Perennial, but sometimes short-lived, terrestrial, epiphytic, or lithophytic, autotrophic or rarely mycotrophic herbs (or rarely scrambling vines), with rhizomes, tubers, or rootstocks with mycorrhizal fungi in roots. Stems either sympodial or monopodial, usually leafy, but leaves sometimes reduced to bractlike scales, 1 or more internodes at base often swollen to form a “pseudobulb”; epiphytic species with aerial, photosynthesis-adventitious roots, often bearing 1 or more layers of dead cells (velamen). Leaves 1 to many, alternate or occasionally opposite, often distichous, sometimes terete or canaliculate, glabrous or very rarely hairy, frequently fleshy or leathery, base almost always sheathing, sometimes articulated, sometimes forming a false petiole, margin entire, apex often emarginate. Inflorescence basal, lateral, or terminal, erect to pendulous, racemose, spicate, subumbellate, or paniculate, 1- to many flowered, flowers rarely secund or distichously arranged. Flowers small to large, often quite showy, usually zygomorphic, very rarely ± actinomorphic, bisexual [very rarely monoeccious and polymorphic], sessile or pedicellate, most often resupinate with pedicel and ovary twisted through 180°, occasionally not twisted or twisted through 360°. Ovary inferior, 1-locular, placentation parietal (or rarely 3-locular and placentation axile). Sepals usually free but sometimes variably adnate, median (dorsal) one often dissimilar to laterals, laterals sometimes adnate to a column foot to form a saccate, conic, or spurlike mentum. Petals free or rarely without a basal foot, occasionally winged or with lobes or arms at apex or ventrally; anther mostly 1, less often 2 or 3, terminal or ventral on column, caplike or opening by longitudinal slits; pollen usually forming distinct pollinia, less often loose, pollinia 2, 4, 6, or 8, mealy, waxy, or horny, sectile or not, sessile or attached by stalks (caudicles or stipes) to 1 or 2 sticky viscidia; stigma 3-lobed, mid-lobe often modified to form a rostellum, other lobes either sunken on ventral surface of column behind anther or with 2 lobes porrect. Fruit a capsule, rarely berrylike, usually opening laterally by 3 or 6 slits. Seeds very numerous, dustlike, lacking endosperm, rarely winged.

About 800 genera and ca. 25,000 species (some estimates as high as 30,000 species): worldwide, except for Antarctica, most numerous in the humid tropics and subtropics; 194 genera (11 endemic, one introduced) and 1,388 species (491 endemic, one introduced) in five subfamilies in China.

Recent analyses of orchids incorporating data from DNA analyses have confirmed many aspects of the established classifications but have also provided some surprises for orchid taxonomists. First of all, the results have upheld the monophyly (evolutionary integrity, i.e., the group includes all the taxa derived from a single ancestral one) of the orchid family, including the apostasioids and cypripedioids. They also suggest strongly that the orchids are an ancient group that evolved in the great southern continent of Gondwanaland before it split up to form the southern continents of Australia, Africa, and South America, the island of Madagascar, and the subcontinent of India. The subfamilies Apostasioideae, Cypripedioideae, and Orchidoideae (sensu Dressler, Phylogeny Classific. Orchid Fam. 1993) are all monophyletic. However, recent work clearly shows that Vanilla and its relatives form a separate and ancient clade (an evolutionary lineage including all the taxa derived from a single ancestral one) that deserves recognition as the subfamily Vanillioideae, that the Spiranthoideae nest within a more broadly defined Orchidoideae, and that Vandoideae are a specialized clade within a more broadly defined Epidendroideae.

A detailed new classification of the orchid family is currently being produced under the title Genera Orchidacearum, of which four of the six volumes have been published and a fifth is near completion (Pridgeon et al., Gen. Orchid. 1–4(1), 1999–2005). Even when this work is completed, such is the speed with which new information and techniques are being developed and published, it will almost certainly require revision. However, we now have the broad bones of a more robust and predictive classification of the family that will be more satisfactory than the presently widely used systems that are based mainly upon morphological characters.

The classification of the family is currently the subject of some debate, particularly the circumscription and the placement of certain tribes, subtribes, and genera. The classification of Chase et al. (in Dixon et al., Orchid Conservation, 69–89, 2003), elaborated in Pridgeon et al. (loc. cit.), which is strongly supported by recent molecular, embryological, and morphological analyses, is followed here. They recognize five subfamilies: Apostasioideae, Cypripedioideae, Vanillioideae, Orchidoideae, and Epidendroideae.


1 Institute of Botany, Chinese Academy of Sciences, 20 Nanxincun, Xiangshan, Beijing 100093, People’s Republic of China.
2 The National Orchid Conservation Center of China, Wang Tong Road, Shenzhen 518114, People’s Republic of China.
3 Missouri Botanical Garden, P.O. Box 299, Saint Louis, Missouri 63166-0299, U.S.A. (Zhu Guanghua died on 2 November 2005.)
4 Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AE, United Kingdom.
5 Kadoorie Farm and Botanic Garden, Lam Kam Road, Tai Po, New Territories, Hong Kong, People’s Republic of China.
6 P.O. Box 8210, Cairns, Queensland 4870, Australia.
7 National Herbarium Nederland, P.O. Box 9514, 2300 RA Leiden, Netherlands.
8 3300 Darby Road C-802, Havertford, Pennsylvania 19041, U.S.A.
Glossary of botanical terms used in the Orchidaceae

Within the definitions, *italics* indicate terms that are defined in this glossary. Adapted from the glossary in Pridgeon, A. M. et al. (eds.). 1999–. Genera Orchidacearum, 1–. Oxford & New York: Oxford University Press.

**adventitious** – applied to roots that do not rise from the radicle but from the stem, etc.; also applied to embryolike structures in a seed that arise from outside the true embryo and often abort.

*androclinium* – see *clinandrium*.

*anther bed* – see *clinandrium*.

*anther canal* – narrow basal part of anther enclosing the *caudicle*.

*anther cap* – a lid formed from the dry outer wall of an anther.

*aseptate* – without a *septum*.

*auricle* – a small lobe or ear, applied to the *lip*; also a small lateral outgrowth on the anther.

*autotroph* (adjective *autotrophic*) – a plant that produces its own nutrition by means of photosynthesis, containing chlorophyll and hence green.

*bract* – a usually leaflike organ (often very reduced or absent) subtending a flower, inflorescence, or partial inflorescence in its axil, sometimes brightly colored.

*bursicle* – a peltate or pouchlike structure enclosing the *viscidia*.

*calceolate* – slipper-shaped.

*callus* (plural *calli*) – a waxy, fleshy, or other protuberance, as on the *lip*.

*calyculus* – a small cup or circle of bractlike structures outside the *sepals*, e.g., in *Lecanorchis*.

*cataphyll* – a scalelike structure outside the *sepals*, e.g., in *Cattleya*.

*caudicle* – an extension of tissue derived from the anther and connecting the *pollinia* to the *stipe* or, in orchids without a *stipe*, directly to the *viscidium*.

*caudiculate* – with *caudicles*.

*claw* – the conspicuously narrowed base of an organ; in the orchids usually applied to the *lip*, but can also be applied to the *sepals* or *petals*.

*clinandrium* – the portion of the orchid *column* underneath the anther.

*column* – an organ of the orchid flower representing the fusion of *filaments* and *style*.

*column foot* – an extension at the base of the *column* in some orchids, to which the *lip* and sometimes the lateral *sepals* are attached.

*column wings* – distinct wings on the column of some orchids; these are not “column arms” or *stelidia*.

*conduplicate* – folded together lengthwise with the adaxial surfaces facing each other (e.g., a leaf).

*disk* – usually in orchids the area between the lateral lobes in the basal half of the *lip*, the place where the *callus* is usually placed, or sometimes the removable part of the *rostellum* projection.

*dorsal sepal* – referring to the apparently upper *sepal* of a flower; in the majority of orchids this is actually the lower sepal because the flowers are *resupinate*.

*dropper* – a storage organ, primarily a swollen root, but with a bud and some stem structure at the base; it may push down into the soil and form a tuber, placing the plant lower in the soil.

*ecaudiculate* – without *caudicles*.

*elastoviscin* – a highly viscous product of the degeneration of a limited number of tapetal cells keeping pollen together in orchid *pollinia*.

*elaters* – spiral thickenings or hairs which help to disperse spores or seeds, often by hygroscopic action.

*epichile* – terminal lobe of a *lip* that is differentiated into a *hypochile*, sometimes a *mesochile*, and an *epichile*.

*epigean, epigeous* – see *terrestrial*.

*epithecium* – see *viscidium*.

*epiphyte* (adjective *epiphytic*) – a plant growing on another plant as its substrate, but not parasitic.

*equitant* – 2-ranked *conduplicate* leaves or bracts with overlapping, clasping bases.

