

Families of Flowering Plants

I. Magnoliopsida (Dicots)

During the past 35-40 years, there has been much discussion as to the best way to classify the botanical world. The flowering plants have been scrutinized in great detail as new paleobotanical and experimental data have been published. A number of individuals have proposed various classifications, with four of them—the late A. Cronquist (New York Botanical Garden, U.S.A.), A. Takhtajan (Botanical Institute of the Academy of Sciences of Russia), R. Thorne (Rancho Santa Ana Botanical Garden, U.S.A.), and the late R. Dahlgren (Copenhagen)—proposing systems that are relatively similar and comparable. The late J. Hutchinson's (Royal Botanic Gardens, Kew, UK) classification is significantly different from the other four and has received less acceptance by botanists. Most recently (late 1998), an international group of botanists—the “Angiosperm Phylogeny Group”—has published an ordinal classification for 462 rearranged families into 40 putative orders and a listing of families in unassigned order (APG 1998). This new classification is strongly based on DNA and cladistic analyses of selected examples from all taxa evaluated.

One is tempted to follow this scheme in an effort to introduce the most recent ideas in a textbook such as this one. However, I have not chosen to follow this classification at this time for the following reasons: 1) The new system has not received sufficient critical evaluation by other botanists; 2) the classification is not complete for some families without any assigned order; 3) other additional information is lacking for student consideration; and 4)

the possibility of confusion may hinder beginning students. It seems more prudent for the present to leave advanced discussion of the validity of the new classification to more advanced works.

In this third edition of *Contemporary Plant Systematics*, the flowering plant arrangement by A. Cronquist is followed for the most part. This classification system was chosen because students have detailed references for further information. It also provides an organized sequence to follow, whether or not one agrees with the classification. Within each order, the families follow Cronquist with their position based on the most recent evidence at that time, though speculative in many instances. In time, data from molecular systematic research may bring about more natural phylogenetic relationships. (A more detailed discussion on the subject is found in Chapter 10.)

DIVISION MAGNOLIOPHYTA (ANGIOSPERMS)

The division Magnoliophyta (class Angiospermae of older classifications) is comprised of 83 orders, 383 families, and approximately 215,000 species. It consists of two unequally sized classes: the Magnoliopsida (dicotyledons) made up of 64 orders, 318 families, and 165,000 species, and the Liliopsida (monocotyledons) with 19 orders, 65 families, and about 50,000 species.

Class Magnoliopsida (Dicotyledons)

The Magnoliopsida are herbaceous or woody plants, with the woody forms and many of the herbaceous forms with secondary tissues derived from a vascular cambium. The vascular bundles in most herbaceous species are in a generalized ring around a central pith. The leaves are generally reticulate-veined, commonly with a petiole and expanded blade. In young plants, taproots are most common, rarely with fibrous roots. The flower's **perianth** parts are generally in sets of fours, fives, or multiples of these. The pollen grains usually have 3 pores (triaperturate) or are derived therefrom, except some with 1 pore (uniaperturate). The cotyledons are 2 in number (rarely 1, 3, or 5).

Subclass I. Magnoliidae The Magnoliidae consists of 8 orders, 39 families, and approximately 12,000 species, with three of the orders—Laurales, Magnoliales, and Ranunculales—having over two-thirds of the species (see Table 8.1.) No exclusive characters set this group apart. The flowers typically are showy and polypetalous with well-developed perianths. The pollen has 1 or 3 pores (uniaperturate or triaperturate) and is produced by numerous, spirally arranged stamens. The pistil is apocarpous. Some members have a unique isoquinoline alkaloid and related compounds or unique volatile oils found in special cells. The delineation of some families is debatable.

