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VII. Notes on the Transformations of some South-African Lepidoptera.

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[PLATES XLVI.–XLIX.]

The following paper is the result of a collection and observations made during a residence of a year at Ladysmith and Pietermaritzburg, Natal, during which particular attention was paid to the habits and early stages of the Lepidoptera of the district.

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IV. Explanation of the Plates: p. 319.

I.—Remarks on the Climatic and Natural Conditions of Natal.

The climate may be described in short as one marked by extreme and rapid changes of temperature, except in what is known as the "Coast Belt." On the higher plateaux, about 3000 feet, a change of wind from west to east has, in the experience of the writer, caused a sudden drop of 22° of the thermometer in one hour; while in the colder months (June to September) the range between day- and night-temperatures is frequently as much as 70°. Such rigorous conditions, taken in conjunction with the want of covert, may account for the extremely poor butterfly-fauna of the higher levels. The rainy season, here coincident with the hotter months, usually begins in November and lasts till the middle of March, and is characterized by exceptionally severe thunderstorms and heavy sea-fogs and rains from the south-east; during the remainder of the year the weather is dry, the days being warm and the nights very cold.

Natal may be divided, for the purpose of these Notes, into three well-defined regions or zones, as the country rises in successive plateaux inland:—

1. The Coast Belt or Zone, from sea-level up to 1000 feet elevation. (Tropical Zone.)
2. The Middle Zone, from 1000 to 5000 feet elevation. (Subtropical Zone.)
3. The High Levels; 5000 feet elevation and over. (Temperate Zone.)

3 Communicated by R. Temes, F.R.S., F.Z.S.

Vol. XV.—Part VI. No. 1.—April, 1901.
1. The Coast Zone, in which Durban is situated, has a tropical climate, and abounds in thick jungles or "bush" (as it is called in South Africa) of virgin forest, the open spaces being mainly under cultivation for tea, pine-apples, sugar-cane, and bananas. In this district Bellevue, some 12 miles out of Durban, and Pinetown are good localities for Butterflies, while a fine tract of virgin forest, called the "Berea," extends to the very outskirt of the city of Durban; but, as a rule, all the bush in this zone is full of Butterflies and Moths of species characteristic of the tropics.

2. The Middle Zone comprises (for the purpose of these Notes) the Maritzburg district. The country here is much more open, and consists of grassy downs with here and there a little mealie cultivation, and a few plantations of wattle (Elephantorrhiza burchelli) and blue gum (Eucalyptus globulus), imported from Australia.

About 70 miles inland a plateau runs north and south, parallel to the sea, and attaining a height in some places of 5000 feet: on the eastern slopes of this range are the only coverts of virgin forest in this zone; they are known as the "Town Bush" (above Maritzburg) and "Karkloof" (about twenty miles north of it). In these coverts alone are the rarer species of Rhopalocera to be found: the commoner species, the larvae of which feed on more or less cultivated plants, such as orange, lemon, passion-flower, vine, oak, &c., being found in Maritzburg and its vicinity. It is remarkable, however, how many larvae in Natal feed on imported plants.

3. The High Levels comprise the country above the 5000 feet plateau above alluded to up to the Transvaal and Orange Free State. It mainly consists of open grassy downs (called "veldt" by the Boers), with here and there rocky knolls ("kopjes" or "koppies") covered with large boulders, entirely devoid of timber, with the exception of a few imported blue gums planted round the farm homesteads; from this district, however, came but few of the forms mentioned below.

II.—Observations on the Rhopalocera.

Most of the species which have been observed are double-brooded, the larvae of the first brood appearing in November and December, changing to pupae in January, and the imagines appearing early in February; while the second brood is met with in March, and remains in the pupal stage till the following October. Those which are single-brooded generally appear as imagines in October.

In the case of species which have already been figured and described, merely the writer's experiences and observations in rearing them are recorded, and the reader is referred to the published descriptions and figures.

