of the labellum small **17. arachnitiformis**
- 16 Labellum 3-lobed
- 18 Outer perianth-segments (8-)10-15 mm; appendage of labellum long or absent; margin of speculum yellow **19. apifera**
- 18 Outer perianth-segments 8-10(-12) mm; appendage of labellum short
- 19 Inner perianth-segments $\frac{1}{2}$ as long as the outer; margin of speculum white **13. cretica**
- 19 Inner perianth-segments $\frac{1}{3}$ - $\frac{1}{2}$ as long as the outer; margin of speculum whitish or yellow **15. scolopax**
- 8 Lateral lobes of labellum without basal protuberances; speculum with or without a coloured margin
- 20 Labellum entire
- 21 Outer perianth-segments green
- 22 Speculum with whitish, greenish or yellow margin **16. fuciflora**
- 22 Speculum without a coloured margin
- 23 Labellum 5-15(-17) mm, without appendage; speculum usually H-shaped **6. sphegodes**
- 23 Labellum 10-12 mm, with appendage; speculum horseshoe-shaped, scutelliform or of 2 parallel lines **8. ferrum-equinum**
- 21 Outer perianth-segments pinkish or purplish
- 24 Speculum without coloured margin
- 25 Speculum horseshoe-shaped, scutelliform or of 2 parallel lines; labellum not curved upwards anteriorly **8. ferrum-equinum**
- 25 Speculum usually scutelliform; labellum \pm curved upwards anteriorly **9. bertolonii**
- 24 Speculum with whitish, greenish or yellow margin
- 26 Inner perianth-segments at least $\frac{1}{2}$ as long as the outer; labellum suborbicular to ovate **11. argolica**
- 26 Inner perianth-segments $\frac{1}{3}$ - $\frac{1}{2}$ as long as the outer; labellum ovate to transversely elliptical **16. fuciflora**
- 20 Labellum 3-lobed
- 27 Inner perianth-segments at least $\frac{2}{3}$ as long as the outer; speculum crescentic **10. lunulata**
- 27 Inner perianth-segments c. $\frac{1}{2}$ as long as the outer; speculum not crescentic
- 28 Inner perianth-segments glabrous or papillose
- 29 Speculum with white margin **7. sprunerii**
- 29 Speculum without white margin
- 30 Basal leaves obtuse; inner perianth-segments greenish or brownish-red; labellum usually without an appendage **6. sphegodes**
- 30 Basal leaves acute; inner perianth-segments purple or pink; labellum with an appendage **8. ferrum-equinum**
- 28 Inner perianth-segments hairy
- 31 Speculum of 2 thick, comma-shaped lines and 2 spots **12. reinholdii**
- 31 Speculum H-shaped (the cross-line sometimes absent), scutelliform or of 1 line or spot
- 32 Outer perianth-segments purple or lilac; speculum with white margin **11. argolica**
- 32 Outer perianth-segments green or greenish-purple
- 33 Speculum without white margin **6. sphegodes**
- 33 Speculum with white margin **7. sprunerii**

1. O. insectifera L., *Sp. Pl.* 948 (1753) (*O. muscifera* Hudson). Plant up to 60 cm. Basal leaves linear-lanceolate, erect, acute. Spike 3- to 14-flowered, lax. Outer perianth-segments 6-8 mm, oblong-ovate, green, glabrous, the lateral patent, the median

suberect, more or less concave; inner perianth-segments 4-6 mm, linear, revolute, blackish-violet, velutinous. Labellum 9-10 x 6-7 mm, deflexed, blackish-violet or -purple, paler at apex, papillose, 3-lobed, not globose-inflated; lateral lobes patent, obtuse; middle lobe flat or concave, ovate, wider and longer than the lateral, deeply emarginate or 2-lobed, sometimes with a tooth in the sinus; speculum reniform or square, shiny, pale blue-violet. Connective obtuse. $2n=36$. ● *Much of Europe, but absent from the south-east and rare in the extreme south and much of the north.* Au Be Br Cz Da Fe Ga Ge Hb He Ho Hs Hu It Ju No Po Rm Rs (N, B, C, W) Su.

2. O. speculum Link in Schrader, *Jour. für die Bot.* 1799(2): 324 (1800). Basal leaves oblong, subobovate, the cauline lanceolate, acute. Outer perianth-segments 6-8 mm, oblong-ovate, green or yellowish, often brown-striate, glabrous, the lateral patent, the median erect, cucullate; inner $\frac{1}{4}$ - $\frac{1}{2}$ as long as the outer, ovate to lanceolate, dark purple, rarely greenish, densely hairy. Labellum up to 13 x 15 mm, dark purple, villous with coloured hairs at margin, deeply 3-lobed, not globose-inflated; lateral lobes patent, obtuse, yellowish in the centre and with darker lines; middle lobe often slightly emarginate, with revolute margin, rarely convex; speculum large, shiny, blue, yellow at margin, sometimes 3-lobed. Connective obtuse. $2n=36$. *Mediterranean region, C. & S. Portugal.* Bl Co ?Cr Ga Gr Hs It Lu Sa Si Tu.

