

PSYCHE.

A PECULIAR CASE OF PARASITISM WITH *HEMEROCAMPA LEUCOSTIGMA* SMITH & ABBOT, WITH DESCRIPTION OF A NEW GENUS AND SPECIES OF PTEROMALIDAE.

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Two similar cases of parasitism, one of which is new to this host, were found to occur with a lot of parasitized specimens of the fall generation of 1907, collected from shade trees at Chicago, Illinois, by Mr. H. E. Hodgkiss then connected with this office. The specimens consisted mostly of dead male and female pupae in their cocoons, a few egg-masses of the moth, and many cocoon-clusters of *Pimpla inquisitor* Say, the whole evidently obtained from shade trees in the various parks of the city. They were in good condition in the spring of 1908, having passed the winter in the cold insectary, and on April 15th, 1908, the *Pimpla* began to emerge in numbers; hyperparasitism in this case occurring very rarely or not at all, though in some of the *Pimpla* cocoons fragments of obvious hyperparasitic pteromalines were found. In this lot, the parasitism of *Pimpla* was normal in every way, but in passing, I desire to record the fact, previously recorded by Howard (1897, pp. 12-13), that in a lot of the same host parasitized by this species kindly collected at Chicago May 19th, 1908, by Mr. J. J. Davis of this office, and consisting of specimens of the fall generation of 1907, four cases of abnormal pupation were found, in that the larva had constructed the cocoon within the host instead of without as is normal. This was found in the instance of four female host pupae, in the first of which were four of the *Pimpla* cocoons, in the second, five of the *Pimpla* cocoons, in the third, two, and in the fourth and last, three of the cocoons of the parasite. In still another instance a single cocoon of the *Pimpla*, apparently *inquisitor*, was found within the body of the full-grown host larva. These *Pimplas* had all emerged, excepting one or two which were found as adults, dead in their cocoons.

On April 19th, it was noticed that a pteromalid was emerging and upon investigation, the particular host pupa infested with this species was isolated and afterwards dissected, before further emergence occurred. The host proved to be a female pupa in its cocoon, and dissection revealed a compact mass of eggs which had developed in the ovaries of the far advanced pupa, and packed in between these, singly, the living adults of this parasite; a number of meconial discharges were also found. From the single host, 4 males and 15 females were obtained, including the pair which

had emerged and was found mating on April 19th. This species did not occur again. It proved to be *Pteromalus cuproideus* Howard (Accession No. 37511, Illinois State Laboratory of Natural History; and 4 females in collection U. S. National Museum) and was first reared from this host by Howard (1897, pp. 28; 55).

On April 23rd, 1908, the whole lot of host pupae were examined and all discarded excepting those still infested with parasites. Seven or eight of the female pupae were obtained which were wholly infested with another pteromalid, occurring under the same conditions as the first species, namely, packed in the body of the host pupae between the compact egg-mass. The host pupa was therefore far advanced in development before killed by the parasite; all of them were very dark in color, and in some, the hairs from the body of the still unexcluded female moth were present.

The numbers of this other parasite found in the bodies of four female host pupae was as follows:

Host pupa No.	No. of Parasites.		Dead Larvae.	Total.	No. meconial discharges.
	Male.	Female.			
1.		14.		14.	1.
2.				51.	13.
3.				73.	36.
4.	7.	21.	6.	34.	32.

The meconial discharges were broken and scattered in quite a number of cases, and these could not be counted from necessity. In a miscellaneous lot of this parasite taken from the hosts, the proportion of the sexes in a total of 131 specimens was 10 males to 121 females or as 1 is to 12. This parasite proved to be a new genus and species (*Tritneptis hemerocampae*) of the subfamily Merisinae of the Pteromalidae and is described in following. It was again present in the specimens sent in from Chicago by Mr. Davis, though both the hosts and the parasites were dead; in a few cases, the entire host pupa was compacted with them.

