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Fig Caprification
or
The Setting of the Fruit

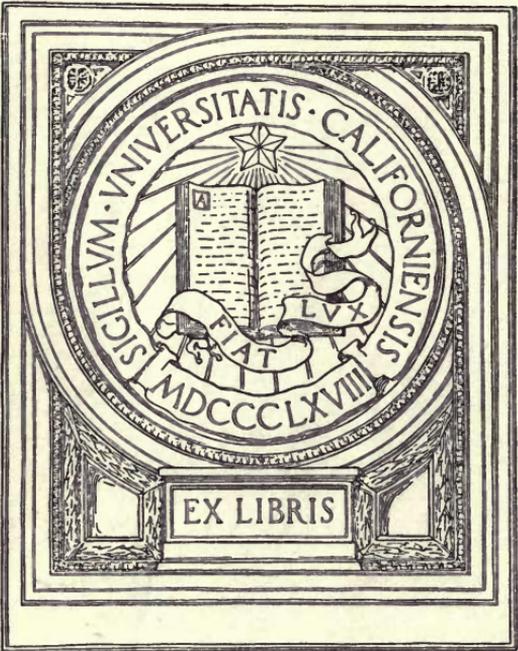
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FIG CAPRIFICATION

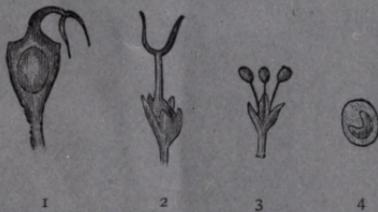
—OR—

The Setting of the Fruit

BY

B. M. LELONG,

Secretary of the State Board of Horticulture, and ex-officio Chief Horticultural Officer.



- (1) One of the fruits of the fig.
- (2) One of the pistillate flowers.
- (3) One of the staminate flowers.
- (4) Seed with embryo; all enlarged.

*A paper read before the Fifteenth State Fruit Growers
Convention, convened at Marysville, Cal.,
November 17th to 20th,
1891.*

FIG CAPRIFICATION.

" Thus we see that the flowers, which we vainly think are

—born to blush unseen,
And waste their fragrance on the desert air,

though unvisited by the lord of creation, who boasts that they were made for him, have nevertheless myriads of insect visitants and admirers, which, though they pilfer their sweets, contribute to their fertility."

The question of fig caprification has been the all-absorbing topic of the day among the fig-growers in this State, and especially since the introduction of the fig wasp, *Blastophaga psenes* from Asia Minor, by means of which insect it was hoped that the fertilization of the Smyrna fig could be successfully accomplished.

I listened with much interest to the lecture on the *Blastophaga* by Gustav Eisen, before the Academy of Sciences, at San Francisco, August 3, 1891, and expressed the fondest hopes of it demonstrating that caprification is an absolute necessity. I procured various specimens of Smyrna figs from early spring to late fall, and carefully examined the eye or blossom end and could find no opening, nor even a possibility for any insect to enter the fig. I so reported what my conclusions were at that time, and further stated that while these investigations were still in progress I did not wish to speak dogmatically; but I had so far found what seemed to me evidence that in some cases, at least of the Smyrna fig, the fruit was found to have gone beyond the point of fertilization of the interior inflorescence before there was any opening whatever in the eye or blossom end of the fig. Even in figs quite small I found the seed formation so far progressed that the seed had a well-defined shell, and at that time I believe the time for fertilization had passed. Mr. Shinn disputed some specimens I exhibited as not being the Smyrna, and brought me several of his Smyrna or so-called Bulletin figs. I carefully examined them and also compared them with the

specimens I had procured from different places, and called Mr. Shinn's attention to the fact of their being much closer or tighter at the blossom end than mine. Mr. Shinn could not account for this and said in reply, jokingly, "the insect will get in ; they know their business."