(a) Subsp. **speculum**: Stem not more than 35 cm. Inflorescence 2- to 10-flowered. Inner perianth-segments dark purple. Middle lobe of labellum orbicular-triangular or suborbicular; speculum with wide, yellow margin, the marginal hairs brown or blackish-purple. *Throughout the range of the species.*

(b) Subsp. **lusitanica** O. & A. Danesch, *Orchidee* 20: 21 (1969): Stem up to 50 cm. Inflorescence up to 15-flowered. Inner perianth-segments greenish. Middle lobe of labellum oblong; speculum with narrow, deep yellow margin, the marginal hairs dark yellow or brownish-red. ● *W.C. Portugal.*

3. O. lutea (Gouan) Cav., *Icon. Descr.* 2: 46 (1793). Plant 7-30 cm. Basal leaves ovate, acute. Spike 2- to 7-flowered, lax. Perianth-segments subglabrous or papillose at margin; outer c. 10 mm, oblong-ovate, obtuse, green, the lateral sub-patent, the median incurved; inner perianth-segments $\frac{1}{3}$ - $\frac{1}{2}$ as long as the outer, linear-oblong, green or yellowish. Labellum 9-18 mm, suborbicular or oblong, with flat margin, dark brown or blackish-purple, with yellow or greenish marginal zone, papillose, 3-lobed, not globose-inflated; lateral lobes ovate, obtuse; middle lobe reniform, often incised; speculum entire or 2-lobed, grey or bluish-grey. Connective obtuse. *Mediterranean region, C. & S. Portugal.* Bl Co Cr Ga Gr Hs It Ju Lu Sa Si Tu.

1 Labellum 12-18 mm, the lobes subequal or the middle lobe larger, with marginal zone 2-3 mm wide (a) subsp. **lutea**

1 Labellum 9-12 mm, the lobes subequal or the middle lobe smaller, with marginal zone 1-2 mm wide

2 Marginal zone of labellum with blackish-purple hairs, the rest of the labellum (except the speculum) blackish-purple

(c) subsp. **melena**

2 Marginal zone of labellum glabrous, the rest of the labellum (except the speculum) dark brown (b) subsp. **murbeckii**

(a) Subsp. **lutea**: Labellum 12-18 mm, the lobes subequal or the middle lobe larger, with glabrous marginal zone 2-3 mm wide, papillose (except the marginal zone and speculum); speculum 2-lobed, narrow in relation to labellum. $2n=36$. *C. & E. Mediterranean region.*

(b) Subsp. **murbeckii** (Fleischm.) Soó, *Feddes Repert.* 24: 25 (1927): Labellum 9-12 mm, the lobes subequal or the middle lobe smaller, with glabrous marginal zone 1-2 mm wide, dark brown (except the marginal zone and speculum); speculum entire or

2-lobed, wide in relation to labellum. *Throughout most of the range of the species.*

(c) Subsp. *melena* Renz, *Feddes Repert.* 25: 264 (1928): Labellum 9–12 mm, the lobes subequal or the middle lobe smaller, with marginal zone 1–2 mm wide with blackish-purple hairs, blackish-purple (except the marginal zone and speculum); speculum 2-lobed, wide in relation to labellum. ● *Greece.*

Subsp. (b) and (c) are perhaps of hybrid origin.

4. *O. fusca* Link in Schrader, *Jour. für die Bot.* 1799(2): 324 (1800). Plant 10–40 cm. Basal leaves oblong-lanceolate, obtuse, mucronate, the cauline 1–2, lanceolate, acute. Spike 1- to 9-flowered, lax. Perianth-segments subglabrous or papillose; outer 9–11 mm, oblong or ovate, green, rarely pinkish; inner perianth-segments 6–8 mm, at least $\frac{1}{2}$ as long as outer, linear to linear-oblong, green. Labellum 13–23 × 9–21 mm, with margins more or less deflexed, obovate, purplish or yellowish-brown, velutinous, 3-lobed with broadly rounded lobes, not globose-inflated; lateral lobes oblong-ovate, obtuse; middle lobe reniform, obcordate or ovate, usually emarginate; speculum 2-partite, blue, bluish-violet or brown, often with white or yellow margin, sometimes with white or pale yellow lines. Connective obtuse. $2n=c$. 73. *Mediterranean region, C. & S. Portugal; S.W. Romania.* Al Bl Co Cr Ga Gr Hs It Ju Lu Rm Sa Si Tu.

- 1 Lateral lobes of labellum almost as long as the middle; inner perianth-segments as long as the outer (a) subsp. *durieui*
- 1 Lateral lobes of labellum very short; inner perianth-segments $\frac{1}{2}$ – $\frac{2}{3}$ as long as the outer
- 2 Labellum geniculately deflexed at base; speculum entire, with white margin and with ω -shaped mark (d) subsp. *omegaifera*
- 2 Labellum horizontal or inclined downwards, incised at base; speculum usually divided into 2 parts without ω -shaped mark
- 3 Labellum not more than 15 × 12 mm, with narrow yellow margin; speculum greyish-blue or bluish-violet (b) subsp. *fusca*
- 3 Labellum up to 25 × 21 mm, without yellow margin; speculum shining blue (c) subsp. *iricolor*

(a) Subsp. *durieui* (Reichenb. fil.) Soó, *Feddes Repert.* 24: 26 (1927): Flowers 1–2(4). Inner perianth-segments papillose. Labellum up to 30 mm, purplish-violet or dark red, long-villous-velutinous, more or less concave in the middle, curved upwards at the apex. Speculum shining, metallic blue. *S. Spain.*

(b) Subsp. *fusca*: Flowers 3–8. Inner perianth-segments subglabrous. Labellum 13–15 × 9–12 mm. Speculum greyish-blue or bluish-violet. $2n=72(76)$. *Throughout most of the range of the species.*

(c) Subsp. *iricolor* (Desf.) O. Schwarz, *Feddes Repert.* 36: 77 (1934) (*O. fleischmannii* auct., non Hayek): Flowers 1–4. Inner perianth-segments often papillose. Labellum up to 25 × 21 mm. Speculum shining blue. $2n=36$. *C. & E. Mediterranean region.*

(d) Subsp. *omegaifera* (Fleischm.) E. Nelson, *Gestaltwandel* 209 (1962) (*O. omegaifera* Fleischm., *O. fleischmannii* Hayek): Flowers 2–6. Inner perianth-segments papillose. Labellum up to 20 mm, without yellow margin. Speculum red-brown to brownish-violet, with white or pale yellow margin, and with ω -shaped mark. *C. & E. Mediterranean region.*

The distribution of subsp. (c) is uncertain because of confusion, perhaps resulting from introgressive hybridization, with subsp. (b) in the W. Mediterranean region.

