

## NOTES ON TACHINA RUSTICA, A PARASITIC FLY OF THE SILKWORM

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FOUR FIGURES

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Since the appearance of my<sup>1</sup> and Toyama's reports<sup>2</sup> on *Tachina rustica*, a parasitic fly of the silkworm, no additional account has been given by any competent zoologist. Shortly before I put on record briefly some results of my observation.<sup>3</sup> In the present paper I would deal with the same subject in some detail.

The tachina fly abounds in Korea, appearing in the breeding house of the silkworm and making terrible havocs. In Japan proper, however, it never comes into the house, though it occurs in the mulberry farm, laying eggs in the wild silkworm, *Theophila mandarina*.

The flies are of varying sizes even in the same sex, but the females are generally a little larger than the males. The former measure 12-13 mm. in the length of body and on an average 24 mm. in wing-expansion, while the latter 6-13 mm. and 11-14 mm. respectively. Such variations in size appear to be due to the quantity of nourishing substances taken by the maggot during their parasitic life. In this country, the flies frequent the mulberry farm from May to November, during which period they pass in all probability 6 or 7 generations. The span of one generation is 18-21 days in the summer.

<sup>1</sup> Annot. Zool. Jap. 3, pt. 1, 1899.

<sup>2</sup> Bull. Coll. Agric. Tokyo Imp. Univ. No. 7. 2, 1906.

<sup>3</sup> Dōbutsugaku Zasshi (Monthly Mag. Zool. Tokyo) 15, No. 413, 1923.

On examining the wild silkworm in the mulberry farm, we can oftentimes discover the eggs of the fly laid on its body. After hatching, the tiny maggot penetrates into the host, gradually weakening the host and finally killing it a little before, or after its pupation.

In order to see whether the fly deposits eggs on the body of our domestic silkworms and how the maggot becomes to infest, I put a number of our domestic silkworms upon the twigs of standing mulberry trees. So far as my observations go, the fly comes near the silkworm and lays eggs in the same way as is the case with the wild silkworm. The eggs laid on a single worm vary in number, counting 10-20 or more. Each egg is marked on the upper surface with a small space bordered by a circular band. At the time of hatching the circular space ruptures along the band, so as to present a valve-like appearance. In this respect the Japanese is apparently different from the Siamese fly, which possesses two openings on the egg, each on its upper, or lower surface. The maggot when hatched out finds its way into the silkworm through the body wall.

The mode of intrusion of the maggot into the body of the silkworm is not so simple, as demonstrated by L. O. Howard<sup>4</sup> in certain parasitic maggots. According to the author, a maggot, when reached beneath the skin of the host body, forms a so-called tracheal funnel, which is called by W. Baer<sup>5</sup> "Trichter" or "Sack" and by Frenchmen "siphon respiratoire conique". In the case of *T. rustica*, however, the newly hatched maggot, without directly entering the body cavity, makes its appearance into an elongated chamber, formed within the extremely thick cuticular layer. This I would name "cuticular chamber". This chamber (Figs. 1,2) appears to be nothing else than the cavity caused by the splitting off of the cuticular layer. It gradually elongates with the growth of the maggot (Fig. 2, ma.), and always opens out by an aperture (Figs. 1, 2, 0), which lies just beneath the empty egg-shell of the fly. When viewed from the exterior, the aperture is surrounded by irregular brownish black patches.

<sup>4</sup> Bull. U. S. Dept. Agric. Bur. Entm. Washington, No. 91, 1911,

<sup>5</sup> Die Tachinen. 1921.

