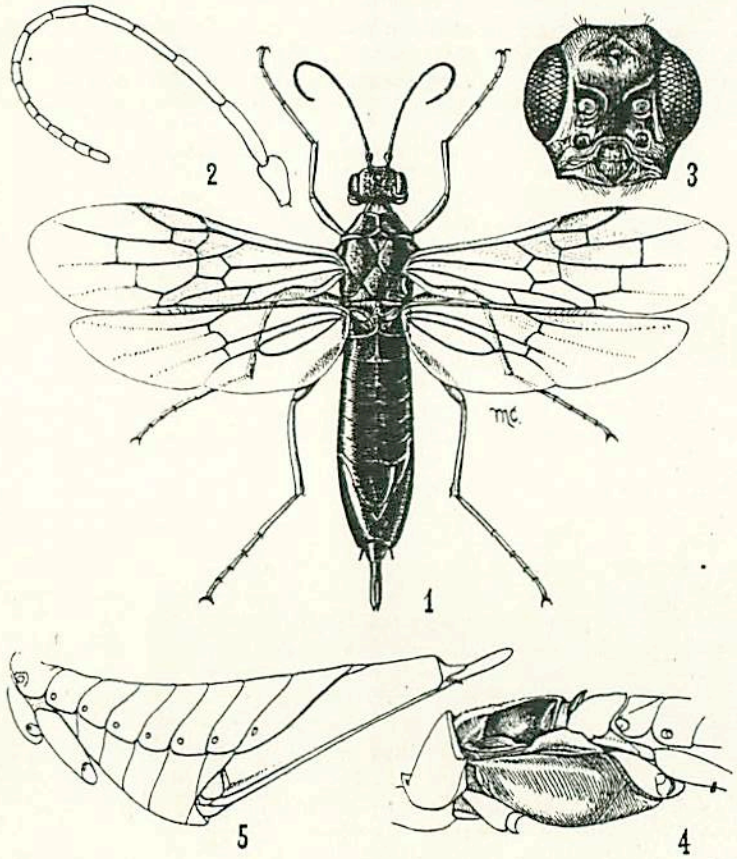

EXPLANATION OF PLATE.

Syntexis libocedrii Rohwer. 1, Adult female; 2, antenna of female; 3, front view of head; 4, lateral view of thorax; 5, lateral view of abdomen. (Drawings by Miss Mary Carmody.)

by a very shallow impression; ocellar basin triangular, open below; facial quadrangle wider than high; pronotum subopaque with sparse tubercles; mesonotum similarly scupltured; mesepisternum and sternum shining, under high magnification, very finely reticulate; tibiæ and tarsi with weak short spines; abdomen shining; sheath nearly parallel-sided, obtusely rounded apically. Black; mandibles and palpi piceous; inner orbits below antennæ, posterior orbits behind the eye, posterior margin of the pronotum laterally and tergites 2 to 8 on lateral posterior margin, *greenish white;* legs beyond the coxæ rufo-testaceous; wings hyaline, slightly milky; venation pale brown anteriorly, pallid posteriorly.

Rose Camp, California. Described from two females recorded under Bureau of Entomology, No. Hopk. U. S. 4996*a* which refers to a note stating that these specimens were reared from larvæ and pupæ collected in the cells near the outer surface of the wood of a large incense cedar (*Libocedrus decurrens* Torr.). Material collected August 8, 1913, and reared June 22, 1914, by H. E. Burke.

Type: Cat. No. 19162, U. S. N. M.

Two poorly preserved larvæ are available for study but they are not in good enough condition to satisfactorily describe. However, as they appear to lack the cerci which occur on the apical sternite below the anal orifice, and have the antennæ more like the Xiphydriidæ it is probable that they are more like the larvæ of the Xiphydriidæ than the Cephidæ.

COMMENSALISM IN DESMOMETOPA.

(*Diptera; Agromyzidæ.*)

BY FREDERICK KNAB, *Bureau of Entomology.*

The small flies of the genus *Desmometopa* have been repeatedly observed under circumstances which indicate a remarkable specialization in habits. There are now on record a series of observations, made independently in widely separated parts of the globe, which all show that these flies feed upon the juices of freshly killed insects; however, unable to themselves kill their prey, they depend upon various rapacious arthropods, with whom they appear to live in more or less close association.