Mr. J. F. Quenkett, Curator of Durban Museum, and Mr. W. Haygarth, of Natal Government Railways, have rendered much valuable assistance in the preparation of these Notes, and have presented many of the larvae described to the writer.
Mr. J. Medley Wood, Curator of the Durban Botanic Gardens, has kindly identified the various food-plants.

The larvæ are figured natural size, except where stated otherwise.

**RHOPALOCERA.**

Family NYMPHALIDÆ.

Subfamily Danae (Bates).

1. *Danais chrysippus* (Linneus).

The larva and pupa of this well-known species have been already figured by Mr. Trimen, in 'Rhopalocera Africæ Australis,' plate i., 1862.

The South-African larva seems to differ considerably from De Nicéville's description of the Indian form in 'Butterflies of India, Burma, and Ceylon,' where only "two large yellow patches" on the second and third somites are mentioned, and nothing is said of the crimson bases to the "dark retractile (?) horns."

The larvæ reared in Maritzburg fed on "Gomphocarpus fruticosus," a common plant in marshy places, and also on the "veldt" in Natal; on being cut the plant exudes a bitter white milky substance, which may account for the bitter taste of the imago, which is said to be its protection. This larva is much infested by the maggots of a very small hymenopterous insect, and out of many examples taken, only two survived to become imagines. I have heard similar experiences detailed by other collectors.

The imago is, however, common all over Natal, and is the only butterfly to be seen on the high levels during the colder months. I have noticed the *alcippeus*, but not the *dorippus* form in Natal.

Subfamily Acraeæ (Bates).

2. *Acraea acara* (Hewitson).

The larva and pupa of this species have been already figured by Mr. Trimen in 'South African Butterflies,' i. plate i. figs. 1, 1 a.

Numerous examples of this larva were reared in Maritzburg on a species of *Passi-flora*, which is a common plant on the verandahs of houses. The period passed in the pupal stage in January was only 11 days. Some of these larvae were placed in a box in which some of the same species had already changed into pupae, and the larvæ
proceeded to devour the pupae, although there was plenty of the food-plant in the box. This is the only species in which I have noticed this carnivorous habit. I have not obtained this species in the coast districts.

3. **Acrea petrea** (Boisduval). (Plate XLVI. fig. 1, larva; figs. 2, 3, pupa.)

*Larva.* Ground-colour pale golden brown, with a dorsal and lateral black lines, and a black transverse line on each segment bearing two largish white spots and six long branched black spines, those on 3rd, 4th, and 5th segments being longer than the remainder. Head large proportionately to body, black with a white bifid mark on front. Thoracic legs and claspers yellowish. The young larvae reared were all blackish in colour, and fed in companies on *Oncoba kraussiana* (Planch.).

*Pupa* appears to be dichromatic, some being pale brown and others ferruginous; in both forms the fine black lines and spots peculiar to *Acrea* pupae are much reduced. The pupal stage lasted 15 days in January.

The imago is common in the Durban and Maritzburg districts.

4. **Acrea encedon** (Linnaeus) = *A. lycia* (Fabricius). (Plate XLVI. figs. 4, 5, larva; fig. 6, pupa.)

*Larva.* Slaty black, with a yellow lateral line above prolegs and claspers. On each segment three deep black fine transverse lines enclosing two white patches dorsally and two yellow patches laterally. On the centre black line of each segment are placed six black spines (branched). Head, thoracic legs, and claspers black.

*Pupa* waxy white, with the usual fine black lines on the wing-covers and black spots with orange centres on the abdominal segments.

The larva figured was not fully grown. It became one-fifth longer and proportionately thicker before changing into a pupa.

It feeds on a species of *Commelina*, a common weed in gardens at Maritzburg.

The imago is one of the commonest butterflies in Durban, both on the Berea and in the Back Beach Bush; but is not so often seen in Maritzburg.

5. **Acrea rahira** (Boisduval). (Plate XLVI. fig. 7, larva; figs. 8, 9, pupa.)

