...going one step further

T21023

Genuine chamomile (Matricaria recutita)

Chamomile belongs to the Asteraceae family, which also goes by the older scientific name Compotae. Asteraceae are characterized by florets arranged in dense heads that resemble single flowers. The nomenclature associated with chamomile is somewhat confusing since a number of synonymous terms are used. For example, the plant is often called both Matricaria chamomilla and Chamomilla recutita. Chamomile mainly grows on the edges of fields, particularly those planted with grain, as well as the edges of fallow fields and nutrient rich areas with ruderal plant growth. Chamomile is a thermophilic plant that grows in clayey soil, usually with low calcium content. The plant is an archaeophyte, i.e. it has existed since prehistoric times.

Use as a medicinal plant

"The Lord created chamomile to still our grief." (K.H. Waggerl).

Chamomile is one of the world's best known natural remedies and has numerous beneficial effects. Dried chamomile flowers are made into chamomile tea, which has long been used as a medicinal preparation for both internal and external ailments. The interplay between the various components of chamomile's essential oil (which contains up to 1% of the powerful antioxidant chamazulene) reduces inflammation,eliminates cramping, promotes good digestion, and is a natural tranquilizer. Chamomile is particularly beneficial for women, a fact reflected in the plant's Latin name matrix (genitive form matricis), which means "womb." Chamomile tea is beneficial for all female ailments, including menstrual cramps.

Fig. A and B: Structure of the inflorescence (approximately 10x enlargement)

Chamomile blossoms fall into two categories. At the margin of the flower are 10-20 white lingulate florets, which are zygomorphic, i.e. the florets are composed of a single planar surface constituted by two symmetrical halves. The florets are more or less planar when they first open, but by the time they finish blossoming they are bent downwards at an acute angle. The pure white coloration of these florets (which are female) attracts pollinating insects. The center of the flowerhead contains a host of small, yellow hermaphrodite tubular flowers that are arrayed annularly and have numerous symmetrical planar surfaces, and thus are referred to as "radial" flowers. The up to 200 individual flowers comprising the flowerhead are themselves composed of a series of green bracts (leaves) known as involucral bracts or phyllaries. The concomitant presence of both linguate and tubular flowers distinguishes chamomile from a number of other flowers in the Asteraceae family such as dandelion, which has only linguate flowers (see article no. T21022). The individual flowers rest on a conical base which has a spheroid extension and is hollow upon opening. This base, whose individual flowers are devoid of scales (palea), along with the downward tending linguate flowers and the perfume of German chamomile, constitute a key differentiating characteristic of Scentless Mayweed (Matricaria inodora), which is also very common and as its name implies scentless. The tubular hermaphrodite flowers (which number between 200 and 300 per flowerhead) do not develop concurrently. Instead, development begins from the outer margin and progresses annularly toward the center of the flower. This allows for relatively long-term presentation of flowers that are amenable to pollination, a characteristic that safeguards the flowerhead against climactic effects and allows for successful pollination of the individual flowers by various insects. In the present illustration, the flowers in the outermost ring have reached maturity, whereas those closer to the center are immature or still closed.

Fig. C: Structure of tubular flowers (approximately 70x enlargement)

The illustration shows a fully opened tubular flower, which (like marginal linguate flowers) has an inferior ovary composed of two carpels. The calyx of the chamomile flower is fully contracted, i.e. unlike many other Asteraceae, it lacks a pappus (a calyx leaf that is reduced to a bristly appendage). The five corollas fuse to form a narrow and slightly tapered tube whose lower transparent whitish section is slightly spherical and terminates at the top in five yellow tips that open outward. The filaments of the five stamens rest on the extensions of the tubes. The anthers fuse to form a tube that circumscribes the two-stigma style, which extends well beyond the receptacle. A striking feature here are the papillary tips of the luminous twin yellow styles. Another relatively inconspicuous feature of the chamomile's receptacle is the pericyclic parenchyma at the base of the ovary. The presence of components of papillary stigmas and pericyclic parenchyma enable pharmacists to determine whether chamomile flowers are present in powdered floral