5. *O. pallida* Rafin., *Caratt.* 87 (1810). Like 4 but inner perianth-segments white to pale greenish, papillose; labellum 7–9 mm, geniculately deflexed at base, the middle lobe reniform

or ovate, sometimes emarginate or shallowly 3-lobed. *Sicilia.* ?Sa Si.

6. *O. sphegodes* Miller, *Gard. Dict.* ed. 8, no. 8 (1768) (*O. aranifera* Hudson). Plant 10–45 cm. Basal leaves ovate-lanceolate, obtuse, usually mucronate. Spike 2- to 10-flowered, lax. Perianth-segments glabrous, rarely papillose; outer 6–10(–12) mm, oblong-ovate to -lanceolate, more or less obtuse, green, rarely purplish or whitish, the median usually narrower; inner perianth-segments 4–8 mm, at least $\frac{1}{2}$ as long as the outer and usually narrower, oblong-triangular to -lanceolate, green, greenish-purple or brownish-red, 1- to 3-veined, usually with undulate margin. Labellum with margins deflexed or flattened, orbicular to ovate, velutinous, rarely with a small appendage, not globose-inflated; speculum usually H-shaped (the cross-line sometimes absent), rarely scutelliform, bluish-violet or blackish-purple. Connective acute. *W., C. & S. Europe, northwards to S. England and C. Germany and eastwards to Krym.* Al Au Be Bl Br Bu Co Cr Cz Ga Ge Gr He Hs Hu It Ju Lu Rm Rs (K) Sa Si Tu.

- 1 Labellum with velutinous speculum (g) subsp. *helenae*
- 1 Labellum with glabrous speculum
- 2 Labellum wider than long (l) subsp. *aesculapii*
- 2 Labellum at least as long as wide
- 3 Labellum 8–15(–17) × 8–14(–17) mm, blackish-brown or -purple, with large basal protuberances
- 4 Inner perianth-segments wide, \pm obtuse; labellum densely long-villous-velutinous; speculum H-shaped or U-shaped, rarely scutelliform, often extending to the protuberances (d) subsp. *atrata*
- 4 Inner perianth-segments narrow, rather acute; labellum shortly velutinous; speculum H-shaped or with the cross-line absent (e) subsp. *mammosa*
- 3 Labellum 5–12 × 5–12 mm, pale to dark brown, rarely blackish-brown or yellowish, with or without basal protuberances
- 5 Labellum (8–)10–12 × 8–12 mm (a) subsp. *sphegodes*
- 5 Labellum 5–10 × 5–10 mm
- 6 Flowers usually 6–10, rarely fewer; inner perianth-segments 1-veined (b) subsp. *litigiosa*
- 6 Flowers usually 3–5, rarely more; inner perianth-segments 3-veined (c) subsp. *tommasinii*

(a) Subsp. *sphegodes*: Outer perianth-segments green. Labellum (8–)10–12 × 8–12 mm, with or without large basal protuberances, brown or dark brown, velutinous, entire, rarely indistinctly 3-lobed; speculum usually H-shaped, rarely with the cross line absent, glabrous. $2n=36$. *Throughout the range of the species except parts of the south-east.*

(b) Subsp. *litigiosa* (Camus) Becherer, *Beitr. Pflanzengeogr. Nordschweiz* 46 (1925) (*O. litigiosa* Camus): Flowers usually 6–10, rarely fewer. Inner perianth-segments 1-veined. Labellum 5–8 × 5–8 mm, usually without basal protuberances, pale- or blackish-brown, rarely yellowish, papillose-velutinous, entire, rarely indistinctly 3-lobed; speculum irregularly H-shaped or scutelliform, glabrous. $2n=36$. *S. & S.C. Europe.*

(c) Subsp. *tommasinii* (Vis.) Soó, *Acta Bot. Acad. Sci. Hung.* 16: 382 (1970) (*O. tommasinii* Vis.): Flowers usually 3–5, rarely more. Inner perianth-segments 3-veined. Labellum 6–10 × 6–10 mm, with basal protuberances, pale brown, papillose-subvillous; speculum U-shaped, scutelliform, glabrous. ● *Coasts of W. Yugoslavia and N.W. Greece.*

(d) Subsp. *atrata* (Lindley) E. Mayer, *Sezn. Prapr. Cvet. Slov.* 387 (1952) (*O. atrata* Lindley): Inner perianth-segments wide, more or less obtuse. Labellum 8–12(–13) × 8–12(–13) mm, with large basal protuberances, blackish-brown or -purple, densely long-villous-velutinous, often emarginate; speculum H-shaped or U-shaped, rarely scutelliform, often extending to the protuber-

ances, glabrous. $2n=36$. ● *Mediterranean region, Portugal; ?Bulgaria.*

(e) Subsp. **mammosa** (Desf.) Soó ex E. Nelson, *Gestaltwandel* 184 (1962) (*O. taurica* (Aggeenko) Nevski): Inner perianth-segments narrow, rather acute. Labellum 10–15(–17) × 8–14(–17) mm, with large basal protuberances, blackish-brown or -purple, shortly velutinous, entire, rarely indistinctly 3-lobed; speculum H-shaped or with the cross-line absent, glabrous. *S.E. Europe.*

(f) Subsp. **aesculapii** (Renz) Soó, *Acta Bot. Acad. Sci. Hung.* 16: 383 (1970): Perianth-segments pale olive-green. Labellum 10–14 × 12–18 mm, entire, without basal protuberances, blackish-brown, shortly velutinous, with wide, glabrous yellowish margin; speculum H-shaped, glabrous. *Greece.*

(g) Subsp. **helenae** (Renz) Soó & D. Moresby Moore, *Bot. Jour. Linn. Soc.* 76: 367 (1978) (*O. helenae* Renz): Perianth-segments dark green. Labellum 11–13 × 16–19 mm, without basal protuberances, brown to reddish or violet, irregularly spotted, shortly velutinous; speculum indistinct, velutinous. ● *N.W. Greece.*

Variants of 6 from Greece and Kriti with the labellum more or less 3-lobed, without or with only small basal protuberances, blackish-brown or purple and often with a white or yellowish margin, and speculum variously shaped, have been called subsp. **parnassica** (Vierh.) Soó, *Acta Bot. Acad. Sci. Hung.* 5: 444 (1959) (*O. sphaciotica* Fleischm.); they are intermediate between 6 and 7 and are probably of hybrid origin. *O. doerfleri* Fleischm., *Österr. Bot. Zeitschr.* 74: 185 (1925), is perhaps of similar origin.