*foliage leaf* – an ordinary, fully developed, and functioning leaf.

*gynandrium* – see *viscidium*.

*gullet* – interior of a conical orchid flower, which the pollinator enters, as in most species of *Dendrobium*.

*hamus* – a type of *stipe* representing the recurved apex of the *rostellum*.

*heteranthous* – flowering from special shoots that do not produce *pseudo-bulbs* or *foliage leaves*.

*heteromycotroph* (adjective *heteromycotrophic*) – a plant that is a *mycotroph* as part of its method of nutrition, usually with inadequate photosynthesis and hence often not green; a facilitative mycotroph.

*holomycotroph* (adjective *holomycotrophic*) – a plant that is a *mycotroph* as its sole method of nutrition, without chlorophyll and hence not green; an obligate mycotroph. This condition has often been erroneously referred to as *saprophytic*.

*hypochile* – basal lobe of a *lip* that is differentiated into a *hypochile*, sometimes a *mesochile*, and an *epichile*.

*hysteranthous* – when an apical inflorescence is produced after the *pseudo-bulb* and leaves on the same shoot. The inflorescence develops on the top of a fully developed pseudo-bulb with a fully grown leaf or leaves.

*keiki* – in orchids, a distal vegetative branch of the main stem, which ultimately grows roots and separates.

*labellum* – see *lip*.

*lip* – the median, modified petal of an orchid flower.

*liothyte* (adjective *liothytic*) – a plant that grows on rock as its substrate.

*massula* (plural *massulae*) – a mass or packet of pollen grains in *sectile pollinia*.

*mentum* – a spurlike or chinlike extension of the flower composed of the variably united *column foot*, *lip*, and lateral *sepals*.

*mesochile* – the middle lobe of a *lip* that is differentiated into a *hypochile*, sometimes a *mesochile*, and an *epichile*.

*monopodium* (plural *monopodia*, adjective *monopodial*) – referring to a growth habit in which new leaves develop from the same meristem or growing point as all previous leaves; cf. *sympodial*.

*mycorrhiza* – the association of fungi and roots of higher plants, often termed a *symbiosis*.

*mycotroph* (adjective *mycotrophic*) – a plant that obtains part or all of its nutrition from organic substances provided by fungi. See also *heteromycotroph* and *holomycotroph*.

*naked pollinia* – *pollinia* of orchids that lack *caudicles* and other elements of the *pollinarium*.

*operculum* – see *anther cap*.

*palea* – flat or terete moveable appendages attached by a threadlike base, found on the *sepals* and *petals* of certain species of *Bulbophyllum*.

*peloric* – an unusual actinomorphic form of a flower that is normally zygomorphic.
petal – any of the whorl of flower parts generally just inside the sepals, usually colorful and showy.

pollinarium (plural pollinia) – the functional unit of pollen transfer in orchid pollination, consisting of two or more pollinia (sometimes with candeles), often a stipe, and a viscidium.

pollinium (plural pollinia) – a coherent mass of pollen grains.

proteranthous – when an inflorescence is produced before the pseudobulb and leaves on the same shoot. The inflorescence develops on the top of a vegetative shoot, of which the leaf or leaves and the terminal internode are not yet developed.

protocorm – the ephemeral structure resulting from the germinated orchid seed and from which the first true shoot and root differentiate.

pseudobulb – the variously thickened portion of an aerial orchid stem.

pseudodeterminate – (of orchids) denotes a stem that grows indefinitely although the plant retains the sympodium and produces new shoots at the base.

pseudopollen – pollen grains that remains after the viscidium has been removed by a pollinator.

pseudophyll – see lithophytic.

saprophyte (adjective saprophytic) – deriving its nourishment, in whole or part, from decaying organic matter. Often used incorrectly for a heteromycotroph or holomycotroph that lacks chlorophyll. Fungi are true saprophytes.

sectile – referring to pollinia comprising several “packets” connected by elastoviscin.

sepal – any of the outermost whorl of lower parts, often as colorful and showy as the petals in orchids.

septum (plural septa, adjective septate) – a partition, e.g., in the spur of the lip of some orchids.

sinker – see dropper.

spur – a saccate or tubular extension of the lip (or other floral parts) in many orchids, often containing nectar.

stelidium (plural stelidia) – a discrete arm or projection borne on each side of the column, near the apex, middle, or base, often slender and elongated; e.g., in Bulbophyllum and Dendrochilum; usually interpreted as staminodia (sterile anthers).

stipe – a pollinium stalk derived from the rostellum. Stipes (plural stipites) – see stipe.

superposed – placed on top of each other or at opposite ends.

symbiosis – an ecological relationship between two different organisms in which both obtain mutual benefit.

sympodium (plural sympodia, adjective sympodial) – a discontinuous main axis, where the stem is made up of a series of superposed branches, these initiating a single main axis: each new shoot developing from an axillary bud on the previous shoot unit; stem, where growth is, continued not by the main stem but by lateral branches; prevalent in monocots; sympodial inflorescences include the dichasium, rhizipodium, cincinnus, and false umbel.

synanthous – when pseudobulb, leaf, and apical inflorescence are produced together.

synsepal – a floral part formed by the partial or complete fusion of two or more sepals.

tegula – a pollinium stalk consisting of the modified epidermis of the rostellum and possibly also subtending layers of cells.

terrestrial – growing on the ground.

tuberoid – see dropper.

tubercle – the spongy outer layer of an orchid root, consisting of dead cells at maturity.

vascular – see viscidium.

viscidium (plural viscidia) – the sticky portion of the rostellum, which is often connected to pollinia.

Figures

The following figures are provided to illustrate some of the terms defined in the glossary and to show examples of habit and morphology in the five subfamilies of the Orchidaceae. The figures were redrawn from previously published drawings by:


Susanna Stuart-Smith in: Pearce, N. R. & Cribb, P. J. 2002. The Orchids of Bhutan [Flora of Bhutan, 3(3)]. Edinburgh: Royal Botanic Garden Edinburgh and Royal Government of Bhutan. Ponerorchis chusua (p. 135, fig. 36, as Chusua pacificoflora), Cryptochilus lateus (p. 366, fig. 88), Cleistostoma linearlobatum (p. 510, fig. 113), and Diploropa championii (p. 516, fig. 114).


Various artists, after Richard Eric Holttum in: Seidenfaden, G. & Wood, J. J. 1992. The Orchids of Peninsular Malaysia and Singapore. Fredensborg: Olsen & Olsen. Spathoglottis plicata (p. 15, fig. 2), Vanda ‘Miss Joaquim’ (p. 18, fig. 4), and Dendrobium crumenatum (p. 22, fig. 6).
Figure 3. 1–3. Examples of plants in the subfamilies of the Orchidaceae. —1. Apostasioideae (*Apostasia wallichii*). —2. Cypripedioideae (*Cypripedium yunnanense*). —3. Orchidoideae (*Ponerorchis chusua*).
Systematic list of subfamilies and genera

● Indicates endemic genera

1. Apostasioideae (p. 20)
   1. Apostasia
   2. Neuviedia

2. Cypridioideae (p. 22)
   3. Cypridium
   4. Paphiopedilum

3. Orchidoideae (p. 45)
   5. Goodyera
   6. Hylophila
   7. Ludisia
   8. Herpygma
   9. Erythrodes
   10. Cheirostylis
   11. Kuhlhaseltia
   12. Myrmecis
   13. Betaeria
   14. Rhomboda
   15. Chamaeagrostodina
   16. Zeuxine
   17. Vrydagynnea
   18. Anoezdchilus
   19. Odontochilus
   20. Spiranthes
   21. Pelexia
   22. Corybas
   23. Stigmatodactylus
   24. Cryptostylis
   25. Microtis
   26. Orchis
   27. Galearia
   28. Ponerorchis
   29. Hemipilia
   30. Brachycorythis
   31. Platanythera
   32. Dactylorhiza
   33. Smithorchis
   34. Diphyllus
   35. Herminium
   36. Amitostigma
   37. Neottiante
   38. Gymnadina
   39. Tsaiorchis
   40. Pectellis
   41. Peristylus
   42. Habeneria
   43. Hemipilopsis
   44. Bhutanthera
   45. Frigidorchis
   46. Diplomeris
   47. Androcorys