The peculiarity of these two cases of parasitism rests in the fact of the far advanced stage of development of the host pupae, which in spite of the parasitism had advanced almost as far as the final ecdysis, and the eggs had become perfect in the ovaries. It is usually the case with primary parasites of this family that the nearly full-grown larva is killed, or death results immediately following the penultimate ecdysis, or after preparation for it. In both cases, I do not believe that there can be much doubt but that the parasites are primary, though in a single instance, in one of the female host cocoons was found the decomposed remains of what appeared to

be a large hymenopterous (or dipterous?) larva, filling the body cavity, and to one side, two dead females and a dead pupa of the *Tritneptis*. But from the appearance of this dead larva, it did not seem to have been parasitized but dead from pathological causes, and the case may have been one of double parasitism. However, it tends to throw doubt on the nature of the parasitism of the species in question. It may also be mentioned that the parasites were mainly found in the abdominal cavities of the host pupae, a fact which also indicates hyperparasitism; no traces of other parasites, however, could be found, and the evidence points to primary parasitism in both cases.

Howard (1897) mentions a case somewhat similar to the foregoing in speaking of the common hyperparasite of this host, *Dibrachys boucheanus* (Ratzeburg).

Quoting:—“A singular and practically inexplicable instance was observed December 16, 1896, where in a cocoon of the *Orgyia* a dead female chrysalis was found in an advanced stage of development. The moth was apparently just ready to emerge at the time of death. All of the scales on the body and legs were fully formed and the wings were also fully developed. On breaking the body across, in the interior of the abdomen were found two active living larvae, which were entirely indistinguishable from the larva of this species. The specimen was put aside to await developments, and the writer has at this time no explanatory comments to make.” (A footnote is then appended giving reference, among others, to T. A. Marshall in *Entomologist's Monthly Magazine*, Dec., 1896, where an ichneumonid larva is recorded as having been found alive in the body of an adult *Acherontia atropos*). It seems to me that these cases can be explained by considering that the parasite attacked the host late in its development and in smaller numbers than usual, and at a time when its resistance was high or the parasite was unable to come to maturity before the host had fully developed. It would then be found in the abdomen of the adult, or if in sufficient numbers and early enough may overcome the host just previous to the final ecdysis. This view is supported by the fact that we know of cases of unusually late attack on the part of some parasites. Thus instead of attacking the third grown or younger larva, it attacks the full-grown larva or even the pupa.

In passing, attention should also be called to the fact that the female pupae only were infested with these parasites.

Description of the Parasites.

Family PTEROMALIDAE.

Subfamily MERISINAE.

Tribe *Roptrocerini*.*Tritneptis* n. genus.

Male, female:— Head orbicular, wider than thorax. The median line of the face concaved; both mandibles 4-dentate; ocelli in a very flat triangle, merely a curved line in the center of the vertex; ovipositor not exerted; antennae with but a single ring-joint, 13-jointed; the pedicel distinctly twice longer than the first funicle joint; club 3 jointed; antennae inserted far below the middle of the face, near the clypeal border; the first funicle joint the shortest of the joints of the funicle. General color metallic blue-black, the forewings clouded, the stigmal vein subequal in length to the postmarginal vein, slightly longer; the marginal vein distinctly shorter and thicker than the submarginal vein; marginal vein of hindwings long. Metathoracic carina distinct, entire, the spiracle moderate in size and oval in shape. Parapsidal furrows faint, incomplete; scutellum with a faint transverse grooved line at caudal third. Abdomen ovate, the median line of the venter slightly convex; segments 2 and 3 the longest, subequal, 2 longer than 3, however; segments 4 and 5 subequal, shorter; 6 shorter and narrower; widest at about the fourth segment; the posterior margin of segments 2, 3, and 4, at least, slightly incised or emarginate at the median line, less so on segment 5. Tarsi 5-jointed.

The absence of the spiracular sulci and lateral folds, the sessile abdomen, single tibial spurs of the posterior tarsi, the 5-jointed tarsi, 13-jointed antennae, and venational characters distinctly show the position of this genus, though if it were not for the nearly straight cephalic margins of the axillae and 5-jointed tarsi, it would run equally as well to the Eulophine tribe Hemiptarsenini of the family Eulophidae, where it would come next to *Necremnus* Thomson. Near to *Uriella* Ashm. and *Tropidogastra* Ashm. from which it is separated by the single ring-joint of the antennae.

Type:— *T. hemerocampae* species nova described in following.

Tritneptis hemerocampae species nova.

Female:— Length variable, 2.25 mm. average.

General color metallic bluish black, the abdomen shining; scutellum purplish;

the head, meso- and metathorax with a greenish hue; abdomen with purplish hues; eyes and ocelli dark garnet; the distance between the lateral ocelli and the margin of the eyes is not so great as the distance between these ocelli, but much greater than that between each lateral ocellus and the cephalic ocellus; epicranial lobes convex. Scape and most of the pedicel, and the legs, excepting the coxae, fuscous. Coxae and remainder of antennae blue-black. Eyes with sparse minute hairs, practically naked.