Variants of subsp. (a) from France, Spain and Italy, with pinkish outer perianth-segments, the labellum up to 12 × 16 mm and a large speculum which often covers the labellum, have been named *O. garganica* (E. Nelson) O. & E. Danesch, *Pl. Syst. Evol.* 124: 94 (1975). Variants from S. Italy and Sicilia, with a dense 10- to 15-flowered spike, white to violet outer perianth-segments and the labellum up to 15 mm, have been named subsp. **sicula** E. Nelson ex Soó, *Bot. Jour. Linn. Soc.* 76: 367 (1978).

7. **O. spruneri** Nyman, *Consp.* 698 (1882). Plant 10–30 cm. Basal leaves 3–6, oblong-lanceolate, acute. Spike 2- to 4-flowered, lax. Perianth-segments green or greenish-purple, rarely white, pink or purple; outer 8–10 mm, oblong-ovate to -lanceolate; inner 5–8 mm, at least $\frac{1}{2}$ as long as the outer, lanceolate or oblong, subobtusely to acute, glabrous or hairy. Labellum 10–13(–15) × 10–13(–15) mm, orbicular, ovate or obovate, blackish-brown or -purple, 3-lobed, very rarely subentire; lateral lobes ovate, convex, deflexed, rarely almost patent; middle lobe much longer than the lateral, semi-orbicular, reniform or oblong, the margin usually strongly deflexed; speculum bluish-violet, with white margin. Connective acute. ● *Greece and Aegean region; Sicilia.* Cr Gr Si.

(a) Subsp. **spruneri**: Outer perianth-segments green or greenish-purple. Labellum with an appendage, without or with small basal protuberances; lateral lobes deflexed; speculum H-shaped, or the cross-line missing. *Greece and Aegean region.*

(b) Subsp. **panormitana** (Tod.) Soó, *Acta Bot. Acad. Sci. Hung.* 16: 383 (1970): Outer perianth-segments white or pale pink. Labellum without an appendage, usually without basal protuberances; lateral lobes scarcely deflexed; speculum H-shaped. *Sicilia.*

Subsp. (b) is transitional to 6(a).

8. **O. ferrum-equinum** Desf., *Ann. Mus. Hist. Nat. (Paris)* 10: 226 (1807). Plant 10–35 cm. Basal leaves lanceolate, acute, the cauline 1–2, similar or smaller. Spike 2- to 5-flowered, lax. Outer perianth-segments 8–10 mm, oblong-ovate to orbicular, purple, pink, green, greenish-purple or whitish; inner 6–8 mm,

at least $\frac{1}{2}$ as long as the outer, linear-lanceolate, purple or pink, glabrous. Labellum 10–12 × 8–12 mm, orbicular to obovate, velutinous, without basal protuberances, with an appendage, dark purple, rarely brown; speculum horseshoe-shaped, scutelliform, or of 2 parallel lines, in the anterior part of the labellum. Connective acute. *Greece and Aegean region.* ?Al Gr.

(a) Subsp. **ferrum-equinum**: Outer perianth-segments purple or pink, rarely greenish. Labellum entire, rarely indistinctly 3-lobed. *Throughout the range of the species.*

(b) Subsp. **gottfriediana** (Renz) E. Nelson, *Gestaltwandel* 141 (1962) (*O. gottfriediana* Renz): Outer perianth-segments green, greenish-purple or whitish. Labellum 3-lobed, rarely indistinctly so. ● *N.W. Greece (Ionioi Nisoi).*

Subsp. (b) is transitional to 7.

9. **O. bertolonii** Moretti, *Pl. Ital.* 6: 9 (1823) (incl. *O. flavicans* Vis.). Plant 25–45 cm. Basal leaves lanceolate, acute. Spike 3- to 8-flowered. Outer perianth-segments 10–12 mm, broadly ovate or oblong-ovate, lilac or purple; inner 6–8 mm, at least $\frac{1}{2}$ as long as the outer, linear-lanceolate to lanceolate, purple or lilac, glabrous or papillose, with flat margin. Labellum 10–15 × 10–13 mm, orbicular- to oblong-ovate, entire, rarely indistinctly 3-lobed, curved upwards and more or less concave anteriorly, blackish-purple, villous-velutinous with a very narrow, glabrous marginal zone, without basal protuberances, with a conspicuous appendage, deeply emarginate at apex; speculum usually scutelliform, violet. Connective acute. $2n=36$. ● *W. & C. Mediterranean region.* Al ?Bl Co Ga Hs It Ju ?Sa Si.

Plants of hybrid origin between 9 and 6(d) have been called **O. bertoloniformis** O. & E. Danesch, *Orchidee* 22: 117 (1971); they differ from 9 chiefly in being 15–25 cm high, in having both the inner and outer perianth-segments greenish and more or less undulate, and the labellum 10–12 × 9–11 mm, scarcely curved upwards and without or with an inconspicuous appendage. They have $2n=36$. Because of frequent confusion between this and 9 the distribution given above refers to both these taxa. *O. bertoloniformis* is probably the more widespread, and 9 is perhaps confined to the E. part of the range. *O. promontorii* O. & E. Danesch, *op. cit.* 258 (1971), described from S.E. Italy (Mte Gargano), is probably of hybrid origin between 9 and *O. garganica* (vide 6). It has $2n=36, 37, 38$.