4. Vanilloideae (p. 167)
   48. Porolabium
   49. Disperis
   50. Satyrion

5. Epidendroidae (p. 174)
   57. Cephalanthera
   58. Tangisia
   59. Aphyllorchis
   60. Epipactis
   61. Diplandorchis
   62. Holopogon
   63. Neottia
   64. Tropidia
   65. Corymborkis
   66. Novillia
   67. Gastrodia
   68. Didymoplexis
   69. Didymoplexilla
   70. Didymoplexiosis
   71. Stereosandra
   72. Epipogium
   73. Bletilla
   74. Yoania
   75. Liparis
   76. Ipsiloricis
   77. Malaxis
   78. Crepidiun
   79. Diccia
   80. Oberonioide
   81. Oberonia
   82. Risleya
   83. Oreorchis
   84. Cremasra
   85. Tipularia
   86. Calypso
   87. Changnienia
   88. Corallorhiza
   89. Eulophia
   90. Geodorum
   91. Cymbidium
   92. Acriopsis
   93. Nephephyllum
   94. Tainia

6. Epidendroidae (p. 174)
   95. Eriodes
   96. Hancockia
   97. Pachystoma
   98. Spadoglossis
   99. Cephalantheropsis
   100. Phaus
   101. Calanthe
   102. Acanthephippium
   103. Anthongonium
   104. Collabium
   105. ChrysoGLOSSUM
   106. Diglyphosa
   107. Arundina
   108. Thunia
   109. Coelogyn
   110. Pleione
   111. Panisea
   112. Dendrochilum
   113. Polatula
   114. Otochilus
   115. Neopyga
   116. Bulleyia
   117. Ischnogyne
   118. Polystachya
   119. Eria
   120. Campanulorchis
   121. Conchidium
   122. Mycaranthus
   123. Cylindrobus
   124. Dendrolium
   125. Aeridostachya
   126. Bryobium
   127. Pindalia
   128. Trichostasia
   129. Oxystiphyllum
   130. Callostylis
   131. Porphyr
   132. Ceratostylis
   133. Cryptochilus
   134. Agrostophyllum
   135. Appendicula
   136. Podochilus
   137. Thelasis
   138. Phelatinga
   139. Dendrobium
   140. Flickingeris
   141. Epigenium
   142. Bulbophyllum
   143. Monomeria
   144. Sunipia
   145. Teniophyllum
   146. Sarcophyton
   147. Micropera
   148. Doritis
   149. Nothodoritis
   150. Vandopsis
   151. Diplorhiza
   152. Ornithochilus
   153. Acampe
   154. Smatindania
   155. Renanthera
   156. Schoenorchis
   157. Cleistostomopsis
   158. Trichoglottis
   159. Staurorchis
   160. Pomatochalpa
   161. Pelatanthera
   162. Sarcochilis
   163. Cleistostoma
   164. Stereochilus
   165. Esmeralda
   166. Hygrochilus
   167. Arachnis
   168. Thrisspermum
   169. Chlorochista
   170. Vanda
   171. Rhynchosystis
   172. Uncifera
   173. Robiquetia
   174. Saccobalsiopsis
   175. Papilionanthe
   176. Phalaenopsis
   177. Chamaeactanthes
   178. Neofinetia
   179. Sedarea
   180. Aerides
   181. Pteroceras
   182. Biermannia
   183. Luissia
   184. Haruella
   185. Gastrochilus
   186. Holcoglossum
   187. Ascocentrum
   188. Penkima
   189. Microtatorchis
   190. Grosaorphy
   191. Tuberochilum
   192. Paragastroporces
1b. Stamen solitary.

1a. Fertile stamens 2 or 3, if 2, opposite to lateral petals; pollen not forming pollinia.

1b. Fertile stamen 1, rarely 2, if 2, opposite to dorsal sepal and lip; pollen forming pollinia.

Key to subfamilies

1a. Pollinia waxy or bony, hard or relatively hard.  
2a. Flower rotate or subregular; lateral sepals free; lip petal-like, sometimes rather broad; column fused only at base of filaments; anthers 2 or 3, erect above lip; stigma terminal.  
3a. Plants usually terrestrial, growing from tubers or a horizontal fleshy rhizome; anther basifixed or not; pollinia segmented, comprising massulae, or mealy.  
5a. Plants scrambling vines; fruit a pod or a long capsule; seeds with thick testa, wingless or surrounded by ± annular wing.  
6a. Fruit dry, dehiscent; seeds with broad wings, wider on one side than seed itself.

2b. Flower strongly zygomorphic; lip conspicuously saccate or urceolate, very different from petals 
3b. Fertile stamens 3; inflorescence erect, unbranched.  
4a. Leaves plicate, usually cauline, rarely 2 prostrate on substrate; perianth persistent when fruiting.  
6b. Stem rather slender; inflorescence and flowers glabrous; column more than 1/2 as long as lip.

2b. Pollinia 8.  
3b. Plants with a coralloid rhizome; sepals 4–10 mm; lip 3-lobed.  
6b. Lip saccate or spurred at base; leaves long petiolate, petioles often forming a pseudostem; column fused only at base of filaments; anthers 2 or 3, erect above lip; stigma terminal.  
7a. Aplant sympodial, mostly with pseudobulbs or thickened stems, rhizomes, or tubers; pollinia not very hard, often attached by ± annular wing.

1b. Stem rather slender; inflorescence and flowers glabrous; column more than 1/2 as long as lip.  
5a. Holomycotrophic plants, without chlorophyll.  
5b. Autotrophic plants, with chlorophyll in leaves, stems, and/or roots.  
6a. Pollinia soft or sectile; plants always terrestrial; leaves not articulated.  
6b. Pollinia waxy or bony, hard or relatively hard; plants mostly epiphytic, rarely terrestrial; leaves often articulated at base.

Key 2: Holomycotrophic genera

1a. Pollinia waxy or bony, hard or relatively hard.  
3a. Plants with a slender, nearly cylindric, straight rhizome; sepals 1–2 mm; lip unlobed.  
8a. Risleya (p. 245)  
3b. Plants with a coralloid rhizome; sepals 4–10 mm; lip 3-lobed.  
88. Corallorhiza (p. 252)  
2b. Pollinia 8.  
4a. Lip not saccate or spurred at base; leaves with neither long petiole nor pseudostem at base; column foot absent.  
91. Cymbidium (p. 260)  
4b. Lip saccate or spurred at base; leaves long petiolate, petioles often forming a pseudostem; column foot conspicuous.  
89. Eulophia (p. 253)  
1b. Pollinia soft or sectile.  
5a. Plants scrambling vines; fruit a pod or a long capsule; seeds with thick testa, wingless or surrounded by ± annular wing.  
6a. Fruit dry, indehiscent; seeds wingless or with ± annular wing narrower than seed itself.  
6b. Fruit dry, indehiscent; seeds with broad wings, wider on one side than seed itself.

7a. Aplant rather slender; inflorescence and flowers glabrous; column more than 1/2 as long as lip.  
53. Galeola (p. 169)  
7b. Stem robust; rachis, ovary, and sepals all ± covered with rust-colored hairs; column less than 1/2 as long as lip.  
54. Erythrorchis (p. 171)
5b. Plants erect terrestrial herbs; fruit a capsule; seeds without thick testa, with narrow, long wings at both ends, ± fusiform.

8a. Plants with conspicuous, long, climbing stems; fruit a pod or a long capsule; seeds with thick testa, wingless.

9a. Pollinia 2; sepals and petals united into perianth tube for almost complete length, with its apex 5-lobed, lip enclosed within perianth tube; stigma often at base of column. 67. Gastrodia (p. 201)

9b. Pollinia 4; sepals and petals united into perianth tube for up to 1/2 length, lip not enclosed; stigma almost at apex of column.

10a. Column wingless, with a short foot at base. 68. Didymoplexis (p. 205)

10b. Column with a pair of falcate wings, without a foot at base. 69. Didymoplexiella (p. 206)

8b. Sepals and petals free.

11a. Calyulus present between ovary and sepals. 55. Lecanorchis (p. 171)

11b. Calyulus lacking between ovary and sepals.

12a. Plants with spindle-shaped, coralloid, tuberlike, or cylindric, fleshy rhizomes, without clustered, fleshy roots; pollinarium with either caudicle or viscidium.

13a. Pollinia attached ± directly to viscidium.

14a. Lip with a broad spur below middle; rhizome cylindric or coralloid, stout, fleshy, branched, with many scalelike sheaths. 74. Yoania (p. 210)

14b. Lip without any spur; rhizome moniliform. 70. Didymoplexiopsis (p. 207)

13b. Pollinia attached to viscidium by distinct caudicles.

15a. Rhizome cylindric, stemlike, decumbent; rostellum as long as anther. 15. Chamaegastrodia (p. 69)

15b. Rhizomes coralloid or tuberlike; rostellum shorter than anther.

16a. Lip spurred; anther with a slender filament; caudicle 1. 71. Stereosandra (p. 207)

16b. Lip spurred; anther without a slender filament; caudicles 2. 72. Epipogium (p. 207)

12b. Plants with shortened, relatively hard rhizomes and clustered, fleshy or fibrous roots; pollinarium with neither caudicle nor viscidium.

