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## ON A KNOWLEDGE OF THE METAMORPHOSIS OF THE LAUXANINAE

by Professor Dr. J. C. H. Meijere

Little is known concerning the metamorphosis of the diptera family Lauxaninae (= Sapromyzinae), despite the fact that the imagines are very widespread and exist in many forms, some of which are very unpleasant. That little which is known was recently compiled by Hendel in issue number 68 of Genera Insectorum von Wytsman, 1908, pages 5-8. It was limited to reports by Bouché (Sapromyza obsoleta Meig. = obsoletoides Schnable, Larvae under rotted tree leaves), Perris (Sapromyza quadripunctata L., Larvae bred from rotted straw of thatched roofs), Winnertz (Lauxania aenea, Larvae in buds of viola), Marchal (Lauxania aenea, Larvae mining in root wood and in the stalk base of clover and therefore destructive).

In his well known work on diptera larvea, Brauer took the description of Perris as an example for the Sapromyzine. After it there is also the metamorphosis of Sapromyza (Toxoneura) fasciata Macq. and of S. blepharipteroides Duf. resp. is described by Perris (Ann. Soc. Ent. France, No 4, Vol X, page 337) and Léon Durour (Ann. Sc. natur., Vol XII, page 42). The first type is identical to Palloptera pulchella Rossi, however, and therefore belongs with the Lonchaeinen, while the second type according to the description and pictures is apparently a Pegomyia. Stein is inclined to consider it as synonymous with P. Winthemi Meig. (= latitarsis Zett.), which also seems most probable to me. I myself have drawn this type and also Peg. tenera Zett. and pallida Stein from fungus in the Netherlands and consider Durour's findings -- also as regards the larvae -- to be completely appropriate so that we need no longer concern ourselves with them here.

As in many cases, it also applies here that one can find the animals with no trouble if one knows how to seek them.

According to my experience, the larvae of several types live in rotted leaves lying on the ground. If one looks in a garden in winter under poplars, willows, prunus, etc., one finds between the lower moist leaves somewhat thick, whitish, fly maggots, somewhat tapered at both ends. Usually they are found inside these leaves, between the upper and lower skin of a leaf, so that the leaf appears swelled at the point where the larva is located. They are, then, mining larvae of rotted leaves. I have found several types at such places in Hilversum and Amsterdam and bred them, namely Sapromyza subfasciata Zett., notata Fall., plumicornis Fall., praeusta Fall., obsoleta Fall., and Lauxania aenea F. All of these types spend the winter as larvae in leaves. Generally, the larvae of the various types are very similar. They are rather stubby for the larvae of a cyclorhaph dipteran, and they differ from the type of Muscine-larvae by their less cylindrical body shape, being somewhat flattened on their under side, by the tapered front end which therefore does not differ from the pointed rear end (not the blunt end as, for instance, in the Calliphora), further by the non-protruding papillae carriers, and by the skin which is mostly covered with short teeth. They are 4-5 mm in length, a little more than 1 mm wide, the surface is slightly shiny, the color is white with the brown or the black of the intestinal canal showing through the skin. The forward segments have numerous little short teeth arranged in rows on the dorsal side. The rear segments have these blunt teeth in increasingly less uniform arrangement, and here they become larger and sharper. There are 11 bands of warts on the flat ventral side at the front edges of the segments. The front segments are the most uniformly formed. The warts are all small, and towards the rear they become larger and less orderly arranged in rows. Segment separation is quite distinct, the side edge is not straight since the warts carrying the papillae protrude somewhat. On most segments they are quite short, but on the tenth (Figure 1) they protrude more and on the eleventh (last) they form two pairs or large knobs on each side, while two short knobs are present a little in front of and to the outside of the rear stigma. The relative size of these knobs varies from one type to the other.