10. **O. lunulata** Parl., *Gior. Sci. Sic.* 62: 4 (1838). Plant up to 25 cm. Basal leaves 4–6, oblong-lanceolate. Spike 4- to 7-flowered, lax. Perianth-segments lilac, rarely whitish; outer 10–13 mm, ovate to oblong, obtuse, the lateral close to the labellum and deflexed-patent; inner $\frac{2}{3}$ as long as or almost as long as the outer, linear-lanceolate. Labellum 10–12 mm, ovate, 3-lobed, the lateral lobes narrow, without or with small basal protuberances, strongly deflexed, the middle lobe with strongly deflexed margin, brown, rarely blackish-purple, with glabrous, greenish or yellow marginal zone, emarginate at apex, with small appendage; speculum crescentic, whitish or lilac to brown in the centre. Connective acute. ● *Islands of C. Mediterranean region.* It Sa Si.

11. **O. argolica** Fleischm., *Verh. Zool.-Bot. Ges. Wien* 69: 295 (1919). Plant 15–35 cm. Basal leaves lanceolate, acute, the cauline similar, smaller. Spike (1–)4- to 6-flowered. Outer perianth-segments 8–12 mm, oblong to oblong-ovate, purple or lilac, rarely whitish or greenish, the median sometimes linear-lanceolate; inner at least $\frac{1}{2}$ as long as the outer, lanceolate, ovate or triangular, purple or lilac, velutinous. Labellum 10–12 mm, entire and suborbicular to ovate, or 3-lobed, slightly convex or flat, reddish-brown or brown, papillose, with a small appendage,

the margin often with a narrow, glabrous yellowish zone; lateral lobes, if present, without basal protuberances, white- or yellowish-hairy; speculum small, semicircular, transversely linear, H-shaped, horseshoe-shaped or of a single line or spot, violet, with white margin. Connective shortly acuminate. ● *S. Greece, Karpathos.* Cr Gr.

12. *O. reinholdii* Spruner ex Fleischm., *Österr. Bot. Zeitschr.* 57: 5, 74 (1908). Like **11** but outer perianth-segments lilac, whitish, green or greenish-purple, the inner green, brown or lilac; labellum distinctly 3-lobed, brown or blackish-purple, with narrow, strongly deflexed lateral lobes; speculum of 2 thick, comma-shaped lines or of 2 separate or connected spots, white or pale violet; connective acute. *Greece and N. Aegean region.* Gr. (*Anatolia, Syria.*)

13. *O. cretica* (Vierh.) E. Nelson, *Gestaltwandel* 146 (1962). Plant 20–30 cm. Basal leaves oblong-lanceolate, acute. Spike 3- to 8-flowered. Perianth-segments green, purplish or brown; outer 8–10 mm, ovate to oblong; inner $\frac{1}{2}$ as long as the outer, linear-lanceolate to triangular, velutinous. Labellum 11–14 mm, distinctly 3-lobed, blackish-purple, with strongly deflexed margins; lateral lobes elliptical, convex, with small basal protuberances, purplish- or blackish-hairy; middle lobe oblong to ovate, with small appendage; speculum of 2 sometimes interconnected lines and H-shaped or scutelliform, or of small spots, white, or bluish with white margin. Connective acute. ● *S. Greece and S. Aegean region.* Cr Gr.

14. *O. carmeli* Fleischm. & Bornm., *Ann. Naturh. Mus. (Wien)* 36: 7 (1923). Plant 15–35 cm. Basal leaves linear-lanceolate. Spike (3–)5- to 8-flowered, rather dense. Outer perianth-segments 6–10 mm, ovate, green, rarely whitish, the median usually incurved; inner $\frac{1}{2}$ as long as the outer, lanceolate or triangular, green, rarely whitish or purplish, hairy. Labellum 6–10 mm, ovate or oblong, widest towards the apex, distinctly 3-lobed, rarely subentire, with an appendage, strongly deflexed, brown or dark brown, papillose with glabrous marginal zone; lateral lobes patent or deflexed, elliptical, dark brownish-hairy, with basal protuberances c. 3 mm; speculum scutelliform, blue or dark brownish-violet, with yellow margin, often brown-velutinous with glabrous margin. Connective acute. *Greece, Turkey-in-Europe.* Gr Tu.

15. *O. scolopax* Cav., *Icon. Descr.* 2: 46 (1793). Plant 15–45 cm. Basal leaves lanceolate, acute. Spike 3- to 12-flowered. Perianth-segments pink or purplish-violet, rarely whitish or greenish; outer 8–10(–12) mm, oblong-ovate, glabrous, the median not incurved; inner $\frac{1}{2}$ as long as the outer, lanceolate or triangular, hairy. Labellum suborbicular, ovate, or obovate, distinctly 3-lobed, rarely subentire, widest at or below the middle, strongly deflexed, brownish- or blackish-purple, velutinous, glabrous towards the margin, with an often 3-dentate appendage; lateral lobes ovate to triangular, deflexed, gibbous, dark brownish-hairy; speculum scutelliform, annular or H-shaped, large, violet or blue with yellow or whitish margin, the spots often somewhat dark brownish-velutinous with glabrous margin. Connective acute. *S. Europe.* Al Bl Bu Co Cr Ga Gr Hs Hu It Ju Lu Rm Rs (K) Sa ?Si Tu.

