...going one step further

1020125 [T210191]

The Sweet Cherry

English

(Prunus avium), magnified 7 times

General Facts

The cherry, in broad terms, falls into the order of the rosales and within this order into the family of the rosaceae. This family is common worldwide, and European flora contains over 3000 species of this family. The rosaceae comprise both herbaceous and ligneous types. In its cultivated form, the sweet cherry belongs to the fruit trees. It de-rives from the widespread bird cherry (prunus avium), a tree that can grow up to 20m high. When the tree is in blossom (in northern Europe in April/May) 2-3 umbelliform blossoms develop per shoot. The fruit can be up to 2cm in diameter, their color can be anything from yellow over light red to dark red. The annual crop of sweet cherries produced worldwide is over 1 million tons. They are consumed mainly as fresh fruit. In this respect they differ from the sour cherry (prunus cerasus), which is used mainly for preserved fruit, jam or juice (the worldwide crop of sour cherries produced, however, is only approx. 0.5 million tons). The wood of the cherry tree is also used as turning wood, among others to build musical instruments, and to a lesser extent for furniture.

Structure of the Blossom

The cherry tree blossom (see model and fig. A) has a relatively simple structure. It is radially symmetric and hermaphroditic (both sexes combined in one blossom), the blossom rings (whorls) are pentacyclic. The outermost whorl (calyx) is made up of five green leaves (sepals) (1) folded downwards and joined at the bases. The next whorl inwards is the one with five individual petals (2), which become narrower towards their base. The differently shaped sepals and petals together are called the perianth (corolla). The white color of the blossom leaves results from the total reflection or transmission of the light. Sepals and petals are only of secondary importance for reproduction. Their purpose is to protect the blossom's organs and to attract insects.

For further viewing of the two-part blossom model it is recommended to remove the front part, so that the stamens and the ovary can be viewed from the side.

The male reproductive organs, the stamens (4), are located at the edge of the tubular receptacle (3), arranged in three whorls (total of 30, this number is increased on a secondary basis, probably 6 x 5). They consist of the threadlike thin stalks called filaments (5) and the yellowish anthers (6). The anthers are made up of two thecae (7), each containing two pollen sacs, where the pollen is produced. The thecae are connected by a sterile part, the connective. The pollen sacs tear open at a preformed section and release the pollen. The stamens of the inner whorl are on the whole a little shorter than those of the two outer whorls.

The unattached ovary (8) of the cherry blossom (female reproductive organ of the blossom) is centered and rests on the base of the receptacle (in the model the ovary can be turned and removed). In the sweet cherry it consists of a single carpel (9) the edges of which are fused together. The suture is visible as a groove (bulgy suture) at the side of the ovary extending all the way to the style. The stigma (11) is located at the tip of the long, upright style (10). The stigma is the place where the pollen lands and germinates. The pollen tubes grow down through the tissues of the stigma and the style, by chemotactic attraction, towards the egg cell located inside the ovule (12).

Inside the carpel, two anatropic ovules (opening facing downwards) are fixed to placentas (can be seen only when turning the ovary of the model in the appropriate position). Of the two ovules of the cherry, one usually dies and one develops into the cherry fruit (see below).

After fertilization and during the ripening of the fruit, the petals at the upper edge of the recep-tacle fall off. The style withers and after falling off, it leaves a small mark on the growing fruit oppo-site of the fruit peduncle.

Figure A – Flower of the Sweet Cherry (Prunus avium)

English

Fruit of the Sweet Cherry

magnified 3 times

The fleshy, juicy fruit of the sweet cherry (see model and fig. B) is an indehiscent fruit. In nature, it can be up to 2cm in diameter. In indehiscent fruits, the pericarp (1), which develops from the carpel, surrounds the seed fully or partially during its dissemination. Among the indehiscent fruits, the cherry belongs to the so-called stone fruits. In stone fruit, the pericarp differentiates into the outer exocarp (2) and the inner endocarp (3) (see also table C). As the cherry fruit ripens, the cells of the exocarp divide and expand to a higher degree and synthesize organic acids and sugar. This
process makes the exocarp thicken greatly and become fleshy and juicy. The endocarp, on the other hand, becomes woody and turns into the outer coat of the cherry seed. The groove that can be seen on the endocarp corresponds to the (bulgy) suture (4) of the pericarp. The cherrystone is not identical to the seed of the cherry! The outermost tissue of the exocarp, the epidermis, differentiates into the epicarp (5), a membranous tissue, whereas the main part is transformed into the flesh we eat (mesocarp) (6).

