

ORCHIDACEAE

兰科 lan ke

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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, photosynthesizing 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 monoecious 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 variously 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 partly adnate to sepals, similar to sepals or not, often showy; lip entire, variously lobed or 2- or 3-partite, ornamented or not with calli, ridges, hair cushions, or crests, with or without a basal spur or nectary, margins entire to lacinate. Column short to long, with or 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 an ancestral species) of the orchid family, including the apostasioids and cyripedioids. 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, Cyripedioideae, 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 Vanilloideae, 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, Cyripedioideae, Vanilloideae, Orchidoideae, and Epidendroideae.

Lang Kaiyong, Chen Singchi, Luo Yibo & Zhu Guanghua. 1999. *Orchidaceae* (1). *In*: Lang Kaiyong, ed., *Fl. Reipubl. Popularis Sin.* 17: 1–499; Chen Singchi, Tsi Zhanhuo, Lang Kaiyong & Zhu Guanghua. 1999. *Orchidaceae* (2). *In*: Chen Singchi, ed., *Fl. Reipubl. Popularis Sin.* 18: 1–412; Tsi Zhanhuo, Chen Singchi, Luo Yibo & Zhu Guanghua. 1999. *Orchidaceae* (3). *In*: Tsi Zhanhuo, ed., *Fl. Reipubl. Popularis Sin.* 19: 1–437.

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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 frequently leaflike organ (often very reduced or absent) subtending a flower, inflorescence, or partial inflorescence in its axil, sometimes brightly colored.
- bursicle** – a purselike 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 leaf, often referring to the first such leaves on a shoot.
- 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 *stelia*.
- 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*.
- epigeal, epigeous* – see *terrestrial*.
- epilithic* – see *lithophytic*.
- 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, gynostemium* – see *column*.
- gullet** – interior of a conical orchid flower, which the pollinator enters, as in most species of *Dendrobium*.
- hamulus** – a type of *stipe* representing the recurved apex of the *rostellum*.
- heteranthonous** – flowering from special shoots that do not produce *pseudobulbs* 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 facultative 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*.
- hysteranthonous** – when an apical inflorescence is produced after the *pseudobulb* and leaves on the same shoot. The inflorescence develops on the top of a fully developed pseudobulb 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.
- lithophyte** (adjective **lithophytic**) – 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 **pollinaria**) – the functional unit of pollen transfer in orchid pollination, consisting of two or more *pollinia* (sometimes with *caudicles*), 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.
- pseudoindefinite** – (of orchids) denotes a stem that grows indefinitely although the plant retains the *sympodium* and produces new shoots at the base.
- pseudopollen** – a mealy, farinose, pollenlike deposit, e.g., on the *lip* in some orchids.
- pseudoraceme** – a specialized leafless apical portion of the stem bearing inflorescences.
- pseudoterminal** – when an inflorescence is apparently terminal, but is actually axillary on a very short terminal internode that is usually concealed by small *bracts*.
- resupinate** – with the pedicel twisted so that the *lip* is always in the same position (usually at the bottom of the flower) regardless of the position of the inflorescence.
- rhizome** – the indeterminate stem or system of stems of many plants, such as *sympodial* orchids, which successively give rise to new shoots and flowers, often horizontal or underground but sometimes appressed to branches or rocks.
- rostellum** – part of the median stigma lobe of orchid flowers.
- rostellum remnant** – the often cleft or 2-lobed part of the *rostellum* that remains after the *viscidium* has been removed by a pollinator.
- rupicolous* – 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 imitating 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, rhipidium, 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*.
- velamen** – the spongy outer layer of an orchid root, consisting of dead cells at maturity.
- viscarium* – 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:

Eleanor Catherine *in*: Cribb, P. J. 1997. The Genus *Cypripedium*. Portland, Oregon: Timber Press. *Cypripedium yunnanense* (p. 200, fig. 30).

Judi Stone *in*: Pridgeon, A. M. et al. (eds.). 1999, 2003. Genera Orchidacearum, 1, 3. Oxford & New York: Oxford University Press. *Apostasia wallichii* (1: 100, fig. 2.1) and *Erythrorchis altissima* (3: 312, fig. 219.1).