The following I quote from my own report of the year 1889, page 136, to show the stand I have taken on the question ; and my conclusions are not theories, but are based upon the reports and investigations of modern scientific writers, viz.:

" In the fig the organs of fructification are hidden from view ; therefore we cannot tell exactly when fertilization is effected ; but it is supposed that it takes place when the eye assumes a pinkish hue and expands and admits a little air into the interior, where the flowers are.

" In many parts of Italy and the south of Europe, in olden times, cultivators paid much attention to setting the figs by the method of caprification. This practice was much believed in, but is condemned by most modern scientific writers as absurd.

" Caprification, according to the experience of practical growers, is altogether a delusion ; and many of the largest plantations of the old world have continued to bear fruit without the aid of the Capri fig.

" Professor Gasparinni, a learned botanist, carried on very extended experiments, covering a period of six years, and in an essay written for the Royal Academy of Sciences of Naples detailed the number of experiments which he had made and repeated in different years. Their results lead to the conclusion that caprification is useless for the setting and ripening of the fruit, and that instead of making the figs remain on the tree it either causes or facilitates their fall, especially when the insect had penetrated into the inside and produced decay by its own death. When the insect ever entered a fig, the maturity of it was hastened as apples and pears are when attacked by a grub. Professor Gasparinni recommended the abolishment of the practice, as it only entails expense and deteriorates the flavor of the fig.

" In the islands of the Archipelago the practice has been abandoned, according to the French naturalist Oliver, but in which islands excellent figs are produced.

" The process, stripped of all its mystification, is a simple one,

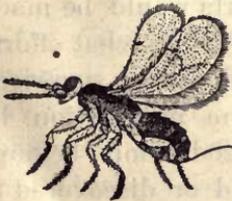
which, as stated before, has proved a delusion, and is only alluded to here as such. In the first place, there is a wild species of fig, called *Capri fig*, on which it is said a certain insect exists, which enters the fruit when in a young state, at the eye, thereby facilitating the entrance of light and air, or some fertilizing vapor whereby the flowers are enabled to set and ripen. In fig plantations numbers of this wild species are planted for the sole purpose of bearing these insects; and at the proper season the fruits with the insects are carried and deposited on the fruit or shoots of the domestic species.

“Without all this maneuvering it is faithfully believed that very scanty crops of figs would be secured; but, according to the investigations of modern science, it is proved to be not only unnecessary but positively injurious.”

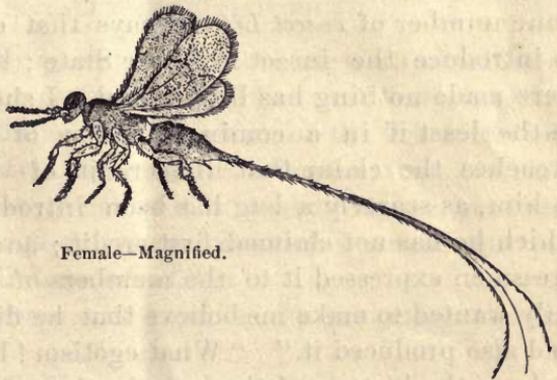
I am by no means a disbeliever of the process; but for the time being, and until the merits of the *Blastophaga* are proven beyond a doubt, I shall weigh with much consideration the conclusions of the authorities I have quoted, and further, because I have but recently made a very important discovery which gives me new grounds for such a belief, which I will explain further on.

BLASTOPHAGA (PSENES) GROSSORUM, GRAV.

(*Cynips psenes*, Linn.)



Male—Magnified.



Female—Magnified.

DESCRIPTION.

Female. Average length .08 of an inch. Wing expanse about .11 of an inch. Color light brown. Antennæ clavate, ten-jointed, covered with fine hairs. Head sub-globose. Eyes very

large and prominent, of a dark color. Thorax long. Abdomen elongate acute, terminating in a long, hairy ovipositor, three times the length of the body, two-thirds of the terminal portion of which is divided into three parts. On the under side of the abdomen is a process. Wings transparent, pubescent, with long marginal hairs. The stigma of the anterior wing at right angle from marginal costa. The legs are of the same color as body and covered with stout hairs. The tibia of the front legs is stouter than that of the second pair. The posterior legs are much stouter and longer than the others.