Not visible in the model: Inside the cherrystone is the embryo, which has developed from the ferti-lized egg cell of the ovule. It is made up of the two cotyledons, the growing point of the stem and the radicle. Initially, the embryo is embedded in nutritive tissue (endosperm) which, however, disintegrates almost completely by the time the seed has ripened and the embryo matured. The embryo and the endosperm are encompassed by a seed coat (testa) which develops from the integuments of the ovule. In the cherry, the testa is relatively thin and would only become visible upon removal of the endocarp.

As the cherry fruit ripens, the chlorophyll (green) of the mesocarp dissolves, making yellowish and reddish colors visible. The yellowish pigments are carotenoids located in plastids, the reddish ones are the vacuolar anthocyans. The change in color while the cherry fruit is ripening results from the same processes occurring when the leaves change color in autumn.

As the cherry fruit ripens, the fruit peduncle (7), which develops from the blossom peduncle, elongates considerably, while its elasticity increases due to a higher production of strengthening elements. This enables the fruit peduncle to carry the weight of the cherry. In the last stage of development the stone fruit detaches from the fruit peduncle within a preformed, slightly thickened separa-tion zone. (8) At the upper end of the leaf peduncle, separation tissue (a natural wound cork) develops, where the fruit, regulated by hormones, detaches from the fruit peduncle and thus from the cherry tree. At the point of detachment (9), the cherry was separated from the shoot including its peduncle.

Figure B – Fruit of the Sweet Cherry (Prunus avium) (Stone Fruit)

Cherry		
Common name:	flesh	cherry stone
Scientific Term:	ovary	
Develops into:	carpel → pericarp → exocarp (fleshy) → epicarp (membranous); exocarp (fleshy) → mesocarp (fleshy); pericarp → endocarp (woody)	ovule → endosperm seed → endosperm (nutritive tissue); ovule → integuments → testa (seed coat); ovule → egg cell → embryo

Table C - Scientific terms and development of the cherry fruit (prunus avium)