*Larva.* Back and sides blackish; thoracic legs, claspers, and a line above them chrome-yellow. A dorsal white stripe, and on each segment four yellow spots from which spring four branched yellow spines, the lower pair springing from the yellow spiracular line. These spines are shorter than in the majority of *Acrea* larvae. Head yellow.

Feeds on a species of groundsel, *Erigeron canadense* (Linnaeus).
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Two figures of the pupa are given: one pupa is waxy white and similar to the pupae of other Acraea, the other ferruginous. The ferruginous pupae had nearly always been attacked by ichneumons, with which the larvae were much infested. The imago is a common butterfly in the coast district.

6. ACRAEA BUXTONI (Butler). (Plate XLVI. fig. 10, larva; figs. 11, 12, pupa.)

Larvae. Pale buff dorsally, deepening to pale green on the sides, with a buff lateral spiracular line above thoracic legs and claspers, which are also buff. Two dorsal pale green stripes, interrupted on every segment by a pale yellow transverse stripe bearing four black branched spines; below these are two buff-coloured spines springing from the buff spiracular line. Head yellowish.

Feeds on a species of nettle, locally called "pink hibiscus" (although it is not a hibiscus at all). It is a common plant on the Berea, Durban, where I found the larva, and has been identified for me by Mr. Medley Wood as Triunfetta rhomboidea (Jacq.).

The larva is here figured, = 4, to exhibit the detail.

Pupa waxy white, with the usual fine black lines and spots with orange centres, beautifully gilded; pupae formed in the dark, however, inside a box, are slaty black.

Imago fairly common in Durban district.

7. PLANEMA ESBEIRA (Hewitson).

This larva and pupa have been figured by Trimen, "South African Butterflies," i. pl. i. figs. 2 & 2 a. I took it on a species of nettle (Urtica sp.), in the covert known as the "Back Beach Bush," near Durban. My specimens resulted in two females of the white variety A. The imago is a very common butterfly in the Durban district.

Subfamily NYMPHALINAE (Bates).

8. JUNONIA CEBORENE (Trimen). (Plate XLVI. fig. 13, pupa.)

This larva has been already figured by Trimen, "South African Butterflies," pl. i. fig. 4.

I reared the larva from an egg which I saw deposited by the female on Justicia natalensis, a common plant amongst the grass of the veldt.

Pupa chocolate-brown, with four rows of small yellow spots on each segment, and a submarginal row of white spots round the edge of the wing-covers, with a row of four white spots inside them. The specimens reared passed 13 days in the pupal stage.
(23rd Jan. to 4th Feb.). I reared one specimen from the egg which I saw deposited by the female, but regret that I made no notes of the earlier stages, save that the young larvae were, during the first two molts, lighter and more violaceous in colour, and the spines were proportionately much smaller.

The imago is common everywhere in Natal.

9. Junonia clelia (Cramer). (Plate XLVI. fig. 14, larva; fig. 15, pupa.)

Larva. Dark slaty black, covered with minute yellowish-white atoms, and each segment bearing black branched spines as in the larva of J. cebrine, from which it only differs in being lighter coloured and brownish underneath, and in having an interrupted white lateral line above spiracles.

Feeds on Asystasia coronandeliiana.

Pupa. Dark chocolate-brown; wing-covers lighter; yellowish-white spots on thorax and each segment and wing-covers, as in pupa of J. cebrine. Duration of pupal stage 11 days (March 1 to 12).

Imago very common in Durban, more rarely seen in Maritzburg.


The larva of this well-known species has been so often described that any description here would be superfluous; I will therefore merely state that I reared it on a large species of thistle named Stoebea discolor (Harv.). The larva was very similar to that of Junonia clelia, but differed in being longer in proportion to its width; the branched spines were yellow instead of black, and the black dorsal line was more defined; the pupa was beautifully gilded.