Male. Length about .07 of an inch. Wing expanse about .11 of an inch. Color black. Antennæ clavate, eleven-jointed, hairy. The scape is much larger than that of the female. Head same as female. Eyes dark and prominent. Thorax about as long as abdomen. Abdomen obtuse with a short curved stylus. Wings and legs same as those of female.

ITS INTRODUCTION.

The credit of the introduction of this insect into the State belongs solely to Mr. James Shinn, of Niles. The fig-growers of this State were and had been anxious to have the insect introduced so that its merits pro and con might be established. To this end the entomologist of the Department of Agriculture was asked to procure the insect from Smyrna, as the facilities of Government officials in such matters are well known. In the June number of *Insect Life* he says that efforts would be made to introduce the insect into our State; but as to what efforts were made nothing has been heard. I should not be surprised in the least if in a coming number of some publication he broaches the claim that the credit of introduction belongs to him, as scarcely a bug has been introduced or discovered to which he has not claimed first credit; and, as one of our Congressmen expressed it to the members of our Board, "He not only wanted to make me believe that he discovered the bug, but had also produced it." "What egotism! how selfish, oh man!"

As to the history of the introduction of the Blastophaga and how it came about, I cannot do better than give Mr. Shinn's own statement, viz.:

Mr. Shinn: "We wrote to some friends that were known to us in Smyrna; or rather some missionaries were stopping at my

house, and seeing that my figs did not bear and that I was getting uneasy about it, one of the ladies, my wife's sister, said she knew a lady from Syracuse, N. Y., who was then in Smyrna, and if she would write to her she would fix up a few of the fig cuttings and send them. The lady sent for them, and instead of sending a half dozen cuttings sent a whole box of cuttings, on which I paid about \$100. After I received this box here comes another little box and a letter saying, 'The figs must be caprifried, if not you will get no figs. I sent you a little box of figs that are full of the Blastophaga, and hope you can do well with them.' The moment we got them my son went out to the Capri fig tree, opened the box and set it out there. Some of the insects were dead and some were alive. I saw Mr. Eisen the next day and told him about the Blastophaga and the figs. He and Mr. Maslin came to my place the Sunday following, July 26th. We examined and found some live insects, but most of them were dead. The Smyrna figs that were caprifried, that is, that had the pollen put in artificially, came to perfection, but no others did. Two crops have all gone to the ground and are now on the ground, except about ten figs. The pollen that was injected into the figs was from the Capri figs grown on my place at Niles. There are two varieties of the Smyrna fig. One has a three-lobed leaf, and the figs small and elongated. The other is a five-lobed leaf, and the figs are flat and roundish."

ARTIFICIALLY CAPRIFIED FIGS.

Mr. Shinn then exhibited three figs which were caprifried by means of a quill toothpick,*—two roundish and one elongated. In answer to a question as to the opening of the figs at the time they were fertilized, Mr. Shinn could not remember, but said: "The insect knows how to get in if it must; that is a provision of nature. Only the figs that were caprifried have come to perfection; the others all dropped off."

Question: Were those figs caprifried by the insect or artificially?

Mr. Shinn: Artificially.

