

## MISCELLANEOUS NOTES ON THE EARLY STAGES OF CERTAIN HETEROCERA.

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The following short notes refer to species recently bred in the Nakuru district. The food-plants have been identified for me by Dr. van Someren at the Coryndon Museum, Nairobi.

The flora of this particular district is not very diverse; but the Acacia thorn trees harbour an enormous variety of larvae (chiefly Geometrae); far more than are to be obtained on any other plant. Next in order comes Maerua ("muthigeo"), followed by the Castor-oil plant. Among the low-growing plants Oxygonum seems to be a very general pabulum. After the Geometrae, Lasiocampids and Lymantrids seem to be more numerous, or at any rate more easily obtained, than any others. The proportion of parasitised larvae among those collected, even when very young, is extremely high. It is possible that the periods given by me for the duration of the pupal state may be slightly in excess of those obtaining under natural conditions. But the error is probably not very great, since it appears that conditions of heat and cold do not affect the length of this stage so much as do those of wet and dry: and these latter conditions are comparatively easy to reproduce in the case of pupae kept under cover.

### SPHINGIDAE.

*Hippotion osiris*, Dalm.

#### FOODPLANT.

*Cissus jatrophioides*.

#### OVA.

Spherical, smooth, translucent green. Laid singly on undersides of leaves.

#### LARVA.

After first moult has dorsal surface blue-grey, darker at root of "tail." Ventral surface the same or slightly darker. Latero-dorsal stripe yellow, and lateral area less vivid yellow, with a "frieze" of short vertical black lines, of irregular length, close together. These are interrupted by the latero-dorsal line, above which their tops again appear in the dorsal grey. Five black longitudinal stripes form a sort of collar behind the yellow head. The "eye-spot" is a black ring, with khaki central area, containing five pale blue spots. Behind it is a large black latero-dorsal spot. The "tail" is long, black, and is

switched actively backwards and forwards. Legs yellow-brown, claspers blue-grey with brown tips.

In the next instar the dorsal area from eye-spot to tail is blue-black, finely reticulated with dense black, and having a narrow central black line. Behind the "tail" it is ochreous, with black central line and other black marks. The lateral area is ochreous with black spottings and vestiges of pale diagonal stripes. Ochreous bars extend over the back from side to side. Spiracles white, each with a black mark at its lower edge. Head is red, collar bright ochreous with black stripes, of which the lateral ones extend back as far as the eye-spot. There are a pair of small pinkish latero-dorsal spots on each segment, and a thin latero-dorsal line of the same colour. Latero-ventral and ventral areas sooty-black, claspers the same. The areas mentioned above as ochreous gradually acquire a pinkish tinge, and the centre of the eye-spot becomes dark grey.

In the last instar the larva is over 4" long, and very obese. The blue-black has become blackish-grey, and the whole thing looks very much like snake-skin. It makes a large cell on ground surface, filling the spaces between leaves, etc., with very large meshed netting.

#### PUPA.

Is very long, grey and ochreous with black marks, and conspicuous black spiracle spots. The head is prolonged into a large narrow process shaped rather like a duck's bill.

Average duration of pupal stage is two months.

*Hippotion celerio*, L.

#### FOODPLANT.

*Oxygonum atriplicifolium* and several of the Vitaceae.

#### LARVA.

The larva of this species is too well known to need any further description. It may, however, be of interest to record the very large proportion of males to females that have emerged in those that I have bred: viz. males 25, females 2.

*Basiothia medea*, F.

#### FOODPLANT.

*Pentania schweinfurtii*.

#### OVA.

Smooth, green, spherical: laid singly on stem or leaves of food-plant.

#### LARVA.

When young, is a delicate shade of blue-green. The skin is rough. The "eye-spot" has a green centre, ringed with lemon yellow, with a black dash above and below. The next segment has a pink and white reniform spot, also with black above and below; and the following segments have a chain of pink marks, each with a 3-pointed black mark above it, and three small black dots below. The "tail" segment has a plain pink dash with a black dash above it. The "tail" is black, springing from a reddish base. The lateral area is paler green than the dorsal, and the spiracular line is paler still. Very small pustules, mostly pale, all over the body: some of those in the lateral area are black. Legs are brown, claspers blue-green.

When full-fed there is less blue in the green of the ground colour. The "eye-spot" has become very dark blue, almost black; yellow-rimmed with a black mark like a shark fin above it. Each segment has, on the latero-dorsal line, a pinkish ellipse (that on the segment next the eye-spot being somewhat reniform), each with its black "shark-fin," on which are three or more white dots. Lateral line very pale grey; spiracles white, ringed with dark grey. The lateral area is irregularly smudged with dark grey.

#### PUPA.

Is in a flimsy cell on ground level. Average length of pupal stage is 50 days.

### ZYGAENIDAE.

*Astyloneura cupreitincta*, Hamp.

#### FOODPLANT.

*Cissus jatrophioides*.

#### LARVA.

Short, stout; when full-fed nearly  $1\frac{1}{4}$ ". There appear to be two forms:

- (a) Ground colour pale yellowish-green, with a chain of maroon lozenges forming dorsal line.
- (b) Ground colour mahogany; no markings visible except that the latero-dorsal stripes are slightly darker. The remainder of this description refers to both the above forms.

There are rows of small tubercles on each segment, emitting star-clusters of short white bristles, the central ones of each star being longer. Head black, small, semi-retractile. Segment 2 black, with a pale ring on its fore side. The larva sits in the trough formed by the leaf of the food plant.

**PUPA.**

One was in the fold of a leaf. The rest in flimsy cocoons just at or below the ground surface. Pupation took place on June 11th, and the first imagines emerged in February. The last emerged on April 2nd. I could not establish any connection between the numbers of each of the two larval forms and of the two forms of the imago. The following are the figures of a typical batch :

Total number of larvæ	...	...	...	12
Number of form (a)	...	...	...	10
Number of form (b)	...	...	...	2
Total emergences	...	...	...	12
Number without markings	...	...	...	8
Number with faint markings	...	...	...	3
Number with complete markings	...	...	...	1

The four specimens with markings were the last to emerge.

