

THE PUZZLE OF THE FIG

Fig (*Ficus carica*)

MORACEAE, Mulberry Family

The [cultivated fig](#) (*Ficus carica*) probably originated in southwestern Asia and became a very popular fruit throughout Persia, Arabia, and the Mediterranean region when civilizations and empires were just being born. Egyptians depicted figs in pictographs and hieroglyphics, and the writings of the Greeks and Jews made many references to the plant. Figs are edible either fresh or dry, and, like dates, the dried fig became an important staple in the diets of people on the move or living in dry areas, where fresh fruits were unattainable. Figs are high in calories, but the milky latex in the plant is a laxative.

Cultivated figs grow on small trees with three-lobed, deciduous leaves. What is here called a [fruit](#) is actually a "multiple fruit," which is an entire inflorescence of flowers. The vase-shaped multiple fruit of a fig is sometimes called a syconium. The syconium evolved from a primitive form that looked like a flat plate crowded with small flowers. Through evolution the plate arched upward into a ball. Therefore, the flowers are located on the inside, and there is a small hole (ostiole) at the top that is hidden by some scales, but is important as the entrance for the pollinator. Most species of figs in the world (the genus *Ficus* has more than 600 species) are monoecious and have male and female flowers within a single syconium. This is the condition also of the "caprifig," the wild goat fig (also *Ficus carica*) of southeastern Europe and southwestern Asia. The charming but puzzling feature of three other types of cultivated figs (Common, Smyrna, and San Pedro) is that no male flowers are ever produced.

Figs of many different varieties have been introduced to dry regions around the world. As early as 1520, figs were carried by the British to the West Indies, and the oldest living fig tree in the New World, the Pizarro Tree, was planted around 1538 at the governor's palace in Lima, Peru. Fig trees were planted early in South Carolina (1577), Florida (1579), and Virginia (1621), and in southern California in the 1700s from figs at the Father Kino missions of Baja California. Surprisingly, the first fig trees arrived in the Hawaiian Islands only in 1813. One notable importer of fig varieties to the New World (from France) was Thomas Jefferson.

Most fig varieties produce crops of figs wherever they grow, such as the Common types (e.g., Adriatic, Mission, and Kadota), the caprifig, and San Pedro type. However, the Smyrna figs do not set fruits when they are grown alone. In 1880, Californians began to import and widely plant Smyrna figs, which have the most desirable fruits. The trees looked healthy, but never formed ripe fruits--all the synconia fell off when the fruits were the size of a marble. In fact, the first successful harvest of Smyrna figs in California was 1900. The lack of fruit production

in these figs posed a major riddle and economic problems for California growers until they finally understood the biology of fig production.

The story of the Smyrna fig must include the story of the caprifig. Briefly stated, for fruit development to occur, the Smyrna fig needs pollen from the caprifig. Kadota and other common figs do not need the caprifig, even though they lack pollen, because syconium development is "parthenocarpic," i.e., it proceeds directly without pollination and fertilization (see also pineapple and banana).

Fig pollen is transferred from male flowers (stamens) to female flowers (pistils) by an insect called a fig wasp (*Blastophaga*). Entomologists have learned that fig wasps overwinter as larvae in the pistils (as galls) of the fruit from the winter crop of caprifigs. Caprifig produces three crops of figs per year, and the winter one is called the mamme crop. In April, the larva changes into an adult. A male emerges from the pistil and promptly impregnates a female, while she is still in her pistil. Soon after the wingless male dies; most male carcasses remain in the syconium. Meanwhile, the winged, gravid females emerge and leave the fig through the ostiole. Eventually a female flies to a new, young, flowering caprifig of the spring crop (profichi crop) and enters through the ostiole. The female oviposits eggs in some of the pistils, one per ovary, and then carries pollen to the other pistils for seed set. This enables the fruit to mature, and her young therefore to receive nourishment. The female dies within the [developing fruit. After a short period, the new generation of fig wasps emerges; males impregnate females and die while gravid females escape to colonize new flowering figs. However, the profichi caprifig has many male flowers near the ostiole, and the wasp thereby carries much pollen with her to the next syconium.](#)

[In the case of fruit set for Smyrna figs, branches with profichi figs of the caprifig are collected and hung in the late afternoon within the fig tree canopy. The next morning the fig wasps emerge from the profichi figs and then transfer pollen to the young Smyrna pistils. Enough fertilization takes place to promote Smyrna fruit development. This process is called **caprification**. Caprification was practiced for centuries in the Old World without understanding the pollination mechanism; but the process had to be verified and understood in California \(by Eisen in the 1890s\) before it could be accepted as sound horticultural practice. Caprifigs were imported to California from Algiers in 1899, which began the western Smyrna fig industry. Three to five caprifigs are grown at fig orchards for every 100 Smyrna fig plants, to provide the necessary pollen and fig wasps.](#)

[San Pedro fig types have two crops of figs each year. The spring crop \(breba crop\) is parthenocarpic, but the second crop, like the Smyrna fig, requires caprification.](#)

[Smyrna figs are considered to be the most desirable fig. They are judged better in flavor than](#)

the parthenocarpic fruits because the skin is more tender and the oil in the fertilized seeds give the fig extra flavor.

Speaking of extra flavor, it is true that the skeleton of a female wasp plus some dead larvae of the next generation fig wasps occur in Smyrna figs; however, the consumer hardly notices these inclusions. The "crunch" of the Smyrna fig is the oily seeds.

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