- 1 Labellum 13–15 mm (d) subsp. *heldreichii*
- 1 Labellum 8–12 mm
- 2 Middle lobe of labellum wider than long, with wide marginal zone (b) subsp. *oestrifera*
- 2 Middle lobe of labellum as long as or longer than wide
- 3 Middle lobe of labellum with papillose, very narrow,

- glabrous marginal zone; basal protuberances small, wide, obtuse (a) subsp. *scolopax*
- 3 Middle lobe of labellum with wide, glabrous marginal zone; basal protuberances up to 10 mm, conical, acute (c) subsp. *cornuta*

(a) Subsp. *scolopax*: Labellum 8–12 mm; lateral lobes with small, wide, obtuse basal protuberances; middle lobe suborbicular, ovate or obovate, as long as or longer than wide, with papillose, very narrow, glabrous marginal zone. $2n=36$ (38, 40). *W. & C. Mediterranean region, Portugal.*

(b) Subsp. *oestrifera* (Bieb.) Soó, *Acta Bot. Acad. Sci. Hung.* 16: 386 (1970): Labellum 8–12 mm; lateral lobes with small or medium basal protuberances; middle lobe ovate-rectangular, wider than long, with wide, glabrous marginal zone. *Krym. (Caucasus.)*

(c) Subsp. *cornuta* (Steven) Camus, *Monogr. Orchid. Eur.* 270 (1908): Labellum 8–12 mm; lateral lobes with conical, acute, basal protuberances up to 10 mm; middle lobe suborbicular, ovate or obovate, as long as or longer than wide, with wide, glabrous marginal zone. $2n=36$. *E.C. & S.E. Europe and C. Mediterranean region.*

(d) Subsp. *heldreichii* (Schlechter) E. Nelson, *Gestaltwandel* 160 (1962) (*O. oestrifera* subsp. *heldreichii* (Schlechter) Hayek): Labellum 13–15 mm; lateral lobes with basal protuberances up to 5 mm; middle lobe suborbicular to elliptic-ovate, as long as or longer than wide, with wide, glabrous marginal zone. *Greece and Aegean region; ?S.E. Italy.*

16. *O. fuciflora* (F. W. Schmidt) Moench, *Meth., Suppl.* 311 (1802) (*Orchis fuciflora* F. W. Schmidt, *Ophrys arachnites* (L.) Reichard). Plant 15–55 cm. Basal leaves ovate-oblong, obtuse, the cauline narrower, acute. Spike 2- to 6(–14)-flowered, lax. Perianth-segments pink, pale pinkish, whitish or green; outer 9–13 mm, ovate-oblong, obtuse, glabrous, the median concave; inner triangular, rarely linear-lanceolate, hairy. Labellum 9–13 (–16) mm, ovate, suborbicular or transversely elliptical, entire, rarely 3-lobed, brown or dark brownish-purple, velutinous, papillose in the centre, sometimes with a yellowish marginal zone, usually with basal protuberances up to 3 mm, with a wide, often 3-dentate, usually upcurved appendage; speculum variable, large. Connective acute. $2n=36$. *S., W. & C. Europe, northwards to S. England and C. Czechoslovakia.* Al Au Be Bl Br Co Cr Cz Ga Ge Gr He Hs Hu It Ju Rm Sa ?Si Tu.

- 1 Perianth-segments green; labellum with very indistinct basal protuberances
- 2 Inner perianth-segments $\frac{1}{2}$ – $\frac{1}{3}$ as long as the outer (c) subsp. *oxyrrhynchos*
- 2 Inner perianth-segments at least $\frac{1}{2}$ as long as the outer (d) subsp. *exaltata*
- 1 Perianth-segments pink, pale purplish or whitish; labellum with distinct basal protuberances
- 3 Speculum scutelliform, brown or violet-brown, with wide whitish or yellowish margin; inner perianth-segments $\frac{1}{2}$ as long as the outer (b) subsp. *candica*
- 3 Speculum variable, violet or blue, with narrow yellow or greenish margin; inner perianth-segments usually $\frac{1}{2}$ – $\frac{1}{3}$ as long as the outer (a) subsp. *fuciflora*

(a) Subsp. *fuciflora*: Perianth-segments pink, pale purplish or whitish, the inner usually $\frac{1}{2}$ – $\frac{1}{3}$ as long as the outer. Labellum with distinct basal protuberances; speculum violet or blue, with narrow, yellow or greenish margin. $2n=36$ (37, 38). *Throughout the range of the species.*

(b) Subsp. *candica* E. Nelson ex Soó, *Bot. Jour. Linn. Soc.* 76: 368 (1978): Perianth-segments pink, pale purplish or whitish, the inner $\frac{1}{2}$ as long as the outer. Labellum with distinct basal pro-

tubercles; speculum scutelliform, brown or violet-brown, with wide, whitish or yellowish margin. *Greece, Kriti; S.E. Italy.*

(c) Subsp. *oxyrrhynchos* (Tod.) Soó, *Feddes Repert.* 24: 26 (1927): Perianth-segments green, the inner $\frac{1}{3}$ – $\frac{1}{2}$ as long as the outer. Labellum with indistinct basal protuberances; speculum often reduced or H-shaped, brownish, with yellowish margin.

● *Sicilia, Sardegna.*

(d) Subsp. *exaltata* (Ten.) E. Nelson, *Gestaltwandel* 169 (1962): Perianth-segments green, the inner $\frac{1}{3}$ – $\frac{1}{2}$ (– $\frac{2}{3}$) as long as the outer. Labellum with indistinct basal protuberances, with a usually deflexed appendage; speculum reduced, often H-shaped or of lines or spots. ● *C. Mediterranean region.*

A variant from S.E. Italy (Monte Gargano), with the outer perianth-segments white or pink, the inner red, and the labellum dark brown or brownish-purple with a minute appendage, has been named subsp. *sundermannii* Soó, *Acta Bot. Acad. Sci. Hung.* 16: 392 (1970). It has $2n=36$.