*Epizygaena xanthosoma*, Jord.

**FOODPLANTS.**

*Capparis* and *Gymnosporia*.

**OVA.**

Butter yellow, spherical, in a large deep pile on under side of leaf.

**LARVA.**

When full-fed is  $\frac{3}{4}$ " long, slug-shaped, putty-colour with sometimes a greenish tinge. Latero-dorsal stripes conspicuous, dark brown or dark grey. Lateral stripes fainter, same colour. Ventral and anal claspers yellowish. Whole body covered with short grey-white bristles in star formation, with a few long dark bristles among them. Head dark shiny brown with whitish marks, completely retractile.

**PUPA.**

Is in a hard shiny yellow or white cocoon on leaf or stem. The cocoon usually shows a few of the larva's long dark bristles in its make-up.

Duration of pupal stage three weeks.

Larva is very heavily parasitised.

I have taken this insect in all stages in every month except August.

**ARCTIIDAE.**

*Amphicallia solai*, Druce.

**FOODPLANT.**

*Crotalaria* sp. (Native name "Mucingiri.")

#### LARVA.

When full-fed is  $1\frac{1}{4}$ " to 2" long. When it is extended, is rather tapered in front. Ground colour, greenish-white, is only seen on the ventral surface, and between the segments when extended. Each segment has a golden-yellow transverse band, with an irregularly shaped black band within it. These black bands meet the irregular black lateral stripe, and (on those segments that carry claspers) extend right down to the ends of the claspers. They carry small tubercles of dark shining metallic blue (which same colour appears on the stems of the claspers) and these tubercles emit each a coarse white bristle of considerable length. There are black dots and smudges between the segments, chiefly in the lateral area. Ventral area is greenish-white, crossed by black bars. Head red, legs and claspers black. A very conspicuous larva, and a voracious eater.

#### PUPA.

Several pupae are spun together, in a very flimsy web. The pupa is stout, black with yellow markings, slightly hairy, polished. Cremaster of very fine hooks, and there are very fine hooks scattered all over the abdomen.

Average duration of pupal stage is three weeks.

*Nola townsendi*. Sp. nov. Tams.

#### FOODPLANT.

*Lantana*, sp. var.

#### LARVA.

$\frac{1}{8}$ " long; rather woodlouse-shaped. Apple green, with dorsal area paler. There is usually a red-brown dorsal mark, or saddle, but this varies in shape and size; being sometimes a small diamond mark on segment 7, and sometimes extending into a line of irregular width over most of the segments. The larva is strongly indented between segments, and has two small black dorsal marks on segment 2. Head small, black. A lateral tubercle on each segment emits a tuft of white bristles; there are smaller tufts of similar bristles on the latero-dorsal area, and a collar of them on segment 2. Ventral claspers (three pairs only) flesh coloured. Ventral area bright green. The larva feeds among flowers and seed heads, and is difficult to see and to dislodge.

#### PUPA.

Is yellowish-green, except on the dorsal area, which is reddish-brown. The abdomen is of uniform girth throughout its length as far as the terminal segment, which tapers very suddenly to a central point. It is in a very inconspicuous cocoon spun on a stem of the food-plant, or, very occasionally, on the midrib of a leaf. Average duration of pupal stage is 25 days.

The insect may be found in larval or imaginal stage in every month of the year.

### SATURNIIDAE.

*Bunaea alcinoe*, Stoll.

#### FOODPLANT.

*Carsonia holstii*.

#### LARVA.

When full-fed is  $3\frac{3}{4}$ " long. Ground colour black, with a ring of backward pointing spines on segments 3—12. On segment 11 the two spines in the dorsal area are combined into one central one, double tipped. These spines are all ivory-white, with the exception that on segments 3 and 4 the dorsal ones are black, and on segment 3 the latero-dorsal ones are black tipped. The lateral spines have a long white base (in shape rather like that of a rose thorn). Head black, horny: a black horny plate on segment 2. A similar black plate on segment 12; anal claspers large and horny. Spiracles orange, situated in rust-red patches. Claspers black, ventral surface black.

#### PUPA.

Subterranean, in a very flimsy earth cell. It is black, very strong and horny. A ridge, slightly out of centre towards the dorsal side, runs across the terminal segment, with a single central tapering point. The dorsal side of this ridge is much wrinkled, and in it are two oval holes or pits, below the base of the central point. There is a small narrow linear projection on either side in a latero-ventral position, having a serrated edge.

Average duration of pupal stage is  $2\frac{1}{2}$  months.

### LASIOCAMPIDAE.

*Streblota diplocyma*, Hamps.

#### FOODPLANTS.

Sodom Apple and *Gymnosporia buxifolia*. (Gikuyu name for the latter is "muthuthi.")

#### OVA.

Every batch of ova that I have found consists of seven, laid in a circular patch, six surrounding one. They are roughly spherical, whitish, but thickly spotted and splashed with burnt sienna.

#### LARVA.

The young larvae do not eat the egg shells. When first hatched they are black with yellow cross-stripes: very hairy. A later descrip-

tion is as follows: The lateral area is covered with very dense grey fur, thicker and longer on the first few segments, and pointing forwards round the face. Dorsal area dark brown, bounded by pale grey narrow stripes, and thickly marbled with pale markings on a dark ground. Above the 2nd and 3rd pairs of legs there are, in the dorsal area, transverse slits, edged and lined with short orange-tawny hair, which, when the larva is quiescent, almost disappear. But when it moves they expand and are very conspicuous. In some specimens they are almost crimson. On segment 11 the young larva has a black dorsal tuft, which disappears later. There are a series of small patches of bright violet along the central line; and on each segment, on the outside of the dorsal area, small ruby-coloured tubercles, from which spring a few long bristly hairs. On segments 11 and 12 these tubercles are sometimes black. Below the pale grey latero-dorsal line the ground colour is slightly darker grey beneath the very dense fur, and there are very short, narrow, black diagonal lines. Head dark grey, with a violet collar. There are distinct "lappets" on the sides of the thoracic segments. Ventral surface orange, with a black central line, and black cross strips between the lappets. Length of full-fed larva is  $2\frac{1}{4}$ " to 3". In the last instar, and sometimes earlier in life, the fur is very strongly tinged with violet, particularly round the head. (This colour seems more marked in those larvae that feed on Gymnosporia.)