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 pauciflora*), *Cryptochilus luteus* (p. 366, fig. 88), *Cleistoroma linearilobatum* (p. 510, fig. 113), and *Diploprora championii* (p. 516, fig. 114).

Gunnar Seidenfaden and Povl Juul *in*: Seidenfaden, G. 1978. Orchid Genera in Thailand, 6. Dansk Botanisk Arkiv, 32(2). *Goodyera procera* (p. 24, fig. 8h).

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).

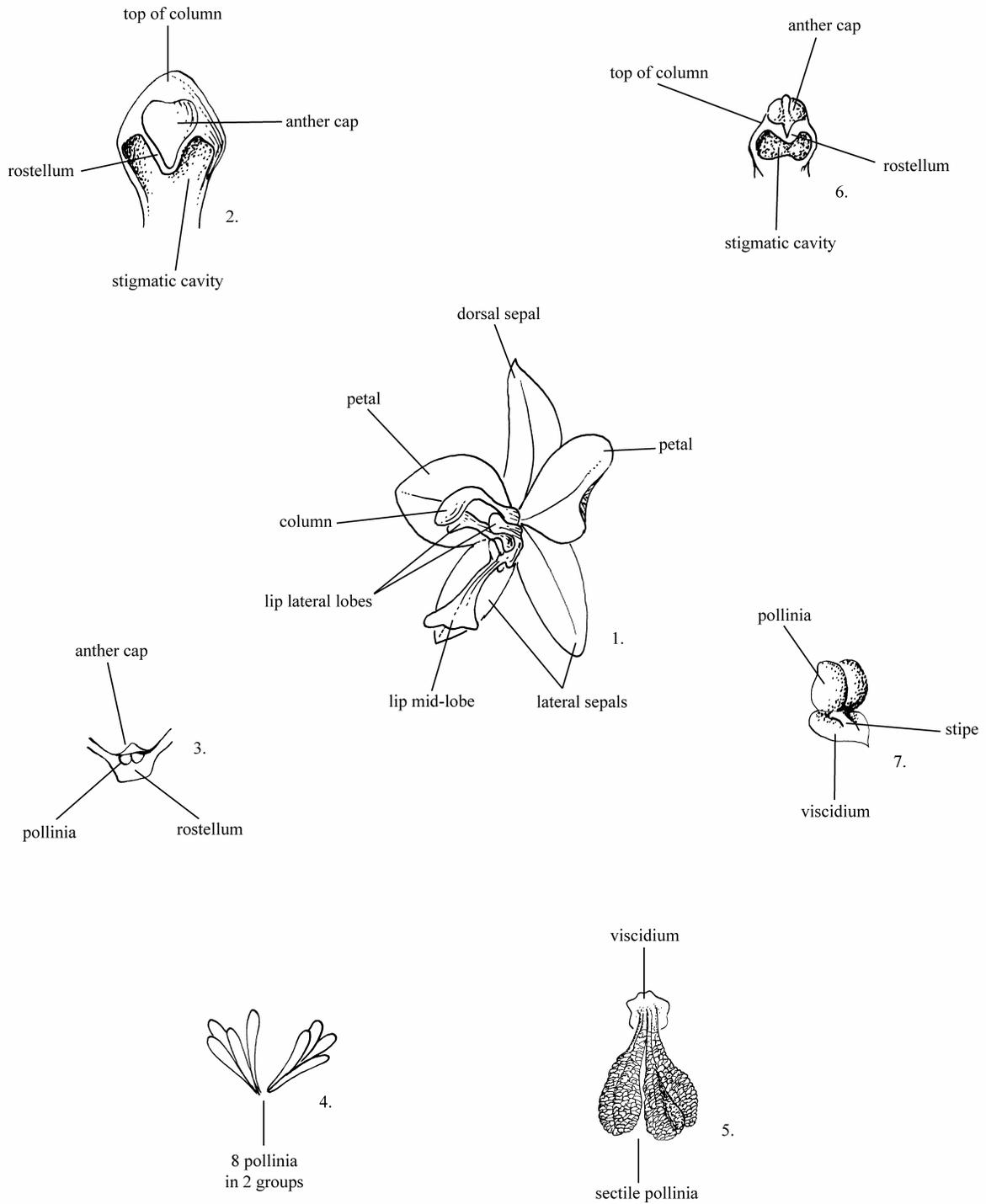


Figure 1. 1–7. Flower structure in the Orchidaceae. 1–4. *Spathoglottis plicata*. 5. *Goodyera procera*. 6–7. *Vanda*.

