

Classification of the Orchids

History

Carl van Linné (Linnaeus) 1707-1778

- 1753: *Species Plantarum* - 8 genera & 69 species. 2nd ed. - 102 spp.
- All epiphytes assigned to *Epidendrum*.
- No family designation.

Antoine Laurent de Jussieu (1748-1836)

- Family concept.
- Plants divided into 3 groups: Acotyledons, Monocotyledans, Dicotyledons.
- Orchideae in *Genera Plantarum* (1789).

Olaf Swartz (1760-1818): 1st orchid specialist.

- First to recognize division between monandrous and diandrous orchids.

John Lindley (1799-1865): father of modern orchid classification.

- 1830-1840: *Genera and Species of Orchidaceous Plants*
- Described ~2000 taxa.
- Recognized monandrous and diandrous groups, split into 7 tribes.
- Started the serial *Gardeners Chronicle* (1841) in which many orchids were described.

Heinrich Gustav Reichenbach (1824-1889)

- Leading European orchid authority after Lindley's death.
- His classification system not used, however.

George Bentham (1800-1884) - 1st influential system of orchid classification (amplification of Lindley's tribes).

Modern Classification Systems

Friedrich Richard Rudolf Schlechter (1926)

- 2 subfamilies: Cyripedioideae and Orchidoideae (Apostasiaceae as separate family)

Leslie A. Garay (b. 1924) - Harvard University.

Robert L. Dressler (b. 1927) - Smithsonian, now Florida State Museum.

Garay's System - Five subfamilies:

- Apostasioideae
- Cypripedioideae
- Orchidoideae
- Neottioideae
- Epidendroideae

Dressler's System (1982, 1994)

- Divided Orchidaceae into 6 (later 5) subfamilies and 21 tribes.
- Most primitive orchids: Apostasioideae (3 anthers)
- Cyripedioideae - 2 anthers
- Spiranthoideae
- Orchidoideae
- Epidendroideae (Vandoideae: now included in Epidendroideae.)

Dressler's System

- Epidendroideae most divergent.
 - Vandoids:
 - Anther incumbent from very early stages of development.
 - Pollinia 2-4 with reduced caudicles and always with viscidium.
- Dressler also places Neottiodeae in the Orchidoideae and segregates Spiranthoideae from the former.

Subfamilies According to Dressler (1994)

Apostasioideae - sometime considered distinct family.

- Terrestrial.
- Stamens 2-3.
- Anther on filament (long or short).
- Stigma terminal with 3 lobes.
- No rostellum.
- No pollinia.
- Pollen in single grains.
- Ovary with 3 locules, axile placentation.
- *Neuwiedia* has fleshy fruits.
- Seed coat thick and opaque.
- Genera: *Apostasia*, *Neuwiedia*, both terrestrials of forest understory, 20 spp. Tropical Asia, Australia.
- $2n = 48$.

Cypripedioideae - Slipper orchids

- Most terrestrial.
- Velamen lacking or simple.
- Pouch shaped labellum.
- 2 fertile anthers.
- Anthers on short filament.
- Staminode.
- Terminal 3-lobed stigma.
- No rostellum.
- No pollinia (except some *Phragmipedium*).
- Pollen in monads.
- Ovary with 1-3 locules, axile or parietal placentation.
- Seed coat thick or transparent and wing-shaped.
- 4 genera: *Paphiopedilum*, *Phragmipedium*, *Cypripedium*, *Selenipedium* (only one with 3-locular ovary).

Spiranthoideae: 3 tribes Tropidieae (Pantropical), Cranichideae (widespread but esp. tropical Asia), Diceratostealeae (West Africa).

- Terrestrial, epiphytic (some parasites).
- 1 anther, anther base near or below base of stigma.
- Rostellum present, terminal viscidium.
- Pollinia powdery or waxy.
- Pollen usually in tetrads.
- Usually 1 locule in ovary, parietal placentation.
- Usually transparent wing-shaped testa.

Orchidoideae: 3 tribes (Diurideae - mostly Australasia, Orchideae - widespread, Diseae - mostly African)

- Terrestrial (some parasitic).
- Soft, herbaceous leaves.
- Root/stem tuberoids.
- 1 fertile anther.
- Rostellum present.
- Pollinia present, powdery.
- Pollen in tetrads.
- Ovary with 1 locule, parietal placentation.
- Seed with transparent, wing-shaped testa.

Orchidoideae: Diurideae

Orchidoideae: Orchideae

Orchidoideae: Diseae

Subfamilies According to Dressler (1994)

Epidendroideae: 15 tribes

- Leaves spirally arranged or distichous.
- Epiphytic, terrestrial (some parasites).
- 1 anther.
- Anther terminal, but bent downward during development (incumbent) so it is at right angle to column axis or pointed backward in many (most) genera.
- Stigma: entire or 3-lobed; sometimes with viscidium.
- Rostellum.
- Pollinia with or without caudicle and viscidium.
- Pollinia soft and mealy or hard (2,4,6, or 8(12)).
- Pollen in tetrads.
- 1 locule in ovary.
- Transparent seed coat.