17a. Stigma terminal; rostellum absent.

18a. Fertile stamens 2. 61. Diplandrorchis (p. 183)

18b. Fertile stamen 1. 62. Holopogon (p. 183)

17b. Stigma lateral or rarely subterminal; rostellum present, usually above concave stigma.

19a. Lip deeply 2-lobed or very rarely long acuminate at apex; rostellum often as long as anther. 63. Neottia (p. 184)

19b. Lip neither deeply 2-lobed nor long acuminate at apex; rostellum conspicuously shorter than anther.

20a. Lip spurred or saccate at base, with longitudinal lamellae on mid-lobe. 57. Cephalanthera (p. 174)

20b. Lip neither spurred nor saccate, without longitudinal lamellae on mid-lobe. 59. Aphyllorchis (p. 177)

Key 3: Subfams. Orchidoideae, some Vanilloideae, primitive Epidendroideae

1a. Plants with conspicuous, long, climbing stems; fruit a pod or a long capsule; seeds with thick testa, wingless or surrounded by ± annular wing. 51. Vanilla (p. 167)

1b. Plants not climbing, stems erect; fruit a capsule; seeds without thick testa, with narrow, long wings at both ends, ± fusiform.

2a. Plants leafless at anthesis.

3a. Leaves many, often 7 or 8, oblong to elliptic, shortly petiolate; ovary and sepals pubescent. 21. Pelexia (p. 86)

3b. Leaf 1, broadly ovate to cordate, long petiolate; ovary and sepals glabrous. 66. Nervilia (p. 197)

2b. Plants with a leaf or leaves at anthesis.

4a. Leaves plicate, papery or thinly leathery.

5a. Leaves clustered on lower part to base of stem; pollinia 8, in 2 groups. 73. Bletilla (p. 209)

5b. Leaves spaced above middle of stem, or rarely clustered at its apex; pollinia 2 or 4.

6a. Inflorescence lateral or terminal; flowers densely arranged on a shortened inflorescence; rostellum long and erect; pollinarium with sectile pollinia, with caudicle and viscidium.

7a. Inflorescence unbranched; sepals less than 1 cm; basal part of lip wider than its apical part. 64. Tropidia (p. 195)

7b. Inflorescence branched; sepals more than 3 cm; apical part of lip wider than its basal part. 65. Corymborkis (p. 197)

6b. Inflorescence terminal; flowers scattered on a long inflorescence; rostellum very small or nearly absent; pollinarium with granular pollinia, without caudicle and viscidium.

8a. Flowers actinomorphic, with lip similar to petals; stigma terminal. 58. Tangtsinia (p. 177)

8b. Flowers zygomorphic, with lip conspicuously different from petals; stigma lateral.

9a. Flowers concolorous, white or yellow; upper bracts small, not foliaceous, shorter than pedicel and ovary (except C. damasonium); lip 3-lobed, saccate or spurred at base. 57. Cephalanthera (p. 174)

9b. Flowers usually not concolorous, green, brown, purple, or yellow; upper bracts large, foliaceous, longer than pedicel and ovary; lip contracted in middle forming epichile and hypochile, neither spurred nor saccate at base, sometimes with concave hypochile. 60. Epipactis (p. 179)
4b. Leaves not plicate, herbaceous or membranous.

10a. Leaves 2, inserted at or near middle of stem, opposite or subopposite ........................................... 63. *Neottia* (p. 184)

10b. Leaves 1 or more than 2, or if 2, then either adpressed to ground or clearly alternate.

11a. Pollinia granular, without separable massulae.

12a. Leaves many, basal ......................................................................................................................... 20. *Spiranthes* (p. 84)

12b. Leaves 1 or 2, basal or cauline.

13a. Leaves basal; flowers usually more than 10.

14a. Leaves flat, 40–50 mm wide, with long, distinct petiole; plants with a few ± fleshy roots ......................................................................................................................... 24. *Cryptostylis* (p. 88)

14b. Leaves cylindric, 2–3 mm wide, without distinct petiole; plants with globose tubers ....... 25. *Microtis* (p. 89)

13b. Leaves cauline; flowers 1 or 2(or 3).

15a. Leaves elliptic to oblong-lanceolate, 3–8 cm, not reticulate-veined; plants without tubers ..... 56. *Pogonia* (p. 172)

15b. Leaves ovate to cordate, less than 2 cm, reticulate-veined; plants with globose tubers.

16a. Bracts not leaflike; lip with 2 spurs .......................................................................................... 22. *Corybas* (p. 86)

16b. Bracts leaflike; lip without any spur ......................................................................................... 23. *Stigmatodactylus* (p. 88)

11b. Pollinia sectile, with many separable massulae.

17a. Anther connected to column by a narrow base, never completely connate to column, often narrowed and elongated toward apex, wholly withered or deciduous later; caudicle protruding from anther apex.

18a. Stigma 1.

19a. Lip separate from column, not divided into apical and basal parts, wholly cymbiform or pouchlike or basal half concave-saccate; sac or pouch not 2-lobed at apex.

20a. Lip cymbiform or basal half concave-saccate; pollinia subsessile ............................................. 5. *Goodyera* (p. 45)

20b. Lip pouchlike; pollinia with a long caudicle ............................................................................... 6. *Hylophila* (p. 54)

19b. Lip ± adnate to column at base, divided into apical and basal parts, base with a sac or spur shallowly 2-lobed at apex.

21a. Column twisted; rostellum not forked to 2-lobed; lip saccate at base ......................................... 7. *Ludisia* (p. 55)

21b. Column straight; rostellum forked to 2-lobed; lip spurred at base.

22a. Spur 7–10 mm; lip with 1 lamella and 2 calli on disk .................................................................. 8. *Herpsysma* (p. 56)

22b. Spur 1.5–4 mm; lip without lamella or callus on disk ................................................................. 9. *Erythropsa* (p. 56)

18b. Stigmas 2, lateral (except in *Odontochilus tortus*).

23a. Sepals ± connate into a tube.

24a. Sepals connate at or above middle forming a tube; column with 2 erect, armlike appendages ......................................................................................................................... 10. *Cheirostylis* (p. 57)

24b. Sepals connate below middle forming a tube; column without armlike appendages ... 11. *Kuhlhasseltia* (p. 63)

23b. Sepals free.

25a. Leaves 4–15 mm; inflorescence with 1 or 2(or 3) flowers ....................................................... 12. *Myrmechis* (p. 63)

25b. Leaves more than 20 mm; inflorescence usually with 3 to many flowers.

26a. Flowers not resupinate, with lip at top, usually without a mesochile (mesochile present with involute margins in *H. anomalus*) ......................................................................................................................... 13. *Hetaeria* (p. 65)

26b. Flowers resupinate, with lip at bottom (except a few species in *Anoectochilus* in which lip has a fimbriate or fimbriate-toothed mesochile).

27a. Lip with a cylindrical or fusiform spur.

28a. Column lacking ventral wings; lip without a mesochile; hypochile containing 2 stalked glands ................................................................. 17. *Vrydagzynea* (p. 76)

28b. Column with ventral wings; lip with an often toothed or pectinate mesochile; hypochile without stalked glands inside ................................................................................................. 18. *Anoectochilus* (p. 76)

27b. Lip lacking a spur.


29b. Lip lacking a raised median keel.

30a. Stigma lobes stalked; lip with an elongate, involute mesochile; inflorescence 1- or 2-flowered .......................................................................................... 12. *Myrmechis* (p. 63)

30b. Stigma lobes not stalked; inflorescence several flowered.

31a. Lip with an elongate mesochile with entire to lacerate flanges; column twisted; stigma lobes apical ......................................................................................... 19. *Odontochilus* (p. 80)

31b. Lip with a short mesochile, rarely with entire flanges; column not twisted; stigma lobes lateral ......................................................................................................................... 16. *Zeuxine* (p. 71)

17b. Anther connate to column with its broad base or back, not narrowed toward apex, persistent; caudicle protruding from base of anther.