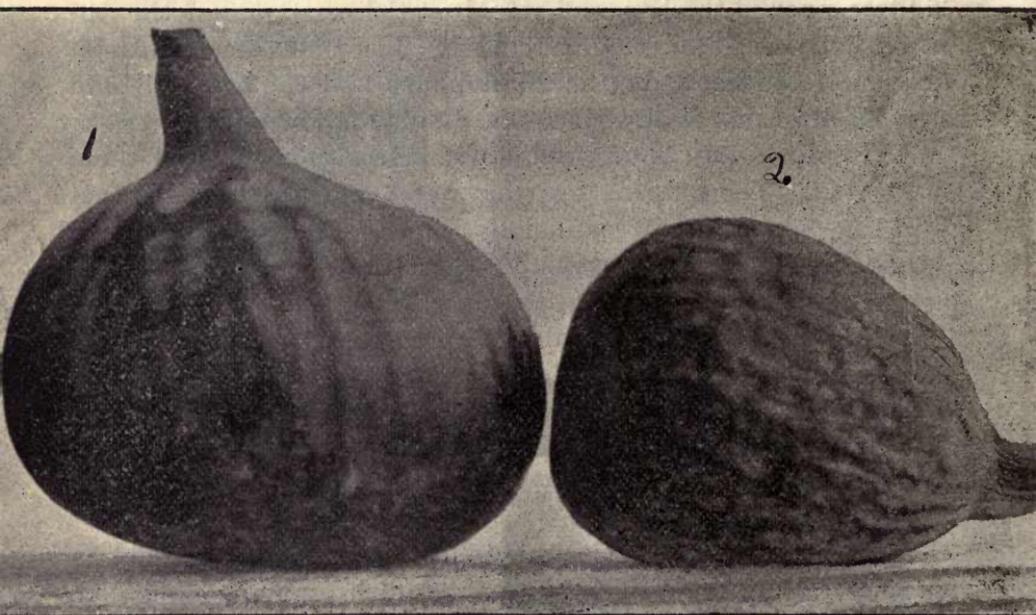
Question: Then there is no fig that has come to maturity known to have been caprifried by the insect?

Mr. Shinn: None at all.

* This operation was first conceived of by Geo. C. Roeding, of Fresno, and thus matured Smyrna figs in 1890, and also in 1891.

Mr. Maslin, who was present, was requested to state his views and observations, which he did as follows :

Mr. Maslin : On the 26th of July I went over with Mr. Eisen, at his invitation, to examine the Blastophaga. We met Mr. Shinn's son, who pointed out to us a fig tree which he said was a Capri fig, and one of the importation made by the *S. F. Bulletin* Company. The others in the rows belonged to the edible fig. We found in the boughs of that Capri fig tree the box containing the Capri figs imported by Mr. Shinn, with quite a large number of dead Blastophaga. Mr. Eisen cut open the



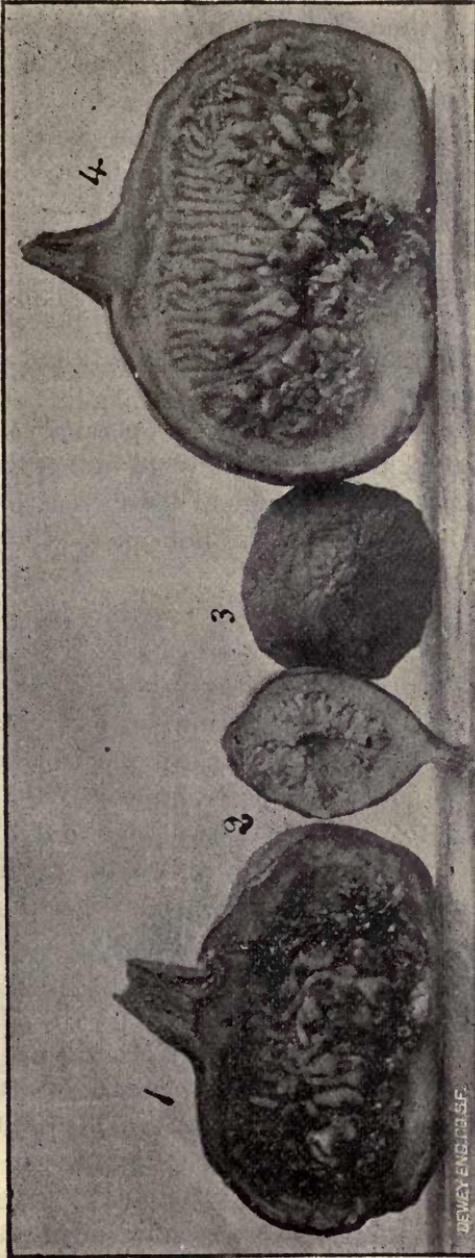
Figs grown and exhibited by Mr. Shinn.