The young larvae sit very closely pressed to a stem of the foodplant, which is covered with a shiny deposit of silk, and looks as if varnished. The larvae are very sluggish.

#### PUPA.

The cocoon is papery, spindle-shaped, white, yellow, or grey. It is spun either on a stem or a thorn of the foodplant.

The average length of pupal state is 32 days. The pupa is bright brown, with very short tawny fur. Wing cases, thorax and spiracles are black, and there are three dark brown bars across the ventral side of the abdomen. The terminal segment is very much flattened at the end. No visible hooks, but two slight projections on the ventral side, with a fissure between them.

*Schausinna clementsi*, Schaus.

#### FOODPLANT.

*Maerua hochnellii*.

#### OVA.

Almost oval, but one end rather flattened and squared. Buttercup yellow, smooth but not polished. Turn apple green shortly before hatching.

**LARVA.**

When full-fed is  $3\frac{1}{4}$ " long, very furry. Ground colour black, covered with tawny fur shading to grey,  $\frac{3}{8}$ " long. The fur below the spiracular line is grey, without any tawny tinge. The most noticeable markings are an irregular series of lemon-yellow blotches on the lateral area arranged more or less in two rows, an upper and a lower. Head is dusty black, with red mouth-parts. Legs dark red. Claspers black, with a dark red patch above each. Ventral surface black, with two large yellow patches on each segment.

**PUPA.**

Is in a hard hairy cocoon, almost black, of blunt oval shape, attached to a stem of foodplant. Pupation took place in the first few days of August, and moths did not emerge until December 30th.

*Lechriolepis leucostigma*, Hamps.

**FOODPLANT.**

*Maerua hochnelii* ("Muthigeo").

**OVA.**

Pale butter-yellow, smooth, blunt oval; covered with grey anal fur.

**LARVA.**

Ground colour blackish-grey, but thickly covered with short old-gold fur. Latero-dorsal lines nearly black, fur on lateral area greyish. Each segment has a ring of blue spots, and on the dorsal surface of segment 2 is a large bifid patch of the same blue. Long greyish hairs occur sparsely all over the body. Head black, with two yellow more or less parallel crooked stripes from over the crown extending half way down the face. Ventral surface black. In the last instar the larva develops a dorsal row of thick white patches like cotton-wool, a lateral row of similar pads or patches, and another set below these, just above the bases of the ventral claspers. None of these occur on the thoracic segments. When the larva is extended, the lowest row are seen to be shaped like "eyebrows" above the claspers.

**PUPA.**

Is in a shuttle-shaped cocoon of heavy silk felt, on a leaf or stem. The cocoon is either white or mustard-yellow. The last abdominal segment is of blunt dome shape, and has a very large number of short curled hooks at its extremity.

*Chilena pelodes*, sp.n. Tams.

**FOODPLANT.**

Acacia thorn.

#### LARVA.

Length full-fed  $1\frac{1}{2}$ ". Double pencil tufts, black with white tips, spring from behind the head, and are held out horizontally at right angles to the body. There is a similar double tuft, vertical, on segment 2, backed with pink, and two short pink tufts behind this. On segment 12, a dorsal tuft, black and pink, points obliquely backwards. The fur on the first three segments has a distinct pink tinge, and the lower lateral fur throughout the length of the larva is faintly pink. Legs reddish, claspers flesh-coloured with a dark streak. Head buff, striped with black. The dorsal area contains a complicated pattern of dark brown, dark blue, and white, with white latero-dorsal lines, and carries short old-gold fur down the centre. Three or more pearly-white vertical dashes in the latero-ventral area of each segment are more easily seen from below. The larva is a very quick walker, falls easily and wriggles furiously when disturbed.

#### PUPA.

Is in a rather flimsy whitish hairy cocoon on a stem of foodplant. Duration of pupal stage about three weeks.

*Leipoxais compsotes*, sp.n. Tams.

#### FOODPLANT.

*Gymnosporia* (" Muthuthi ").

#### LARVA.

When young, has dorsal area light grey, interrupted by a black horseshoe mark near the hinder end. A dark line separates this grey from the lateral area, which is bluish with orange dots. A slight dorsal tuft on segment 11, and two very small ones on segment 3, which is slightly humped. Grey fur collar.

When full-fed, the general colour is drab, or bluish-grey. Thick grey fur on the lower lateral area points downwards (making an almost invisible joint with the stem on which the larva sits). There is an irregular grey-white dorsal stripe, wider in front. Segment 3 has two small vertical dark tufts, side by side, and segment 11 one tuft. The whole body is covered with inconspicuous orange dots and spots, and there are vestiges of short oblique lateral lines. Thick tufts of grey fur round head. Legs brown, but hidden in fur. Ventral surface has a black central stripe interrupted by orange marks.

#### PUPA.

Is in a fairly tough hairy cocoon, very small for the size of the larva, pupating among leaves. It is short and stout; abdomen tapering very slightly to the rounded terminal segment. Bright brown, wing-cases and spiracles darker brown. Short yellow-brown fur on

abdomen, slightly longer and thicker on head and thorax. There is a deal of very short stiff fur at the end of the terminal segment, and on its dorsal side is a patch of very many short separate hooklets.

Average duration of pupal stage is 24 days.

*Anadissa affinis*, Auriv.

FOODPLANT.

Acacia thorn tree, various species.

OVA.

Bright green, roughly spherical, laid in a pile covered with dark grey fur. (N.B.: In captivity the females lay infertile ova without hesitation a few hours after emergence.)

LARVA.

