OVIPOSITION HABITS AND EARLY STAGES OF ORASEMA SP.

By H. L. PARKER.

Bureau of Entomology and Plant Quarantine U. S. Department of Agriculture.

In April, 1941, the writer observed a chalcid fly[1] ovipositing in the leaves of zarzaparilla colorado (*Muehlenbeckia sagittifolia* Meissn., Fam. Polygonaceae) at Reconquista, in the Province of Santa Fe, Argentina. A search on the leaves of other nearby plants revealed that similar egg punctures, probably of the same species, occurred on mburucuyo (*Passiflora coerulea* L., Fam. Passifloraceae), barba de viejo (*Clematis* sp., Fam. Ranunculaceae), and tripa de fraile (*Pithycoctinium cyanchoides* DC. *clematidium* Gris., Fam. Bignoniaceae). Eggs were very abundant on these plants, literally millions being present, especially on *M. sagittifolia*, and it is to material from this plant that the observations refer. Eggs were found in great abundance on these plants in various directions for distances of 10 to 20 kilometers from Reconquista. None was found at Vera, however, about 60 kilometers away, but the searches in this place were limited to a few hours. On another occasion, at Puerto Tirol, near Resistencia in the Chaco Territory, similar egg punctures were noted on an unknown plant by Dr. A. Ogloblin, who stated that they were very similar to the egg punctures of *Orasema aenea* Gahan on *Ilex paraguayensis*, and that the latter species was common throughout the Chaco and Misiones on many species of plants.

The eggs of *Orasema* sp. observed by the writer are deposited in the tissue of the leaf on the underside. The punctures are made, for the most part, near the border of the leaf, but many leaves have the entire underside almost completely covered with punctures, which cause them after a few days to turn light brown. One can distinguish leaves heavily punctured from a distance of many yards. When only a few eggs are laid, they are usually in a row or rows, with the eggs more or less evenly spaced in the rows (fig. 1). Very often, however, so many eggs are laid near the outer edges of a single leaf that all semblance of order appears to be lost.

In ovipositing the female takes a position on the underside of the leaf with her body oriented more or less longitudinally with the leaf. She curves her abdomen somewhat underneath the body and gives a short, steady thrust downward and forward into the leaf tissue. This movement requires only a few seconds, and apparently an egg is laid during the process, only

[1] Adults of this fly were examined by A. B. Gahan, who stated that "this [species] runs directly to *Orasema aenea* Gahan in my key and agrees with that species except that it is distinctly less deeply sculptured. I am in doubt as to the identity."

one egg being placed in each puncture. The female then withdraws her ovipositor, straightens out her abdomen, and quickly takes a step or so forward and repeats the process. Arriving at the edge of the leaf she turns about and starts another row of punctures, more or less parallel to the first, but sometimes diverging.

The puncture is left open, the egg being placed rather far into the hole made by the ovipositor; it lies parallel to the surface of the leaf, with the anterior pole nearest the opening of the wound (fig. 2). The tissue above the egg (inverted view of the leaf) dessicates somewhat and turns brownish. In many cases the punctures become slightly scarified, undoubtedly after the hatching of the egg, and are partly closed up with a gall-like, or cancerous growth.

Some females were observed apparently in the act of oviposition on leaves bearing old oviposition scars. Close examination revealed no new punctures, however, although newly laid white eggs were noted in some of the old punctures, partially extruding and sometimes entirely outside the cavity. Other eggs were noted lying about on the leaf surface where no puncture had been made. The writer was thus led to assume that the females attempt to utilize the punctures more than once for egg laying.

The ovarian egg (fig. 3) is approximately oblong-oval, with a heavy stem, or peduncle, at the pole taken to be the anterior, for this is the end of the egg which apparently issues last from the abdomen and lies nearest the opening of the puncture (fig. 2). It is white and without sculpturing or other appendages. The deposited egg is similar except that the pedicel is more slender (fig. 4). There appear to be four or five thousand eggs in the ovaries of a female.

Leaves were collected and kept in cardboard and tin boxes. Larvae hatched in both these containers and died therein, but the majority of larvae were found in the following June dead within the egg in the puncture. The illustrations were made from this material by treating it in warm water and weak potash for 48 hours, which distends the larva considerably and separates the segments so that they can be observed.

The first-stage larva is of the well-known planidium type, being composed of the head and 13 body segments, of which the last is a fleshy lobe between the caudal cerci. It is dark brownish except for the fleshy parts between the sclerites. The head is somewhat heartshaped, slightly truncate posteriorly and anteriorly, with a fleshy portion around the mouthparts and an unsclerotized longitudinal strip ventrally. It bears two pairs of circular sensoria (probably the bases of setae) dorsally. The mandibles are of the usual comma shape. The body (fig. 5) is more or less spindle-shaped, being widest at the third thoracic