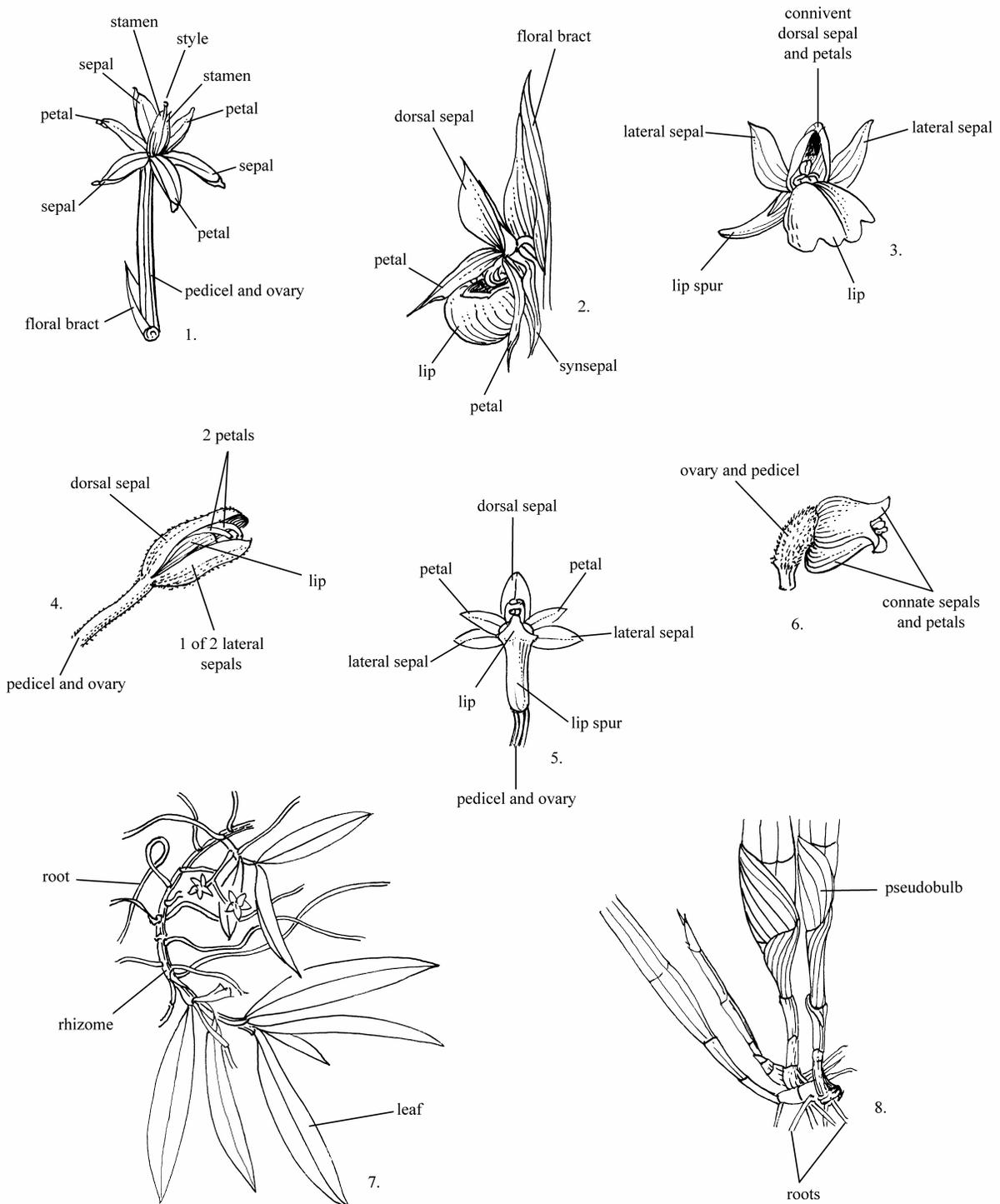


Figure 2. 1–6. Examples of flowers in the five subfamilies of the Orchidaceae. —1. Apostasioideae (*Apostasia wallichii*). —2. Cyripedioideae (*Cyripedium yunnanense*). —3. Orchidoideae (*Ponerorchis chusua*). —4. Vanilloideae (*Erythrorchis altissima*). —5. Epidendroideae (*Cleisostoma linearilobatum*). —6. Epidendroideae (*Cryptochilus luteus*). 7–8. Monopodial and sympodial growth habit. —7. Monopodial (*Diploprora champinii*). —8. Sympodial (*Dendrobium crumenatum*).



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*).



Figure 4. 1–6. Examples of plants in the subfamilies of the Orchidaceae. 1–2. Vanilloideae (*Erythrorchis altissima*). —1. Habit. —2. Capsules. 3. Epidendroideae (*Cleisostoma linearilobatum*). 4–6. Epidendroideae (*Cryptochilus luteus*). —4. Habit. —5. Inflorescence. —6. Infructescence.

Systematic list of subfamilies and genera

● Indicates endemic genera

1. Apostasioideae (p. 20)

1. *Apostasia*
2. *Neuwiedia*

2. Cyprripedioideae (p. 22)

3. *Cypripedium*
4. *Paphiopedilum*

3. Orchidoideae (p. 45)

5. *Goodyera*
6. *Hylophila*
7. *Ludisia*
8. *Herpysma*
9. *Erythrodes*
10. *Cheirostylis*
11. *Kuhlhasseltia*
12. *Myrmechis*
13. *Hetaeria*
14. *Rhomboda*
15. *Chamaegastrodia*
16. *Zeuxine*
17. *Vrydagzynea*
18. *Anoectochilus*
19. *Odontochilus*