The Hungarian naturalist Ludwig Biró is responsible for the first and at the same time most remarkable observation in this connection. He observed a species, *Desmometopa minutissima,*[1]

[1] Described as an *Agromyza* by Van der Wulp and so recorded by Banks (Entom. News, xxii, 196; 1911). Mik, in the article quoted in the following, has referred the species to its proper genus.

in New Guinea resting in pairs on the back of an asilid fly, *Ommatius minor* Dol. "They sat on the back of the large fly, between the wings, back to back, so that one of them faced toward the head of the robber-fly and the other toward the abdomen." That their occurrence in this manner was not accidental, Biró determined by further observations. In eight additional cases he found the small flies, as before in pairs and back to back, upon the thorax of the asilid.[1,2] This strange association of these minute flies with the large robber-fly appeared quite mysterious without further knowledge of the habits of the genus. Shortly afterward Joseph Mik, in Austria, found a little swarm of *Desmometopa m-atrum* upon the body of a freshly killed worker-bee dangling on a spider-thread. The bee apparently had been just killed by a spider and the little flies, thirteen in number, were eagerly probing about on the body of the bee, pushing their horny probosces among the body-hairs and in particular probing about the roots of the wings. Mik observed them in their occupation for fully fifteen minutes, before gathering them in, and compared their behavior to that of vultures about a cadaver.[3]

The explanation naturally suggested by this second observation is that the *Desmometopa* found riding on the back of the robber-flies by Biró through this association assured themselves of suitable food. Later observations, made by Biró during a short stay at Amboina, confirmed this conclusion. It seems worth while to give his interesting account in his own words, and to let his other observations on the subject follow.

"In the afternoon hours I withdrew into a young woodland, where first of all *Ommatius minor* caught my eye, as it fluttered before me from one dry twig to another. Naturally from now on I gave it my undivided attention.

"From a distance of a few paces we had taken sharp cognizance of each other. The *Ommatius* was not resting empty-handed, but held between its claws the dead body of a trigoniid cricket; I could not detect his riders. Although quite close, I nevertheless took out my opera-glasses and began to observe him through them. Thereby I found at once the solution to this apparently strange association. I immediately detected the *Agromyza* [=*Desmometopa*], and moreover three of them, as they were probing about the prey. *Agromyza minutissima* is therefore the

[1] Kertész, Koloman. Új-Guinea Légy-Faunájából. Dipterologisches aus Neu-Guinea. Termesz. Füzetek, vol. 20, p. 611–613. 1897.
[2] Biró, Lajos. Asilida és lovasa. Rovart. Lapok, vol. 4, p. 129. 1897.
[3] Mik, Josef. Merkwürdige Beziehungen zwischen Desmometopa M-atrum Meig. aus Europa und Agromyza minutissima v. d. Wulp aus Neu-Guinea. Wien. Ent. Zeit., vol. 17, p. 146–151. 1898.

commensalist of *Ommatius minor!* The insects hopped nimbly about the body of the cricket, stopped to feast, ran up onto the back of the robber-fly and again descended to the branch, ran and flew rapidly about, and could not rest for a minute.

"It still remained for me to check the correctness of my observations. Afterwards I amused myself for hours, partly with these first associates, partly with others found in these woods, where *Ommatius* was far from being a rarity. * * *

"In the woods of Amboina I captured the whole of one of these partnerships, then first released the *Agromyzas*, and afterward the *Ommatius*. It was easy to recapture the robber-fly, as it soon settled again at a distance of fifteen or twenty paces, and, although now more shy, I could, with sufficient patience and equipped with a long-handled net, recapture some individuals three or four times. To my astonishment the little flies had again all congregated upon its back.

"I still wanted to determine whether these were always the same individuals of *Agromyza*. For this reason I drove a specimen into the tip of the net and with the forceps tore a minute piece from its wing; made recognizable in this manner, I perceived that it came back twice, although upon the second instance I had released it at a distance of ten or twelve paces. Afterwards I facilitated the experiment by simply tethering the *Ommatius* to the end of a twig.

"However, not every *Ommatius* has its companion flies; many forage about without them. Some harbor only one, some two or three flies, but never more.

"The fidelity of the *Agromyza* is praiseworthy. It does not easily change its host. I tethered some robber-flies caught flying about unaccompanied to a branch and then released near them some of the little flies whose host I had killed. All scattered and none adopted the host selected for them."

As will be seen from the foregoing, Biró was not aware that the flies he had found associated with *Ommatius* belong to the genus *Desmometopa*, but they reminded him vividly of the *Desmometopa* which he had observed repeatedly in southern Europe. When collecting he had never found *Desmometopa* alone, but always about the prey of some predaceous insect that had just captured a bee, wasp, fly or butterfly. He was first of all impressed by the fact that these little flies showed no fear of spiders, but, on the contrary, boldly participated in their meals. Later he often saw them associated with flower-inhabiting spiders (*Misumena* and *Thomisus*), as well as with Asilidæ.

