

fusion of two or more or the suppression of one or more elements. Therefore, in order to correctly homologize and generalize, one must have a comprehensive knowledge of the manifestation of the primary elements as represented by characteristic examples of all stages in all orders."

### CERATOPOGONINÆ SUCKING THE BLOOD OF CATERpillARS

BY FREDERICK KNAB, *Bureau of Entomology.*

Under date of December 29, 1913, my friend Mr. C. A. Mosier sent me from Florida some small Diptera with the information that they were sucking the blood of a sphingid caterpillar which was feeding on the foliage of the papaya. The flies were busily sucking, while the caterpillar thrashed about and in that way succeeded in dislodging some of its enemies. The caterpillar was that of the well-known papaya sphinx, *Erinnyis ello* L. The flies, strangely enough, were of two widely different species, one of them a biting chironomid of the genus *Forcipomyia*, the other a lauxaniid of the genus *Pachycerina*. The *Forcipomyia*, of which fourteen females were sent, proves to be closely related to the Antillean *F. propinquus* Will., but distinct and undescribed, and I propose to call it *Forcipomyia erucicida*. Specimens collected by Mrs. A. T. Slosson at Lake Worth and Biscayne Bay, Florida, stood in the national collection labeled "*Culicoides eriophorus* Will." and included with them were specimens of *Forcipomyia propinquus* from Cuba. I find it necessary to mention these erroneous determinations, as they have found their way into the literature of the present subject.<sup>1</sup>

Prof. C. F. Baker records a biting midge attacking the caterpillars of the geometrid moth *Melanchroia geometroides* (Walker) in Cuba, swarming about them and killing large numbers of them.<sup>2</sup> The midges were determined by the late D. W. Coquillett as "*Ceratopogon eriophorus* Will.," but it would seem that the specimens were not preserved. As there are no true *eriophorus* in the collection, and the Cuban specimens (collected by Mr. E. A.

<sup>1</sup> In this connection it should be noted that Williston's description of *F. eriophorus* (Trans. Ent. Soc. Lond., 1896, p. 279) is of the female, and not of the male as there stated. The figures of the tarsus and wing of *F. propinquus* (l. c., pl. 9, figs. 41, 41a) also are of the female, instead of the male.

<sup>2</sup> Remarkable habits of an important predaceous fly (*Ceratopogon eriophorus* Will.). U. S. Dept. Agric., Bur. Ent., Bull. 67, pp. 117-118, 1907.

Schwarz at Cayamas) so labeled are *Forcipomyia propinquus*, it is safe to conclude that this last mentioned was the species observed by Professor Baker.

Doctor Lutz records two observations of *Forcipomyia* attacking caterpillars. One was by Townsend, who took specimens sucking a sphingid larva in Peru, the other by Barbiellini, who made a similar observation at São Paulo, Brazil.<sup>3</sup>

A further record of *Forcipomyia* attacking caterpillars comes from Prof. F. W. Ulrich and is published here for the first time. The observation was made in October, 1911, during Professor Ulrich's stay on the Isthmus of Tehuantepec. The species observed is also closely related to *F. propinquus* and I propose to call it *Forcipomyia crudelis*.

These records of closely related species of *Forcipomyia* attacking caterpillars would lead one to suppose that these flies feed exclusively on lepidopterous larvæ, and the writer was inclined to adopt this view. However, among a number of specimens of *Forcipomyia propinquus*, taken by Mr. A. Busck in the island of Santo Domingo, was a female bearing a label indicating that it had inflicted a painful bite on the collector. Also, the writer, while at Miami, Florida, took two females of *F. erucicida*, along with other Ceratopogoninæ, on the flowers of an avocado (*Persea* sp.). Thus there is a wide range of feeding habits indicated, which does not, however, preclude decided food predilections on the part of these insects.

It may be further pointed out that Ceratopogoninæ have been observed attacking adult insects. F. H. Gravely, in India, found a specimen of *Culicoides* attacking an *Anopheles* mosquito, the former having its proboscis so firmly fastened in the abdomen of the mosquito that it remained attached when the catch was placed in alcohol.<sup>4</sup> It must be pointed out that some species of *Culicoides* are very troublesome blood-suckers of man and of other warm-blooded animals, so that Gravely was well justified in thinking that his *Culicoides* probably normally "sucks mammalian blood, and was taking it second-hand from the mosquito." But more recent observations, made by Major N. P. O'Gorman Lalor in Lower Burma, show that these attacks of Ceratopogoninæ upon mosquitoes are far too frequent to be accounted for in this way. In these observations three species of *Anopheles* were found to be attacked. Caught specimens of *Anopheles fuliginosus* "have been found infested to the extent of 6 per cent, and this probably implies a much wider infestation of that species in nature."<sup>5</sup>

<sup>3</sup> Mem. Inst. Oswaldo Cruz, iv, p. 24, 1912.

<sup>4</sup> Mosquito sucked by a midge. Records Indian Mus., iv, p. 45, 1911.

<sup>5</sup> Note on a parasitic fly which infests malaria carrying *Anopheles* in Lower Burma. Paludism (Sinla), no. 5, pp. 42-43, 1912.