20. *Spiranthes*
21. *Pelexia*
22. *Corybas*
23. *Stigmatodactylus*
24. *Cryptostylis*
25. *Microtis*
26. *Orchis*
27. *Galearis*
28. *Ponerorchis*
29. *Hemipilia*
30. *Brachycorythis*
31. *Platanthera*
32. *Dactylorhiza*
33. ● *Smithorchis*
34. *Diphylax*
35. *Herminium*
36. *Amitostigma*
37. *Neottianthe*
38. *Gymnadenia*
39. ● *Tsaiorchis*
40. *Pecteilis*
41. *Peristylus*
42. *Habenaria*
43. *Hemipiliopsis*
44. *Bhutanthera*
45. ● *Frigidorchis*
46. *Diplomeris*
47. *Androcorys*

48. ● *Porolabium*

49. *Disperis*
50. *Satyrium*

4. Vanilloideae (p. 167)

51. *Vanilla*
52. *Cyrtosia*
53. *Galeola*
54. *Erythrorchis*
55. *Lecanorchis*
56. *Pogonia*

5. Epidendroideae (p. 174)

57. *Cephalanthera*
58. ● *Tangtsinia*
59. *Aphyllorchis*
60. *Epipactis*
61. ● *Diplandrorchis*
62. *Holopogon*
63. *Neottia*
64. *Tropidia*
65. *Corymborkis*
66. *Nervilia*
67. *Gastrodia*
68. *Didymoplexis*
69. *Didymoplexiella*
70. *Didymoplexiopsis*
71. *Stereosandra*
72. *Epipogium*
73. *Bletilla*
74. *Yuania*
75. *Liparis*
76. ● *Ypsilorchis*
77. *Malaxis*
78. *Crepidium*
79. *Dienia*
80. *Oberonioides*
81. *Oberonia*
82. *Risleya*
83. *Oreorchis*
84. *Cremastra*
85. *Tipularia*
86. *Calypto*
87. ● *Changniemia*
88. *Corallorhiza*
89. *Eulophia*
90. *Geodorum*
91. *Cymbidium*
92. *Acriopsis*
93. *Nephelaphyllum*
94. *Tainia*