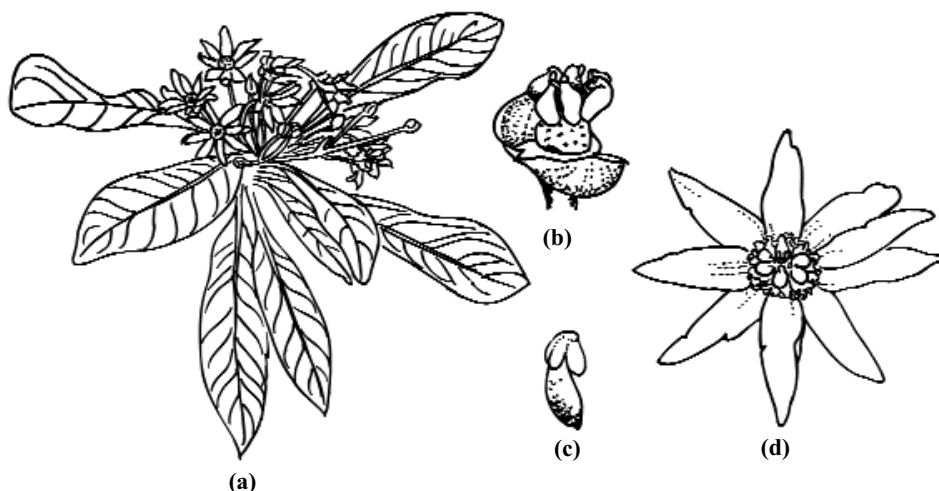
Table 8.1 A list of orders and family names of flowering plants found in the subclass Magnoliidae.

Division Magnoliophyta (flowering plants)	
Class Magnoliopsida (dicots)	
Subclass I. Magnoliidae	
Order A. Magnoliales	Order D. Aristolochiales
Family 1. Winteraceae*	Family 1. Aristolochiaceae*
2. Degeneriaceae	Order E. Illiciales
3. Himantandraceae	Family 1. Illiciaceae*
4. Eupomatiaceae	2. Schisandraceae
5. Austrobaileyaceae	Order F. Nymphaeales
6. Magnoliaceae*	Family 1. Nelumbonaceae*
7. Lactoridaceae	2. Nymphaeaceae*
8. Annonaceae*	3. Barclayaceae
9. Myristicaceae*	4. Cabombaceae
10. Canellaceae	5. Ceratophyllaceae*
Order B. Laurales	Order G. Ranunculales
Family 1. Amborellaceae	Family 1. Ranunculaceae*
2. Trimeniaceae	2. Circaeasteraceae
3. Monimiaceae*	3. Berberidaceae*
4. Gomortegaceae	4. Sargentodoxaceae
5. Calycanthaceae*	5. Lardizabalaceae
6. Idiospermaceae	6. Menispermaceae*
7. Lauraceae*	7. Coriariaceae
8. Hernandiaceae	8. Sabiaceae
Order C. Piperales	Order H. Papaverales
Family 1. Chloranthaceae	Family 1. Papaveraceae*
2. Saururaceae*	2. Fumariaceae*
3. Piperaceae*	

* Discussed and illustrated in the text.

ORDER MAGNOLIALES
Family Winteraceae (Wintera)

Figure 8.1 *Drimys*: (a) leafy branch with flowers; (b) flower lacking petals and stamens and showing spirally arranged stamen scars and distinct carpels; (c) individual stamen; (d) front view of flower. Redrawn with permission from Cronquist, 1981.



General Description: shrubs or trees, aromatic, glabrous ethereal oil cells present in the parenchyma tissue, but calcium oxalate crystals rarely present.

Leaves: alternate, simple, entire; dotted with translucent glands and an unorganized venation; no stipules.

Flowers: small, regular to slightly irregular, hypogynous, perfect and unisexual; inflorescence of solitary flowers or flowers borne in cymes.

Sepals: 2-6, distinct or connate at the base.

Petals: 5-many, generally in 2 whorls, distinct.

Stamens: many, filaments strap-shaped; insect or wind pollinated. **Pistil:** simple of few to many individual carpels, generally in only one whorl; distinct but may be slightly connate and unsealed in fruit; ovary superior.

Fruit: berry-like or a follicle.

Seed: small, oily, endosperm present.

Distribution: 9 genera and 100 species in the montane subtropics and tropics of Mexico, Central and South America, and most diverse in southeastern Australasia; absent from Africa, except Madagascar. The largest genera are *Tasmania* (40 species) and *Bubbia* (30 species).

Economic Value: very little, except *Drimys winteri*, winter's bark from South America, used as a tonic locally.

Classification: usually considered one of the oldest known flowering plant families (along with the Magnoliaceae).

Fossil Record: pollen remains attributed to the Winteraceae from Upper Cretaceous deposits, with other plant parts from Oligocene formations.