A Second Mycetophila with Dung-bearing Larva (Diptera; Mycetophilidae).

By Frederick Knab and R. H. Van Zwaluwenburg,
Bureau of Entomology.

(Plate VIII)

From the majority of published statements one gains the impression that the larvæ of the numerous species of the genus *Mycetophila* are very much alike in appearance and habits. They are described as elongate white fleshy larvæ with a darker chitinous head. They are stated to occur more or less gregariously in fungi, either burrowing in their interior or living between the lamellæ. Larvæ of this genus living singly and exposed, upon the foliage of higher plants, appear to have been recorded but once.* We are able to make known a second species of such habits, discovered in Porto Rico by the junior author. We initiate the subject with a brief synopsis of the principal biological data brought out by Doctor Holmgren in the paper just mentioned.

These highly remarkable larvæ were discovered by the third Nordenskioeld expedition in the rain-forest region of Peru and Bolivia. The larvæ occurred singly upon the leaves of bamboo (*Chusquea* spp.) and carried upon their backs a black shell; they so closely simulated in appearance a small gastropod, such as *Ancylus*, that at first they were mistaken for such. The larva is short and stout and the protecting shell carried upon its dorsum is constructed of its own excrement and shows a series of rings or creases indicating the successively added layers of material (Plate VIII, fig. 4). That the shell has a protective function is shown by the fact that when the larva is touched at one side it draws the shell in that direction. The larvæ occurred but sparingly and crept about slowly on the bamboo leaves in search of food. Forward movement was accomplished by successive muscular contractions along the ventral surface in the manner of a gastropod; but the

* Holmgren, Nils, Monographische Bearbeitung einer schalentragenden Mycetophilidenlarve (*Mycetophila ancyliformans* n. sp.). Zeitschr. f. wissensch, Zool., vol. 88 pp. 1-77, pls. 1-5 (1907).

larva can only progress upon a moist surface and this is provided by the secretion from the enormously developed salivary glands. A shining silky trail remains after the larva has moved on and the secretion dried. The larva feeds upon fungi occurring upon the surface of the bamboo leaves, mowing these off with its peculiar serrate mandibles (Plate VIII, fig. 5). Holmgren had great difficulty in rearing the larvæ, partly from inability to maintain suitable conditions, but especially from the frequent infestation of the larvæ with small parasitic dipterous larvæ. Finally Holmgren succeeded in rearing a single imago and this proved to belong to the genus *Mycetophila* and was described as a new species under the name *M. ancyliformans*. The larva when about to pupate threw off its shell and constructed a cocoon of salivary threads, consisting of an outer layer of large meshes and an inner closely woven one which rather closely covered the pupa within.

The larvæ found by the junior author in Porto Rico were very similar to those discovered by Holmgren; they were dirty white and, like them, carried a black shell formed of their own excrement. The larvæ were first found in October, 1916, near the town of Aibonito, on the edge of the woods and at an altitude of about 2000 feet. They occurred upon the leaves of Guamá (*Inga laurina*) and extensive search yielded only five of them, the largest one about four millimeters in length. A further careful search in the same locality recently (June, 1917) was unsuccessful. Very recently (July, 1917) larvæ of the same kind were found in considerable numbers on the under surfaces of leaves of "poma rosa" (*Eugenia jambosa* L.) in a narrow valley near Mayaguez. A single male was reared from the larvæ found at Aibonito, and another male from the larvæ found near Mayaguez; through these two specimens the specific unity of all the larvæ is established.

The dung-covering of the larva consists of a dull blackish, rather rough mass of homogeneous material. Its shape differs more or less in our specimens from that described and figured

by Holmgren for his species. The resemblance to a snail-shell is usually less complete, although the mass is obliquely conical, the apex close to one end, and concentric creases are present. Some of our specimens are much more flattened and rise but gradually toward the apex, while the creases are less numerous. Others of our specimens (compare, Plate VIII, our figs. 2 and 3 with fig. 4 from Holmgren) do not slope regularly from the apex to the sides; instead there is a central strongly conical portion, separated by a deep crease from an outer flattened portion. In short, while the principle of construction is the same, there is considerable variation culminating in specimens closely approaching Holmgren's in shape

The larva before pupation spun a loose-meshed cocoon beneath the black dung-cap, which ultimately rested on top of the cocoon. As in the species described by Holmgren, the cocoon consists of wide, irregular meshes of white glistening threads secreted from the salivary glands. There is an outer network of a few very coarse threads and these are connected and here and there drawn toward each other by finer threads. Inside of this outer very open meshwork is a cocoon of smaller meshes and finer threads, a considerable space intervening between the two, but occasional threads connecting them. The meshes of this inner cocoon are still very open and allow the pupa within to be plainly seen. This inner cocoon again consists of coarser and finer threads, the former approximately corresponding to the finer threads of the outer cocoon. The coarser threads for the most part run around the cocoon transversely at rather regular intervals, while the finer threads run mostly lengthwise and bind together the transverse threads. The entire structure is fastened to the leaf-surface. On top of the cocoon, as already mentioned, usually rests the shell or dung-cover of the larva (Plate VIII, figs. 2, 3); in other cocoons the dung-cover has been cast off. The pupal period lasts four days. The description of the imago follows.