32a. Lip uppermost, hooded, with 2 spurs ......................................................................................... 50. *Satyrium* (p. 165)
32b. Lip usually lowermost, not hooded, with 1 or no spur.
33a. Lateral sepals saccate or spurlike near middle; anther not erect due to recurved column; lip erect, not spurred; leaves less than 2 cm .............................................................. 49. Disperis (p. 164)
33b. Lateral sepals never saccate or spurlike near middle; anther erect; lip spreading or nodding, base often spurred; leaves often more than 2 cm.
34a. Lip with 2 pores toward base ................................................................................... 48. Porolabium (p. 164)
34b. Lip lacking pores.
35a. Connective broadly hooded; 2 anther locules widely separated ......................... 47. Androcorys (p. 162)
35b. Connective not hooded; 2 anther locules close together.
36a. Stigma often 1 (rarely 2 in some Platanthera species).
37a. Viscidia hidden in a common bursicle.
38a. Rootstock of tubers, subglobose, ovoid, or ellipsoid, not divided ................... 26. Orchis (p. 90)
38b. Rootstock a creeping rhizome ................................................................................ 27. Galearis (p. 90)
37b. Viscidia naked or hidden in 2 separate bursicles.
39a. Stigma raised and thickened.
40a. Staminode with a stalk; rostellum absent; sepals and petals connivent into a hood ............................................................................................................. 34. Diphy lax (p. 117)
40b. Staminode sessile; rostellum small but distinct; sepals not connivent.
41a. Rostellum similar in appearance to stigma; flowers 2–3 mm wide, not resupinate, with lip at top ...................................................................................... 33. Smithorchis (p. 117)
41b. Rostellum different in appearance from stigma; flowers 7–8 mm wide, resupinate, with lip at bottom.
42a. Flowers usually pink or purple, often spotted purple on lip, or green with a chestnut-brown lip; plants with palmate tubers; viscidia naked; lip without 2 small lobes at base .............................................................. 32. Dactylorhiza (p. 114)
42b. Flowers white, cream-colored, yellow-green, or green; plants with fusiform tubers; viscidia enclosed in shell-like bursicles formed by rostellum margins; lip with 2 very small lobes at base ...................... 31. Platanthera (p. 101)
39b. Stigma often neither raised nor thickened (except some Platanthera species with 1 or 2 stigmas).
43a. Tubers digitately or palmately lobed ................................................................. 32. Dactylorhiza (p. 114)
43b. Tubers ovoid, ellipsoidal, or fusiform.
44a. Bracts leafy, leaves merging into floral bracts .................................................... 30. Brachycorythis (p. 100)
44b. Bracts distinctly smaller than leaves and not leaflike.
45a. Lip ligulate; flowers white, yellow-green, or green ........................................... 31. Platanthera (p. 101)
45b. Lip lobed, not ligulate; flowers often purple or pink.
46a. Anther locules parallel, connective obscure; lip lacking calli at mouth of spur .................................................................................................................. 28. Ponerorchis (p. 92)
46b. Anther locules divergent, with a broad connective; lip with 2 small calli at mouth of spur ................................................................................................. 29. Hemipilia (p. 98)
36b. Stigmas 2, usually separate, conjoined in Bhutanthera.
47a. Tubers fusiform or tapering to a slender apex, sometimes digitately or palmately divided.
48a. Tubers palmately or digitately divided; flowers pink to purple; lip 3-lobed, often obscurely so ........................................................................................ 38. Gymnadenia (p. 133)
48b. Tubers fusiform, not divided; flowers white, green, or yellow-green; lip ligulate .................................................................................................................. 31. Platanthera (p. 101)
47b. Tubers ovoid, ellipsoidal, or somewhat cylindric.
49a. Viscidia involute and hornlike; lip often spurred ................................................. 35. Herminium (p. 119)
49b. Viscidia not involute, sometimes slightly curved, but not hornlike; lip often spurred.
50a. Rostellum without distinct arms, beaklike or square to triangular.
51a. Rostellum beaklike, 1-toothed on either side; underground rhizomes cylindric; viscidium hidden in a cavity formed by lip and column ............... 39. Tsaiorchis (p. 135)
51b. Rostellum square or triangular, toothless; underground tubers ellipsoidal or palmate; viscidium naked.
52a. Raceme not secund; sepals completely separate from each other; leaf often 1 ................................................................................................................. 36. Amitostigma (p. 124)
52b. Raceme often secund; sepals connate for ca. 3/4 into a hood; leaves often 2–4 or more ............................................................................................................. 37. Neottianthe (p. 131)
1a. Plants with leaves reduced to inconspicuous scarious scales, roots containing chlorophyll, often flattened against substrate.

2a. Scape or inflorescence erect, less than 2 cm, glabrous ...

2b. Scape or inflorescence pendulous, more than 10 cm, densely hairy ...

3a. Pollinia 4, subglobose, separate from each other.

3b. Pollinia 2, sometimes each divided into 2 pieces, but then not subglobose.

4a. Epiphytic plants; lip ± 3-lobed; column foot absent or very short.

4b. Terrestrial plants; lip 5-lobed; column foot to 6 mm ...

5a. Stem, rachis, leaves, and ovary all spotted with purple; spur with a large mouth and globose apex ...

5b. Stem, rachis, leaves, and ovary not all spotted with purple; spur without a swollen globose apex and large mouth.

5a. Inflorescence with 1(0) rather large flowers; petals 10–21 mm, much longer than sepals ...

5b. Inflorescence with 1 or 2 very small flowers (4–5 mm in diam.) or 3 to many rather large flowers; petals smaller than sepals.

5a. Inflorescence with 1 or 2 flowers; stigmas conjoined, pulvinate; tubers ovoid or globose ...

5b. Inflorescence usually with 3 to many flowers; stigmas separate, not pulvinate; tubers ellipsoid or oblong or gourd-shaped.

5a. Seed fusiform with elongated testa cells, lacking any appendages; plants 8–75 cm tall; tubers ellipsoid or oblong ...

5b. Seed lacking elongated testa and with a baglike appendage on each side; plants 3–4 cm tall; tubers gourd-shaped ...

Key 4: Subfam. Epidendroideae: monopodial taxa

1a. Plants with leaves reduced to inconspicuous scarious scales, roots containing chlorophyll, often flat against substrate.

2a. Scape or inflorescence erect, less than 2 cm, glabrous ...

2b. Scape or inflorescence pendulous, more than 10 cm, densely hairy ...

3a. Pollinia 4, subglobose, separate from each other.

3b. Pollinia 2, sometimes each divided into 2 pieces, but then not subglobose.

4a. Epiphytic plants; lip ± 3-lobed; column foot absent or very short.

4b. Terrestrial plants; lip 5-lobed; column foot to 6 mm ...

5a. Stem, rachis, leaves, and ovary all spotted with purple; spur with a large mouth and globose apex ...

5b. Stem, rachis, leaves, and ovary not all spotted with purple; spur without a swollen globose apex and large mouth.

5a. Inflorescence with 1(0) rather large flowers; petals 10–21 mm, much longer than sepals ...

5b. Inflorescence with 1 or 2 very small flowers (4–5 mm in diam.) or 3 to many rather large flowers; petals smaller than sepals.

5a. Inflorescence with 1 or 2 flowers; stigmas conjoined, pulvinate; tubers ovoid or globose ...

5b. Inflorescence usually with 3 to many flowers; stigmas separate, not pulvinate; tubers ellipsoid or oblong or gourd-shaped.

5a. Seed fusiform with elongated testa cells, lacking any appendages; plants 8–75 cm tall; tubers ellipsoid or oblong ...

5b. Seed lacking elongated testa and with a baglike appendage on each side; plants 3–4 cm tall; tubers gourd-shaped ...

7a. Pollinia subglobose, not cleft, split, or porate.

7b. Pollinia ± cleft, split, or porate, sometimes each completely divided into 2 pieces.

13a. Each pollinium porate at apex.

13b. Lip neither spurred nor saccate.

15a. Leaves narrowly terete ...

15b. Leaves not terete.

16a. Inflorescence 0.5–1.5 cm; lip 3-lobed; column foot short but distinct ...

16b. Inflorescence 2–4 cm; lip contracted in middle; column foot absent ...

14b. Lip spurred or saccate at base.
17a. Lip not 3-lobed, often contracted in middle and with a pouchlike or saccate hypochile, lacking lateral lobes ............................................................. 185. Gastrochilus (p. 491)
17b. Lip 3-lobed, base with a distinct spur and 2 lateral lobes on both sides of its mouth.

18a. Lateral sepals wider than dorsal sepal, oblique; spur tapered toward apex; mid-lobe of lip 7–15 mm wide; pedicel and ovary 1.7–5 cm .................................................. 186. Holcoglossum (p. 499)
18b. Lateral sepals similar to dorsal sepal; spur cylindrical, usually ± dilated toward apex; mid-lobe of lip 1–4 mm wide; pedicel and ovary 0.6–1.5 cm.

19a. Lateral lobes of lip inserted beside entrance of spur; lip often with appendages at base; spur 5–15 mm; sepals and petals 4–9 × 2–6 mm ........................................ 187. Ascocentrum (p. 502)
19b. Lateral lobes of lip inserted distally to spur on sides of mid-lobe; spur 2–2.3 mm; sepals and petals 2.5–3.5 × 1.2–1.7 mm ................................................................. 188. Penkinia (p. 503)

30a. Plants very short stemmed (1–6 cm); spur of lip not as above, unornamented
30b. Plants rather long stemmed, with distant leaves; spur of lip contracted in middle

31a. Flowers minute (sepals 2–2.5 mm); inflorescence slender, laxly many flowered; mid-lobe of lip (when present) tiny, spur short, often saccate, not slender or slightly curved .......................................................... 174. Saccolabiopsis (p. 476)
31b. Flowers larger (sepals 8–10 mm); inflorescence few flowered; mid-lobe of lip large, spreading horizontally, spur slender, cylindrical, sometimes slightly curved ........................................... 178. Neofinetia (p. 483)

13b. Each pollinium cleft or split, or sometimes divided into 2 unequal halves.
20a. Each pollinium cleft or split.

