A LIPARID MOTH (*OCNEROGYIA AMANDA*, STAUD.) DESTRUCTIVE TO FIGS IN MESOPOTAMIA.

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There are few countries in which agriculture is more important and the enemies of the crops less known than Mesopotamia. The following notes on a serious pest of the fig-tree in various parts of the Baghdad vilayet were put together on the River Diyala, north-east of Baghdad, at the end of July 1918. The Liparid moth which is so injurious has been determined by Sir G. F. Hampson as *Ocnerogyia amanda*, Staud. The larvae devoured all the fig leaves completely, with the exception of one or two of the large vascular bundles. The fruit shrivelled and dropped before it was ripe.

Life-History.

The eggs are easily found in patches of from twenty to a hundred, often laid so that they did not touch each other; the groups of eggs are found on the lower parts of the trunks, more rarely on the underside of the lower leaves, and on rubbish on the ground. The female does not deposit her anal hairs upon the eggs. The eggs are large* for the size of the moth (horizontal diameter 1.39 mm., height 1.23 mm.).

As Dr. G. A. K. Marshall has pointed out to me, eggs large in proportion to the size of an insect are generally laid by species which either aestivate or hibernate in the egg stage. This is clearly not the case in the species that we are now considering, which is continuous-brooded.

The larvae are almost entirely night feeders, and conceal themselves before 7.0 a.m. in summer among dead leaves beneath the fig-trees, in cracks in soil or in mud walls and similar situations. They may occasionally be found by day on, and especially under, the leaves in shady parts of the gardens. The hairs of this species produced no urticating effect on my skin, which is however by no means sensitive.

The pupa is placed in cracks in soil, and under overhanging portions of mud walls.

So far as I could detect during my short stay in the area in which I found this species, the two sexes fly with equal readiness if disturbed during the day-time; they do not fly in sunshine unless disturbed.

We have no knowledge of the time of year at which the pest begins to be troublesome. It has been actually observed from the end of July to the end of September. It is apparently a species that breeds continuously during these months, as all the stages can be found at the same time. This is quite unusual, for the very great majority of Mesopotamian Lepidoptera aestivate throughout the summer, which is excessively hot; we do not know whether they go through the summer as eggs or pupae.

* Compare *Orgyia antiqua*, 0.82 by 0.68 mm.; *Liparis monacha*, 1.045 by 0.77 mm.

Distribution.

In the year 1918 *O. amanda* was a very serious pest of figs at Ba'quba (Bakubah) on the River Diyala, about thirty miles north-east of Baghdad; also at Mendali, Shahroban, and Balad Ruz, all of which are within sixty miles of Ba'quba towards the Persian frontier; also at Kerbela on the west side of the River Euphrates, 50 miles S.S.W. of Baghdad. This last was important, because the large black figs of Kerbela are famous all over lower Mesopotamia and the whole crop was destroyed by *O. amanda* in 1918. So far as I know, figs, though widely grown, are not a principal crop in any part of the country. The incidence of the pest appears to be very sporadic; I failed to find it at Khaniqin, about 60 miles up the River Diyala from Ba'quba, or at Baghdad, Basrah, Qurnah, Nasiriyah, or Suq-ash-Shuyukh. In the year 1919, as I am informed by the Director of Agriculture, Baghdad, there were no reports of its incidence in Mesopotamia, and in the same year I failed to find it in North-West Persia at Qazvin and Enzeli, and at Tiflis in Transcaucasia.

The larva is known to the Arab cultivators as Shimbaran, but the word is not in very general use.

Preventive Measures.

The habits of the insect lead us to believe that it should be easy to keep in check, and the following measures may be mentioned:—(1). Arab cultivators burn the dead leaves and other rubbish in heaps beneath the trees. This destroys all stages of the insect, and also its hiding places. The damage done to the tree is slight. (2). Hand-picking the larvae from beneath the leaves shortly after dawn should be effective; batches of eggs would be found at the same time. (3). Grease banding would no doubt catch the larvae on their morning and evening migrations, but it is unlikely that so expensive a method will be used when burning the rubbish is so efficacious.

Description of the Moth.

When Staudinger described the monotypical genus *Ocnerogyia* he had only the male of the present species before him; the female has not previously been captured. Sir George Hampson has been good enough to redescribe the species as follows:—

Family LIPARIDAE.

