

**Brassicaceae Burnett**  
(= Cruciferae A. L de Jussieu)  
(Crucifer, Mustard, or Caper Family)

Trees, shrubs, or herbs; producing glucosinolates (mustard oil glucosides) and with myrosin cells; often cyanogenic. Hairs diverse, simple to branched, stellate, or peltate. Leaves usually alternate, sometimes in basal rosettes, simple, often pinnately dissected or lobed, or palmately or pinnately compound, entire to serrate, with palmate or pinnate venation; stipules present or absent. *Inflorescences indeterminate*, occasionally reduced to a solitary flower, terminal or axillary. *Flowers* usually bisexual, radial or bilateral, often lacking subtending bracts; receptacle prolonged, forming an elongate or shortened gynophore (or androgynophore). *Sepals* 4, distinct. *Petals* 4, distinct, often forming a cross, often with an elongate claw and abruptly spreading limb, imbricate or convolute. *Stamens* (2-) 6, or numerous, all  $\pm$  the same length or the 2 outer shorter than the 4 inner (tetradynamous); filaments elongate to rather short, distinct, or connate in pairs; pollen grains usually tricolporate or tricolpate. Carpels usually 2, connate; ovary superior, with parietal placentation, frequently with the placentas forming a thick rim (replum) around the fruit and often connected by a false septum (a thin partition lacking vascular tissue) that divides the ovary into 2 chambers; stigma capitate, sometimes bilobed. Ovules 1 to numerous on each placenta, anatropous to campylotropous. Nectar disk or gland usually present. Fruit a berry or capsule, frequently with 2 valves breaking away from a replum and often additionally with a persistent septum (the fruit then a silique), these short to elongate, globose to flattened; seeds with or without broad to narrow invagination, occasionally arillate; embryo curved or folded; endosperm scanty or absent (Figure 8.92).

**Floral formula:** \* or X, , 4, 4, (2-) 6- $\infty$ ,  $\text{\textcircled{2}}$ ; berry, capsule, silique-like capsule, silique

**Distribution and ecology:** Cosmopolitan, most diverse in the Mediterranean region, southwestern and central Asia, and western North America. Many species occur in early successional communities.

*Genera/species:* 419/4130. *Major genera:* *Capparis* (350 spp.), *Draba* (350), *Cleome* (200), *Erysimum* (180), *Cardamine* (170), *Lepidium* (170), *Arabis* (170), *Alyssum* (150), *Sisymbrium* (90), *Lesquerella* (90), *Heliophila* (70), *Thlaspi* (70), *Rorippa* (70), and *Hesperis* (60). Numerous genera occur in the continental United States and/or Canada; in addition to most of the above, noteworthy genera include *Barbarea*, *Brassica*, *Cakile*, *Caulanthus*, *Capsella*, *Cochlearia*, *Descurainia*, *Dimorphocarpa*, *Leavenworthia*, *Physaria*, *Platyspermum*, *Polanisia*, *Schoenocrambe*, *Stanleya*, *Streptanthus*, and *Warea*.

*Economic plants and products:* The family contains many important food plants, including both edible species, such as *Capparis spinosa* (capers), *Raphanus sativus* (radish), *Brassica oleracea* (cabbage, kale, broccoli, cauliflower, Brussels sprouts, kohlrabi), and *B. rapa* (Chinese cabbage, turnip), and sources of condiments, such as *Brassica juncea* (Chinese mustard), *B. nigra* (black mustard), *Sinapis alba* (white mustard), and *Armoracia rusticana* (horseradish). Table mustard is prepared from a mixture of the seeds of white mustard and either black mustard or Chinese mustard. Vegetable oil is extracted from the seeds of several species of *Brassica*, especially *B. napus* (canola, rapeseed oil). The family contains many ornamentals, such as *Cleome* (spider flower), *Hesperis* (rocket, dame's violet), *Erysimum* (wallflower), *Iberis* (candytuft), *Lunaria* (honesty, money plant), *Lobularia* (sweet alyssum), *Aurinia* (golden alyssum), and *Arabis* (rock cress). Weedy taxa are also common, e.g., *Capsella* (shepherd's purse), *Descurainia* (tansy mustard), *Lepidium* (peppergrass), and *Sisymbrium* (hedge mustard). *Arabidopsis thaliana* (thale or mouse-ear cress), a Eurasian weed, is the most widely used vascular plant in molecular and experimental biology.

**Figure 8.92** Brassicaceae (Cruciferae). (A-I) *Capsella bursa-pastoris*: (A) plant with flowers and fruits (x 0.5); (B) flower (x 14.5); (C) flower with sepal and two petals removed to show tetradynamous stamens (x 14.5); (D) floral diagram; (E) silique (x 3.5); (F) replum and septum (x 3.5); (G) seed (x 30); (H) embryo (x 30); (I) diagrammatic cross-section of seed, showing folded cotyledons (x 30), (J) *Coronopus didymus*: silique (x 7). (K) *Lepidium virginicum*: silique (x 7). (L) *L. campestre*; fruit after removal of valve (x 7). (M-N) *Brassica campestris*: (M) silique (x 2.5); (N) seed (x 7). (O-Q) *Sinapis alba*: (O) silique (x 2.5); (P) embryo (x 7); (Q) diagrammatic cross-section of seed showing folded embryo (x 7). (R) *Diplotaxis muralis*: silique (x 3.5). (S) *Cakile edentulasp. harperi*: fruit, notetransverse joint (x 2). (T) *Calepina irregularis*: silique (x 7). (From Al-Shehbaz 1984, *J. Arnold Arbor.* 65: p. 368.)