"Most frequently I found them in the region of Fiume and Buccari at the time when *Palurus aculeatus* blooms. The flowers

harbor the large predaceous bug, *Harpactor iracundus*, which commonly hunts the workers of *Apis mellifica*. The pollen and sweet juices covering its body attract many *Desmometopa m-nigrum*. As long as *Harpactor* lies in wait, no flies appeared; but as soon as the table was set, they immediately gathered about. It appeared to be their determination to feast only in the presence of the hunter, for when I had removed the *Harpactor* I offered them the body of the bee in vain; none came to it. But I succeeded in deceiving them by placing beside the bee the killed bug. Furthermore, they must have a good sense of smell, for a dried *Harpactor*, or one killed some hours previously, failed to attract them.

"At Singapore I met with *Desmametopa* flies again in April of this year. One night I collected a nest of *Apis florea* Fab., var. *andreniformis* Sm. with its entire inhabitants, and from the following noon on single small flies came flying to the dead bees and the cells laid out to dry. They were easily recognizable by the M-shaped mark on the frons and in their movements and manner of flight behaved entirely like their European relatives."[1]

This last observation induced Biró to incline to the belief that the European *Desmometopa* also might be attracted, if a large quantity of dead bees and comb were suitably exposed. Still another observation made by Biró in Singapore is quoted by Kertész in connection with the original description of *Desmometopa singaporensis*.[2] According to Biró's note, this species "lives in the same manner as the European species and appears at once when a spider or *Harpactor* kills a bee."

More recently Dr. Carl Lundström, in Sweden, confirmed a part of Biró's statements by independent observation. "On June 17 of last summer (1905) I observed a swarm of from 20 to 40 small black flies flying about on the flower-heads of a bush of *Cornus alba* in the garden of Julla in Kunstö. By close observation I saw that it was not the flowers that attracted the flies, but a recently killed bee which a spider was clasping around the head and sucking. Unceasingly some of the small flies alighted upon the abdomen of the bee, stayed there for a moment, and then flew up to rejoin the swarm and make room for others of the flies; but during the whole time the swarm itself remained in the same position, flying around the bee."

Lundström caught some of the flies, and of six specimens preserved, four belonged to *Desmometopa m-atrum* Meig., and two to *D. m-nigrum* Zett. The spider was a full-grown female of *Misumena vatia* Cl. At that time Lundström was not acquainted with Biró's observations and had only read the article by Mik. He therefore sought to determine more closely the possible relation of *Desmometopa* to the bees. By catching bee after bee, he satisfied himself that the flies do not travel with them. Freshly killed bees pinned to the flower-heads of *Cornus alba* failed to attract them, and bits of white paper with honey spread on them also gave a negative result. Lundström concluded that *Desmometopa* associates with predaceous insects and "immediately after eclosion from the pupa seeks a spider or predaceous insect, to remain associated with it thenceforth and feeding only upon the remains of its prey." In his opinion it is only in this manner that the seeming rarity of these flies, abundant enough under proper conditions, can be accounted for.[1]

Finally, C. A. Frost, in a short note, has indicated that in America *Desmometopa* has similar habits, the species observed by him (*D. latipes* Meig.) being indeed found in both hemispheres.[2] All these observations indicate that commensalism in *Desmometopa* is a well fixed habit, furthermore showing some additional specialization in certain species.

[1] Biró, Ludwig. Asztalközösség a legyeknél. Commensalismus bei Fliegen. Termesz. Füzetek, vol. 22, p. 196–199, 200–204. 1899.

[2] Kertész, Koloman. Verzeichniss einiger von L. Biró in Neu-Guinea und am Malayischen Archipel gesammelten Dipteren. Termesz. Füzetek, vol. 22, p. 173–195 (Biró quoted, p. 195). 1899.

[1] Lundström, Carl. Om Desmometopa-arternas snyltgästning hos spindar och rofinsekter. Meddel. Soc. pro Fauna et Flora fennica, Heft. 32, p. 100–104. 1906.

[2] Frost, C. A. Peculiar habits of small Diptera, *Desmometopa latipes* Meig. Psyche, vol. 20, p. 37. 1913.

Under the head of "Notes and Exhibition of Specimens," the following were presented:

MIGRATING ARMIES OF MYRIOPODS.

By H. S. Barber, *Bureau of Entomology*.

Just before dusk one day near the end of May, 1903, a surprising migration of myriopods was observed by the writer, the army issuing from the Redwood forest on one side of a logging railroad at Fieldbrook (Buckman), Humboldt Co., Cal., crossing the track on both sides of a little hollow spanned by a short trestle and entering the woods on the other side of the cleared right-of-way. The width of the marching army was perhaps 120 feet, and the width of the cleared right-of-way was about 200 feet. One could not walk in this area without crushing many at each step and it was difficult to count the rapidly moving