Head and thorax, including the metathorax and axillae, moderately pentagonally punctate, the abdomen apparently smooth, but in reality similarly sculptured with fine shallow lines like net-work. The sculpture of the head and thorax slightly coarser than the surface of the eye. Pleura and coxae less deeply sculptured.

Wings normal, the submarginal vein much longer than the marginal, and the stigmal vein curved, its club with a prolongation at the cephalic extremity. Discal cilia moderately dense and uniform, and a large dusky cloud under the marginal vein extending along and beyond the stigmal vein to the apical fourth of the wing, and across nearly to the opposite (caudal) margin where, however, it is limited by a distinct angular milky-white line which starts in the apical fourth of the wing, curves slightly convexly, and then obliques down (caudad) and in (proximad) toward the caudal margin of the wing, nearly reaching that margin at a point about opposite the middle of the marginal vein, and sharply curving upward (cephalad) and inward (proximad) toward the submarginal vein limiting the proximal spread of the dusky area; this line is not devoid of discal cilia. Under the microscope, the dusky area is also seen to extend through the angle subtended by the stigmal vein and the post-marginal vein and to the caudal margin, beyond the whitish line, in fact faintly suffused over the apical fourth of the wing. Sheaths of the ovipositor barely exerted.

Scape of antennae slender, uniformly cylindrical, about as long as the pedicel and the first three funicle joints combined; pedicel as long as the first two funicle joints combined, subclavate; first funicle joint shorter and narrower than funicle joints 2, 3, 4, 5, 6 and 7, which are uniform, subquadrate and subequal; 2 basal club joints very slightly larger than the apical funicle joint, subequal; the third or apical club joint nearly a half smaller and conical. Antennae uniformly hairy, less thickly so on scape and pedicel.

From many specimens. $\frac{2}{3}$ -inch objective. Bausch & Lomb. Coddington lens, $\frac{1}{2}$ -inch.

Male:— The same, but more slender. Antennae subclavate, more hairy, the joints more distinct, the funicle joints widely separated; the scape and pedicel dark, funicle and club fulvous. Scape as long as pedicel and first 4 funicle joints combined.

Pedice! five times the length of funicle joint 1, which is abruptly short and narrow, circular or semihemispherical, not more than twice the size of the single ring-joint and of the same shape nearly, and one-third the size of funicle 2; the latter much larger, hemispherical (cephalic end truncate); all funicle joints hemispherical, becoming gradually more wide and short toward the club, so that the 7th or last funicle joint is somewhat lozenge-shaped; club conical, the segments less distinct, about equal in length to the last 3 funicle joints combined, or shorter. In dead specimens, genitalia exerted.

From 10 specimens. $\frac{2}{3}$ -inch objective. Bausch & Lomb. Coddington lens, $\frac{1}{2}$ -inch.

Described from 10 males and many females reared from the female pupae of *Hemerocampa leucostigma* (Smith et Abbot), in the insectary of this office, Urbana, Illinois, April 23rd to May 4th, 1908.

Habitat:— Chicago, Illinois.

Types:— Accession No. 37512, Illinois State Laboratory of Natural History, Urbana, Illinois, 1 ♂, 8 ♀'s, tagmounted. *Cotypes*: No. 11923, U. S. National Museum, Washington, D. C., 1 ♂, 3 ♀'s, on tags.

Subfamily PTEROMALINAE.

Tribe *Pteromalini*.

Pteromalus cuproideus Howard, 1897, p. 55.

Female: — Length variable, 2 mm. average.

General color, pale metallic green, with a brassy sheen. In general, head and thorax sculptured, the abdomen smooth and shining; mandibles, scape and legs fuscous, the apical tarsal claw and portions of the femora darker and the apices of tibiae and the tarsi lighter; coxae, however, concolorous with thorax; flagellum (including the pedicel) and apex of the scape deep black tinged with fuscous, in certain lights with a prismatic lustre. Eyes dark red; ocelli concolorous with the eye, or darker, in a flat isosceles triangle in the center of the vertex; the distance between each lateral ocellus and the margin of the eye is twice, or nearly, the distance between each and the cephalic ocellus, and the distance between the lateral ocelli is subequal to, or slightly shorter than, the distance between each laterad and the margin of the eye. Surface of the eyes moderately fine and nearly naked, but a few sparse minute setae are present.

The whole of the head, the prothorax and mesothorax from dorsal aspect (includ-

ing the parapsides, mesoscutum, mesoscutellum, axillae, and lateral portions of the mesopostscutellum), the dorsal aspect of the metathorax, the thoracic pleura (including the femoral furrows, but excluding an irregular faintly lined area surrounding the insertion of the wings in the direct lateral aspect) and the posterior coxae (but distinctly less so) moderately roughly, nearly uniformly, punctately, sculptured into polygonal areas, generally pentagons; this sculpture is from two to three times rougher than the eye surface. Cephalic and intermediate coxae, sculptured nearly similarly with finer lines; most of the thoracic venter similarly sculptured (as the cephalic coxae). Metathorax with a faint median carina.

Abdomen shorter than head and thorax combined, normal for the genus, but slightly triangularly produced ventro-proximad, and conic-ovate; segment 2 the longest, much longer than segment 3, the latter one-third longer than segment 4, and the remaining subequal in length, excepting the last; the forewings extend for about one-sixth of their length beyond the abdomen. Body covered with moderately sparse, grayish, inclined hairs, thicker on the coxae, legs, apical abdominal segments, at the spiracles, and amounting to a soft, grayish pubescence on the antennae.

Wings normal, hyaline; postmarginal vein about one-third longer than stigmal vein, which is about one-fifth shorter than the marginal vein; stigmal knob ovate, but with a nipple-like prolongation at its apical third on the cephalic margin; submarginal vein twice the length of the marginal. Discal cilia of the wings uniform, close. Venation dusky.

Antennae 13-jointed, with two ring-joints, scape and pedicel less hairy and sculptured with very fine lines. Scape long and slender, projecting beyond the vertex for at least a fifth of its length, at least more than half the length of the remaining joints combined. Pedicel subconic, stouter, slightly more than half the length of the first funicle joint; joints 1, 2, and 3 of funicle subequal, funicle joints 4 and 5 subequal, the former longer, one-fourth and one-third shorter than the 3 preceding joints respectively; funicle 6 sub-quadrate, one-third shorter than the preceding joint; club 3-jointed, the first two joints subequal, about equal in length to funicle 6 but narrower, and the third or apical joint nearly one-half shorter and conic; club ovate in shape, longer than the combined length of the two apical funicle joints. Both mandible 4-dentate, the dentations darker in color than the body of the mandible; the dentations are not symmetrical for both sides. Ovipositor not exerted.

From 15 specimens; $\frac{2}{3}$ -inch objective, Bausch & Lomb.

Seen from the naked eye the species is very dark.

Male:— The same. From the single specimen at hand, most of the antennae are missing, but enough of the funicle is present to show that they are wholly fuscous,

excepting the darker pedicel and apex of scape, unless the few apical joints missing are to the contrary. The abdomen is more like that of the females of most of the species of *Pteromalus*, namely ovate and depressed; in the male, the median carina on the metathorax is also absent, and the lateral folds are less prominent; the antennae also are more hairy.

Redescribed from 1 male and 15 females reared from a female pupa of *Hemero-campa leucostigma* (Smith et Abbot), April 19th, 1908. *Habitat*: Chicago, Illinois.

LITERATURE REFERRED TO.

1897. Howard, Leland Ossian. A Study in Insect Parasitism: etc. Bull. No. 5, technical series, Division of Entomology, U. S. Department of Agriculture, Washington, D. C., pp. 37-38.

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Gryllodes sigillatus WALKER (= *poeyi* SAUSS.) IN WASHINGTON, D. C.—Recently the cosmopolitan cricket *Gryllodes sigillatus* Walk. appeared in countless numbers in the hot-houses of the U. S. Department of Agriculture at Washington, D. C. They are reported as having caused considerable damage to various seedlings, which they cut off near the ground. Myriads of the beautiful little crickets in all stages were found hiding by day in piles of boards in one of the green houses. A few of the adult males, which far outnumbered the mature females, were heard to stridulate at this time.

This species is recorded from Florida by Rehn and Hebard. They took both adult and immature specimens at Miami in February.

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Girault, Alexandre Arsène. 1908. "A peculiar case of parasitism with
| *Hemerocampa leucostigma* | Smith & Abbot, with description of a new genus
and species of Pteromalidae." *Psyche* 15, 89–96.

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