Figure A / Abbildung A

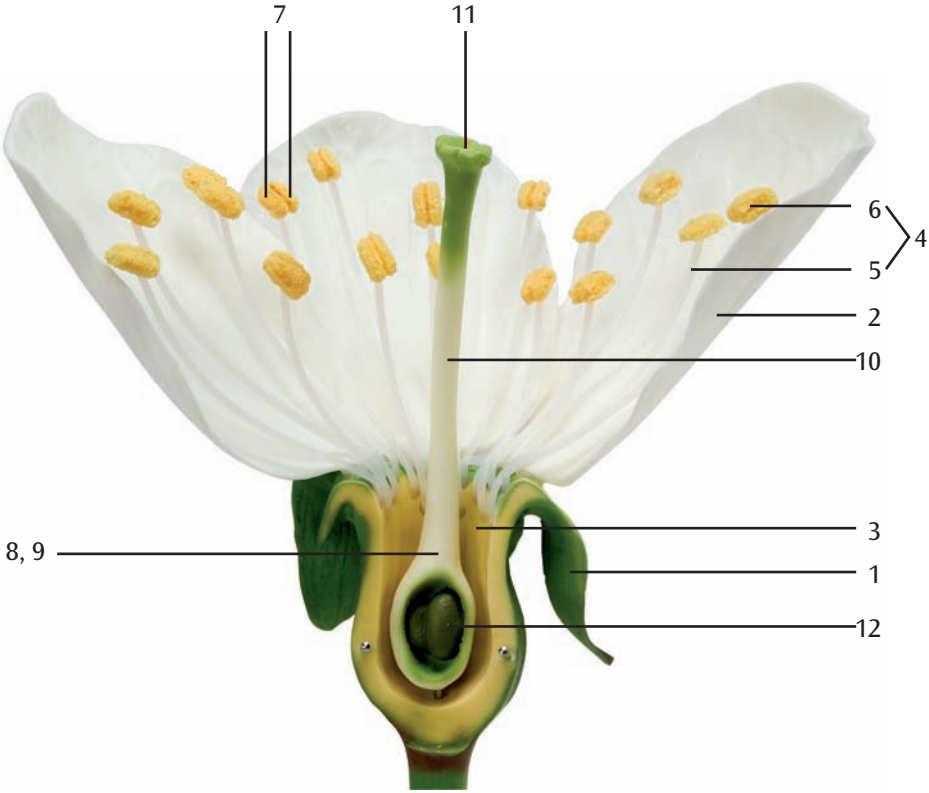
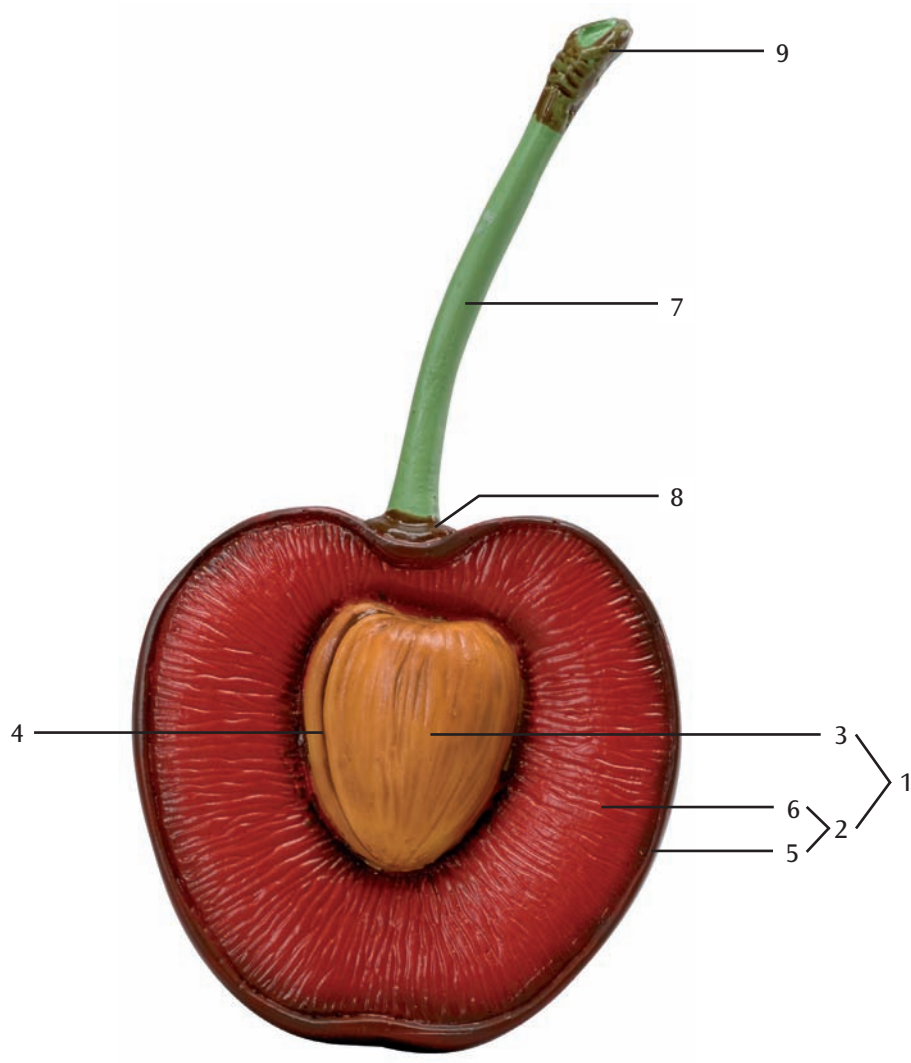


Figure B / Abbildung B



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