Recently I have had the privilege of examining specimens of a species of *Ceratopogon* (restricted sense) captured by Mr. I. P. Kryger in Denmark while fastened to the wings of a geometrid moth (*Cidaria didymata* L.). So tightly had the small flies inserted their beaks into the wing-veins of the moth that they remained in position long after they had been introduced into the killing-bottle and death had followed.<sup>6</sup> Of course the moth must have been a recently emerged one, in which the blood was still present in the wing-veins. The midges belong in the neighborhood of *Ceratopogon murinus* Winnertz, but I have been unable to place them satisfactorily and they are probably an undescribed species.

As to the *Pachycerina* captured by Mr. Mosier along with the *Forcipomyias* on the caterpillar of the papaya sphinx, nothing appears to be known of their habits. Probably they were attracted by the blood exuding from the injured caterpillar, and were not participants in the primary attack of the *Forcipomyias*. The species was represented in the national collection by a single specimen taken by Mrs. Slosson at Biscayne Bay, Florida, and determined by D. W. Coquillett as *Pachycerina flavida* Wiedemann.

#### **Forcipomyia erucicida** n. sp.

*Female*: Occiput dull brown, clothed with coarse yellow hairs. Antennæ with the shaft yellowish, shading to brownish distally, the proximal joints subglobose and subovate, the last five lengthened, subcylindrical. Palpi black, the antepenultimate segment thickened, the penultimate nearly as long, slender, subcylindrical, the last joint short. Thorax and scutellum brownish black, a pale spot on the humerus, clothed with coarse, shining yellow hair. Postnotum black. Abdomen black, clothed with blackish hairs with yellow luster. Wings smoky, clothed with coarse black hairs, a patch of yellow hairs at base of costa; subcostal cell thickened and strongly pigmented, its distal end slightly beyond the middle of the wing. Halteres with white knob. Legs yellowish, clothed with coarse, irregular yellow hairs, a broad blackish ring at the ends of the middle and hind femora, a narrower blackish ring close to base of the corresponding tibiæ; tarsi tinged with brown, slender, the first joint of the hind pair about half the length of the second, last joint slightly thickened, subcylindrical. Claws long and slender; empodium fleshy, ciliate. Length: Body about 2 mm., wing 2 mm.

*Male*: Antennæ plumose, luteous brown, the tori very large, the proximal joints of the shaft subglobose. Palpi considerably longer than in the female. Abdomen slender, elongate, black, with broad pale segmental rings on the proximal half; lateral ciliation of long and coarse brown hair

<sup>6</sup> En Myg, der angriber en Sommerfugl. Ent. Meddel., pp. 83-88, 1914.

with yellow luster. Wings narrower than in the female. Length: Body about 3 mm., wing 1.8 mm.

Buena Vista, Florida, December 29, 1913 (C. A. Mosier); Miami, Florida, two females on flowers of avocado (*Persea* sp.), December 20, 1912, two males, November 22 and 23, 1912 (F. Knab); Little River, Florida, two females November 30, 1912 (Knab); Biscayne Bay and Lake Worth, Florida (Mrs. A. T. Slosson).

*Type:* Cat. No. 18419, U. S. N. M.

Closely resembles *Forcipomyia propinquus* Williston, but differs principally in the shape of the palpi and hind tarsi, both being more slender than in Williston's species.

#### ***Forcipomyia crudelis* n. sp.**

*Female:* Occiput dull brown, clothed with coarse yellow hair. Antennæ with the proximal portion of the shaft yellowish, of subglobose and subovate joints, the last five joints blackish and clothed with white pubescence, elongate and subcylindrical. Palpi black, the antepenultimate joint greatly thickened. Thorax and scutellum brownish black, a small yellowish humeral spot, vestiture of coarse yellow hair. Abdomen black, clothed dorsally with dark hair, at the sides with tufts of shining yellow hair at the bases of the segments. Wings smoky, clothed with coarse black hair; costa black to end of first vein and on this portion bearing long and dense black hair, a patch of yellow hair at its base; submarginal cell indistinct, ending slightly beyond middle of wing. Halteres with brownish stem and whitish knob. Legs yellow, clothed with coarse, irregular yellow hairs; an ill-defined brown ring subapically on middle and hind femora; entire fore tarsi infuscated, middle and hind tarsi with the last three joints dark; first joint of hind tarsi slightly less than half the length of the second, the last joint nearly as long as the fourth. Claws long and slender; empodium fleshy, ciliate. Length: Body about 1.5 mm., wing 1.7 mm.

Plantation "La Oaxaqueña," near Santa Lucrecia, Mexico, October, 1911. (F. W. Ulrich.)

*Type:* Cat. No. 18420, U. S. N. M.

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### NOTES ON SOME FOREST COLEOPHORA WITH DESCRIPTIONS OF TWO NEW SPECIES.<sup>1</sup>

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The following species of *Coleophora* were reared by Mr. A. Busek and the writer during the past summer, at the Falls Church, Virginia, station of the Forest Insect Investigations Division of

<sup>1</sup> Contribution from the Division of Forest Insect Investigations, Bureau of Entomology.