11. Charaxes candiope (Godart). (Plate XLVI. fig. 16, larva; fig. 17, pupa.)

Larva. Grass-green, irrated with minute yellow spots, which coalesce into a lateral line below the spiracles, which ends on the 12th segment in a bifid tail. On the 6th and 8th segments are placed three yellow spots with orange centres, one dorsal and two subdorsal, the dorsal spot being larger than the subdorsal spots and more oval in shape. Head dark green in front, brownish to pale yellow at the sides, with four light brown serrated horns, two springing divergently from the top of the head and two from the sides.

Feeds on a species of Croton, probably Croton sylvaticus (Hochst).

Pupa. Grass-green; very short and thick, suspended by tail to stem of food-plant. I am indebted to Mr. Walter Butcher for a specimen of this larva from the neighbourhood of Durban, where the imago is common on the Berea in the summer months.
Family PAPILIONIDÆ.

Subfamily PIERINE (Bates).

12. PIERIS SEVERINA (Cramer). (Plate XLVI. fig. 18, larva; figs. 19, 20, pupa.)

Larva. Dark green on back, covered all over with very fine whitish hairs. Two lighter subdorsal lines, and below them a row of yellow spots, one on each segment, placed in a darker green line. A light yellow lateral line along spiracles above a light green line just above thoracic legs and claspers, which, with under surface, are white. Head dark brown with minute white spots; 1st segment light yellow anteriorly.

Feeds on Capparis coriophifera.

Pupa. Bluish green with two yellow spots on each segment subdorsally, and four on each side of thorax. A fine black line along dorsal side of thorax, and two small white tubercles with black bases at angle of wing-covers.

Imago common in Durban and Maritzburg.

This larva is described in ‘South African Butterflies’ as “Dull reddish sandy on back, with a median longitudinal streak of violaceous grey.” It may be dimorphic; but I have never met with a specimen of this colour (‘S. African Butterflies,’ vol. iii. p. 69)1.

13. PIERIS HELLICA (Linneus). (Plate XLVI. fig. 21, larva; fig. 22, pupa.)

Larva. Yellow above, bluish green underneath; a light blue dorsal stripe, and on each side of it a broader greenish stripe, and below these a pale yellow spiracular stripe; body covered by minute black papille and some sparse short hairs; head bluish, covered with black dots.

Feeds on a common weed in the grass of the veldt, of which I did not get the name.

Pupa. Yellow above and green underneath, covered with minute black spots.

Pupal stage lasted only 7 days in February.

Common everywhere in Natal.

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1 "My description (l. c.) of this larva was made from numerous Natalian specimens sent alive to me by Colonel Bowker. I observed, on the page quoted, that in its earlier stages the larva is dorsally much tinged with greenish, and it is of interest to find that the green tint commonly persists till the full-grown stage.”—R. Titchen.
14. Papilio policensis (Cramer). (Plate XLVI. figs. 23–28, larva; figs. 29, 30, pupa; fig. 31, head of larva with tentacles.)

Larva. 1st stage. Chocolate-brown, each segment with a transverse yellow stripe; three yellow spines on thoracic segments, and a yellow bifid tail consisting of two yellow divergent spines. The larva does not exceed ½ inch in length in this stage.

2nd stage. Ground-colour ferruginous red, with transverse black stripes as follows:—one between each two segments, and two on each segment enclosing a greyish-blue streak between them. 1st and 2nd segments and bifid tail yellow with black points. A black spiracular line divides the ferruginous upper portion of the body from the lower portion, which is violaceous grey. Three thin black spines with scarlet bases on thoracic segments. Head ferruginous, thoracic legs and claspers pale grey.

3rd stage. Ground-colour has become green, fading to yellow at sides above the black lateral line; the black line dividing the segments has become obsolescent, and the two black lines on the segments enclosing the blue streak have become ferruginous. Otherwise as in 2nd stage.

In this stage larva attains its full size.

4th (and final) stage. Entirely green above, with the exception of the three black spines on the thoracic segments, which still retain their scarlet bases, and are joined by transverse black streaks; under surface violaceous grey. Head and Y-shaped tentacular organ pale green.

Larva feeds on Uvaria caffra, called by the natives “Maswinda,” a common bush in the coverts of the coast-belt.

Pupa green, very broad, and very much flattened, with a very prominent thoracic dorsal projection pointing forward; the lateral projections pale ferruginous; two subdorsal lines of black spots on each side.

One pupa formed in a box was pale pinkish, with the subdorsal region strongly marked with black.

Only the 2nd stage of this larva is described in ‘South African Butterflies’ (vol. iii. p. 203).

The imago is common in the Durban district.

15. Papilio brasidias (Felder). (Plate XLVI. figs. 32–34, larva; figs. 35, 36, pupa.)

Larva. 1st stage. Pale yellowish ferruginous, with reddish diagonal streaks on sides; back of 3rd, 4th, and 5th segments occupied by an olive-green area, with a
median dorsal pink stripe from head to tail, bounded by an olive-green stripe on each side. 1st segment reddish brown superiorly, with short tubercles on each side; a pair of short pink tubercles dorso-laterally, bounded inwardly by dark olive-green, and joined by a fine pink transverse line on 2nd and 3rd segments; tail bifid.

2nd stage. Pale green above, darker green underneath; all the markings described in 1st stage defined by slightly darker green, except the olive-green area on the back of the thoracic segments, which has become dark green in this stage, while the pink median dorsal line and transverse stripes have become a rather startling whitish cross.

3rd (and final) stage. Shortly before changing into a pupa the larva loses all its distinctive marks, and becomes very pale yellow all over, almost diaphanous.

Feeds on *Popovia caffra* (Kaffir name, “small Maswinda”), a common shrub in the coast district.

**Pupa.** Bright green. On each side of back, from apex of dorso-thoracic projection to anal extremity, a narrow yellow elevated stripe; on summit of back a pair of similar stripes commencing considerably apart near base of dorso-thoracic projection, and converging till they meet at anal extremity. A series of diamond-shaped lozenges down the back, medially, and a series of diagonal streaks subdorsally between the two yellow stripes, and extending beyond them to the cephalic area. Duration of pupal stage 21 days (24th January to 16th February).

Common in Durban and the coast-zone. I have taken the allied species *Papilio leonidas* in the same coverts and at the same time. It is, I should say, doubtful if they are distinct species. *P. brasidas* is the commoner species in the Durban district. I have not met with either in the vicinity of Maritzburg.

16. **Papilio morania** (Angas). (Plate XLVI. figs. 37–39, larva; fig. 40, pupa.)

**Larva (early stage).** General colour grass-green on back, incisions of segments pale blue; two dark chocolate-brown lateral stripes above spiracles (which are white). Head, thoracic legs, claspers, and bifid tail brownish yellow. 1st segment yellow dorsally, bearing two short tubercles on each side; 2nd and 3rd segments bearing dorso-laterally a pair of black spines, short, with orange bases, and joined by two broad transverse streaks of chocolate-brown; that on the 2nd segment having three brown spots posteriorly, and that on 3rd segment five brown spots anteriorly, and being much larger than the other, extending posteriorly over part of the next segment; from this three dark brown longitudinal lines, one dorsal and two subdorsal, extend to the 11th segment, where the two subdorsal lines become two chocolate-brown spots joined by fine transverse lines, while the dorsal line (which is much finer than the others) extends to the tail. A double lateral line of black spots along the segments, two on each segment along the upper line, and one on each segment in the lower line.

2nd stage. On casting its last skin, the larva emerges exactly the same as in the...
early stage; but in a very short time (perhaps half a day) it loses all its distinguishing characters in that stage, and becomes uniform pale green; a yellow lateral line above a darker green line being all that remains to represent the two very distinct brown lateral lines of the early stage, and the under surface, thoracic legs, claspers, and head have all become pale green. The black spines on the thoracic segments, however, remain the same, except that their bases become more reddish. In this stage the larva is very similar to the larva of *P. policenes* in its green stage; but the latter always retains its brown lateral streak and its blue-grey under surface.

3rd (and final) stage. Like the larva of *P. brasidas*, this larva also becomes pale yellow and almost diaphanous just before pupating.

It feeds on *Uvaria caffra* (the large "Maswinda"), like the larva of *P. policenes*.

*Pupa.* Grass-green and more rounded than in pupa of *P. brasidas*. Dorso-thoracic prominence thicker and pointing more upward; a pair of raised yellow lines from thoracic prominence along the sides to anal extremity, also a second pair of similar lines run subdorsally from base of thoracic prominence to tail, where they converge and meet.

Pupae formed on 1st February remain over the winter months in this stage.

The imago is common in the vicinity of Durban.

17. *Papilio demodocus*, Esper. (Plate XLVI. figs. 46–48, larva; figs. 49, 50, pupa; fig. 51, head of larva with tentacles.)

*Larva (early stage).* Ground-colour black, with short yellow tubercles on the thoracic and 10th, 11th, and 12th segments. Top of 1st segment yellow between the two tubercles; a dorsal line of diamond-shaped lozenges commences grey on the 4th segment, becomes white on 6th and 7th segments, and darkens again to grey and brown on the remaining segments to the tail, where it is obsolescent. On 4th, 5th, and 6th segments are white lateral spots, which converge and meet the dorsal line of lozenges on 5th and 6th segments; similar white lateral spots on 10th, 11th, and 12th segments. Tail bifid and yellow, head reddish. This larva, which apparently mimics the droppings of birds, varies but little in this stage.

*Full-grown stage.* The ground-colour in this stage varies according to the colour of the lemon-leaves on which the larva is feeding, from pale green almost yellow to dark green; the transverse streaks on the sides also vary from light brown almost ferruginous in the pale specimens to deep velvety black in the dark green examples.

The most common form has a grass-green ground-colour, with velvety black transverse streaks on the three thoracic segments, and black diagonal streaks on the 7th, 8th, and 9th segments, converging till they almost meet dorsally on 8th and 9th segments. Under surface and claspers greyish white, and a broad white lateral line above spiracles. Head and thoracic legs reddish; head surmounted by two reddish tubercles, between
which the Y-shaped tentacular process is situated. The transverse black streaks on the 2nd and 3rd segments have a line of ferruginous ocellate spots variegated with light blue and yellow. The black diagonal streaks on 7th, 8th, and 9th segments are mottled with rather indistinct purple ocellate markings, and edged outwardly with fine lines of pale yellow. There are also short diagonal streak-like spots on the 9th and 12th segments just above the white spiracular line. Two yellow tubercles over the anal extremity.

The pupa also varies in colour according to its surroundings: the most common form is light green, paling to two yellow subdorsal streaks; head and cephalic prominences (which are well-marked) brown, as is also the thoracic prominence posteriorly, from which a broad brown streak extends almost to the anal extremity. Several dark green and brown spots on the segments.

I first bred this larva at Ladysmith, in the high level zone, in April 1898, on a plant named Clausena inaequalis; the larvae began pupating on the 7th April, and the first imago emerged on 12th October, 1898. I noticed that these specimens were smaller than those which I subsequently reared on lemon-leaves at Maritzburg in December and January following; these individuals only averaged a fortnight in the pupal stage.

This is the commonest and most widely distributed Papilio in S. Africa.

18. Papilio xireus (Cramer). (Plate XLVI, figs. 41–44, larva; fig. 45, head of larva with tentacles.)

Larva. 1st stage. Ground-colour black, paling to greenish on the sides, the under surface, thoracic legs, and claspers being greenish yellow; head, thoracic, 10th, 11th, and 12th segments surmounted by orange-coloured tubercles in pairs; the pairs on the three thoracic segments being joined by transverse orange lines bearing two to three tubercles each, smaller than those at the extremities. 7th, 8th, and 9th segments ferruginous; 5th, 6th, and 10th segments black superiorly with white sides. In this stage the larva somewhat resembles that of P. demodocus. In some individuals the black markings are replaced by very dark green.

2nd stage. Ground-colour grass-green superiorly, under surface greyish white. No ferruginous markings on 7th, 8th, and 9th segments, and no lateral white spots on 5th, 6th, and 10th segments, these being replaced by a pale lemon-coloured lateral streak. The tubercles, which have become light lemon-coloured, are confined to the thoracic and 12th segments.

3rd stage (final). Ground-colour generally dark green, but, like P. demodocus, varying according to the colour of the leaves of the food-plant. A wide pale greenish-blue oval area with a thin whitish line across its centre, on the summit of the 3rd and 4th segments, bounded anteriorly and posteriorly by a transverse line of ocellate spots:—the anterior series outlined in black on an ochreous transverse band, the ocelli at the
extremity of the band being larger than the rest; the posterior series indistinct: four ocelli in each series have light blue centres. A lateral white stripe along the spiracles from 4th to 12th segments: tubercles on anal segment yellow, well-defined, and joined by a raised yellow pale streak; tubercles on back of 1st segment pale and inconspicuous. The Y-shaped tentacles in this species are bright crimson and much longer than those of P. demodocus; the scent emitted is, however, similar.

Pupa. Bright green: point of dorso-thoracic prominence, two spots below it (at abdominal base), and edge of lateral abdominal angles creamy reddish. In shape somewhat attenuated anteriorly, cephalic processes short and directed laterally outward, so that the frontal line of head is widened and but slightly concave. Thoracic lateral angles moderately acute; dorsal prominence also elevated acutely but not inclined forward. Sides of abdomen widely flattened, and so extended as to form a very marked angle on each side of third abdominal segment; whence abdomen narrows very rapidly and greatly to the extremity. Infra-pectoral region, where wing-covers meet, very strongly convex.

A marked constriction dorsally at junction of thorax and abdomen.

In its natural position, attached vertically or nearly so, head uppermost, the anterior portion of this pupa is seen to be very much more bent backward than it is in P. demodocus. I have taken this description of the pupa, with some alterations, from 'South African Butterflies,' as I thought it so well describes the peculiarities in shape of the pupa.

The imago is not so often met with as P. demodocus, and seems to prefer wooded country more. In its haunts, however, and in the coast district it is one of the commonest species.

III.—Observations on the Heterocera.

Family SATURNIIDÆ.

1. Actias mimose. (Plate XLVII. figs. 1, 2, larva; fig. 3, cocoon.)

Larva. Ground-colour grass-green, with paired dorsal series of long conical humps with yellow apices, surmounted by three or four short black hairs, and the same number of longer yellow hairs, from 2nd to 10th somites inclusive; the 11th somite has only one similar dorsal hump, and the 1st somite no hump, with the black and yellow hairs planted just above the head; a subspiracular line of small tubercles with similar hairs. Between each somite, from 3rd to 11th, a yellow transverse streak
folding over a blue transverse streak at the incisions of the somites. Head and thoracic legs ferruginous, spiracles white, with ferruginous centre.

In the early mouls this larva is ferruginous, the head and thoracic legs being black. Feeds on *Sclerocarya caffra* (Soud.), called in Natal "the wild mango tree"—a common tree in the coast districts, but not found higher up.

When about to change the larva spins a greyish-white silky cocoon, with a line of ventilation-holes round the exit end, which it attaches longitudinally to a twig of the food-plant. The pupa is chocolate-brown and of the usual shape. This moth appears to be double-brooded, the larva appearing in November and February, and the perfect insects in January and the following October.

Common at Sydenham, near Durban.

2. *Nudaurelia wahlbergii* (Boisduval). (Plate XLVII. fig. 4, larva; fig. 5, pupa.)

*Larva.* Ground-colour deep velvety black, each somite bearing four branched ferruginous spines with reddish bases, two subdorsally and two laterally, from 2nd to 12th somite inclusive, the spines on the 2nd somite having black bases. Between the subdorsal and the lateral row of spines are placed a collection of small yellow spots on each somite; the red bases of the subdorsal and lateral spines being joined on 10th and 11th somites. Spiracles white: a subspiracular row of small yellowish tubercles bearing a few whitish hairs, one on each somite. Head and legs concolorous with body.