(1) The large Smyrna, flesh amber color. (2) The small Smyrna, flesh dark red.

dried Capri figs and found them literally black with the insects, which began to move, but very sluggishly. The size of the insect is about one line, one-twelfth of an inch. We then took some of those insects and scattered them at the so-called blossom end of some of the Capri figs and some of the figs known as the *Bulletin's* importation. Mr. Eisen then proceeded to fertilize some of the figs. We found that the fallen Capri figs from the growing tree on the ground were full of pollen ; cutting them open Mr. Eisen dusted the pollen about the open end of

various figs. I suggested to him that we should insert the pollen by means of a toothpick. I picked up a fig and dusted the

FIGS SHOWING THE MATURED FRUITS IN THE RECEPTACLE.



(1 and 4) Sections of Smyrna figs, artificially caprifried, showing the cavity made by the insertion of the quill toothpick with which the pollen of the Capri fig was inserted.

(2 and 3) Small or immature figs, showing the female flowers in the receptacle, and the size the mature figs were at the time the pollen was inserted; also the closeness of the blossom, or eye, of the figs at the time fertilization is said to take place.

pollen into my hand, filling the toothpick with the pollen; and he inserted the toothpick into several figs. We pollinated sev-

eral figs with the pollen of the Capri fig, then went round at the end of the row and proceeded down toward the south and pollinated probably twenty figs in several places, selecting such figs as showed growth. We then tied a string at each place below the fig that was pollinated, so as to find them afterward.

Question : Mr. Eisen claims to have inserted a quill into an edible fig, and when he withdrew it that there were Blastophaga at the end of the quill. He so stated in his lecture on the Blastophaga.

Mr. Maslin—I recollect that on a tree next to the Capri fig there was a Blastophaga ; but I doubt the correctness of the statement, because we were not looking for any insect in the fig, and you don't generally find something you are not looking for. We were not looking for insects.

Question : How large were the figs you operated on ?

Mr. Maslin—About $1\frac{1}{2}$ inches long and $1\frac{1}{4}$ inches thick.

Question : How were the openings of the figs at that time ?

Mr. Maslin—To the eye they were not open. Closed as tight as tight could be.

Question : In your opinion, was it possible for an insect to get in ?

Mr. Maslin—That I could not say ; but I was particular, because I am interested in that question. I particularly looked to see if I could find a fig where the insect was in ; but I declare I never saw a fig where it seemed possible for an insect to enter ; and when I took a bottle of these Blastophaga to my ranch, and went over the ten acres, I found only two figs with a hole big enough to put an insect in, and I put the insects into these, but the figs have fallen off.

Question : Was the pollen used taken from California-grown figs or from the imported ?

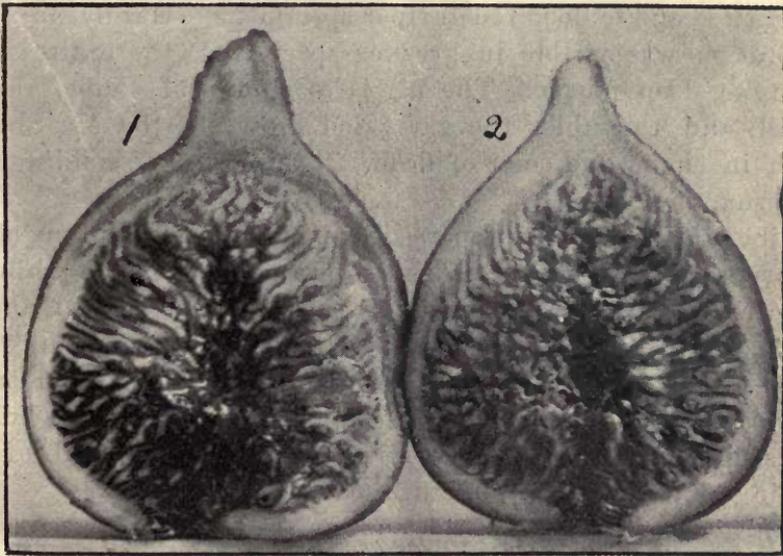
Mr. Maslin—From Capri figs grown by Mr. Shinn.