The young larva, when about  $\frac{1}{8}$ " long, is very furry, with small black tubercles in pairs on segments 8—11, thick lateral tufts of grey-white fur. Dorsal area black, bounded on either side by a gold line, with a red-gold transverse mark on each segment. Latero-dorsal and lateral areas greyish, with paler diagonal markings. Head and segment 2 slaty-blue, with minute black spots. Ventral surface blackish. Legs and claspers black. When full-fed the length is  $1\frac{1}{2}$ ". Head black, with a white mark on either side. Large dorsal tufts of black hair, backed by white, on segments 2, 6, and 12. Smaller tufts on 3, 4, and 5; pairs of very small black tufts on 7, 8, 9, and 10.

Dorsal area segments 2—6 black; 6—10 a complicated pattern of black and red, with a gold dotted line on either side, and a gold central line. This part of the dorsal area is reminiscent of an illuminated M.S. Lateral area brownish, with triangular splashes of white on most segments. White horizontal tufts below the spiracles. The larvae are semi-gregarious. Fall very easily, on a thread.

PUPA.

Is in a hard, hairy oval cocoon, of nondescript colour, spun on the stem.

Average duration of pupal stage is three weeks.

LYMANTRIDAE.

*Dasychira thysanoessa*, Collenette.

FOODPLANT.

Fig, both cultivated and indigenous fig trees.

#### OVA.

Laid in large patches of 50 or more. Spheroid, but much flattened on the upper side. Colour is light wainscot brown above, shading to almost white below. Covered with very minute reticulation.

#### LARVA.

The young larva is black, with long grey fur, and a black vertical tuft at either end. When full-fed length  $1\frac{1}{3}$ ". Ground colour dull blackish. Segments 2, 3, 8 to 10, and 12 covered with very short old-gold fur from amongst which spring longer white hairs. Segments 4 to 7 have an extraordinary jacket of dense stiff black bristles from the spiracular line, over the back to the other spiracular line; the perimeter of this jacket being quite twice that of the parts of the body not so clothed. The black bristles are white-tipped. A brush-like tuft of the same bristles occupies the dorsal portion of segment 11. In front of the jacket are two thin pencils of long white bristles directed upwards but diverging; and behind the jacket four similar pencils spread out through a transverse semicircle. Head black, a whitish patch between jaws. From behind the head spring two pencils of fine black hairs, club-tipped; directed forwards, upwards, and outwards. Some of the white hairs on the body are nearly 1" long. Legs and claspers (four pairs ventral) flesh-coloured.

#### PUPA.

Is in a thick hairy cocoon, usually among leaves. The pupa is bright brown, with a thin sprinkling of pale, short fur. The terminal segment has a slight swelling on the ventral side; and the cremaster, on the dorsal side, consists of a stout tapered shank, ending in a number of fairly long-stalked hooklets. Average duration of pupal stage, two months.

(NOTE.—The males of this species "assemble" very freely.)

#### *Lymantria (Polymona) modesta*, Wkr.

#### FOODPLANT.

*Maerua hochnelii*. (Gikuyu name "Muthigeo.") More larvae are found on the very small, low-growing bushes than on the bigger ones.

#### LARVA.

The half-grown larva has an intricate marbled pattern of dark grey spottings on a reddish-brown ground, with fine longitudinal lines of the same red-brown. Each segment has two rather conspicuous latero-dorsal almost circular patches, slightly raised, grey-ringed, emitting dark bristles; and below the wavy red-brown latero-dorsal line are large lateral greyish tubercles emitting fairly long grey bristles. On segment 2 is a black collar, from which spring two

forward-pointing pencils of black hair. Segments 10 and 11 have each a white dorsal stud; and similar studs, but smaller and in pairs, are on segments 5, 6, 7, and 8. The fur over anal claspers is long and points backwards. Legs and claspers pink. Ventral surface yellow with dark central line. Head pale, face black.

When full-fed, length is  $1\frac{1}{3}$ " and the larva is almost uniform dark grey above, slightly paler laterally. The studs on 10 and 11 are yellow; the others have disappeared. Lateral fur-tufts are long and thick, of dusty-looking brown fur. They are quite separate from one another, and combine with the short dorsal fur in giving the larva a very wide, flat appearance from above (rather like a worn-out broom head).

#### PUPA.

Spun in a flimsy web among leaves. Dark brown, with a good deal of pinkish and yellow fur, and longer black fur tufts on thorax and head.

Average duration of pupal stage about four weeks.

#### *Polymona rufifemur*, Walk.

#### FOODPLANT.

Pepper-tree is the only foodplant I know for this species.

#### OVA.

Laid in a flat patch, containing thirty to fifty, either on the communal web in which the pupae are enclosed, or sometimes on bark. Very occasionally on leaves. Nearly spherical, slightly flattened, orange-pink. Very small shallow depressions all over the surface.

#### LARVA.

When full grown is  $1\frac{1}{3}$ " long, brown, furry. A flat wide-looking larva. On each segment, two on either side of the dorsal line, are four small tubercles, the two smaller close to the centre, the two larger ones behind them and further from it. These emit thick star-clusters of very short brown bristles. The colour of all this area down to the lateral line is dark brown. The lateral line is flesh colour, with a slight pinkish tinge, and below it the colour (and that of ventral area) is pale flesh. A lateral tubercle on each segment emits a tuft of mixed long and short hairs, grey-brown, and paler hairs come from below these. The dorsal studs on segments 10 and 11 are black and inconspicuous. Head shiny black.

#### PUPA.

Very many of which are spun together in a messy communal web, is brown, glossy, with tufts of short tawny fur spaced out round the abdominal rings, and longer tufts on the head. Cremaster is long-stalked, and pointed, with a large number of thin curly hooks.

*Laelia hemipha*, Swinh. (Subsp. nov.?)

**FOODPLANT.**

Acacia thorn tree.