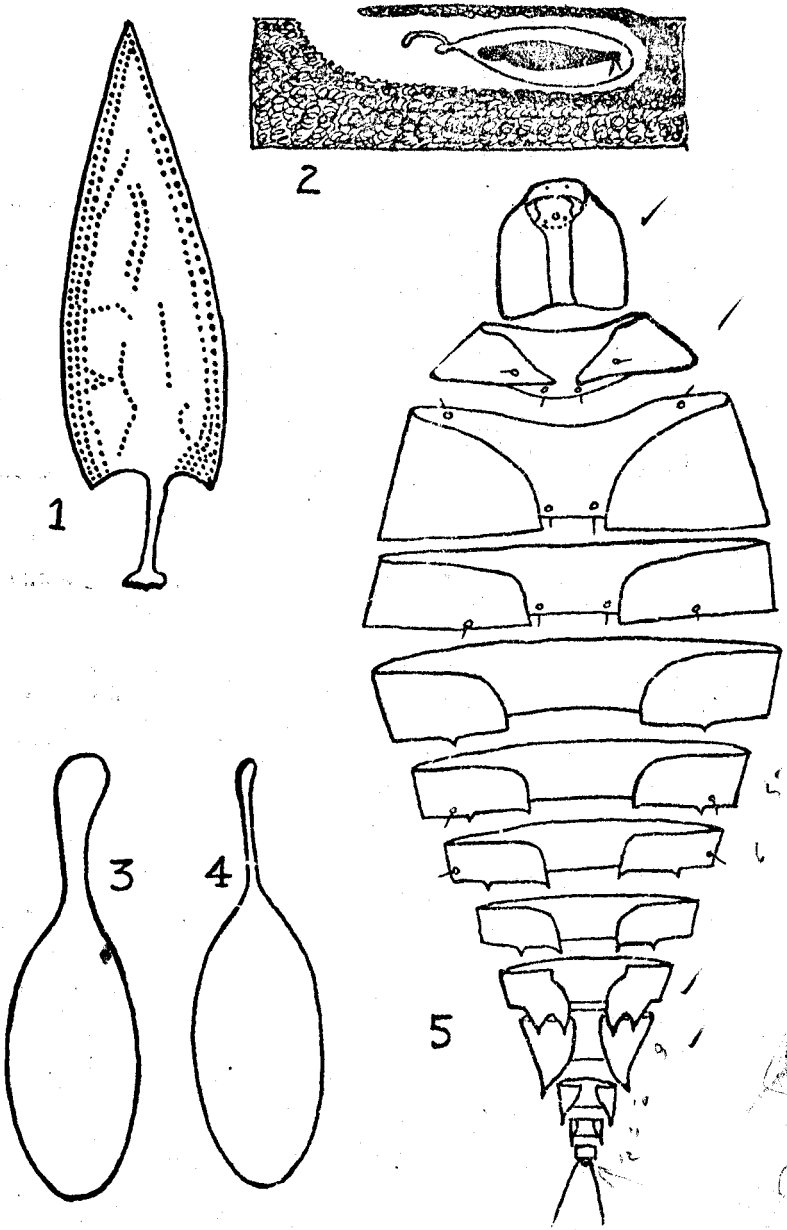

Fig. 1, leaf of *Muehlenbeckia sagittifolia* showing pattern of egg punctures on underside of leaf; fig. 2 egg *in situ* with a fully developed first-stage larva within it; fig. 3, ovarian egg; fig. 4, deposited egg; fig. 5, first-stage larva, showing sclerotized parts only.

and first abdominal segments. There are 12 sclerotized bands, or dorso-pleural plates, extending almost entirely around the body, as is usual with this type of larva. Setae are found in the following places. One pair dorsally on the first thoracic segment near the posterior border and one pair ventrally also posteriorly; one pair dorsolaterally on the anterior edge of the second thoracic segment and one pair dorsally on the posterior edge; one pair dorsally on the third thoracic segment and one pair ventrally, both near the posterior border; one pair ventrolaterally on each of the second and third abdominal segments near the posterior border; a pair of long caudal cerci apparently attached to the fleshy portion of the ninth abdominal segment, since no circular base can be discerned on the sclerotized part of this segment, whereas in the other cases the circular bases are quite distinct. The second thoracic segment is the longest medially, the thoracic plates terminating ventrally in a simple manner, the first to fourth abdominal segments each have a distinct tooth on each side posteriorly in a ventro-lateral position, and the inner angle of the posterior edge of the segments is somewhat pointed; the fifth abdominal segment bears two large teeth at its posterior-ventral margin; the sixth, somewhat wider than the preceding segments, is drawn out posteriorly in a long tooth that is obtuse before the apex but has a sharp-pointed apex; the seventh and eighth are slightly drawn out to a point posteriorly, otherwise simple; the ninth seems to be a simple plate without teeth.

NOTES ON THE SEASONAL HISTORY OF THE RABBIT TICK, HAEMAPHYSALIS LEPORIS-PALUSTRIS, IN OKLAHOMA.[1]

By GAINES W. EDDY.[2]

ECONOMIC IMPORTANCE.

Although the rabbit tick has been known for over seventy years, its importance in the dissemination and transmission of diseases has only recently come to light. It was shown to transmit spotted fever by Parker (1923) and was incriminated as a carrier of tularaemia by Parker, Spencer and Francis (1924). This tick is also a proved vector of tularaemia in British Columbia, according to Moilliet (1936), and was shown to carry that disease in Alaska by Philip and Parker (1938).

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[1] A contribution from the Oklahoma Agricultural and Mechanical College Department of Entomology, Stillwater.

[2] Now with the U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine.