

Chapter 12. **Asteraceae: The sunflower family**

The sunflower family:

Asteraceae

ASTERACEAE (Sunflower Family)

General physiognomy. Heads of flowers that resemble a single larger flower and the (usual) presence of a pappus on the tiny, seed-like fruits.

Vegetative morphology. Annuals, perennial herbs, and small shrubs with a wide variety of leaf designs and arrangements. Many have leaves containing volatile, fragrant oils.

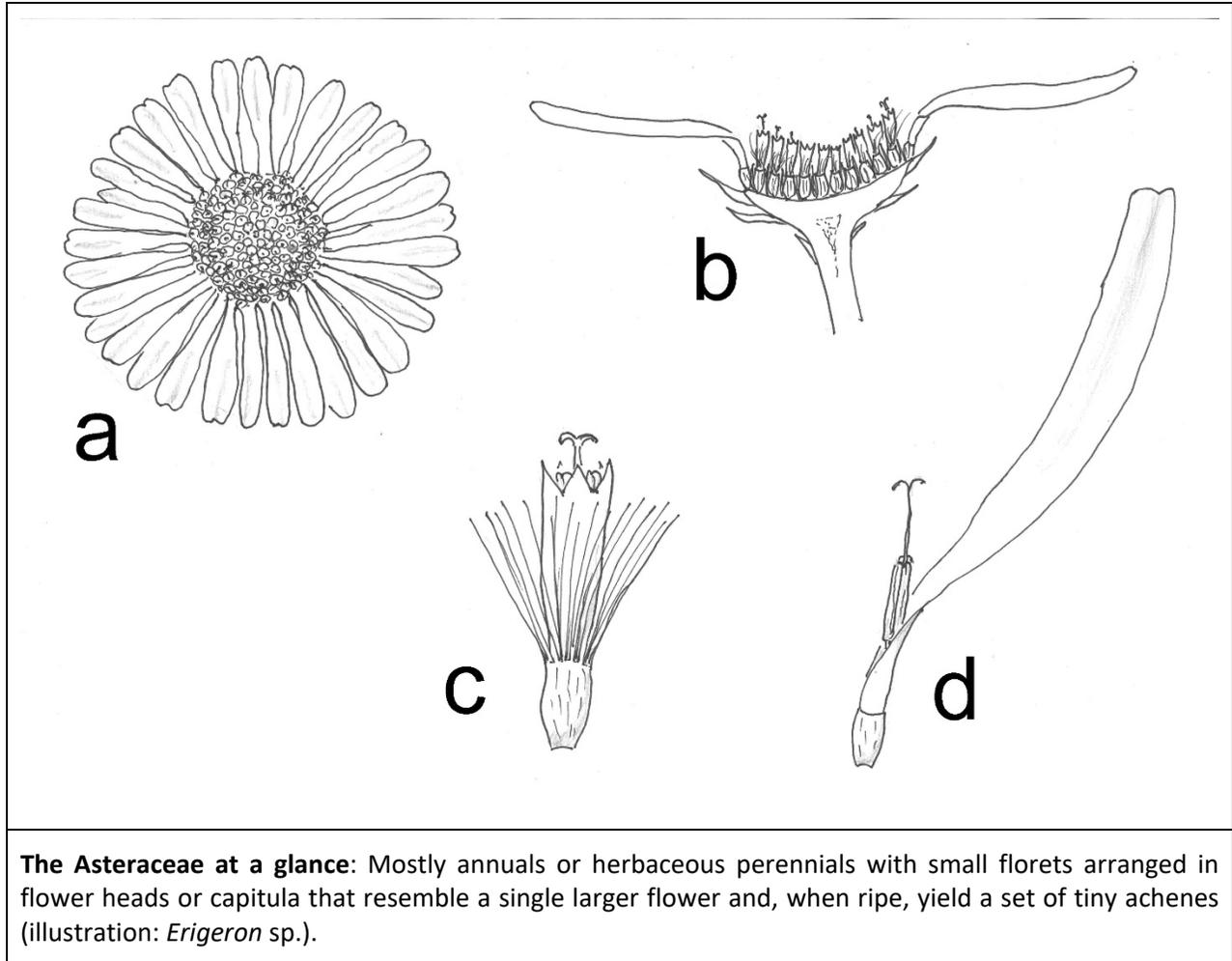
Reproductive morphology. Diminutive flowers arranged in tight heads (capitula) that resemble single, large flowers. Flowers can be regular (actinomorphic) or strongly actinomorphic, with the corolla tube elongated into a long strap-shaped projection or *ligula*. The composite heads have three basic designs: petaloid heads with only ligulate flowers as in the dandelion; heads with small, non-ligulate flowers only, as in the thistles, and heads with peripheral ligulate flowers, called ray flowers, around a central disk of small non-ligulate, or disc flowers, as in the sunflowers and daisies. The heads are surrounded by one or more rows of usually green, sepal-like bracts called phyllaries (the green bracts we eat in artichokes).

Sepals are modified into hairs, bristles, or scales, and persist in the fruit in a dispersal-aiding structure called the *pappus*, or are missing. Ray (ligulate) flowers have five highly fused, flat, strap-shaped petals; disc flowers have five star-like petals joined to form a tube. There are five stamens usually fused by their anthers to form a hollow tube, and a single pistil with an inferior ovary and two style branches. Good magnification is required to see these features. Often, ray flowers are sterile and disc flowers are fertile, but there are many exceptions.

The fruits are small, often tiny one-seeded achenes that function as a single dispersal unit and are often called "seeds". Most achenes have a pappus attached to the top. Plumose pappi can float in the air and are wind-dispersed; bristly or spiny pappi can attach themselves to the fur of animals and are dispersed by passing wildlife.

Taxonomic relationships. This distinctive family is usually readily recognized and seldom confused with others. A few other families have evolved similar strategies of massing many flowers together for show but have different flower details. The most similar and easy to confuse group is the teasel family (Dipsacaceae). Vegetatively, teasels (*Dipsacus* spp.; Dipsacaceae) look very similar to thistles, which are true Asteraceae, but their flower-clusters form dense spike-like heads instead of flattened capitula. Other groups forming dense flowering heads include the dogwoods (*Cornus* spp.; Cornaceae) that form buttonlike heads surrounded by petal-like white or pink bracts, and the yerba mansa (*Anemopsis californica* in the Saururaceae) that features a spike of petal-less flowers surrounded at the base by several white, petal-like bracts.

Biodiversity and distributions. Immense family of possibly 20,000 species distributed throughout the world and dominant in most floristic provinces and floras except for tropical rain forests. Many aggressive and weedy species belong to the family and are aided by the efficient wind dispersal of their tiny one-seeded fruits.



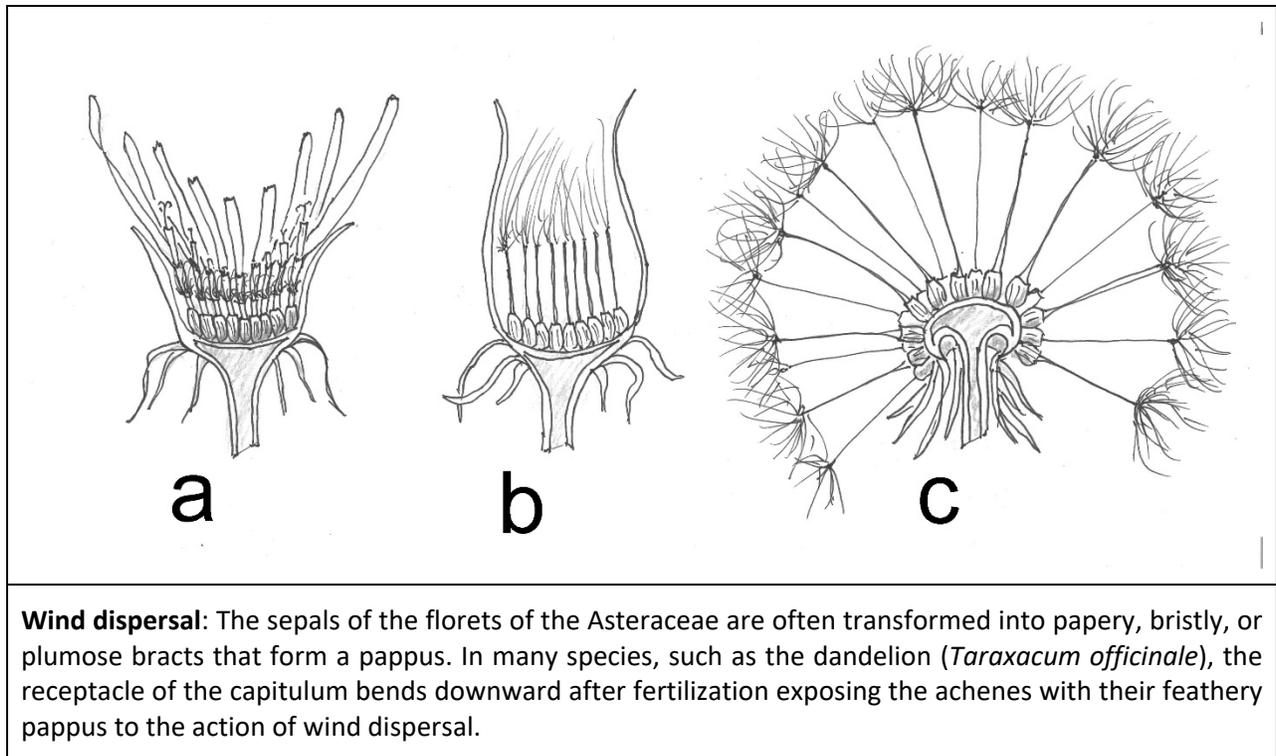
The Asteraceae at a glance: Mostly annuals or herbaceous perennials with small florets arranged in flower heads or capitula that resemble a single larger flower and, when ripe, yield a set of tiny achenes (illustration: *Erigeron* sp.).