95. *Eriodes*

96. *Hancockia*
97. *Pachystoma*

98. *Spathoglottis*

99. *Cephalantheropsis*

100. *Phaius*

101. *Calanthe*

102. *Acanthephippium*

103. *Anthogonium*

104. *Collabium*

105. *Chrysoglossum*

106. *Diglyphosa*

107. *Arundina*

108. *Thunia*

109. *Coelogyne*

110. *Pleione*

111. *Panisea*

112. *Dendrochilum*

113. *Pholidota*

114. *Otochilus*

115. *Neogyna*

116. *Bulleyia*

117. ● *Ischnogyne*

118. *Polystachya*

119. *Eria*

120. *Campanulorchis*

121. *Conchidium*

122. *Mycaranthes*

123. *Cylindrolobus*

124. *Dendrolirium*

125. *Aeridostachya*

126. *Bryobium*

127. *Pinalia*

128. *Trichotosia*

129. *Oxystophyllum*

130. *Callostylis*

131. *Porpax*

132. *Ceratostylis*

133. *Cryptochilus*

134. *Agrostophyllum*

135. *Appendicula*

136. *Podochilus*

137. *Thelasis*

138. *Phreatia*

139. *Dendrobium*

140. *Flickingeria*

141. *Epigeneium*

142. *Bulbophyllum*

143. *Monomeria*

144. *Sunipia*

145. *Taeniophyllum*

146. *Sarcophyton*

147. *Micropera*

148. *Doritis*

149. ● *Nothodoritis*

150. *Vandopsis*

151. *Diploprora*

152. *Ornithochilus*

153. *Acampe*

154. *Renanthera*

155. *Schoenorchis*

157. *Cleisostomopsis*

158. *Trichoglottis*

159. *Stauorchilus*

160. *Pomatocalpa*

161. *Pelatanthera*

162. *Sarcoglyphis*

163. *Cleisostoma*

164. *Stereochilus*

165. *Esmeralda*

166. *Hygrochilus*

167. *Arachnis*

168. *Thrixspermum*

169. *Chiloschista*

170. *Vanda*

171. *Rhynchostylis*

172. *Uncifera*

173. *Robiquetia*

174. *Saccolabiopsis*

175. *Papilionanthe*

176. *Phalaenopsis*

177. *Chamaeanthus*

178. *Neofinetia*

179. *Sedirea*

180. *Aerides*

181. *Pteroceras*

182. *Biermannia*

183. *Luisia*

184. ● *Haraella*

185. *Gastrochilus*

186. *Holcoglossum*

187. *Ascocentrum*

188. *Penkimia*

189. *Microtatorchis*

190. *Grosourdyia*

191. *Tuberolabium*

192. *Parapteroceras*

193. *Pennilabium*

194. *Malleola*

Key to subfamilies

- 1a. Stamens 2 or 3.
- 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 1. Subfam. Apostasioideae (p. 20)
- 2b. Flower zygomorphic (bilaterally symmetrical); lateral sepals usually fused almost to apex; lip usually saccate or urceolate; column with 2 lateral anthers and a terminal usually shield-shaped staminode; stigma ventral, stalked 2. Subfam. Cypripedioideae (p. 22)
- 1b. Stamen solitary.
- 3a. Plants usually terrestrial, growing from tubers or a horizontal fleshy rhizome; anther basifixed or not; pollinia segmented, comprising massulae, or mealy 3. Subfam. Orchidoideae (p. 45)
- 3b. Plants usually epiphytic or lithophytic, rarely terrestrial or lianallike, growing from cylindrical stems or pseudobulbs, borne on woody or tough rhizomes; anther not basifixed; pollinia mealy or hard, often attached by a stalk to a sticky viscidium.
- 4a. Plants lianallike or terrestrial, often heteromycotrophic and lacking green leaves; stems cylindrical, never pseudobulbous; pollinia 2, powdery, as monads or tetrads, lacking a stipe and a distinct viscidium 4. Subfam. Vanilloideae (p. 167)
- 4b. Plants epiphytic, lithophytic, or less commonly terrestrial, rarely heteromycotrophic; stems cylindrical to pseudobulbous; pollinia 2, 4, 6, or 8, usually hard, rarely sectile, often attached by 1 or 2 stipes to 1 or 2 distinct viscidia 5. Subfam. Epidendroideae (p. 174)

