SPECIAL ARTICLES

THE EGG-LAYING HABITS OF MEGARHYSSA (THALESSA)

DURING the summer of 1921 I had frequent occasion to watch the females of the beautiful large Ichneumonid *Megarhyssa* (formerly *Thalessa*) in the act of ovipositing into the trunk of a decaying maple tree at Mendham, N. J. In looking over the literature on the subject, I find that this process, though often described and commented upon, does not seem to have been fully elucidated so far. There are at least two facts that have escaped attention of observers, namely first, that the ovipositor is always brought into a position at right angle to the bark *directly behind the thorax of the insect* and is held here in position by the hind coxae, allowing only upward and downward movements but no lateral excursions. It is only under this condition that one may correctly say that the insect "makes a derrick out of her body" (Comstock). The second point is, that the remarkable extensile membranous sac or disc into which the ovipositor enters with its basal part to allow of its being temporarily shortened, is not only formed twice, at the beginning and at the end of the process, but at the beginning *receives also the sheaths into its interior,* which are freed when the membrane collapses, as two separate loops, while at the end of the process, when the membranous sac forms again, the loops of the sheaths do not re-enter it, making it possible that one can tell whether the insect is just beginning or just ending operations.

It appears that the extensile membranous sac has been seen first and correctly interpreted by J. Quay,[1] who, however, does not mention the loops formed by the sheaths. The most complete and accurate account is given by C. V. Riley,[2] who describes the loops formed by the sheaths, which, as he correctly stated, do not enter the wood. But Riley is in error in his statement that the sheaths "have not followed the ovipositor within the membrane"; in fact they do so at the beginning of the process. According to Riley the sheaths make "a larger and larger loop *on one side of the body*[3] or even a valve on each side," and he figures the ovipositing insect with ovipositor and sheaths on one side of the body which is quite impossible. In the same figure, otherwise excellent, the ovipositor is drawn at a certain distance behind the end of the thorax, while, as I have stated above, it is held by the hind coxæ. Riley criticizes the previous illustrations (Blanchard, Wood), which figure *Thalessa* (*Rhyssa*) as ovipositing into insect larvæ which she never does.

More recently, Comstock[4] gives an illustration possibly adapted from Riley as it figures almost exactly the same stage in the egg-laying process, and especially as it continues both Riley's errors in figuring the ovipositor at a certain distance behind the thorax, and on one side of the body. The wings are drawn as if held vertically; the antennæ held farther upward than in Riley's picture. The vertical position of the wings is preserved in Kellogg's and Lutz's figures. Kellogg's figure[5] is almost identical with that (presumably older one) of Comstock but apparently redrawn as to details; the error of drawing the sheaths both on one side of the body has here been eliminated. The figure in The New International Encyclopaedia (2d edit., 1915, article "Ichneumon fly"), is adapted from Riley; the antennæ, however, are here drawn as if directed vertically upward—perhaps to save space. It should be noted that the egg-laying insect holds the antennæ forward and often downward, touching the bark. This figure also shows both Riley's errors which I have commented upon. A new illustration is given in Lutz's "Field Book of Insects" (1918; Pl. LXXXVIII., p. 413); this illustration was, as Dr. Lutz tells me, not drawn from nature but combined from illustrations and a specimen they had. This picture is the first one in a long time to show a different stage in the process than that

[1] *American Entomologist,* Sept., 1880, Vol. III., p. 219.

[2] "Insect Life," Vol. I., 1889, p. 168 ff.

[3] Italics mine.

[4] "Manual for the Study of Insects," 13th edit., 1915, p. 623, Fig. 749.

[5] "Insects," 1905, Fig. 682.

figured by Riley, and the membranous disk is shown correctly with the sheaths inside, corresponding to the beginning of the boring process. But the position of the abdomen is impossible; indeed at this stage, when the disk is formed, the abdomen is held not only vertically but even bent forward to some extent above the thorax; and at no time during the whole process is the ovipositor inserted as far behind the insect as drawn by Lutz. Like Comstock, Lutz shows the wings in a vertical position and the antennæ are held obliquely upward which is possible but not characteristic. Mention should be made that Riley too, already gave a picture, undoubtedly from a preserved specimen, of the extended membrane, the two sheaths just leaving it, as would be the case as soon as the membrane begins to collapse. This illustration shows very well how the ovipositor at the beginning of the process is held in a vertical direction by being sunk into a ventral furrow of the abdomen, which renders its basal portion quite invisible.

It becomes a matter of interest that, of many authors commenting on such a familiar insect as our large, long-tailed ichneumon fly, and on its oviposition, only comparatively few have watched the process long enough to verify its details, and that, in fact, some of these details have never been clearly established though *Megarhyssa* is common in many localities. Does not this indicate that we have been neglecting the ecological for the systematic aspect of entomology?

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A CONDENSATION PUMP

Condensation pumps of the following particular type have been used in our work for a number of years and the design seems to possess sufficient advantages over others in both simplicity and compactness to merit this note.

The method of operation of this pump, in which the exhausting process is accomplished in two stages, will be made clear by reference to the cut. In the initial or "rough" stage, *A*, the mercury vapor is ejected at relatively high pressure from a small nozzle into a long narrow throat. The nozzle opening is made sufficiently small that the pressure of the vapor

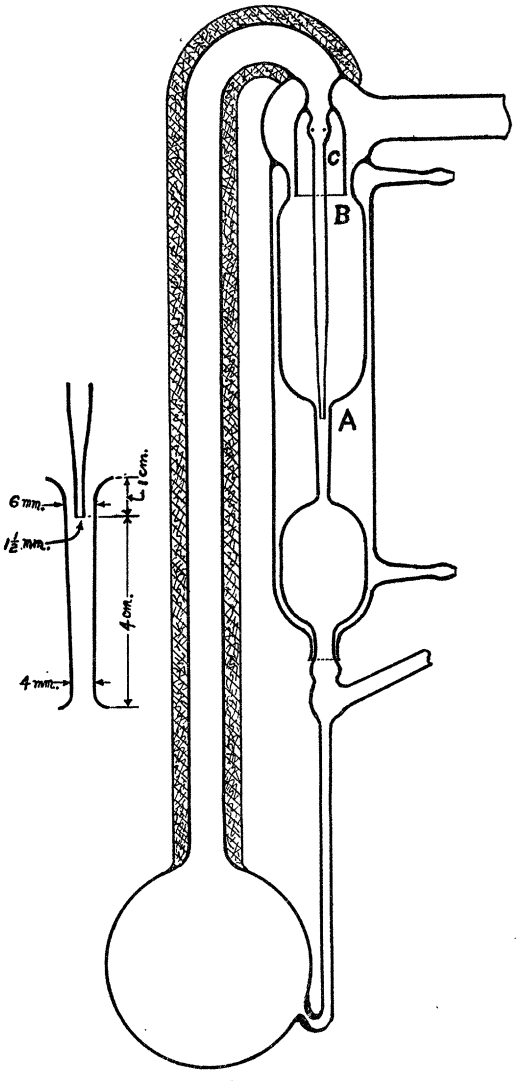

Fig. 1

in the boiler, instead of being practically limited to 2 or 3 millimeters, as in the case of the ordinary vapor pump, may attain a value of 75 millimeters or more depending upon the heating. The efficacy of this arrangement was first pointed out by Stimpson.[1] The evac-

[1] *Washington Acad. Sci. J.*, 7, pp. 477–482, Sept. 19, 1917.