

Campanulaceae A. Lde Jussieu
(Bellflower or Lobelia Family)

Mostly herbs, but sometimes secondarily woody; plants storing carbohydrate as inulin (an oligosaccharide); laticifers present with milky sap; polyacetylenes present, but iridoids absent. Hairs usually simple, unicellular. Leaves usually alternate, simple, sometimes lobed, entire to serrate, with pinnate venation; stipules absent. Inflorescences various. Flowers usually bisexual, radial to bilateral, with hypanthium, sometimes twisting 180° in development (resupinate). Sepals usually 5, connate. Petals usually 5, connate, forming a tubular or bell-shaped corolla, or 2-lipped to 1-lipped and then with a variously developed dorsal slit, the lobes valvate. Stamens usually 5; filaments distinct to distally connate, usually attached to disk at apex of ovary; anthers distinct but pressed together around the style or connate (syngenesious), forming a tube into which the pollen is shed, and the style then growing through this tube, picking up pollen with specialized, often invaginating hairs, or pushing it out, after which the stigmas become receptive (i.e., a plunger pollination mechanism); pollen grains with 3 to 12 apertures. Carpels 2-5, connate; ovary usually inferior (or half-inferior), with usually axile placentation; style with pollen-collecting hairs near the apex; number of stigmas equaling number of carpels, globose to cylindrical. Ovules usually numerous, with 1 integument and a thin-walled megasporangium. Nectar disk present above ovary. Fruit a loculicidal or poricidal capsule or a berry (Figure 8.126).

Floral formula: * or X $\left(\begin{array}{c} \textcircled{5} \\ \textcircled{5} \\ \textcircled{5} \end{array} \right) \overline{\textcircled{2-5}}$; capsule, berry

Distribution: Widely distributed in temperate and subtropical regions and in the montane tropics.

Genera/species: 65/2200. Major genera: *Lobelia* (400 spp.), *Campanula* (450), *Centropogon* (200), *Siphocampylus* (225), and *Wahlenbergia* (270). Genera occurring in Canada and/or the continental United States include *Campanula*, *Downingia*, *Githopsis*, *Heterocodon*, *Howellia*, *Jasione*, *Legenere*, *Lobelia*, *Nemacladus*, *Parishella*, *Porterella*, *Triodanis*, and *Wahlenbergia*.

Economic plants and products: *Campanula* (bellflower, bluebell), *Lobelia* (cardinal flower, lobelia), and *Codonopsis* (bonnet bellflower) are used horticulturally.



Figure 8.126 Campanulaceae. (A-L) *Lobelia cardinalis*: (A) flowering stem (x 0.75); (B) flower (x 3); (C) flower with corolla removed, filaments monadelphous except at base, stigmas just beginning to expand (x3); (D) anther tube formed by connation (x6); (E) cross-section of anther tube after dehiscence of anthers, style in center (x 9); (F) tip of style with stylar brush and unexpanded stigmas at time of anther dehiscence (x 17.5); (G) expanded stigma, protruding from anther tube following dehiscence of anthers (x 6); (H) expanded stigmas, receptive to pollen (x 18); (I) ovary in cross-section (x 9); (J) ovary in longitudinal section, note half-inferior condition (x 4.5); (K) capsule (x 4.5); (L) seed (x37). (M) *L. siphilitica*: flower (x 4.5). (From Rosatti 1986, *J. Arnold Arbor.* 67: p. 67.)