

✓ NOTE ON A CALIFORNIAN FRUIT WORM.

By HARRISON G. DYAR.

Dried fruit, infested with "worms," which proved to be lepidopterous larvæ, were received at the Department of Agriculture from Santa Clara County, California. The resulting moths were *Vitula serratilineella* Ragonot. Their larvæ show some peculiar points of structure.

Egg.—Elliptical, flattened above and below, symmetrical, rounded; soft-skinned, coarsely granularly shagreened; somewhat translucent, pale yellowish or wood color. Size about $.6 \times .4 \times .3$ mm.

Larva.—Head rounded bilobed, the vertex retracted in joint 2, somewhat flattened before and erect; clypeus not reaching the membranous vertical triangle; red-brown, sutures of clypeus and mouth darker, ocelli black. Body cylindrical, tapering slightly toward the ends, segments dorsally 2-annulate; feet normal, small, pale, the abdominal ones with crochets in an ellipse. Cervical shield distinct, large, transverse, luteous translucent, brown at the marginal tubercles. Anal plate darker luteous. Body whitish, rather opaque, a red dorsal shade at maturity. Tubercles small, dark brown; iib of joint 3 and iii of 12 and all those of joint 13 enlarged. On joint 13 dorsally there is a single medio-dorsal shield carrying the tubercles ii of each side; a lateral shield bears i and iii, which are closely approximated; on joint 12, tubercle ii is a little dorsad to i; on the central segments i and ii are in line, iv + v; on the thorax ia + ib, iia + iib, iv + v. The enlarged tubercles iib of 3 and iii of 12 have the hair in a large, clear space around which the tubercle shield forms a ring; these hairs must be specially movable. Setæ rather long, brown. Spiracles brown, those of joint 12 larger than the others. Anal feet with a brown leg shield.

The following paper, by Mr. Banks, was then read by title:

SECONDARY SEXUAL CHARACTERS IN SPIDERS.

By NATHAN BANKS.

That differences in size exist between the sexes of spiders has long been known, and often commented upon. Yet it does not apply to all spiders; with the Theraphosidæ, Pholcidæ, Dysderidæ, Drassidæ, Clubionidæ, Agalenidæ and Dictynidæ there is little difference in size between the sexes. Usually the abdomen of the male is more slender than that of the female, but the cephalothorax is about as large. In the Agalenidæ the male is frequently larger and stouter than the female. In many Theri-

diidæ (micro-theridiidæ) there is little difference in size between the sexes. In the Epeiridæ and Theridinæ the male is commonly smaller, often very much smaller; in the Oxyopidæ and Lycosidæ there is not much difference in size, and with the Attidæ the males are never much smaller than the females. In the male sex of Thomisidæ, Epeiridæ, some Theridiidæ, and a few Clubionidæ the legs are proportionally or actually longer than in the female.

The difference in coloration between the sexes of many Attidæ has been dwelt upon by Prof. Peckham. It is far more prominent in this family than elsewhere in spiders. The Thomisidæ often show slight differences, and they are, in a few cases, I think, due to sexual selection. In at least one species (*Xysticus triguttatus*) there are two forms of the male, one colored as the female, the other, and much more common form, marked in a different manner. In the Oxyopidæ, *Oxyopes salticus* shows a very marked difference in the color of the sexes. In the Lycosidæ there are few cases, none very prominent. The male of *Lycosa ocreata* has the tibia I clothed with long, black, erect hair, which might well be considered as an ornament. In several species of *Pardosa* the male is very much darker than the female. In some Theridiidæ certain parts are more brightly colored in the male sex. In *Latrodectes* the male is much marked, and resembles the young of both sexes. In a few species of *Dictyna* the male is of a different color from the female.

The secondary structural characters in spiders are perhaps more interesting and less understood. I know of no case in either the Thomisidæ or the Lycosidæ. In the Attidæ we quite frequently notice that the mandibles of the male are much longer and larger than in the female, as *Zygoballus*, *Philæus*, *Epiblemum scenicum*, and *Icius nitratus*. In the males of some species of *Habrocestum* there are small projections on the tips of the patellæ and tibiæ of the third pair of legs. These projections are sometimes prominently colored, and are probably for ornament. In the Tetragnathidæ the mandibles of the male are usually larger and furnished with more teeth than in the female. Yet in the female they are much elongated. It is probable that this character is partly due to the general lengthening of all parts of the body, and later was especially modified in the male. But not all long and slender spiders have elongate mandibles; as in *Hyctia* and *Tibellus* they are of usual size.