Mycetophila merdigera, n. sp. (Pl. VIII, fig. 1).

♂. Pale ocher-yellow, the dorsum of the abdomen with the apices of the segments extensively marked with brown.

Head prominent, yellow, the frons evenly convex, nearly as long as broad, clothed rather densely with short, coarse, pale shining hairs; ocelli two, large and distinct, close to ocular margin. Eyes very shortly hairy. Antennæ slightly longer than the head and thorax together, yellow at the base, shading to black beyond the fifth joint; fifth joint about twice as long as wide.

Mesonotum moderately convex, not prominent anteriorly, ocher-yellow, opaque, slightly pollinose, clothed with shining rather short hairs. Scutellum concolorous, with four long marginal bristles, the middle pair slightly longer than the outer ones. Postnotum brownish. Pleuræ pale blotched with brown.

Abdomen dorsally dull ocher yellow and clothed with coarse and rather sparse black hairs, the segments distally marked with blackish, on the second segment all but a median triangle the apex of which reaches its posterior margin; on the succeeding segments the dark color is less extensive, becoming indefinite on the distal ones. Venter wholly yellow.

Coxæ very pale, all three pairs with a few coarse dark bristles distally. Femora pale yellow, the hind pair brown at extreme apex and with a few long bristles. Tibiæ pale at base, tinged with green and becoming darker toward apices; middle and hind pairs with three rows of long black bristles on extensor surfaces; middle pair with three bristles on flexor surface, the proximal one of which is much shorter than the others; front tibiæ shorter than first tarsal joint (20:24), the spur slightly shorter than the tibia; hind tibiæ apically with a comb of yellow bristles on inner side, the longest spur nearly equal to first tarsal joint. Tarsi green, the crowded black setulæ causing them to appear blackish toward apices; hind tarsi with the first joint distinctly shorter than the succeeding ones together (24:31).

Wing uniformly tinged with greyish yellow, unspotted; veins strong, brownish yellow; petiole of medial fork very short, not quite equal to the R-M cross-vein; base of cubital fork about as near wing-base as the latter. Halteres pale.

Length: Body about 3 mm., wing 2.5 mm.

Porto Rico: Aibonito, 26 October, 1916, one male reared from larva found on *Inga laurina* (R. H. Van Zwaluwenburg); Mayaguez, 9 July, 1917, one male reared from larva from *Eugenia jambosa* L. (Van Zwaluwenburg).

Type: Cat. No. 21535, United States National Museum.

This species is closely related to *Mycetophila ancyliformans* Holmgren, and also to *M. insipiens* Williston (Trans. Ent. Soc. London, 1896, p. 264) from the island of St. Vincent.

The latter will probably prove to have similar larval habits. *Mycetophila merdigera,* according to the table of Johannsen (Fungus gnats of No. Amer., Part IV, 1912, p. 84) falls together with *M. exstincta* Loew from the eastern United States; perhaps this last species also will prove to have a similar life-history and our collectors should watch for these very remarkable larvæ.

In conclusion attention must be called to the existence of dung-bearing larvæ in the closely related genus *Epicypta.* Such larvæ were recorded by Bremi* and by Perris** as early as 1846 and 1847. The latter gives a detailed and very interesting account of the early stages of *Epicypta scatophora* (Perris); Osten Sacken is of the opinion that Bremi had the same species under observation. These larvæ feed upon fungi occurring upon dead wood and cover themselves much more completely with their own dung. They finally pupate within an urn-shaped cocoon of the same material.

EXPLANATION OF PLATE VIII.

Mycetophila merdigera Knab and Van Zwal., n. sp.
(Photographs by J. H. Paine.)

1. Adult male. 2. Cocoon, top view. 3. Cocoon, side view.

Mycetophila ancyliformans Holmgr.
(After Holmgren.)

4. Larva, lateral view. 5. Mandible of larva. 6. Maxilla of larva.

Beetle, Hippomelas sphenicus, Prey of Wasp (Col.).

While collecting on the desert near Barstow about May 15, 1917, a large black-bodied, yellow-winged wasp was taken in my net. The wasp was found to be carrying a small specimen of *Hippomelas sphenicus* LeConte. This was remarkable, for *H. sphenicus* has never been reported from California. The wasp may have carried it from Arizona, a distance of about 140 miles, although that point is debatable. The size of the beetle very closely approximated that of the wasp, which was a very large specimen. It is a well-known fact that wasps collect and store their nests with various Coleoptera; specimens of *Hippomelas californicus* Horn in my collection, taken by Dr. F. E. Blaisdell in 1885, were found in a wasps' nest at Poway, San Diego County.—RICHARD T. GARNETT, Oakland, California.

*Isis von Oken, vol. 39, 1846, p. 169.

**Notes pour servir a l'histoire des métamorphoses de diverses espèces de Diptères. 1. Notice sur une larve de *Mycetophila* qui se couvre de ses excréments. Ann. Soc. Ent. France, 2 Ser., vol. 7, pp. 51-61, pl. 3, no. 1, figs. 1-13 (1847).