Key to genera

- 1a. Fertile stamens 2 or 3, if 2, opposite to lateral petals; pollen not forming pollinia.
- 2a. Flowers actinomorphic or almost so; lip similar to petals, neither saccate nor urceolate (1. Subfam. Apostasioideae).
- 3a. Fertile stamens 2; inflorescence often \pm curved outward or pendulous, branched 1. *Apostasia* (p. 20)
- 3b. Fertile stamens 3; inflorescence erect, unbranched 2. *Neuwiedia* (p. 21)
- 2b. Flowers strongly zygomorphic; lip conspicuously saccate or urceolate, very different from petals (2. Subfam. Cypripedioideae).
- 4a. Leaves plicate, usually cauline, rarely 2 prostrate on substrate; perianth persistent when fruiting 3. *Cypripedium* (p. 22)
- 4b. Leaves conduplicate, basal, 3 to many, distichous; perianth caducous when fruiting 4. *Paphiopedilum* (p. 33)
- 1b. Fertile stamen 1, rarely 2, if 2, opposite to dorsal sepal and lip; pollen forming pollinia.
- 5a. Holomycotrophic plants, without chlorophyll Key 2
- 5b. Autotrophic plants, with chlorophyll in leaves, stems, and/or roots.
- 6a. Pollinia soft or sectile; plants always terrestrial; leaves not articulated Key 3 (p. 10)
- 6b. Pollinia waxy or bony, hard or relatively hard; plants mostly epiphytic, rarely terrestrial; leaves often articulated at base.
- 7a. Plants monopodial, without pseudobulbs or thickened stems, rhizomes, or tubers; pollinia bony, very hard, often attached by a common stipe to a viscidium Key 4 (p. 13)
- 7b. Plants sympodial, mostly with pseudobulbs or thickened stems, rhizomes, or tubers; pollinia not very hard, usually without stipe Key 5 (p. 15)

Key 2: Holomycotrophic genera

- 1a. Pollinia waxy or bony, hard or relatively hard.
- 2a. Pollinia 4–6.
- 3a. Plants with a slender, nearly cylindrical, straight rhizome; sepals 1–2 mm; lip unlobed 82. *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 \pm annular wing.
- 6a. Fruit fleshy, indehiscent; seeds wingless or with \pm annular wing narrower than seed itself 52. *Cyrtosia* (p. 168)
- 6b. Fruit dry, dehiscent; seeds with broad wings, wider on one side than seed itself.
- 7a. Stem robust; rachis, ovary, and sepals all \pm covered with rust-colored hairs; column less than 1/2 as long as lip 53. *Galeola* (p. 169)
- 7b. Stem rather slender; inflorescence and flowers glabrous; column more 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, \pm fusiform.
- 8a. Sepals and petals \pm connate and forming a tube.
- 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. Calyculus present between ovary and sepals 55. *Lecanorchis* (p. 171)
- 11b. Calyculus 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 \pm 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 spurless; 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 \pm 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, \pm 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 sessile 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. *Herpysma* (p. 56)
 - 22b. Spur 1.5–4 mm; lip without lamella or callus on disk 9. *Erythrodes* (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. anomala*) 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 cylindric or fusiform spur.
 - 28a. Column lacking ventral wings; lip without a mesochile; lip hypochile containing 2 stalked glands 17. *Vrydagzynea* (p. 76)
 - 28b. Column with ventral wings; lip with an often toothed or pectinate mesochile; lip hypochile without stalked glands inside 18. *Anoectochilus* (p. 76)
 - 27b. Lip lacking a spur.
 - 29a. Lip with a raised median keel 14. *Rhomboda* (p. 67)
 - 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 \pm saccate or \pm 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 \pm connivent into a hood 34. *Diphylax* (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, ellipsoid, or somewhat cylindrical.
- 49a. Viscidia involute and hornlike; lip often spurless 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 cylindrical; viscidium hidden in a cavity formed by lip and column 39. *Tsaiorchis* (p. 135)
- 51b. Rostellum square or triangular, toothless; underground tubers ellipsoid 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)