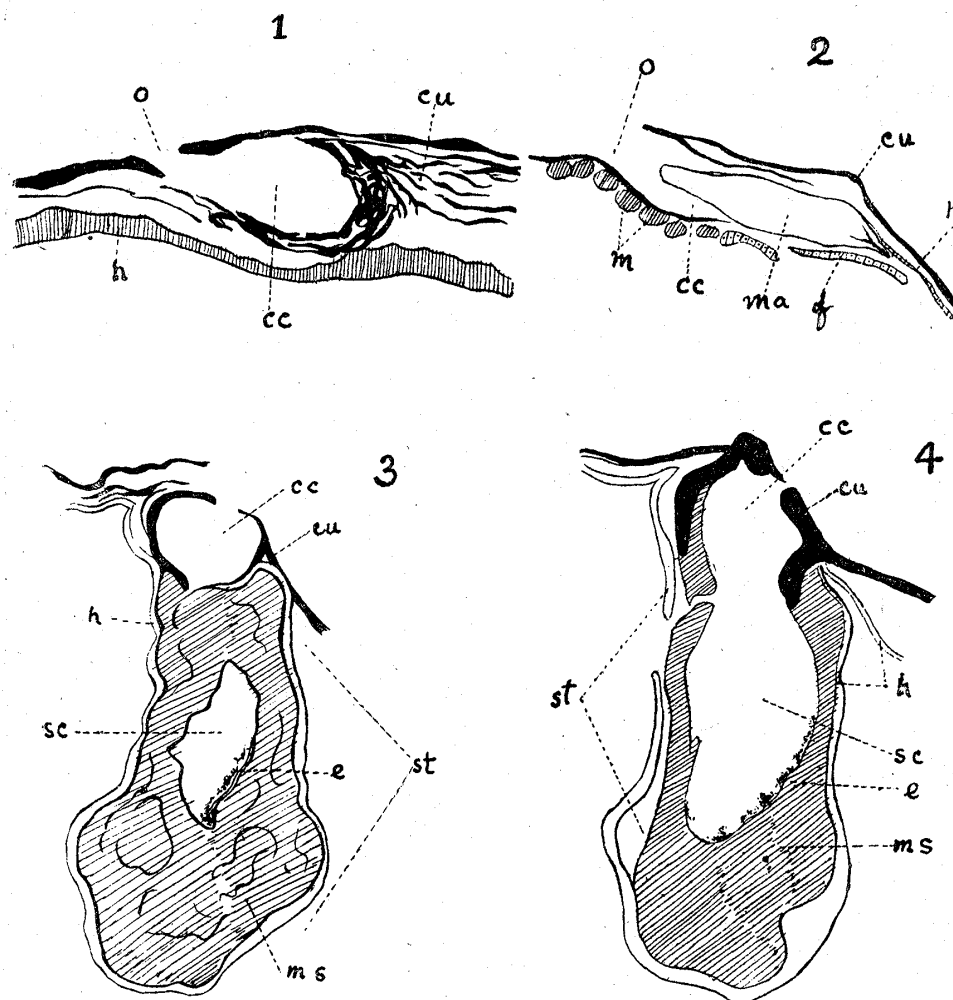


Fig. 1 Section of a part of body through the cuticular chamber.

Fig. 2 Same.

Fig. 3 Same, showing the chamber which comes in close contact with the stomach.

Fig. 4 Same, showing the communication of chamber with the stomach.  
 cc cuticular chamber, cu cuticula, e degenerating epithelium, f fat-tissue, h hypodermis, m muscle, ma maggot, ms muscle of stomach, sc stomach cavity, st stomach.

When the wall of the cuticular chamber assumes a brownish or brownish black color, a lower portion of it gradually disappears and is substituted by the underlying fat-tissue and muscles (Fig. 2). However, these tissues also become atrophied, and the cuticular

chamber comes to lie close to the stomach (Fig. 3) and becomes finally to communicate with it (Fig. 4). At this time the hypodermis lying in close contact with the cuticular wall seems to be spread in part over the stomach. Simultaneously some remarkable changes are inaugurated in the stomach. In spite of the degeneration of its epithelial layer, the general wall greatly thickens by the development of muscles, but the stomach retains its cavity wide enough to receive the parasitic maggot.

When the maggot attains maturity in the stomach of the silkworm, it passes out of the host by rupturing the stomach wall and the body wall, which are in the course of degeneration. It is highly probable that the maggot, without always remaining in the stomach, makes frequently its reappearance into the cuticular chamber which opens out on the surface of the body.

The mature maggot which emerges out of the host goes into the ground to pupate. Frequently to be met with are one or two maggots which come out through the cocoon of the silkworm, at one or two poles. The duration of the pupal stage is very variable. In the summer the fly emerges on the seventh to the tenth day after pupation.