Variants from S. Italy, with flowers 25–35 mm and inner perianth-segments $\frac{1}{2}$ – $\frac{3}{4}$ as long as the outer, have been named subsp. *apulica* O. & E. Danesch, *Orchidee* 21: 20 (1970).

17. *O. arachnitiformis* Gren. & Philippe, *Mém. Soc. Émul. Doubs* ser. 3, 4: 399 (1859). Plant 15–40 cm. Basal leaves ovate-lanceolate, obtuse, the cauline bract-like. Spike 2- to 9-flowered, lax. Perianth-segments usually pink, rarely purplish-violet, whitish or pale greenish; lateral outer perianth-segments c. 10 mm, oblong-ovate, obtuse, the median outer oblong-elliptical or -lanceolate; inner perianth-segments 6–7 mm, oblong, triangular- or linear-lanceolate, more intensely coloured than the outer, glabrous, papillose or densely hairy. Labellum 8–10 mm, suborbicular, obovate or somewhat square, subentire, rarely indistinctly 3-lobed, velutinous, with broadly conical, short, inconspicuous basal protuberances, sometimes with a narrow, yellow, glabrous marginal zone, usually with a small appendage; speculum annular or square, usually H-shaped, blue or dark purplish, with whitish or yellow margin. Connective acute. $2n=36, 38$. *W. Mediterranean region.* Ga Hs It Sa Si.

Very variable; probably a hybrid between 6 and 16.

18. *O. tenthredinifera* Willd., *Sp. Pl.* 4: 67 (1805). Plant 10–45 cm. Basal leaves ovate to lanceolate, subobtuse or acute, the cauline similar, acute. Spike 3- to 8-flowered, lax. Perianth-segments purplish or purplish-violet, rarely whitish; outer 6–12 mm, broadly ovate, obtuse, glabrous, concave; inner usually $\frac{1}{3}$ as long as the outer, broadly triangular, papillose-velutinous. Labellum (8–)11–14 × 11–14 mm, obovate, square or flabelliform, convex, entire, rarely oblong and emarginate or indistinctly 3-lobed, purplish-brown, velutinous, usually with a wide, yellow, densely hairy marginal zone, with a glabrous appendage, with short, inconspicuous basal protuberances; speculum reduced, often 2-fid, rarely scutelliform, composed of brown spots. Connective obtuse. $2n=36$. *Mediterranean region, C. & S. Portugal.* Bl Co Cr Ga Gr Hs It Lu Sa Si Tu.

19. *O. apifera* Hudson, *Fl. Angl.* 340 (1762). Plant 15–50 cm. Basal leaves lanceolate to ovate, obtuse, the cauline similar, acute. Spike 2- to 7(–11)-flowered, lax. Outer perianth-segments (8–)10–15 mm, oblong-ovate, patent or deflexed, purplish or purplish-violet, rarely whitish, green-striate; inner triangular to linear-lanceolate, green or purplish. Labellum 10–13 mm, broadly ovate, strongly convex, brownish- or blackish-purple, rarely yellowish-green or bicolorous, partly papillose, partly villous, with long, yellow, deflexed appendage, or appendage

absent; lateral lobes triangular-ovate, deflexed, with externally hairy basal protuberances up to 3 mm; speculum scutelliform at the base, violet or reddish-brown, with a yellow margin, with clear yellow spots towards apex. Connective long-acuminate. $2n=36$. *S., W. & C. Europe, northwards to N. Ireland.* Al Au Be Bl Br Co Cr Cz Ga Ge Gr Hb He Ho Hs Hu It Ju Lu Rm Rs (K) Sa Si Tu.

(a) Subsp. *apifera*: Inner perianth-segments less than half as long as the outer, hairy. Labellum 3-lobed, with an appendage. *Throughout the range of the species.*

(b) Subsp. *jurana* Ruppert, *Allgem. Bot. Zeitschr.* 17: 2 (1911): Inner perianth-segments almost $\frac{2}{3}$ as long as the outer, glabrous or papillose. Labellum 3-lobed or indistinctly 5-lobed, with or without an appendage. *Mainly in W.C. Europe; also locally in S. Europe.*

20. *O. bombyliflora* Link in Schrader, *Jour. für die Bot.* 1799(2): 325 (1800) (*O. oestriifera* subsp. *umbilicata* (Desf.) Hayek). Plant 7–25 cm. Basal leaves oblong-lanceolate, acute, patent, the cauline erect, slightly sheathing. Spike 1- to 5-flowered, lax. Outer perianth-segments 9–12 mm, ovate, obtuse, green, sometimes whitish, concave, the lateral patent or deflexed; inner c. $\frac{1}{3}$ as long as the outer, triangular, purplish at base, greenish towards apex, velutinous. Labellum 8(–10) mm, deeply 3-lobed, the lobes gibbous, deflexed so that the labellum appears globose-inflated, brown or dark brown, partly papillose, partly glabrous, without an appendage; lateral lobes oblong, convex, villous, glabrous towards apex, with externally hairy basal protuberances; middle lobe transversely ovate or oblong; speculum scutelliform or 2-partite, bluish-violet, with paler margin. Connective obtuse. $2n=36$. *Mediterranean region, C. & S. Portugal.* ?Al Bl Co Cr Ga Gr Hs It Ju Lu Sa Si.

31. *Corallorhiza* Chatel.¹

Brownish saprophytes with much-branched, fleshy, coralloid rhizome; roots absent. Stems with a few sheathing scales. Green leaves absent. Flowers pendent in a spike-like raceme. Perianth-segments more or less patent, free, the outer median and inner lateral somewhat convergent. Labellum entire or 3-lobed, the lateral lobes very small or absent. Spur very short or absent. Column long. Rostellum small. Viscidia 2, distinct; bursicles absent.

