NOTES ON A SPECIES OF EPIPYROPIDAE (LEPIDOPTERA) PARASITIC ON *METAPHAENA* SPECIES (HEMIPTERA : FULGORIDAE) AT AMANI, TANGANYIKA

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Since it is believed that this is the second record of Epipyropidae from Africa, the following biological notes, though very incomplete, should be of interest.

I have found the *Epipyropid*, which Mr. W. H. T. Tams of the British Museum (Natural History) has described as *Fulgoraecia cerolestes* sp. n., parasitising two species of *Metaphaena—M. cruentata* Gerstaecker which occurs on the introduced tree *Grevillea robusta*, and *M. militaris* Gerstaecker which I have only seen on a species of *Entandophragma*, a tree indigenous but uncommon in the Amani forest. Most of these observations refer to parasites on *Metaphaena cruentata*.

This Fulgorid occurs in small colonies of from five to twenty adults on the trunks of *Grevillea*, but though there are numerous *Grevillea* in the Amani district, I only know of two such colonies. One of these, at least, has been in existence on the same trees for many years, though it was only early in 1945 that I first noticed the Epipyropid.

I have not been able to find the immature stages of either species of *Metaphaena*. They may live on the upper branches of the trees on which the adults are to be found, but they certainly never occur on the trunks of these trees, nor on other vegetation in the neighbourhood.

In 1945 adults of *M. cruentata* were usually present from February to early June although the number varied from time to time. None was seen during the remainder of the year ; a very few appeared in January, 1946, but they did not become common until April. It was not possible to make frequent or regular observations on the small colony of *M. militaris* on the trunk of an *Entandophragma* in the forest, but a few adults were present from February to September, 1945 : none was then seen until April, 1946, when at first one and later three adults reappeared.

Both species generally remain almost motionless on the tree-trunk. If disturbed they fly away for a short distance, but usually come back to the same tree and often to very nearly the same position on it. I have twice, in April, 1946, seen a pair of (unparasitised) *M. cruentata in copula* on a *Grevillea* trunk. I have not succeeded in keeping adult *Metaphaena* alive in captivity for more than a week or ten days. Such few observations as have been made on the Epipyropid have therefore been under natural conditions. Owing to the sluggish habits of *Metaphaena* it has, however, been possible on two occasions to place a first-instar larva of the Epipyropid on to a healthy specimen of *M. cruentata* and observe its development until pupation.

Life history of *Fulgoraecia cerolestes* Tams.

The first-instar larva is exceedingly active although, like so many migratory first stage parasitic larvae of different orders of insects, it frequently stops walking, erects the anterior part of its body and waves itself from side to side. In the laboratory they only survive for two or three days—a very few for five days—in the absence of a host. Presumably they find a host by random searching. Having found a host the larva takes up its position on the dorsum of the abdomen with its head directed towards the posterior end of the host.

There has apparently been some doubt as to the method of feeding of EPIPYROPIDAE, some observers asserting that they puncture the integument of the host and others that they feed on the wax secreted by them (Clausen, 1940). This species appears to feed on the wax, the production of which seems to be stimulated by the presence of the parasite, for unparasitised adult *Metaphaena* secrete very little wax. Although there are no indications that the integument is punctured, yet a parasitised host apparently always dies within twenty-four hours of the full-grown larva of *F. cerolestes* leaving it. Except for this, nothing is known of the effects of the parasite on its host, but it is suggested that the fertility of the *Metaphaena* may be impaired if not destroyed.

Two larvae have several times been found on one host and once three, but only one from each host has ever become full-grown and pupated. I do not know how many parasitic larval instars there are : exuviae of two quite different sizes have been found still adhering to the host, but it is quite likely that there are more than three parasitic instars. The developmental period, from attachment of the first-instar larva until the full-grown larva leaves the host, was 28–30 days in two instances observed during April, 1946.

As soon as the full-grown larva has left the host it spins a white waxy cocoon on the tree-trunk. Observed durations of the pupal period varied between 18 days at an average temperature of about 24° C. to 25 days at about 22° C.

When the adult moth emerges the empty pupa case is left protruding from the cocoon. The female remains on or close to the cocoon and pairing can occur on the day of emergence. It lasts for 10–15 minutes and may be repeated later on the same day. Oviposition starts a few hours after copulation and almost all the eggs are laid within the next 24 hours. Of two fertilised females kept in the laboratory one laid about 2,000 eggs and the other nearly 3,000. The last 200–300 eggs laid by each of these females were paler in colour than the rest and were apparently infertile. Although these females lived for about two weeks after the last egg was laid and to one of them a fresh male was introduced, no further copulation was observed.