**LARVA.**

Length 1" to 1¼". Four brush-tufts, tawny yellow, with black bases, spring from a black dorsal area. Behind these, yellow dorsal spots interrupt a grey transverse ring on each segment. Two dark pencil-tufts point forwards from segment 2, and there is a canary-yellow dorsal tuft, backed with dark hair, on segment 12, on which segment there is also a white lateral mark. The lateral tubercles emit stars of whitish-grey hair, while the longer bristles on dorsal and latero-dorsal parts are black. (In the young larva the lateral fur on segments 3, 4, and 5 is canary-yellow.) Head, legs, and claspers red. The larvae run very rapidly, and are obtainable in most months.

**PUPA.**

Is in a loose cocoon of nondescript colour, usually among stems and leaves, but sometimes on ground surface. In the latter case the silk is mixed with earth, and the cocoon attached to the trunk of the tree.

The pupa is bright brown with a good deal of yellowish fur. Cremaster is on a long conical base and consists of a large number of hooklets which all converge to a point.

Duration of pupal stage about three weeks.

**NOTODONTIDÆ.**

*Thaumatopeoa apologetica*, Strand.

**FOODPLANTS.**

*Maerua* ("Muthigeo") and pepper-tree.

**OVA.**

In a patch about 1¼" long, glued to the stem of foodplant, thickly covered with the tawny anal fur of the female.

**LARVA.**

The young larva is yellow, with long white hairs springing from black warts. Head black, and a black plate on segment 2. When full-fed it is 1¼" long with very dense long white fur. Head black, with a few short bristles. Dorsal area pale green. Immediately behind the head is a shiny black half-collar. Segments 3 and 4 have a ring of small black dots. Segments 5 to 12 have, besides the ring of dots, a large central black patch, rather humped or cushioned. A thin broken black line separates the green of the dorsal area from the

yellow colour of the sides. Ventral surface pink flesh colour. Legs black, claspers yellow-green, anal claspers black. Description is rather difficult since the whole larva is clothed in a dense mass of silky white hair.

The young larvae sometimes live in a web, but are more often in a group, quite openly, on a leaf. When older they form large conspicuous silky balls at or near the ends of the branches. Their moults usually take place in a web, sometimes on the ground surface, mixed up with dead leaves, earth, grass, etc. Moulting process is sometimes prolonged into six days. The processionary habits of these larvae are well known.

#### PUPA.

The pupae are subterranean, in a ball of earth and felt, as large as a tennis ball. The cocoons, dark grey, Zeppelin-shaped, are packed as close together as possible in this ball.

Emergence seems very irregular. One batch, which went down on July 24th, produced imagines from December 12th until May 5th, the greater number emerging between February and May. Other batches have emerged in three months.

### NOCTUIDAE. HADENINAE.

*Cetola pulchra*, B. Bak.

#### FOODPLANT.

Lantana.

#### LARVA.

When young is superficially like a young larva of *P. demodocus*. Its length when full fed is  $1\frac{1}{2}$ " and it is very stout. The fore end is much thicker than the hind end, and the body is very much humped up between legs and claspers. Ground colour dark brown, with two large splashes of dirty white, the first on segments 2, 3, and 4, the second on segment 12. The former is an irregular dorsal splash, roughly double-diamond shape; the latter extends over the back down to the spiracular line, and forwards in the lateral area to enclose two spiracles. At the highest part of the forward hump is a dirty-ochreous transverse fold, or ridge; and the four tubercles in its neighbourhood are of the same colour. The body is covered with brown and black tubercles of varying sizes, larger on the humped parts; and there are faint diamond marks, outlined in white, forming a dorsal line between the two white splashes.

Head large, black. Legs black. Ventral claspers paler (four pairs, but the first pair little used). Ventral surface dark grey. The larva mimics a bird-dropping, and is a most unpleasant looking insect, with a wet, oily appearance. Just before pupation all the marks mentioned above as "white" turn to deep orange-buff.

#### PUPA.

Is in a cocoon made of earth mixed with a deal of glutinous stuff, very hard, and smooth outside like dried mud. Among leaves on ground, or occasionally fixed to a stem at ground level.

The pupal stage lasts for  $2\frac{1}{2}$  months or more.

The terminal segment of the pupa ends in a small dome, rather flattened on the ventral side; the cremaster appears to consist of two very short points at the extremity of this dome.

### EUTELIANAE.

*Eutelia adulatrix*, Hubn.

#### FOODPLANT.

*Maerua* ("Muthigeo").

#### LARVA.

Stout, smooth-skinned, tapers considerably from front to back. Light apple-green, with white or yellow latero-dorsal lines joined by fainter cross-lines of the same colour at each segment, making a "ladder" effect. These cross lines are carried on, less distinctly, to the faint lateral lines. As it grows to maturity the dorsal cross lines become much less distinct; and in the final instar the whole body is covered with faint white dots, thicker on the dorsal area, so that its colour becomes whitish or greyish-green, with a slightly granulated appearance. The spiracles are red; head and claspers paler than ground colour. Occasionally the cross lines vanish altogether except one on the ridge formed by the withdrawal of the retractile head and second segment. The other markings then are four yellow longitudinal lines, the latero-dorsal ones meeting over the anal claspers; the laterals not extending the full length of the body. The larva lies along the mid rib on the under side of a leaf, or sometimes at the edge. In either case it is extremely difficult to detect. It is very much subject to a parasitic fly.

#### PUPA.

Is underground, in a very close fitting cell. It is black, or very dark brown. The terminal segment is a blunt dome, highly polished, with no visible cremaster. Duration of pupal stage is about two months.

### PHYTOMETRINAE.

*Plusia tranfixa*, Walk.

#### FOODPLANT.

*Vernonia* sp.

#### LARVA.

1½" long, tapering very much in front, slightly humped behind. The central green colour of the dorsal area is edged by a white line. Latero-dorsal area green, with three or more very fine white lines in it. A slightly darker green area occurs just above the white (or sometimes yellow) spiracular line. Ventral surface green. Head very small, vivid translucent green, with dusky marks on cheeks and forehead. Ventral claspers (2 pairs) green. A few scattered short colourless bristles scattered over the body. The larva usually stands with its fore part raised from the plant. It falls very readily.