Genus **Ocnerogyia**.

“*Ocnerogyia*, Staud., Iris, iv, p. 254 (1891). Proboscis absent; palpi very short, porrect, clothed with rough hair; frons smooth, with large tuft of hair; eyes rather small and elliptical, smooth; antennae of male bipectinate with long branches to apex, of female with rather shorter branches; thorax and abdomen clothed with rough hair and without crests; tibiae and tarsi moderately fringed with hair, the mid and hind tibiae with terminal pair of spurs. Forewing broad, the costa evenly arched, the apex rounded, the termen obliquely curved and not crenulate; vein 2 from beyond middle of cell; 3 from well before angle of cell; 5 from above angle; 6 from upper angle; 7, 8, 9 stalked; 10, 11 from cell. Hind wing with the cell long; vein 2 from beyond middle of cell; 3 from well before angle of cell; 5 from just above angle; 6, 7 from upper angle; 8 connected with the cell by a slight oblique bar just before middle.

Ocnerogyia amanda.

Ocnerogyia amanda, Staud., Iris, iv, p. 254 (1891).

“♂. Head and thorax grey, tinged with reddish brown the lower part of frons and palpi yellowish; abdomen fulvous orange. Forewing grey, tinged with reddish brown and irrorated with rather elongate pale griseous scales; a rather diffused blackish discoidal bar. Hind wing uniform fulvous orange, the cilia brownish grey. Underside of forewing without dark irroration or discoidal bar, a small rather diffused fulvous orange patch below middle of cell; hind wing with the costal edge brownish grey.

“♀. Antennae with the shaft whitish; abdomen pale grey tinged with brown, the basal segments and sides tinged with yellowish; hind wing pale grey, tinged with brown, the inner area with some pale fulvous hair; underside of forewing without the fulvous orange patch below the cell.

Exp., ♂ 38, ♀ 40 mm.

UPPER SYRIA: Mardin. MESOPOTAMIA: R. Diyala, Ba‘quba (*P. A. Buxton*), 1 ♂, 1 ♀ in Brit. Mus.”

Description of the Larva.

The larva presents points of difference from that of other LIPARIDAE, and I have drawn up the following description from spirit specimens in the last instar. Unfortunately I was engaged with other work at the time when I found the larvae, at the height of the Mesopotamian summer; my notes only say that the skin was grey-green in colour, and that the intersegmental membrane was neither paler nor darker than the rest. The setae were silky and almost colourless. The general appearance is shown in text-fig. 1 (A & B) and suggests an Aretiid rather than a Liparid. There are none of the dense brushes of hair with which we are so familiar in *Orgyia* and *Dasychira*. The larva lacks also what Fracker calls “clavate-plumed setae.” The colourless setae are very finely and evenly serrate. It will be noticed that long setae arise from the prothorax (actually from a large verruca formed by the fusion of Kappa and Rho), and curve forwards over the head of the larva; these setae are more than half the length of the larva, but in fig. 1.B only their basal half is shown. On the meso- and metathorax and abdomen the longest setae grow out sideways on verrucae Kappa and Pai. Among the silky setae a few brown ones (*b.s.*) may with difficulty be found. They are always long and thick, and arise from the large verruca (*g.t.*) (Rho plus Kappa) of the prothorax in some numbers, and as single setae on Beta of the meso-thorax, and Rho on abdominal segments 1–8 inclusive.

Chaetotaxy. The head. All the primary setae of Forbes can be easily seen except ii, v, and vi. The last two are probably present but cannot be distinguished with certainty among the rather large secondary setae which are sparsely scattered over the lower and more lateral parts of the head. There is only one secondary seta on the adfrontal, situated below adfrontal i; this is fewer than is usual among the LIPARIDAE (Forbes).

The thorax.* On the anterior margin of the prothorax, near the mid-dorsal line is a small group of setae, alpha, beneath it a still smaller group of setae, two or three

* In describing the chaetotaxy of the thorax and abdomen I have followed Fracker's system.

only, gamma. Beta and delta appear to be absent. In front of the large prothoracic spiracle an immense tubercle (*g.t.*) arises, pointing forwards. It is clothed with setae of both types, the brown and the colourless, which are more than half as long as the entire larva, and are directed forwards over the head. This verruca is very well developed in various Liparid larvae which I have examined, and is formed by the fusion of Rho and Kappa. This we see when we compare the prothorax with either of the succeeding segments, in both of which Rho and Kappa are separate. The process of fusion of these two verrucae, so complete on the prothorax, can actually be watched taking place on successive segments of the abdomen. Beneath this very large verruca is a second one, which consists of Pai with its associated setae; this is recognisable in all segments to the ninth abdominal inclusive. Its setae project outwards and downwards and form a conspicuous tuft over the leg on all leg-bearing segments.

Meso- and metathorax. The chaetotaxy is sufficiently shown in text-fig. 1 (B). Rho and Kappa are not fused.

Abdomen. Beta (α , plus β , plus secondary setae) can be seen on each of the first nine segments and is largest on the eight and ninth. The gradual migration of Kappa to a position behind but distinctly above the spiracle is interesting. It never coalesces completely with Rho except on the ninth segment, but the two groups, Rho and Kappa, are borne on one large partly divided verruca on all the abdominal segments. The group which represents sigma consists of many setae, and is borne on a definite verruca on the legless segments (1, 2, 7, 8, and 9); on the other segments it is only to be found with difficulty. No trace can be found of nu, tau, or mu; we presume therefore that they are components of Pai.

The legs and prolegs are covered sparsely with secondary setae which are believed to be of no phylogenetic significance. The prolegs (A and C, *pl.*) are long and armed with long crochets all of one size arranged in a mesoseries, that is to say a curved line concave outwards. On the outer side of all prolegs except the anal pair is a chitinous plate bearing secondary setae. The dorsal glands on abdominal segments 6 and 7 are small; the diameter of the mouth of the gland is less than verruca Beta; these glands are believed to be characteristic of all LIPARIDAE.

The points of interest in the structure of the larva are:—

(1) Liparid larvae fall into two main groups: *Ocnerogyia amanda* falls into the first, many of which are densely hairy like ARCTIIDAE. The second group contains bizarre species armed with dense brushes (verricules) and clavate plumed setae; *Orgyia* is a good and familiar example of this group.

(2) Fracker states that in these insects there are "three verrucae above the Kappa group on the mesothorax and metathorax." Forbes says (p. 103) "five warts on mesothorax." (This comes to the same thing as beneath Kappa lies Pai). *Ocnerogyia amanda* forms an exception to these general statements; as will be seen from text-fig. C, there are only four verrucae on the mesothorax, and metathorax; two of which are above Kappa.

(3) The eversible gland on the mesodorsum of abdominal segments 6 and 7 appears to be the most constant characteristic of the larvae of LIPARIDAE. So far as we know, it is always present, though it may be very small.

Fig. 1. Structure of larva of *Ocneroqgia amanda*, Staud.

- A. Abdominal segments 5-10
 B. Head, thorax and abd. segt. i } Magnified by about 35.

In these figures certain segments are shown armed with their setae; others are denuded of setae and show the chaetotaxy diagrammatically. The long setae curving over the head are drawn about half their full length. The head is shown in outline only, without setae, eyes or mouth-parts. On I alpha and gamma are indicated, but are not lettered in order to avoid overcrowding the figure.

C. Proleg of 3rd abdominal segment viewed from side, magnified by 150.

I, II & III. Pro-, meso-, and metathorax; 1-10, abdominal segments; a.c., anal clasper; b.s., large brown seta; cr., crochets arranged in a line concave outwards, all of one size except those at the ends; g.t., great tubercle of I; pl., proleg; pt., plate on lateral side of proleg, bearing secondary setae; sp., spiracle; s.s., secondary setae; B, Beta bearing alpha plus beta; on I Beta is figured but not lettered to avoid confusion; K, the compound verruca Kappa; π, large compound verruca above the insertion of leg or proleg; P, verruca bearing epsilon plus rho, and fusing with Kappa on I to form g.t. and partly fusing with it on 1-9; σ, the nearly midventral sigma, which in this species is represented by a tuft of setae.

In fig. 1. A & B the compound verruca π has been marked π in error.

References.

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O. STAUDINGER (1891). Iris, iv, p. 254.

A pannier hopperdozer for catching insects on sugar-cane.