21a. Column foot conspicuous.

22a. Leaves terete ........................................................................................................ 175. Papilionanthe (p. 477)
22b. Leaves flat.

23a. Lip spurless.

24a. Lip immovable ...................................................................................................... 176. Phalaenopsis (p. 478)
24b. Lip movable .......................................................................................................... 177. Chamaeopsis (p. 483)

25a. Lip spur often horn-shaped, curved; mid-lobe large, flat .................................. 180. Aerides (p. 485)
25b. Lip spur usually oblong-cylindric, not curved; mid-lobe fleshy, strongly reduced .... 181. Pteroceras (p. 486)

26a. Lip movable .......................................................................................................... 179. Sedirea (p. 484)
26b. Lip immovable.

27a. Stipe broad, short, shorter or slightly longer than pollinia; viscidium usually suborbicular to transversely elliptic .................................................. 170. Vanda (p. 471)
27b. Stipe narrow, long, much longer than pollinia, usually widened toward apex; viscidium not as above.

28a. Plants large, with thick aerial roots; leaves 20–40 cm ....................................... 171. Rhynochostylis (p. 474)
28b. Plants medium-sized, without thick aerial roots; leaves 4–20 cm.

29a. Stipe linear, apex curving forward, sigmoid, rising behind and above pollinia, pollinia separated by a vertical lamella on stipe .................................................. 172. Uncifera (p. 475)
29b. Stipe not as above.

30a. Plants rather long stemmed, with distant leaves; spur of lip contracted in middle and then globose and circinate at apex, ornamented inside ........................................ 173. Robiquetia (p. 475)
30b. Plants very short stemmed (1–6 cm); spur of lip not as above, unornamented inside.

31a. Flowers minute (sepals 2–2.5 mm); inflorescence slender, laxly many flowered; mid-lobe of lip (when present) tiny, spur short, often saccate, not slender or slightly curved .......................................................... 174. Saccolabiopsis (p. 476)
31b. Flowers larger (sepals 8–10 mm); inflorescence few flowered; mid-lobe of lip large, spreading horizontally, spur slender, cylindrical, sometimes slightly curved ........................................... 178. Neofinetia (p. 483)

20b. Each pollinium completely divided into 2 unequal halves, halves never globose.

32a. Column foot conspicuous.

33a. Stem often elongate, 2–8 cm, with (4–)6–10 or more cauline leaves (except T. eximium); lip without any appendage between 2 lateral lobes or at base of mid-lobe adaxially .................................................. 168. Thrixspermum (p. 466)
33b. Stem short, often less than 1 cm, with 3–5 subbasal leaves; lip with 1 fleshy or forked appendage between 2 lateral lobes or at base of mid-lobe adaxially ........................................... 176. Phalaenopsis (p. 478)
32b. Column foot inconspicuous or absent.

34a. Lip movable.

35a. Both sepals and petals oblanceolate or narrowly spatulate, 5–6 × as long as wide .......... 167. Arachnis (p. 465)
35b. Both sepals and petals broadly obovate to obvate-elliptic, 2–3 × as long as wide.

36a. Stem 10–20 cm, with 3–5 leaves; sepals and petals marked with colored spots; viscidium small, suborbicular ................................................................. 166. Hygrochilus (p. 465)
36b. Stem 20–70 cm, often with 6–8 leaves; sepals and petals marked with colored transverse stripes; viscidium large, saddlelike ............................................. 165. Esmeralda (p. 464)
34b. Lip immovable.
37a. Lip with neither spur nor sac at base, sometimes concave.
38a. Inflorescence 30–50 cm, much longer than leaves; flowers 5–6 cm in diam.; lip shorter than either sepals or petals .......................................................... 150. *Vandopsis* (p. 446)
38b. Inflorescence 10–15 cm, shorter or slightly longer than leaves; flowers 1.5–2 cm in diam.; lip longer than either sepals or petals .......................................................... 151. *Diploprora* (p. 447)
37b. Lip with a spur or sac at base.
39a. Spur of lip with a longitudinal (various in length) septum or ridge inside.
40a. Inflorescence ca. 1 cm, with 2–7 flowers; column with 2 linear and curved appendages on both sides toward apex .......................................................... 161. *Pelatantheria* (p. 456)
40b. Inflorescence more than 3 cm, usually with more than 10 flowers; column without appendages as above.
41a. Rostellum very small; pollinia without caudicles; stipe various in shape but not long linear or curved .......................................................... 163. *Cleisostoma* (p. 458)
41b. Rostellum large; pollinia with short but distinct caudicles; stipe long linear, ± curved.
42a. Leaves unequally and deeply bilobed at apex; stipe strongly curved .......... 162. *Sarcoglyphis* (p. 457)
42b. Leaves very minutely bilobed at apex; stipe slightly curved ...................... 164. *Stereochilus* (p. 463)
39b. Spur of lip without septum or ridge inside.
43a. Spur with appendage (often ligulate) on inner wall.
44a. Leaves terete; spur with Y-shaped appendage on back wall .................. 157. *Cleisostomopsis* (p. 453)
44b. Leaves not terete; spur with tongue-shaped appendage on back wall.
45a. Spur with an erect, forked-tipped tongue in middle or near bottom of back wall; column not conspicuously toothed, glabrous .............................. 160. *Pomatocalpa* (p. 455)
45b. Spur with a movable, hairy tongue in upper part of back wall; column toothed, hairy.
46a. Inflorescence 0.5–1(−1.5) cm, much shorter than leaves, densely several flowered or reduced to a single flower ...................................................... 158. *Trichoglottis* (p. 453)
46b. Inflorescence 5–45 cm, nearly as long as or much longer than leaves, sparsely several to many flowered ...................................................... 159. *Staurochilus* (p. 454)
43b. Spur usually without appendage on inner wall.
47a. Flowers not resupinate, with lip at top .................................................. 153. *Acampe* (p. 449)
47b. Flowers resupinate, with lip at bottom.
48a. Lip clawed basally, with a spur in apical half of claw; spur far from ovary; mid-lobe erose-crisped or fimbriate along margins; column with a very short foot .......................................................... 152. *Ornithochilus* (p. 448)
48b. Lip not clawed at base, spurred at base; spur close to ovary; mid-lobe entire; column footless.
49a. Flowers 3–5 cm in diam.; lip much smaller than petals, almost 1/10 as long as petals .......................................................... 155. *Renanthera* (p. 451)
49b. Flowers less than 1 cm in diam.; lip nearly as large as petals.
50a. Lip with a fleshy transverse appendage at base of mid-lobe over entrance to spur .......................................................... 154. *Smitinandia* (p. 450)
50b. Lip without a fleshy transverse appendage over entrance to spur .......... 156. *Schoenorchis* (p. 452)

**Key 5: Subfam. Epidendroideae p.p.: sympodial taxa**

1a. Lateral sepals connate into a synsepal; inflorescence branched .......................................................... 92. *Acriopsis* (p. 280)
1b. Lateral sepals free or forming a tube with dorsal sepal, if connate into a synsepal; inflorescence unbranched.
2a. Pollinia 2.
3a. Stems each with a single leaf.
4a. Lip clawed at base; mentum spurred, cylindrical, 4–6 mm ........................................ 104. *Collabium* (p. 311)
4b. Lip not clawed at base; mentum not as above.
5a. Lip 3-lobed; mentum distinct, conic, ca. 2 mm ......................................................... 105. *Chrysoglossum* (p. 313)
5b. Lip unlobed; mentum indistinct ................................................................. 106. *Diglyphosa* (p. 314)
3b. Stems each with 2 to many leaves.
6a. Lip not saccate or spurred at base; leaves with neither long petiole nor pseudostem at base; if mycotrophic, without column foot .......................................................... 91. *Cymbidium* (p. 260)
6b. Lip saccate or spurred at base; leaves long petiolate; petioles often forming a pseudostem; if mycotrophic, column foot conspicuous.
7a. Inflorescence erect; anther cap with 2 dark projections; lip conspicuously 3-lobed ................................................................. 89. Eulophia (p. 253)
7b. Inflorescence nodding; anther cap without projections as above; lip often unlobed or inconspicuously 3-lobed .................................................................................................................... 90. Geodorum (p. 258)

8a. Pollinia 8.