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drugs. Chamomile flowers are protandrous, i.e. the stamens mature before the carpels, thus inhibiting self-fertilization. This asynchronous maturation of stamens and carpels within the flower also increases the likelihood of cross-pollentation, since the style of a receptacle that is still closed (see the illustration at the center of the flowerhead) does not yet extend all the way to the stamen tubes, and thetwo styles abut each other. In the subsequent developmental phase, the anthers open inwardly, spilling pollen into the anther tubes. As the still immature style pushes through the tube, it moves the pollen outward. When the corolla tubes open, the pollen is presented on the style, where insects can “harvest” it. Once the pollen has been removed, the styles spread apart, thus allowing the stigmas to accept pollen from another flower. The fruit of the Asteraceae is a one-seeded achene, i.e. a fruit that does not open at maturity.

1 Hollow flowerhead base
2 “Naked” flowerhead base containing tubular flowers devoid of scales (palea)
3 Radial tubular flowers (the outermost flowers have matured while those closer to the center are either immature or closed)
4 Zygomorphic linguate blossoms turned downward
5 Style with papillary stigmas
6 Anther tube
7 Five-tip corolla tube
8 Filaments
9 Inferior ovary
10 Pericyclic parenchyma on the ovary base

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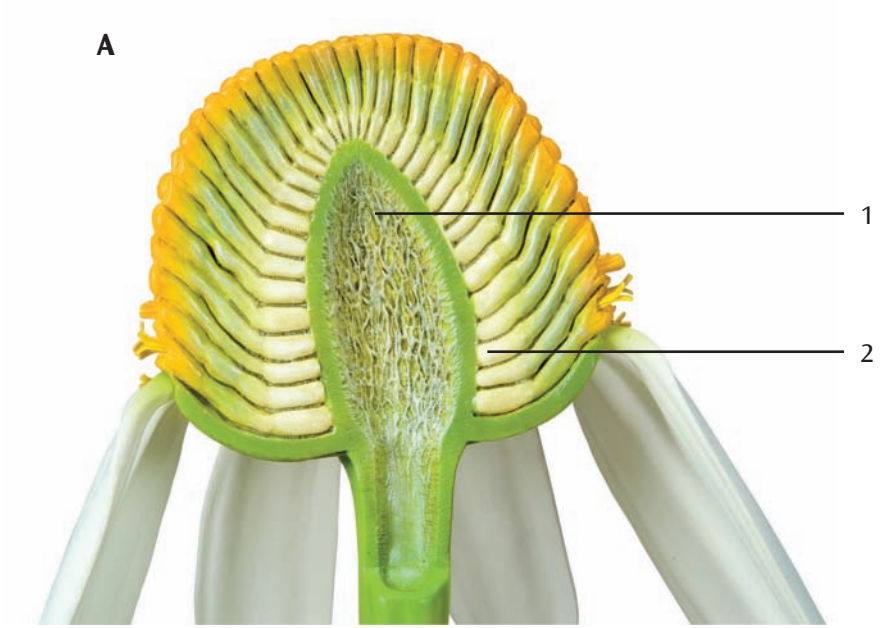
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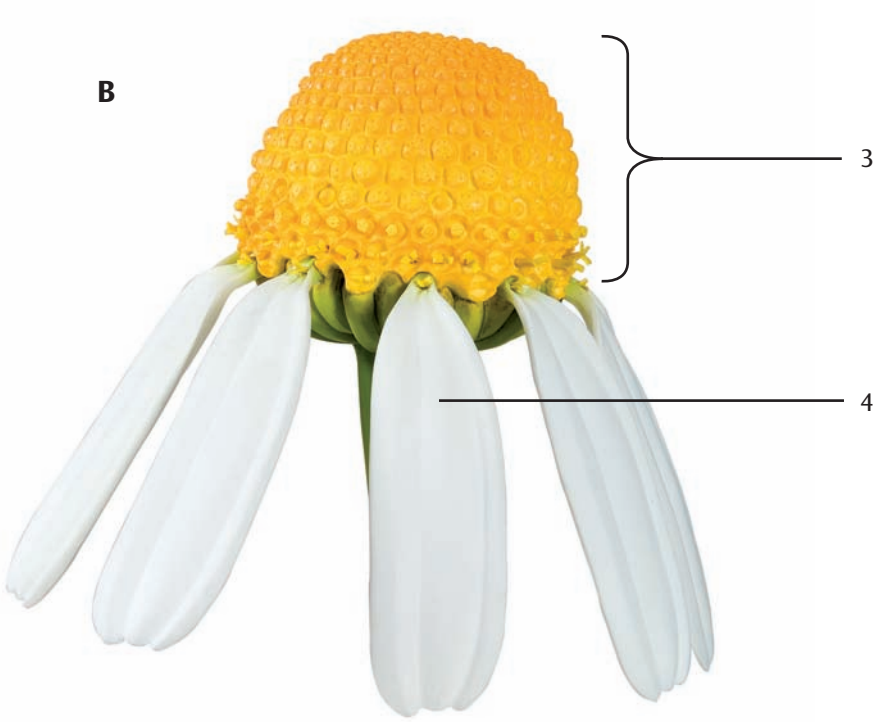
2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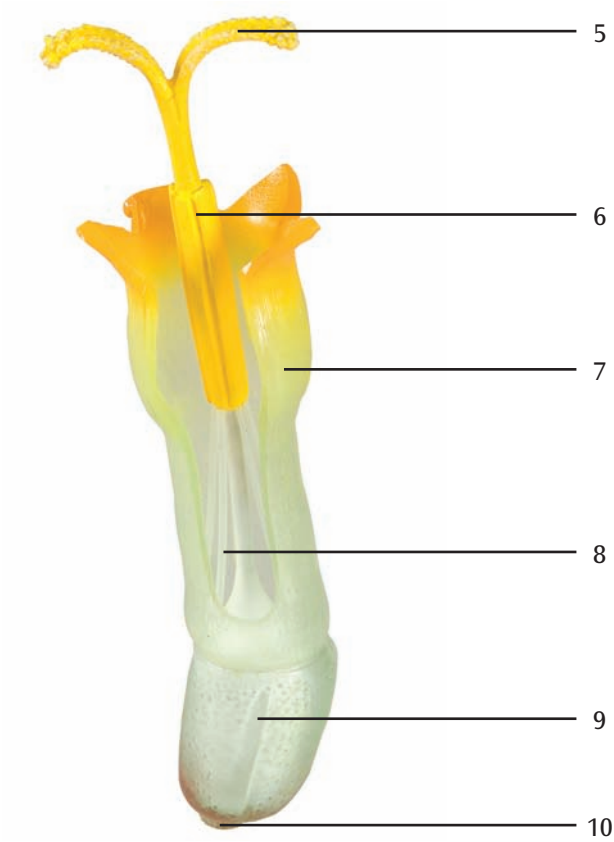
C



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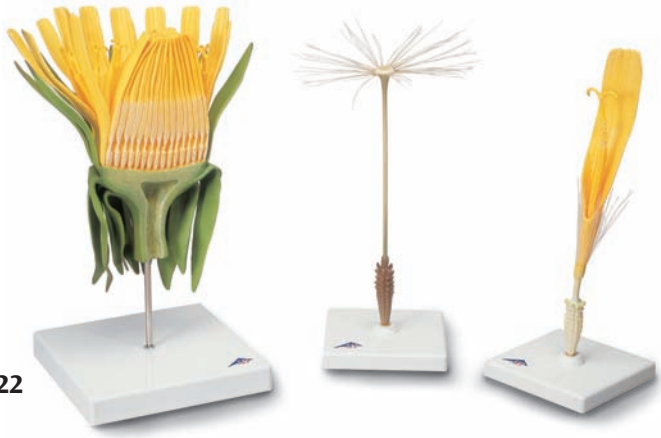

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