Subfamilies - Dressler (1994)

Primitive monandrous orchids (allied with Epidendroideae) with soft pollinia.

- Gastrodieae: saprophytes, 10 genera, worldwide tropics, Eurasia.
- Triphoreae: 3 genera, America, terrestrial or saprophytic.
- Nervilieae: 1 genus, *Nervilia*, terrestrial (Old World tropics).
- Palmorchideae: 1 genus, terrestrial (tropical America).
- Vanilleae: 10 genera, terrestrial or saprophytic, some vines or even shrubs, pantropical.
- Neottieae: 6 genera, terrestrial or saprophytic, mostly Northern Hemisphere.

Primitive monandrous orchids (of uncertain affinity) with soft pollinia.

- Pogoniinae: 5 genera, America and eastern Asia, terrestrial or saprophytic.

The Advanced Tribes of the Epidendroideae (sensu Dressler) = genera of greatest horticultural importance.

Dressler recognizes two main lineages: the "Cymbidoid phylad" and the "Epidendroid phylad."

Unfortunately, the separation is not terribly discrete.

“Cymbidoid phylad”

- Calypsoeae
- Malaxideae
- Maxillarieae
- Cymbidieae

Calypsoeae

- 9 genera, North temperate and subtropical.
- Terrestrial or saprophytic.
- 4 pollinia, distinct viscidium and stipe.

Malaxideae

- 6 genera, world-wide.
- Terrestrial or epiphytic.
- “Naked” pollinia (though many species have tiny viscidium), no caudicle.

Maxillarieae

- Entirely American
- Virtually all of the American genera with a stipe and viscidium
- 8 subtribes, the most important being:
 - Oncidiinae (77 genera), largest and most advanced.
 - Stanhopeinae (22 genera).
 - Lycastinae (8 genera).
 - Maxillariinae (8 genera).
 - Zygopetalinae (30 genera).

Cymbideae: 2-4 pollinia

- 7 subtribes, the most important being:
 - Eulophiinae: 6 genera, pantropical but mostly Old World.
 - Cyrtopodiinae: 12 genera, pantropical but mostly Old World.
 - Catasetinae: 5 genera, tropical America, all pollinated by male Euglossine bees, mostly unisexual flowers.

“Epidendroid phylad”

■ 8 pollinia (but reduced in many groups), distinct seed types.

- Arethuseae
- Coelogyneae
- Epidendreae
- Podochileae
- Dendrobieae
- Vandeae

Arethuseae

3 subtribes:

- Arethusinae: 2 genera, terrestrial with fleshy corm, temperate Asia and North America
- Blettiinae: 21 genera, pantropical, temperate Asia and North America
- Chysiinae: 1 genus, Tropical America

Coelogyneae

- Pollinia with massive caudicles, *Dendrobium* seed type.

Epidendreae I (New World)

- Six subtribes:
 - Sobraliinae
 - Arpophyllinae: 1 genus.
 - Meiracylliinae: 1 genus.
 - Coeliinae: 1 genus.
 - Laeliinae
 - Pleurothallidinae

Sobraliinae: 8 soft pollinia

Laeliinae: 43 genera, prominent caudicles.

Pleurothallidinae: 28 genera

Epidendreae II (Old World)

3 tribes:

- Glomerinae: 7 genera, tropical Asia and Australasia.
- Adrorrhizinae: 2 genera, Tropical Asia (India, Ceylon).
- Polystachyinae: 4 genera, pantropical but primarily Africa.

The “Dendrobioid Subclade” (the Vandoid orchids)

Spherical silica bodies in cells.

- 3 tribes:
 - Podocheleae.
 - Dendrobieae.
 - Vandeae.

Podochileae

4 subtribes:

- Eriinae: 10 genera, tropical Asia and Australasia, 1 genus in Africa.
- Podocheleinae: 6 genera, tropical Asia and Australasia.
- Thelasiinae: 6 genera, tropical Asia and Australasia.
- Ridleyellinae: 1 monotypic genus Australia and New Guinea.

Dendrobieae

Naked pollinia without caudicles, prominent column foot, seed type.

- 2 subtribes:
 - Dendrobiinae: 6 genera, Tropical Asia and Australasia.
 - Bulbophyllinae: 10-15 genera, pantropical, but especially Old World.

Vandeae

- Monopodial, many with reed stem habit.
- Complex pollinaria.
- 3 subtribes:
 - Aeridinae: 103 genera, mainly tropical Asia and Australasia; 2-4 pollinia.
 - Angraecinae: 19 genera, Africa (esp. Madagascar), a few in tropical America, 1 species in Sri Lanka; 2 pollinia, deeply divided rostellum, each division typically with its own viscidium; moth pollination.
 - Aerangidinae: 36 genera, tropical Africa; 2 pollinia, narrow, beak-like rostellum, moth pollination.