9a. Inflorescence globose, densely flowered; sepals 4–5 mm ................................................................. 134. Agrostophyllum (p. 362)
9b. Inflorescence racemose or reduced to a single flower; sepals (8–)10–70 mm.

10a. Inflorescences and often stems, leaves, and leaf sheaths ± covered with reddish brown, or rarely white, hispid hairs; leaves never fleshy and subterete ................................................................. 128. Trichotosia (p. 357)
10b. Inflorescences, stems, and leaves glabrous or rarely bearing white or black hairs; leaves sometimes fleshy and subterete.

11a. Pollinia connected by a common stipe to viscidium.

12a. Column foot absent; mentum absent; anther beaked at apex ................................................................. 137. Thelasis (p. 365)
12b. Column foot conspicuous; mentum present; anther obtuse at apex ................................................................. 138. Phreatia (p. 366)

11b. Pollinia often sessile, directly attached to viscidium or sticky substance (sometimes viscidium and sticky substance absent), rarely each pollinium with a separate stipe.

13a. Column without a conspicuous foot.

14a. Pseudobulbs petiole-like, slender, 1.5–2.5 mm in diam.

15a. Inflorescence racemose, with several flowers; flowers not resupinate; lip superior, base shortly spurred ........................................................................................................ 93. Nephelaphyllum (p. 280)
15b. Inflorescence reduced to a single flower; flower resupinate; lip inferior, spurless .............. 96. Hancockia (p. 286)
14b. Pseudobulbs absent or much thicker, never petiole-like.

16a. Pseudobulbs subglobose to ovoid-globose, rarely ovoid-conic, with 1–5 terminal leaves; viscidium triangular ........................................................................................... 98. Spathoglottis (p. 287)
16b. Pseudobulbs cylindric to conic, very rarely subglobose, sometimes absent or replaced by long stems, with several to many basal or lateral leaves; viscidium absent or if present then not triangular.

17a. Stems 1-leaved; leaves terete or dorsiventrally flattened; lip mid-lobe swollen, bulbous ................................................................................................................................. 132. Ceratostylis (p. 360)
17b. Stems few to many leaved; leaves and lip without above combination of characters.

18a. Stems short, entirely enclosed by imbricate leaf sheaths; inflorescence a densely flowered raceme with small bracts ................................................................. 138. Phreatia (p. 366)
18b. Stems elongate, leafy throughout entire length.

19a. Inflorescence axillary, few flowered, glabrous ........................................................................ 123. Cylindrolobus (p. 349)
19b. Inflorescence terminal or subterminal, few to densely many flowered, glabrous to densely stellate-hairy.

20a. Inflorescence densely covered with short stellate hairs, usually densely many flowered; lip callus bipartite, farinose, with a powdery median ridge that usually ends in a protruding globose apical callus ........................................................................................................ 122. Mycaranthes (p. 348)
20b. Inflorescence glabrous or nearly so, few to many flowered; lip without above combination of characters.

21a. Stems terete, with more than 10 leaves along lower to upper part.

22a. Leaves not deciduous after anthesis; lip spurless ......................................................................... 107. Arundina (p. 314)
22b. Leaves deciduous after anthesis; lip spurred at base ................................................................. 108. Thunia (p. 315)
21b. Stem, if present, with 2–6–(8) leaves above middle.

23a. Stigma usually subterminal; lip neither spurred nor saccate at base, vesiculate on mid-lobe or disk ........................................................................................................ 99. Cephalantheropsis (p. 288)
23b. Stigma lateral; lip often spurred or saccate, very rarely spurless, not vesiculate on mid-lobe or disk.

24a. Pseudobulbs subglobose to ovoid-globose, rarely ovoid-conic, with 1–5 terminal leaves; viscidium triangular ................................................................................................. 98. Spathoglottis (p. 287)
24b. Pseudobulbs cylindric to conic, very rarely subglobose, sometimes absent or replaced by long stems, with several to many basal or lateral leaves; viscidium absent or if present then not triangular.

25a. Plants usually rather tall, with conic, ovoid, or subcylindric, long pseudobulbs or elongate stem; leaves sparsely growing on upper part of stem or toward apex of pseudobulb; lip often completely separate from column wings ........................................................................................................ 100. Phaius (p. 290)
25b. Plants smaller, without or with small, mostly ovoid pseudobulbs; leaves subbasal; lip often ± connate along basal margins with column wings ................................................................. 101. Calanthe (p. 292)

13b. Column with a conspicuous foot.

26a. Scape or inflorescence arising from upper part to apex of stem or pseudobulbs.

27a. Sepals connate into a cylindric or nearly urceolate tube.

28a. Inflorescence 4–10 cm, with 10–40 flowers; leaves 5–40 cm; pseudobulb not reticulate ...................................................... 133. Cryptochilus (p. 361)

28b. Inflorescence very short, with 1 or 2 flowers; leaves 1.5–2.5 cm; pseudobulb surface reticulate ........................................................... 131. Porpax (p. 360)

27b. Sepals free or only lateral sepals connate at base to column, never forming a tube.

29a. Stem with 1 distinct internode only.

30a. Leaves convolute; pseudobulbs conic, 2-leaved; inflorescence many flowered; flowers stellate ................................................................. 119. Eria (p. 343)

30b. Leaves conduplicate, sometimes terete; inflorescence 1–6-flowered; flowers not stellate.

31a. Sepals densely tomentose abaxially ............................................................. 120. Campanulorchis (p. 346)

31b. Sepals glabrous abaxially ............................................................................. 121. Conchidium (p. 346)

29b. Stem usually with several internodes.

32a. Leaves terete, fleshy; inflorescence synanthous, 1-flowered; flower relatively large, outer surface of sepals woolly .............................................. 122. Mycaranthes (p. 348)

32b. Leaves dorsiventrally flattened.

33a. Column with 2 erect, armlike appendages at apex; stem not swollen to form a pseudobulb; leaf 1 .................................................. 132. Ceratostylis (p. 360)

33b. Column without armlike appendages at apex; stem often swollen to form a pseudobulb; leaves 2 to many in taxa lacking pseudobulb.

34a. Lip convex, entire, articulate to column foot and mobile; inflorescence never bottle-brush-like; column foot at right angle to column, bearing a fleshy cushion ................................................................. 130. Callostylis (p. 359)

34b. Lip not convex, 3-lobed or obscurely 3-lobed, if entire, then inflorescence bottle-brush-like, fixed to apex of column foot, lacking a fleshy cushion.

35a. Floral bracts large, ca. 8 cm, bright orange; inflorescence bearing a few medium-sized resupinate flowers; rhizome stout; pseudobulbs short ...... 124. Dendrolirium (p. 350)

35b. Floral bracts smaller, not bright orange.

36a. Inflorescence densely flowered, bottle-brush-like; flowers small, not resupinate or ovary only slightly twisted ...................................... 125. Aeridostachya (p. 351)

36b. Inflorescence not as above; flowers resupinate or not.

37a. Pseudobulbs usually less than 1/4 as long as leaves, borne sequentially on a stout rhizome; leaves 2 or 3, apical or subapical on pseudobulb ...... 126. Bryobium (p. 352)

37b. Pseudobulbs usually 1/2 or more as long as leaves, clustered, not noticeably arranged along rhizome; leaves 2–6 along upper part of stem .... 127. Pinalia (p. 352)

26b. Scape or inflorescence arising from middle to base of pseudobulbs or from rhizome.

38a. Pseudobulbs noded in middle; sepals connate into a tube; column foot conspicuously longer than column, curved upward ............................................. 102. Acanthephippium (p. 309)

38b. Pseudobulbs not noded at least in middle; column foot usually shorter than or as long as column, spreading horizontally.

39a. Plants leafless at anthesis, with neither pseudobulb nor conspicuous stem; rhizome fleshy, usually geniculate .................................................................................. 97. Pachystoma (p. 286)

39b. Plants with leaves at anthesis.

40a. Leaf 1, petiolate or with a petiole-like pseudobulb at base; petiole similar to pseudobulb.

41a. Base of leaf blade often cuneate (only T. longiscapa and T. emeiensis subrounded); petiole distinguishable from pseudobulb .................................................. 94. Tainia (p. 281)

41b. Base of leaf blade cordate or subrounded; petiole pseudobulb-like.

42a. Flowers not resupinate, with lip at top; spur short ................................... 93. Nephelaphyllum (p. 280)

42b. Flowers resupinate, with lip at bottom, spurless or long spurred.

43a. Lip with a slender spur; column without foot; lateral sepals not forming a mentum at base ................................................................. 96. Hancockia (p. 286)

43b. Lip spurless; column with a long and curved foot; lateral sepals adnate to column foot forming a broad mentum at base ........................................... 94. Tainia (p. 281)
40b. Leaves 2 to many (\textit{Spathoglottis} occasionally with 1 leaf), petiolate; petiole quite different from pseudobulb, sometimes overlapping to form a pseudostem.