#### PUPA.

In a thin cocoon on stem among leaves, or on ground surface. Pupa is at first brown, with yellow abdominal rings; later, uniform black. Average duration of pupal stage 3½ weeks.

### CUCULLINAE.

#### *Empusada argentivitta*, Hamp.

#### FOODPLANT.

*Vernonia*.

#### LARVA.

When young, dark green, with vivid white lateral stripe, and white dorsal dots on each segment. When full-fed length 2". Wide dorsal stripe of slate-grey, with a rusty-pink central line. In some cases, in the last instar, this rust colour covers almost the whole width of the dorsal area. In this area each segment has four white dots, arranged in a square (except on segments 2, 3, and 4, where they form a transverse ring). Below the dorsal area is a wide green stripe, with a yellowish upper edge. Below it a vivid white stripe. The whole dorsal area and the green stripe carry a mass of very fine black longitudinal lines. Ventral surface and claspers dull green; head and legs yellowish-red. Spiracles white. Skin smooth and rather polished.

The young larva when annoyed strikes out with its head. When older it rolls up and falls very easily. It eats both leaves and flowers. It is very much subject to a parasitic fly.

#### PUPA.

Is usually among leaves and rubbish on ground surface but in two cases I found them in earth cocoons below ground.

Average duration of pupal stage 2½ months.

## ACRONICTINAE,

*Magusa versicolora*, Saalm.

### FOODPLANT.

*Cassia didymobotrya*.

### LARVA.

When full-fed is nearly  $1\frac{1}{2}$ " long, stout, smooth-skinned, with segment 12 slightly humped. Ground colour dull light green, but with a great many stripes and lines. There is a dorsal central bright yellow stripe, with one of ground colour on either side. A narrow white line separates this from a further stripe of green, which itself has a thread-like white line in its centre. Next, a broader white stripe, followed by a black one of the same width. (This last usually disappears in the final instar.) The black one has faint signs of a white central line, and below it is another thin white line. The spiracles, black ringed, lie in a broad yellow stripe, with black and green spots on its upper edge. Below the spiracular stripe the green ground colour appears again, with a tiny darker dot on each segment. At the base of the claspers is a thin rather broken white line. Most of these lines and stripes converge on the hump, which has white patches on its dorsal surface. Ventral surface ground colour, claspers the same, with reddish extremities. Legs pale green. The pale green head and segment 2 have several black dots. The larva sits extended on a leaf. It is sluggish, and very much subject to attacks by a small ichneumon.

### PUPA.

Subterranean.

Average duration of pupal stage five weeks.

*Brithys pancratii*, Cyr.

### FOODPLANTS.

*Crinum kirkii* (Amaryllidaceae) and cultivated Amaryllis lilies.

### LARVA.

Length when full-fed is  $1\frac{1}{2}$ ", tapers slightly towards either end. Head reddish-yellow with black spots, claspers same colour as head. Ground colour pale yellow, with deeper yellow lines dividing the segments, and four narrow black longitudinal stripes. Round each segment runs a broad irregular transverse band, dark brown to black; and the effect of these, together with the longitudinal lines, is to give a network appearance of pale yellow, more or less circular, spots with dark edging. There are inconspicuous small shiny black tubercles scattered over the body, emitting bristles; the greater number of these tubercles being disposed in double transverse rows on the black bands. Anal segment about the same colour as the head, with raised black spots.

#### PUPA.

Naked, dark brown, in a very flimsy subterranean cell. Cre-master has only two very short points, widely separated, on the dorsal side of the terminal segment.

Duration of pupal stage is about one month.

### OPHIDERINAE.

*Sphingomorpha chlorea*, Cram.

#### FOODPLANT.

Acacia thorn tree.

#### LARVA.

When young 1" long, slender, very dark dirty green, lighter on the humped-up and slightly swollen portion between legs and claspers. A sharply defined grey dorsal stripe from anal claspers more than half way up the body; then a gap of green, and the grey again over the front two segments and head. Under a lens the whole body shows very fine marblings of very dark colour. Black latero-dorsal spots become small raised tubercles on the last few segments. A few short scattered bristles, chiefly on the lateral area. Two pairs of white dots on top of head. Face grey, with dark lines. Palpi prominent.

When full-fed, larva is 2½" long, dark velvety brown. There is one very conspicuous dorsal patch (between legs and claspers), orange, with black sides. Shortly before pupation this patch becomes vivid scarlet. On the next segment is a smaller patch, lemon yellow. These patches are so hidden in the folds of the skin that they are only visible when the larva moves, and is extended. Dorsal stripe irregular, reddish brown, with small twin tubercles on segment 11, and smaller ones on 10 and 12. Very small white dots in pairs, lateral and latero-dorsal, on most segments. Head velvety black, face brown. Ventral claspers pale, four pairs, but the first pair rarely used. A few pale bristles scattered over the body. Ventral surface pale, with wide central black stripe. Legs brown, spiracles red-brown. A few brownish-yellow spots behind head. The larva is sluggish, but once aroused has a great turn of speed, its motion including a sort of half looping action.

#### PUPA.

Subterranean. Duration of pupal stage two months.

*Audea fatilega*, Feld.

#### FOODPLANT.

Acacia thorn tree.

#### LARVA.

Length when full-fed  $2\frac{1}{4}$ ". Ground colour dun, with a dark reddish tinge on the dorsal area of each segment. Body very much flattened below, so that it lies very closely pressed to stem of food-plant. Head large, with thin neck; its colour the same as that of the body, but it has two pale "eyebrow" marks, with black "eyes" below them. A pair of brown dorsal protuberances on segment 11, smaller and darker pairs on 9 and 12, and rows of very small ones along the latero-dorsal lines. Dorsal line is faint, paler than ground colour, with a fine black line each side of it. Short pale bristles, pointing downwards, below the spiracular line. Ventral claspers, four pairs, but the front pair are little used, so that the larva half-loops when walking. The claspers are paler than the ground colour. The larva is difficult to see, and very sluggish; but when once aroused it runs at terrific speed, with a curious centipede-like motion.