- 50b. Rostellum with arms, neither beaklike nor square to triangular.
 - 53a. Viscidium hidden within a tubular fold at end of rostellum arm 40. *Pecteilis* (p. 136)
 - 53b. Viscidium naked.
 - 54a. Rostellum arms very short; anther with 2 parallel locules; flowers small 41. *Peristylus* (p. 137)
 - 54b. Rostellum arms long; anther with 2 usually divergent locules.
 - 55a. Stem, rachis, leaves, and ovary all spotted with purple; spur with a large mouth and globose apex 43. *Hemipiliopsis* (p. 160)
 - 55b. Stem, rachis, leaves, and ovary not all spotted with purple; spur without a swollen globose apex and large mouth.
 - 56a. Inflorescence with 1(or 2) rather large flowers; petals 10–21 mm, much longer than sepals 46. *Diplomeris* (p. 162)
 - 56b. Inflorescence with 1 or 2 very small flowers (4–5 mm in diam.) or 3 to many rather large flowers; petals smaller than sepals.
 - 57a. Inflorescence with 1 or 2 flowers; stigmas conjoined, pulvinate; tubers ovoid or globose 44. *Bhutanthera* (p. 161)
 - 57b. Inflorescence usually with 3 to many flowers; stigmas separate, not pulvinate; tubers ellipsoid or oblong or gourd-shaped.
 - 58a. Seed fusiform with elongated testa cells, lacking any appendages; plants 8–75 cm tall; tubers ellipsoid or oblong 42. *Habenaria* (p. 144)
 - 58b. Seed lacking elongated testa and with a baglike appendage on each side; plants 3–4 cm tall; tubers gourd-shaped 45. *Frigidorchis* (p. 161)