44a. Lip movable, on a long column foot ................................................................. 95. \textit{Eriodes} (p. 285)

44b. Lip immovable; column without a foot (except \textit{Calanthe labrosa}).

45a. Leaves linear-lanceolate or lanceolate; pseudobulb ± globose; mid-lobe of lip with a claw and 2 thickened appendages ........................................... 98. \textit{Spathoglottis} (p. 287)

45b. Leaves elliptic or elliptic-lanceolate, if linear or linear-lanceolate, without globose pseudobulb; mid-lobe of lip without a claw.

46a. Lip with neither spur nor sac; mid-lobe with many vestigial appendages .................................................. 99. \textit{Cephalantheropsis} (p. 288)

46b. Lip often spurred, rarely spurless; mid-lobe without vestigial appendages.

47a. Plants rather small; leaves subbasal; lip ± connate at base with lateral wings of column to form a tube (except \textit{C. labrosa} and \textit{C. actinomorpha}); column often short .......................................................................................... 101. \textit{Calanthe} (p. 292)

47b. Plants much taller; leaves sparsely growing on a long stemlike pseudobulb or densely growing toward apex of a large pseudobulb; lip often completely separate from column wings; column long and stout .................................. 100. \textit{Phaius} (p. 290)

8b. Pollinia 4–6.

48a. Sepals partly connate at base into a calyx tube and almost at right angle to ovary .............. 103. \textit{Anthogonium} (p. 311)

48b. Sepals free and/or not at right angle to ovary.

49a. Column with a conspicuous foot; mentum clearly visible.

50a. Inflorescence arising from base of pseudobulbs or from rhizome.

51a. Pollinarium with neither viscidium nor stipe ....................................................... 142. \textit{Bulbophyllum} (p. 404)

51b. Pollinarium with both viscidium and stipe.

52a. Lateral sepals densely hispid adaxially ................................................................. 143. \textit{Monomeria} (p. 440)

52b. Lateral sepals glabrous.

53a. Pollinarium with a single, undivided stipe with a common viscidium ....................... 142. \textit{Bulbophyllum} (p. 404)

53b. Pollinarium either with a single, y-shaped stipe with a single viscidium, or with 2 stipes each with a viscidium ................................................................. 144. \textit{Sunipia} (p. 440)

50b. Inflorescence arising from upper part of stem or pseudobulbs.

54a. Pollinarium with neither caudicle nor viscidium; stems fleshy or with internodes enlarged to form pseudobulbs, sometimes bamboolicke or bamboo-shoot-like to ward end, or covered completely by fleshy bases of laterally compressed leaves.

55a. Plants with many 1-noded pseudobulbs along a rhizome ........................................ 141. \textit{Epigeneium} (p. 400)

55b. Plants with 1- to many-noded or pseudobulb-like stems.

56a. Stems not superposed; either (1) rhizomatous, (2) erect and many noded, (3) erect and 1-noded or several noded from a many-noded rhizome, or (4) rhizome absent, new stems of many nodes arising from base of old ones; leaves 1 to many; flowers long-lived or ephemeral .................................................................................................................. 139. \textit{Dendrobium} (p. 367)

56b. Stems superposed, non-rhizomatous part of shoot consisting of several quite long thin internodes, uppermost pseudobulbous and 1-leaved; flowers always ephemeral .................................................................................................................. 140. \textit{Flickingeria} (p. 397)

54b. Pollinarium with both caudicle and viscidium; stems without above combination of characters, occasionally cornlike at base.

57a. Leaves several, subbasal; stem less than 1 cm ......................................................... 118. \textit{Polystachya} (p. 342)

57b. Leaves many, densely and distichously arranged throughout stem; stem usually more than 5 cm.

58a. Leaves equitant, shoots iridiform; lip with a conic subapical wart below ................. 129. \textit{Oxystophyllum} (p. 358)

58b. Leaves not equitant, often twisted at base so as to be in one plane; lip without such a wart.

59a. Pollinia 6 ................................................................................................................ 135. \textit{Appendicula} (p. 363)

59b. Pollinia 4 ................................................................................................................ 136. \textit{Podochilus} (p. 365)

49b. Column without a conspicuous foot; mentum absent.

60a. Plants with a long stem; leaves cauleine .................................................................. 108. \textit{Thunia} (p. 315)

60b. Plants without a long stem; leaves basal or at apex of pseudobulbs.

61a. Leaves laterally compressed or sometimes cylindric ............................................... 81. \textit{Oberonia} (p. 236)

61b. Leaves flat, not as above.
62a. Terrestrial plants, without green naked pseudobulbs.
63a. Plants without underground pseudobulbs, sometimes with stem fleshy or stemlike pseudobulbs basally; pollinarium without caudicle, stipe, or viscidium.
64a. Column rather long, arching; flowers resupinate .................................................. 75. Liparis (p. 211)
64b. Column often very short, erect; flowers often not resupinate, with lip at top; always terrestrial.
65a. Leaf 1 or 2, lacking prominent veins ................................................................. 77. Malaxis (p. 229)
65b. Leaves 2 or more, with prominent veins.
66a. Column lacking fingerlike projections on each side of anther; anther connective broad with locules well separated; lip with lateral lobes enfolding column ................................................. 80. Oberonioides (p. 235)
66b. Column with fingerlike projections on either side; anther connective narrow.
67a. Lip entire to obscurely lobed, often with a denticulate margin, without transverse callus at base .................................................. 78. Crepidium (p. 229)
67b. Lip prominently 3-lobed, with a transverse callus at base ................................. 79. Dienia (p. 234)
68b. Plants with underground pseudobulbs; pollinarium with conspicuous stipe or viscidium (except Tipularia).
68a. Plants with a single flower.
69a. Sepals shorter than 2 cm; lip with a horizontally spreading sac ......................... 86. Calypso (p. 251)
69b. Sepals longer than 2.5 cm; lip with an incurved spur ....................................... 87. Changnienia (p. 252)
68b. Plants with many flowers.
70a. Lip with a cylindric spur at base; spur conspicuously longer than pedicel and ovary ................................................................. 85. Tipularia (p. 250)
70b. Lip spurless or with a spur conspicuously shorter than pedicel and ovary.
71a. Flowers pendulous; sepal 1.7–3 cm ................................................................. 84. Cremesla (p. 249)
71b. Flowers not pendulous; sepal 1.5–11 mm.
72a. Lip saccate or shortly spurred at base; pollinarium without a distinct stipe ...... 85. Tipularia (p. 250)
72b. Lip neither saccate nor shortly spurred at base; pollinarium with a slender stipe ................................................................. 83. Oreorchis (p. 245)
62b. Epiphytic plants, with green naked pseudobulbs.
73a. Leaves membranous or papery; lip unlobed, without concave or saccate base.
74a. Petals not Y-shaped; pollinia 4, without distinct caudicles ................................ 75. Liparis (p. 211)
74b. Petals deeply 2-lobed, ± Y-shaped; pollinia 2, each with caudicle .................. 76. Ipsilorcher (p. 228)
73b. Leaves thickly leathery; lip, if unlobed, with concave or saccate base.
75a. Sepals concave and saccate at base ................................................................. 115. Neogyna (p. 341)
75b. Sepals not concave or saccate at base.
76a. Lip spurred.
77a. Pseudobulbs each with 2 leaves at apex; flowers many, on pendulous raceme; spur curved upward .................................................. 116. Bulleyia (p. 341)
77b. Pseudobulbs each with 1 leaf at apex; flower solitary, not pendulous; spur straight .................................................. 117. Ischnogynae (p. 342)
76b. Lip spurless, sometimes saccate at base.
78a. Lip concave-saccate at base.
79a. Column thick and short, usually shorter than lip .............................................. 113. Pholidota (p. 335)
79b. Column slender, usually nearly as long as lip .................................................. 114. Otochilus (p. 339)
78b. Lip not or only slightly concave, but never saccate, at base.
80a. Raceme with 20–30 flowers; flowers ca. 1 cm in diam.; column with 2 armlike appendages on both sides .............................................. 112. Dendrochilum (p. 334)
81b. Raceme often with several flowers or reduced to a single flower;
flowers more than 3 cm in diam.; column without armlike appendages.
82a. Plants with persistent leaves alive for more than 1 year, present at anthesis; flowers often more than 2, white, yellow, green, or brown, lacking reddish spots on lip .................................................. 109. Coelogyne (p. 315)
82b. Leaves annually deciduous, absent or very young at anthesis; flower solitary, rarely 2, usually pink to purple, rarely yellow or white, with reddish spots on lip .................................................. 110. Pleione (p. 325)