#### PUPA.

Is in a strongly constructed cocoon plastered all over with the acacia leaves, and anchored to two or three leaf-stalks. Duration of pupal stage is about three weeks.

### ERASTRINAE.

#### *Eublemma chlorochroa*, Hmps. n.

#### FOODPLANT.

"Sodom Apple" (*Solanum*).

#### LARVA.

Length 1" to  $1\frac{1}{2}$ ", stout. Greenish putty-colour, strongly indented between segments. Only two pairs of ventral claspers developed. There are transverse rings of pale tubercles, set obliquely in pairs, joined by brownish longitudinal lines, giving a sort of chain effect. These tubercles emit a few straggling bristles. Head black, very small. A black plate on segment 2, with three light lines on it.

The young larva lives in a nearly transparent brownish "cocoon" on the underside of a leaf. Later it pulls together the point of a leaf and lives in the retreat so formed.

#### PUPA.

The pupa is either in the larval home as above, or sometimes in a cocoon fastened to the stem on the earth surface.

The pupal stage usually lasts about 35 days, but in three cases it was prolonged to over nine months.

#### *Tathorrhyncus exsiccata*, Led.

#### FOODPLANT.

*Indigophora*, various species.

#### LARVA.

A very active looper, with two fully developed pairs of ventral claspers, and a third (in front) rudimentary. The full-fed larva is  $1\frac{1}{4}$ " long, tapering to either end, very slender. Ground colour reddish ochreous, but the whole body is covered with a mass of fine dark longitudinal lines. These lines thicken to form latero-dorsal stripes, with a slight "splotch" on each segment. Spiracular line is black. Head grey, but with many fine dark lines. Palpi long and prominent, grey-white.

The larva is almost invisible on its foodplant. It sits closely pressed to a stem, with legs and palpi held forward. It does not fall easily, but when it does, it remains rolled up on the ground for a very long time.

#### PUPA.

The red pupa is enclosed in a loose silk-and-earth cocoon on ground surface.

Average length of pupal stage is 25 days.

#### *Chalciope hyppasia*, Cram.

#### FOODPLANT.

*Indigophora* sp. var.

#### LARVA.

In general appearance and habits, as in food, this larva much resembles those of *Tathorrhyncus*. But it has only two pairs of ventral claspers, without any vestiges of a third pair. When full-fed it is  $2\frac{1}{4}$ " long, and stout. The description of a full-fed larva is as follows: The whole body is a mass of fine dark longitudinal lines. Dorsal area is ochreous, sharply divided from the grey lateral area. There are smoky smudges on the dorsal part of the central segments, and a fairly distinct central stripe, more noticeable at either end, where the area on either side of it is darker. Two small latero-dorsal black spots on the five central segments. Lateral area grey with a faint pink and white narrow stripe along its lower edge. The ventral area is a much darker grey, with a central stripe almost black. The stems of the ventral claspers are the same colour as the ventral area. There is no sign of a third pair of ventral claspers. Head is a mass of black and white lines, and has small black dots on crown and sides. A few short bristles, mainly around head and anal segment. When the larva is "looped," there are distinct dark grey divisions between the segments of the central portion. The larva's colour gets lighter with age, and when it is full-fed the whole body is a sort of ashen grey, except for the dorsal area (which remains ochreous) and the black ventral stripe.

**PUPA.**

Is in a rather flimsy cocoon among the stems just above the surface of the ground. It is brown, covered with a grey bloom. The last abdominal segment is truncated, and the cremaster is a nearly semi-circular plate, situated on the dorsal side, fluted on the outside edge, with a large number of separate short hooklets distributed over the surface of the plate.

Duration of the pupal stage is seven weeks.

**GEOMETRIDAE (GEOMETRINAE).**

*Osteodes procidata* forma *turbulentata*, Guen.

**FOODPLANT.**

Acacia thorn tree.

**OVA.**

Laid on May 5th. Some on the edges of leaves, but most on the leaf-buds. Bluish-green, short oval. Very small for the size of the moth. They hatched on May 13th.

**LARVA.**

Young larvae ate shells and moulted. Green with black lateral and latero-dorsal spots, and a yellowish lateral line.

On May 31st, about  $\frac{3}{4}$ " long, ground colour now ochreous, either reddish or brownish, retaining the yellow lateral line as a series of crescent marks. Slight latero-dorsal tubercles appearing. Later the larva's ground colour is various shades of ochreous, grey, or bright brown in different specimens. The segments are "bulgy," with lateral and latero-dorsal tubercles more marked. In most cases there is a dorsal pattern consisting of a black broad-arrow behind the head followed by pairs of short narrow parallel black dashes, usually indistinct or absent on the central segments. A very variable larva for so unvariable a moth. Length of full-fed larva is  $1\frac{1}{2}$ ".

**PUPA.**

(June 21) is just underground in a very flimsy web-cocoon. Average duration of pupal stage is 24 days.

*Coenina aurivena*, Butlr.

**FOODPLANTS.**

Various; perhaps the favourite is Lantana.

**LARVA.**

When young is uniform purple-brown. When full-fed it is nearly 2" long. Ground colour grey, with a slightly pinkish tinge.

The most prominent feature is a pair of latero-dorsal tubercles on segment 6, Indian-club shaped, white with black spots. Very small latero-dorsal tubercles on segments 5, 7, 8, and 12. Head small, ground-colour with black spots. Mouth-parts and palpi yellow. Various black spots on the lateral area of all segments, and on the dorsal area of segment 3. Lateral wrinkle lighter than ground colour, and latero-dorsal lines the same, but faint. Triple black lateral dashes on 7, 8, and 9, of which the uppermost is the largest. Legs black and white ringed.

This larva varies considerably. In some specimens there is a large amount of orange—orange tips to the clubs, and orange spottings in the spiracular area and on the claspers. Occasionally there is a double pink interrupted dorsal line, and a black dorsal dash on segment 2.

**PUPA.**

Is in a tough cocoon among leaves. Average duration of pupal stage about two months.

*Lomographa eridata*, Warr.