Key 4: Subfam. Epidendroideae: monopodial taxa

- 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 145. *Taeniophyllum* (p. 444)
 - 2b. Scape or inflorescence pendulous, more than 10 cm, densely hairy 169. *Chiloschista* (p. 470)
- 1b. Plants with normal green leaves.
 - 3a. Pollinia 4, subglobose, separate from each other.
 - 4a. Terrestrial plants; lip 5-lobed; column foot to 6 mm 148. *Doritis* (p. 445)
 - 4b. Epiphytic plants; lip ± 3-lobed; column foot absent or very short.
 - 5a. Stem very short, invisible; leaves all basal; lip with a sac at base of mid-lobe 149. *Nothodoritis* (p. 446)
 - 5b. Stem elongate, 25–100 cm; leaves cauline; lip with a spur at base.
 - 6a. Inflorescence axillary; leaf blade linear, 1.5–1.8 cm wide 146. *Sarcophyton* (p. 445)
 - 6b. Inflorescence often leaf-opposed; leaf blade lorate, 3–4.5 cm wide 147. *Micropera* (p. 445)
 - 3b. Pollinia 2, sometimes each divided into 2 pieces, but then not subglobose.
 - 7a. Pollinia subglobose, not cleft, split, or porate.
 - 8a. Plants very small; leaves 0.5–1.5 cm; sepals and petals connate at base to form a tube 189. *Microtatorchis* (p. 503)
 - 8b. Plants small to medium-sized; leaves 4–17 cm; sepals and petals free.
 - 9a. Column with a conspicuous foot.
 - 10a. Scape glabrous; stem 2–12 cm 192. *Parapteroceras* (p. 505)
 - 10b. Scape densely minutely hispid; stem less than 1 cm 190. *Grosourdyia* (p. 504)
 - 9b. Column without a foot.
 - 11a. Lateral lobes of lip large, apical margin serrate or fimbriate 193. *Pennilabium* (p. 505)
 - 11b. Lateral lobes of lip inconspicuous, margin neither serrate nor fimbriate.
 - 12a. Rachis slender, never thickened and sulcate, never clavate; column hammer-shaped; stipe linear-spatulate, much broadened at apex 194. *Malleola* (p. 506)
 - 12b. Rachis fleshy, sulcate, or sometimes clavate, few to many flowered, with a few or all flowers open simultaneously; column short and stout, not hammer-shaped; stipe linear, not broadened at apex 191. *Tuberolabium* (p. 504)
 - 7b. Pollinia ± cleft, split, or porate, sometimes each completely divided into 2 pieces.
 - 13a. Each pollinium porate at apex.
 - 14a. Lip neither spurred nor saccate.
 - 15a. Leaves narrowly terete 183. *Luisia* (p. 488)
 - 15b. Leaves not terete.
 - 16a. Inflorescence 0.5–1.5 cm; lip 3-lobed; column foot short but distinct 182. *Biermannia* (p. 487)
 - 16b. Inflorescence 2–4 cm; lip contracted in middle; column foot absent 184. *Haraella* (p. 491)
 - 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 cylindric, usually \pm 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 \times 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 \times 1.2–1.7 mm 188. *Penkimia* (p. 503)
- 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. *Chamaeanthus* (p. 483)
- 23b. Lip spurred, spur spreading at a right angle to column foot.
- 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)
- 21b. Column foot absent or very inconspicuous.
- 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. *Rhynchostylis* (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, cylindric, 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 \times as long as wide 167. *Arachnis* (p. 465)
- 35b. Both sepals and petals broadly obovate to obovate-elliptic, 2–3 \times 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-cripsed 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 spurlike, cylindric, 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)
- 2b. Pollinia 4–8.
- 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. *Thelasia* (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. *Ceratosylis* (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. Stem 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 \pm 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. *Ceratosstylis* (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; sepals completely free; 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 (*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. *Eriodes* (p. 285)
- 44b. Lip immovable; column without a foot (except *Calanthe labrosa*).
- 45a. Leaves linear-lanceolate or lanceolate; pseudobulb \pm globose; mid-lobe of lip with a claw and 2 thickened appendages 98. *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 vesiculate appendages 99. *Cephalantheropsis* (p. 288)
- 46b. Lip often spurred, rarely spurless; mid-lobe without vesiculate appendages.
- 47a. Plants rather small; leaves subbasal; lip \pm connate at base with lateral wings of column to form a tube (except *C. labrosa* and *C. actinomorpha*); column often short 101. *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. *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. *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. *Bulbophyllum* (p. 404)
- 51b. Pollinarium with both viscidium and stipe.
- 52a. Lateral sepals densely hispid adaxially 143. *Monomeria* (p. 440)
- 52b. Lateral sepals glabrous.
- 53a. Pollinarium with a single, undivided stipe with a common viscidium 142. *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. *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 bamboolike or bamboo-shoot-like toward end, or covered completely by fleshy bases of laterally compressed leaves.
- 55a. Plants with many 1-noded pseudobulbs along a rhizome 141. *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. *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. *Flickingeria* (p. 397)
- 54b. Pollinarium with both caudicle and viscidium; stems without above combination of characters, occasionally cormlike at base.
- 57a. Leaves several, subbasal; stem less than 1 cm 118. *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. *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. *Appendicula* (p. 363)
- 59b. Pollinia 4 136. *Podochilus* (p. 365)
- 49b. Column without a conspicuous foot; mentum absent.
- 60a. Plants with a long stem; leaves cauline 108. *Thunia* (p. 315)
- 60b. Plants without a long stem; leaves basal or at apex of pseudobulbs.
- 61a. Leaves laterally compressed or sometimes cylindric 81. *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)
- 63b. 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 cylindrical 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; sepals 1.7–3 cm 84. *Cremastra* (p. 249)
- 71b. Flowers not pendulous; sepals 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, \pm Y-shaped; pollinia 2, each with caudicle 76. *Ypsilorchis* (p. 228)
- 73b. Leaves thickly leathery; lip, if unlobed, with concave or saccate base.
- 75a. Sepals concave and saccate at base 115. *Neogyne* (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. *Ischnogyne* (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. Lip sigmoidally curved at base 111. *Panisea* (p. 333)
- 80b. Lip not sigmoidally curved at base.
- 81a. 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)