1. *C. trifida* Chatel., *Sp. Inaug. Corall.* 8 (1760) (*C. innata* R. Br.). Stems 7–30 cm, erect, glabrous, yellowish-green, with 2–4 scales up to half as long as stem. Spike lax, 2- to 12-flowered. Outer perianth-segments c. 5 mm, greenish, the lateral linear-lanceolate, with incurved margins, the median ovate-lanceolate; inner perianth-segments narrower, greenish or yellowish with reddish margins or spots. Labellum about as long as other perianth-segments, oblong, whitish with red lines or blotches, with 2 wide longitudinal ridges near the base. $2n=42$. *Damp woods, rarely on moist coastal sands. Europe, southwards to the Pyrenees, S. Appennini, N.W. Greece and Krym, but only on mountains in the south.* Al Au Be Br Bu Cz Da Fe Ga Ge Gr He †Ho Hs Hu Is It Ju No Po Rm Rs (N, B, C, W, K) Su.

32. *Calypso* Salisb.¹

Pseudobulb solitary, bearing a single leaf. Flower solitary. Perianth-segments connate at base, patent. Labellum large, inflated, slipper-shaped. Spur absent. Column petaloid, ovate. Rostellum small, 3-dentate. Viscidia 2, distinct; bursicles absent.

1. *C. bulbosa* (L.) Oakes in Z. Thompson, *Hist. Vermont.* 1:

¹ By D. M. Moore.

200 (1842). Pseudobulb ovoid. Stem 10–20 cm, slender, with few leaf-sheaths towards base. Leaf 3–5 cm, elliptic-oblong, shortly petiolate, distinctly veined. Flower in axil of a linear bract. Perianth-segments 1–2 cm, pinkish-purple, linear-lanceolate. Labellum 1–2 cm, whitish, with pinkish or yellowish spots or blotches. *Marshes and wet coniferous woods. Fennoscandia and N. Russia, southwards to 57° N. and westwards to 14° E.* Fe Rs (N, B, C) Su.

33. *Liparis* L. C. M. Richard¹

Stock stout, with 2 ellipsoid pseudobulbs joined by a short horizontal stolon; parent pseudobulb enveloped in old leaf-bases, the daughter pseudobulb at base of the current year's stems. Leaves 2. Perianth-segments free, narrow, patent. Labellum usually pointing upwards, entire. Spur absent. Column long, slender. Anther caducous. Rostellum minute. Viscidia 2, small; bursicles absent.

1. *L. loeselii* (L.) L. C. M. Richard, *Orchid. Eur. Annot.* 38 (1817) (*Malaxis loeselii* (L.) Swartz, *Pseudorchis loeselii* (L.) S. F. Gray). Glabrous. Stem 6–20 cm, 3(–5)-angled above, with 2–3 basal scales enclosing developing daughter pseudobulb. Leaves subopposite, about half as long as stem, oblong-elliptical to ovate-lanceolate, acute. Flowers 3–8(–18), in a lax spike. Perianth-segments yellowish-green, the outer linear-lanceolate, the inner shorter and narrower. Labellum equalling outer perianth-segments, oblong-obovate, undulate or somewhat crenate. $2n=32$. *Bogs, fens and other wet places. From S. Wales and S. Fennoscandia southwards to S.W. France, S. Romania and S. Russia.* Au Be Br ?Bu Cz Da Fe Ga Ge He Ho Hu It Ju No Po Rm Rs (B, C, W, E) Su.

34. *Microstylis* (Nutt.) A. Eaton¹

Like *Liparis* but pseudobulbs borne one above the other, the youngest uppermost; leaf usually solitary; flowers twisted through 360° so that labellum points upwards; column short.

¹ By D. M. Moore.

1. *M. monophyllos* (L.) Lindley, *Gen. Sp. Orchid.* 19 (1830) (*Malaxis monophyllos* (L.) Swartz). Stem (8–)10–30 cm; basal pseudobulb surrounded by old leaf-sheaths. Leaf solitary, rarely 2, 3–6 cm, ovate to elliptical. Flowers numerous, in a rather lax, spike-like raceme 3–15 cm. Perianth-segments 2–2.7 mm, greenish; outer ovate to ovate-lanceolate, the lateral erect, the median pointed downwards; inner linear, directed downwards, slightly recurved. Labellum broadly lanceolate-ovate, acuminate, slightly incurved, thickened and densely tuberculate beneath towards apex, as long as other perianth-segments. Sphagnum-bogs, wet meadows and scrub. *N., C. & E. Europe, westwards to C. Norway and C. Switzerland, and southwards to N. Italy and S. Russia.* Au Cz Fe Ge He †Hu It Ju No Po Rm Rs (N, B, C, W) Su.

35. *Hammarbya* O. Kuntze¹

Like *Liparis* but pseudobulbs borne one above the other, the youngest uppermost; leaves 2–5; flowers twisted through 360° so that labellum points upwards; column very short; anther persistent.

1. *H. paludosa* (L.) O. Kuntze, *Revis. Gen.* 2: 665 (1891). Glabrous. Stem 3–12 cm, slender, 3- to 5-angled above. Leaves 0.5–1 cm, concave, broadly rounded at apex, sheathing at base, enclosing daughter pseudobulbs, usually with marginal bulbils towards apex, the lower 1–2 leaves often reduced to sheaths. Flowers numerous in a rather dense, later lax spike 1.5–5 cm. Perianth-segments greenish-yellow; outer 2.5–3 mm, ovate-lanceolate, the lateral erect, the median pointed downwards and rather larger; inner c. 1.5 mm, linear-lanceolate, patent, deflexed at apex. Labellum lanceolate, acute, erect, shorter than outer perianth-segments. $2n=28$. *Acid bogs, usually in Sphagnum. N. & C. Europe; U.S.S.R. except the south-east.* Au Be Br Cz Da Fa Fe Ga Ge Hb He Ho ?Hu Ju No Po Rm Rs (N, B, C, W, E) Su.