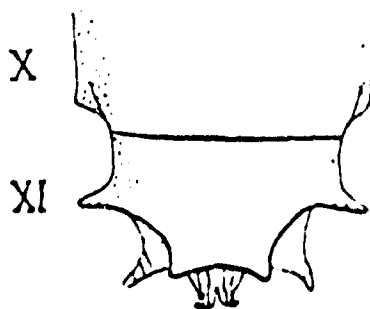


Fig. 1.

Figure 1.

The antennae are small, the final member being somewhat longer than it is wide. The stomodeal structure is of normal shape, the mouth hooks are rather thick and blunt, there being no teeth on the lower side. In front of the mouth hooks there are several rows of large hook-shaped little teeth with curved, brown, cleft point. The front stigmas (Figure 2) have the usual segmented construction, the buds being 8-9 in number and moderately long. The rear stigmas are relatively small, they stand close together, each on a short, blunt cylindrical knob, and they show three relatively small oval buds. Short small hair surround the stigma on the edge of the knob.

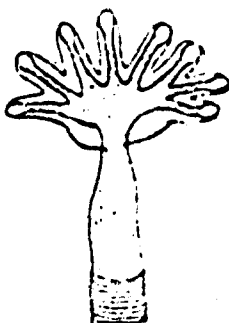


Fig. 2.

Figure 2.

At the start of the Chylus stomach there are four short cylindrical blind sacks. The two front ones are sometimes extended by the four Malpighian tubes and, because of numerous light-refracting grains, are chalk-white in color. A double-leaved organ can be extended from the anal orifice, as in the case of other diptera larvae such as Lonchoptera. Overall, it is very similar to my descriptions of the latter family (de Meijere, "On the Larvae of Lonchoptera," Zoological Yearbook Vol XIV, 1900, page 95, Table 6, Figures 15 and 21), whereby it is noteworthy that both families lead a similar life in the larva stage, for the Lonchoptera larvae also live between rotted leaves, although they do not mine in them. The fat body is white.

After they have spent the winter in leaves, the flies crawl into the earth for pupation. The puparium is also quite thick and is characterized by a dull, sometimes somewhat glistening yellowish-brown color. They are therefore very different from the slender, very shiny red-brown cocoons on Lonchaea, just as in the case of the larvae, for those of the Lonchaea types are long, cylindrical and smooth. The puparium of the Sapromyza is oval in shape, somewhat tapered to the front and rear, and also flattened at the front end. At the rear edge there are several more or less developed knobs. The same are very clearly

seen (four large and two small) on the Lauxania; in the case of Sapromyza plumicornis, there are only two very slight knobs.

The puparium of Sapromyza pallidiventris Fall. I found under rotted tree bark. It is also nearly dull yellowish-brown. At the rear end there are only very slight traces of knobs.

The larve of Sapromyza quadripunctata pictured by Ferris (Ann. Soc. Entom. France, 2 October 1852, page 594) is of a different shape than those which I found in leaves. It is longer and more tapered toward the rear. The knobs which Ferris describes on the tenth and eleventh segments are probably the same as the six which I described on the eleventh segment. The last pair he draws as having three members. In actuality, it is this knob, also in other types such as the first side pair, with one or two slight constrictions, causing a segmented appearance. Although Ferris distributes these knobs over two different segments, I must confess that the last (11th) segment given here is relatively long, compared to other cyclorhph larvae, and shows a sectional division. However, the rear stigmas would then be on the rear part; behind this there would then be another -- in this case 13th -- anal segment which would be very reduced.

As regards Marchal's report ("Note sur la biologie de Lauxania aenea Fall., Diptère nuisible au Trèfle," Bull. Soc. Ent. France, 1897, page 216) that larvae of Lauxania aenea mine in root tops and stem bases of clover, I cannot avoid entertaining some doubt as to whether the flies bred by Marchal and determined by Mik really belong to the mining larvae or perhaps resulted from the breeding in rotted leaves. Unfortunately, sufficient details concerning the characteristics of these larvae are not given, and new observations appear to me to be desired. Also unclear and requiring additional investigation is the report of Winnertz to the effect that the same larvae live in the swollen buds of viola, for I personally bred this type from rotted leaves.