Mr. Maslin [Continuing.]—I have ten acres of Smyrna seedlings. I sowed the seed in 1885 and 1886. The first crop this year the fruit on the limbs was very thick, as on plum and prune. The figs this year of that crop on the trees that were grown from seed are big, but had no saccharine matter in them and dried right up. About two weeks ago I found two dozen little figs on currant wood, being so-called second crop. They were of a lovely cream, ivory color. The meat was amber color

and very sweet, but not filling the receptacle. It only showed that there was some saccharine principle being developed.

AN IMPORTANT DISCOVERY.

The ground for argument by those who believe in caprification has been that no fertile seeds had been found in any California-grown fig. Also, that all figs, and especially the Smyrna, only contain female flowers; and the fact of fruit of trees imported from Smyrna not coming to perfection gave them stronger grounds for such belief, that is, the pollen of the male or Capri fig had to come in contact with the flowers of the female fig to produce fruit. Also that the reason of not having found kernels in the seeds of California-grown figs was attributed to the lack of the pollen fertilization.



California-grown figs with fertile seeds.

- (1) Specimen showing mature fruits.
- (2) Specimen showing how the fruits lay in the receptacle; the male flowers are towards the blossom end.

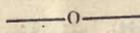
On October 20, 1891, while visiting an orchard at Los Gatos, I came across a tree which attracted my attention by reason of it being of peculiar foliage; and upon cutting the fruit I found that it possessed both pistillate (the female organ of a phænogam, consisting of the ovary with its stylus and stigma) and staminate (the pollen-bearing organ of the flower, consisting of

an anther usually supported upon a stalk or filament) flowers, which were so grouped that the pollen from one was freely conveyed to the other. Thus fertilized the female blossoms had developed into hundreds of perfect seeds with well-defined kernels.

This is the first time that fruit of this character has been found in this State, that is, containing both pistillate and staminate flowers, and the seeds perfect kernels. One of the specimens cut in the presence of E. W. Maslin, Secretary State Board of Trade, and G. F. Weeks, Agricultural Editor of the *S. F. Chronicle*, was full of pollen; in fact, the pollen was so abundant that it gave the center of the fig a yellow appearance. Unfortunately the figs were not fully matured, so there was no opportunity to test their quality. On cutting them open they were of a decidedly purple hue near the skin, changing to bright red and to deep red in riper specimens. Hardly any red coloration was visible in greener specimens, the entire flesh being a deep purple. The fig is of elongated shape, rather small, and resembles the elongated fig grown by Mr. Shinn, both in shape and color of flesh. It has a leaf resembling the Smyrna, finely lobed.

Since the above was prepared, Mr. Maslin brought to my office (November 9), several seedling Smyrna figs grown by him in Placer county. The specimens were small, of a bright amber color, and the fruits in the receptacle well developed and ripe. Upon examination they were found to contain numerous male flowers and considerable pollen. We have here two conclusive facts showing that the insect is not altogether essential for the setting of the fruit, in some figs at least.

This is a progressive world, and its people, step by step, have unraveled many of the most difficult problems; so let us hope that wisdom and ingenuity will in the near future solve this interesting question.



“A fact is a serious thing, and the most difficult matter in the world to determine.”

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