One unfertilised female was kept in the laboratory. Three days after emergence this laid some 300 eggs only, none of which hatched. Some species of EPIPYROPIDAE, it should be noted, are parthenogenetic (Perkins, 1905).

The eggs are normally laid on the trunk of the tree, in batches of

200–400, within about one foot of the cocoon from which the female emerged.

Since a female lays all its eggs within about twenty-four hours, immediately after fertilisation, it appears remarkable that they should not hatch almost simultaneously but over a period which is known to extend over a year, and may possibly prove to be much longer.

Table 1 shows the dates of hatching of the eggs laid by two females in glass-bottomed "pill-boxes" in the laboratory. The first was fertilised on 25.iv.45 and laid about 2,000 eggs on 25–26.iv.45 ; the second was fertilised on 4.v.45 and laid about 3,000 eggs on 4–5.v.45. Both lots started to hatch on 15.viii.45 and continued fairly regularly at an average of two to three a day each until 19.vi.46, when I left Amani. Dr. D. W. Duthie is kindly continuing the observations for me and I have recently heard from him that they are still (on 8.viii.46) continuing to hatch. There were a few days on which none hatched and the greatest number on any one day from one batch was ten, but the comparatively slight variations in the number hatching during ten-day periods cannot apparently be correlated with changes in temperature or humidity. Table 2 shows the dates of hatchings from a batch of 175 eggs taken from the trunk of an *Entandophragma* on 26.xi.45 and brought into the laboratory : the date on which these were laid is not known.

TABLE I.

Dates of eclosion of eggs of *E. cerolestes* laid in laboratory.

Ten-day period ending	(*a*) *Eggs* (*about* 2,000) *laid* 25–26.iv.45	(*b*) *Eggs* (*about* 3,000) *laid* 4–5.v.45
24.viii.45	6	25
3.ix.45	8	21
13.ix.45	16	31
23.ix.45	12	16
3.x.45	16	10
13.x.45	15	13
23.x.45	22	22
2.xi.45	22	10
12.xi.45	10	26
22.xi.45	23	28
2.xii.45.	12	19
12.xii.45	18	25
22.xii.45	19	30
1.i.46	21	36
11.i.46	26	26
21.i.46	14	28
31.i.46	14	27
10.ii.46	26	20
20.ii.46	19	23
2.iii.46	16	16
12.iii.46	25	14
22.iii.46	18	9
1.iv.46	23	12
11.iv.46	27	24
21.iv.46	27	22
1.v.46	27	24
11.v.46	24	31
21.v.46	24	21
31.v.46	24	31
10.vi.46	28	31
Total number hatched up to 10.vi.46	582	671

TABLE II.

Dates of eclosion of Epipyropid eggs (about 175) laid on an unknown date on *Entandophragma* sp. and brought to laboratory on 26.xi.45.

Date	*Number hatching*	*Date*	*Number hatching*
26.xi.45	1	18.ii.46	1
28.xi.45	1	20.ii.46	1
30.xi.45	1	21.ii.46	1
1.xii.45	1	25.ii.46	1
5.xii.45	1	6.iii.46	3
11.xii.45	1	11.iii.46	1
13.xii.45	1	21.iii.46	1
15.xii.45	1	23.iii.46	1
17.xii.45	2	24.iii.46	1
21.xii.45	1	26.iii.46	1
23.xii.45	1	30.iii.46	1
25.xii.45	1	1.iv.46	1
27.xii.45	1	2.iv.46	1
4.i.46	1	4.iv.46	1
5.i.46	1	5.iv.46	1
6.i.46	1	7.iv.46	1
9.i.46	1	9.iv.46	2
10.i.46	2	12.iv.46	1
17.i.46	1	14.iv.46	1
18.i.46	1	20.iv.46	1
31.i.46	1	18.v.46	1
1.ii.46	1	21.v.46	1
9.ii.46	1	22.v.46	1
11.ii.46	1	24.v.46	1
12.ii.46	1	14.vi.46	1
14.ii.46	2	16.vi.46	1

It is probable that this extended hatching of the eggs tends to ensure the survival of the species, for if all the eggs laid by one female were to hatch together, this might occur when no adult *Metaphaena* happened to be present. Conversely, if it were to happen at a time when the whole *Metaphaena* population was congregated on the tree trunks, it would result in excessive parasitism and, if this parasite does in fact render its host sterile, the host would become extinct.

It is, however, difficult to imagine the physiological mechanism by which a large number of eggs, all fertilised on one day and laid on the following day, and kept in the same environment, should hatch, a few on almost every day, over a period lasting for a year or possibly more.

References.

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