**FOODPLANT.**

Acacia thorn tree.

**LARVA.**

When full-fed is  $\frac{7}{8}$ " long, slightly flattened, sharply pointed behind. Dull pale green, with a rather greyish tinge. The skin appears granulated, an effect which a lens shows to be caused by small transverse corrugations that give all the longitudinal lines a serrated appearance. Four white raised transverse lines over the back join the strong white lateral lines, or wrinkles, which meet one another at the anal point, and have slight reddish spots throughout their length. There is a very faint double white dorsal line, stronger on segment 2. Ventral surface darker green, with faint yellow divisions between the segments. Head narrow, high-crowned, bifid; tips of lobes yellowish. Claspers yellowish.

**PUPA.**

Black, in a small cocoon among leaves. Cremaster on a long tapered stalk, inserted on the dorsal side, and terminating in two diverging branched hooks.

*Zamarada ochrata*, Walk.

**FOODPLANT.**

Acacia thorn tree.

#### OVA.

Are laid among the leaf-buds, or on the edges of the leaflets. They are dull green with a slightly bluish tinge, long oval, but slightly tapered to one end. They are covered with lengthwise rows, close together, of minute oval depressions. On the 12th day they turned dark grey and hatched on the 13th day.

#### LARVA.

The young larva is green with a pronounced blackish lateral stripe. When full-fed it is  $\frac{7}{8}$ " long, fairly stout. Ground-colour bluish dull green, paler on the ventral surface. Six or more diagonal lines, yellow with a red forward edge, start from the centre of the dorsum and extend downwards and forwards to the lateral line. This line, which meets its fellow at a red spot in a triangular projection above the anal claspers, is yellow with red spots. Below it the above-mentioned diagonals are carried on to the centre of the ventral area, but have no red edge, and are paler than the part of them above the lateral line. Head square, green with two red-yellow marks on crown. Legs and claspers green.

#### PUPA.

Brown, in a tight cocoon among leaves of foodplant. Cremaster has eight or more thin brown curly hooks. Most of these spring from the tip of a large cone on the dorsal side of the segment, but a few are placed higher up the cone.

Duration of pupal stage is three weeks.

### HEMITHEINAE.

*Omphacodes pulchrifimbria*, Warr.

#### FOODPLANT.

Acacia thorn.

#### LARVA.

When full-fed is  $1\frac{1}{2}$ " or more. Very slender, stouter at rear end, but tapering all the way to the head. Very inconspicuous, being extremely like the mid-rib of a leaf. Ground-colour pale yellowish-green, with very few markings. In some specimens there are hardly any at all. The following description is from a heavily marked larva. Head deeply bifid, the points of lobes being dark brown. Two small pointed dorsal tubercles on segment 2, also brown. A small dark dorsal spot at each joint, these spots being joined by a thin indistinct dark line. A red lateral mark just behind each segment-joint, with an elongated brownish smudge behind it, in which smudges are the spiracles. The first and second smudges are slightly swollen. Below the smudges is a pale longitudinal line. Two brown spines project

over the anal claspers. Ventral claspers have a streak of reddish brown, and there are two lateral dots of the same colour between them and the anal claspers.

**PUPA.**

Loosely spun up among leaves, has a pale yellow abdomen, pale green wing cases. Cremaster has eight long curled hooks, springing from a fluted, tapering stalk. Average duration of pupal stage is 19 days.

**STERRHINAE.**

*Rhometra sacraria*, Linn.

**FOODPLANT.**

*Oxygonum atriplicifolium*.

**OVA.**

When first laid are pale yellow, but in twenty-four hours they turn to carmine. They are long oval in shape, and are fastened to the ends of the bristles at the joints of the stem. A few however were attached to the edge of a leaf. After ten days the ova turned silver-grey, and hatched on the eleventh day.

**LARVA.**

The young larvae did not eat the egg-shells. They grew very fast, and in just over a week had reached a length of almost 1". At this time the dorsal area was brown, with pale central and other lines in it. It is bordered on the lower edge by a darker brown line which is continued along the side of the head. Below this is an almost white lateral stripe. Ventral area greenish grey. At the joints of segments there is a small white dorsal spot (but not on the first few segments). There is another form in which the ground colour is green. In the final instar the ground colour is very variable; from rose red through golden brown to stone grey.

**PUPA.**

Is very slender, usually green, sometimes buff, in a flimsy web among leaves. Average duration of pupal stage 19 days.

*Sterrho intervenata*.

**FOODPLANT.**

*Oxygonum atriplicifolium*.

**OVA.**

Are deposited on the bristles at the joints of foodplant, or occasionally on the edges of leaves. They are oval, yellow when first laid, turning in twenty-four hours to rosy carmine. They hatched on the 12th day, having previously turned grey.

#### LARVA.

When half-grown has ground colour light brown, with a pronounced white lateral wrinkle, below which, and on ventral surface it is grey. The whole body has many fine dark longitudinal lines. In the centre of dorsal area is a sort of chain of short white streaks; and the spiracles appear as minute black dots. A dark line starting at side of head extends as far as the first of these. The larva stands erect on the edge of a leaf, and often keeps up a violent side to side vibration for long periods. When full-grown the larva is usually green, with an interrupted red dorsal stripe having a chain of white marks in its centre. (In some specimens this chain takes the form of a white cross at each segment-joint, having a dark spot behind its centre.) The dorsal stripe thickens and darkens towards the anal claspers. The ventral area is much paler, grey-green, and the green shades to a darker colour as it goes upwards. The latero-dorsal area is quite a dark green. Head red, with paler mouth parts, and whitish lines. Claspers red; a whitish streak on the anal ones. A less common form of the full-fed larva has ground colour dark brown (with the usual chain of white dorsal marks); ventral surface grey.

#### PUPA.

Spun loosely among leaves, is slender, pale green or yellow, with black lines defining antennae, wing venation, etc. There are two black dorsal streaks on the thoracic segments, and a faint dorsal line on abdomen, with black spots on either side of it. Also black lateral spots. Pupal stage lasts three weeks.