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Economic uses and ethnobotany. Commercially important species include edible plants such as chicory, radicchio, and endive (*Cichorium* spp.), lettuce (*Lactuca sativa*), artichoke (*Cynara cardunculus*), Jerusalem artichoke (*Helianthus tuberosus*), sunflower (*Helianthus annuus*), and safflower (*Carthamus tinctorius*). Sunflower and safflower are also widely cultivated as industrial crops to produce oil from

their seeds, while the Mexican deep-yellow marigold (*Tagetes patula*) is grown as an additive for commercial poultry feed, as it gives egg yolks and chicken tissues an orange-reddish “natural” color. Many other commercially important species are used as aromatic, culinary, or healing herbs, including chamomiles (*Matricaria* and *Chamaemelum*), calendula (*Calendula officinalis*), echinacea (*Echinacea purpurea*), absinthe (*Artemisia absinthium*), and tarragon (*A. dracunculus*), tansy (*Tanacetum vulgare*), and yarrow (*Achillea millefolium*). Many members of Asteraceae are copious nectar producers; in particular, knapweeds, sunflowers, and goldenrods are major honey plants for beekeepers. Modern environmentally-friendly insecticides contain pyrethrin, a natural compound derived from *Chrysanthemum cinerariifolium* that have potent insecticidal activity by targeting the nervous systems of insects. Other genera (*Pulicaria*, *Tagetes*, and *Tanacetum*) also contain species with useful insecticidal properties. Finally, many popular garden flowers belong to numerous genera and species, including aster (*Callistephus* and *Aster* spp.), daisies (*Erigeron* spp.), marigolds (*Tagetes* spp.), zinnias (*Zinnia* spp.), cosmos, dahlias, marguerites, chrysanthemums, and many others.



California genera and species. The region has 70 native or partly native genera and four nonnative genera. Owing to its size, most books split the family into tribes, then genera and species. With new molecular studies, the tribes are being reinterpreted and many are no longer considered natural, evolutionary groups. Locally-common species include the following:

Artemisia californica (California sagebrush, coastal sagebrush) – Scented shrub, dominant on the coastal scrubs of California. Slender, deeply divided lobed leaves. Unconspicuous flower heads with white-greenish disk flowers, in racemose clusters.



Chaenactis glabriuscula (yellow pincushion) – Small annual with dense capitula formed by yellow diskflowers. Common in sandy washes.



Erigeron foliosus (purple daisy, fleabane) – Herbaceous perennial, common on lower montane reaches. Disk flowers yellow, ray (ligulate) flowers light purple.



Eriophyllum confertiflorum (golden yarrow) – Herbaceous perennial common in open habitats. Slender stalks with dense corymbs of yellow capitula.



Encelia farinosa (brittlebush) – Small, nearly herbaceous, widespread shrub of dry slopes and deserts. Foliage is pale whitish green (farinose); sunflower-like heads with showy yellow ray flowers and darker disk flowers in the center.



Helianthus annuus (sunflower) – Widespread, tall (2 m) herbaceous species with yellow capitula on top of slender stalks. Annual or short-lived perennial, can live for 1–3 years.



Uropappus lindleyi (syn. *Microseris lindleyi*; silver puffs) – Widespread annual of sage scrub, has yellow capitula with ligulate flowers, somewhat similar to the dandelions. The pappus filaments are membranous and silvery in color.