In the Epeiridæ we notice that in the males of some species the tibiæ of the second pair of legs are thickened, and thickly clothed with stout spines, while the metatarsi are curved; for example in *E. trivittata*, *E. foliata*, etc. Sometimes the tibia bears a curved projection as in *Mahadeva*. These characters may be of some use in holding the female and preventing her from turning and biting the male. In the males of a few species

there are spines on the anterior coxæ, as in *E. solitaria*, *E. angulata*, and *E. silvatica*. These species also have the tibia and metatarsus of leg II modified as above. Similar projections on the coxæ will be noticed in some Clubionidæ. In those Epeirids that have humps or spines on the abdomen the male sex is almost destitute of such characters. The head of male Epeirids is nearly always narrower than that of the female.

In the Theridiidæ there are a large number of differences in the sexes. In *Microdipæna* there is a curved, spine-like projection at the tips of the anterior tibiæ and metatarsi. A similar structure is found in some tarantulas. The head of the male of this genus is much higher than in the female; this is a very common difference in the family. In *Theridium frondeum* and one or two allied species there is a small hump at the base of the mandibles in the male. The mandibles are elongate and toothed in the male of *Theridium sexpunctatum*, and in certain species of *Linyphia* and *Erigone*. In the males of some species of *Tmeticus* and *Microneta* there is a spine on the front of each mandible. In *T. tridentata* there is a row of teeth on the sides of the mandibles, and in the female these are present in a rudimentary condition. In some species of *Erigone* the sides of the thorax in the male are spiny. In a number of micro-theridiidæ (*Lophocarenum*, some *Ceratinella*, etc.) the head of the male is curiously modified; elevated into humps of various shapes, and in the former genus with a little hole on each side. In the male of *Tmeticus unicornis* there is a prominent projection on the clypeus; a similar one exists in the male of *Histiagonia rostrata*. In the latter and in the allied *Ancylorrhaxis hirsuta* there is a corneous shield on the abdomen of the male. In *Ceratinella* the males possess a similar shield above and sometimes also below; in some species it may be present in the female. In *Cornicularia* there is a horn between the eyes of the male. In *Erigonoplus* the male has the metatarsus of the front legs greatly swollen; this genus has the head lobed as in *Lophocarenum*. In the male of *Maso* the head is much broader than in the female.

The importance of the sexual peculiarities of the micro-theridiidæ is not understood. Though they are not ornamental in our eyes, they serve to give a distinctness to the male which may be of service in enabling the female to recognize her proper male; for except in these secondary sexual characters and in the genitalia (accessory) the species are much alike. In *Asagena* the cephalothorax is rougher in the male than in the female, and it is said that these spiders make a noise by rubbing the base of the abdomen over the cephalothorax, but it has not been observed in the American species. In this genus the second pair of legs is very spiny in the male.

In the Agalenidæ two species of *Hahnia* have the hairs on the

anterior legs of the male elevated on little projections. In the Dictynidæ the males of *Dictyna* have the mandibles longer than the female, and bowed. In the Clubionidæ a few species of *Clubiona* have ridges on the edge of the mandibles of the male. In three species of *Gayenna* (*G. calcarata*, *fraterna*, and *pectorosa*) there are spines on the posterior coxæ; these are possibly of use in holding the female. In *Thargalia* several species have horny shields at the base of the abdomen in the male. In the Drassidæ several species also have a horny shield at the base of abdomen of the male.

In the Dysderidæ the anterior metatarsi of the male *Ariadne bicolor* are curved and have a spine on each side. In *Plectrurus* may be noticed a hook-like process on the anterior tibia of the male, and the males of *Eurypelma* (Theraphosidæ) also have a curved hook at the same place. These projections are probably of use in holding the female. The mandibles of the male of *Psilochorus pullulus* (Pholcidæ) have each a spine on the front; the same are found in *Pholcophora americana*; in the latter species there is also a hump on each anterior corner of the sternum. In *Physocylus gibbosus* it is the female that is modified, the hinder part of the cephalothorax is elevated behind into a spine. The cephalothorax of the male is flat as usual in the genus. These various projections on the mandibles of the Pholcidæ are probably of no use in fighting, and probably not ornamental.

When one considers that each of these species has several allied species that exhibit no sexual structural peculiarities, it is difficult to explain the cause of these structures. Many cannot be used in fighting. Some Attidæ, as *Zygodallus*, are known to fight; but there are other Attidæ that also fight, and show no sexual structural differences. A few of them may be ornamental.

However, one must draw largely upon his imagination to find any use for some of these structures.

I would rather suppose that it is a part of the male inheritance to be endowed with an intense nervous restlessness that sometimes finds an expression in extreme developments of color or structure. Sometimes these may be seized upon and maintained by sexual selection. And, again, although they are not useful, they may be maintained as outlets for the excessive vigor of the male.

This, I think, would be more plausible than that they are the results of accidental variation maintained by sexual selection.

—The next paper, "Notes on the Habits of two Cicindelidæ from Texas," by Mr. J. D. Mitchell, of Victoria, Texas, was presented by Mr. Schwarz, who made some introductory remarks