Feeds on English oak, but has also been taken in large numbers on peach-trees, in gardens in Maritzburg—both these trees being imported species in Natal. When full-fed it burrows underground, where it makes a sort of web 1, inside, which it undergoes its transformation. Individuals which changed about 14th March reappeared as imagines on 6th May and subsequent days.

*Pupa* dark chocolate-brown.

Common in Maritzburg.

3. *Buna caffraria* (Stoll). (Plate XLVII. fig. 8, larva.)

*Larva.* Ground-colour deep velvety black; each somite, from 4th to 12th, bearing eight yellow tubercular processes, two subdorsally, two laterally, and four (in two rows) on each side subspiracularly. The 2nd somite bears four black processes, two subdorsally and two laterally; the 3rd somite bears four black processes, as in the 2nd,

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1 "The group of *Antherae* to which this species belongs—*Nudaurelia*—is noted for forming no cocoon, and the closely allied species *A. (N.) cytherea*, *menippa*, and *tyrce*, as well as *Buna caffraria*, as far as I have observed, simply bury themselves without any attempt at forming even a 'web.'"—R. Temminck.
and two small yellow processes on each side, in line with the subspiracular processes on the other somites. Spiracles red; those on the 4th to 11th somites being surrounded by an irregularly shaped red area. Head and legs concolorous with body.

Larva figured has not attained its full size.

Mr. Quckett writes: “The food-plants of this *Bunaea* are, at Durban, *Celtis kraussiana* (Bernh.), and *Ekebergia meyeri* (Presl), and at and near Maritzburg a species of *Cussonia*, on which I have taken the larvae in the Botanic Gardens.”

This larva, which much resembles that of *N. wahlbergi*, undergoes its transformation underground in a similar manner to that larva, and is double-brooded, the larvae appearing in November and December, and the second brood in March and April; these latter individuals remain pupae until the following October, my first specimen emerging on 12th of that month.

_Pupa_ dark reddish brown; very similar to that of _Gynanisa maia_ (Klug).

4. **Gynanisa maia** (Klug). (Plate XLVII. fig. 6, larva; fig. 7, pupa.)

_Larva._ Ground-colour pale green, with paired dorsal series of humps; each somite, from 2nd to 12th, bearing four silver spikes with yellow points inclined backwards, one subdorsally and one laterally on each side; also a number of small silver spots placed irregularly over each somite; the first somite has no spikes, but is raised to a sharp ridge, with a black edge, which may be of assistance to the larva in forcing its way through the ground. Spiracles purple, and immediately beneath them a purple lateral line having on its lower edge a yellow raised lateral line bearing a small orange-coloured tubercle on each somite, and thickening considerably above anal claspers, where it has a series of small black tubercles superiorly. Head green, with black side-streaks defining the eye. Under surface darker green with minute white spots, and a row of small red tubercles, one on each somite just above the claspers, which are green. Thoracic legs pale brown banded with black.

Feeds on the common wattle (_Elephantorrhiza burchellii_, Bth.) and on several species of thorny acacia. When full-fed the larva burrows underground, and there undergoes its transformation, making little or no preparation in the way of a web.

The _pupa_ is dark reddish brown, and is remarkable for the large size of the antennae covers. The moth is double-brooded, the larvae appearing in November, and the imagines emerging end of January; the second brood of larvae appearing in March and emerging in the following October. At Fort Napier, Maritzburg, the wattle-trees were completely cleared of their leaves by the March brood this year.

If the collector possesses one female, any number of males can be secured by placing the female in a box on the verandah. The writer has seen as many as twenty males at one time fluttering round the box about 10 p.m. Next morning the verandah was strewn with their wings, a cat, as was subsequently discovered, having caught and devoured them.
5. **Pseudaphelia apollinaris** (Westwood). (Plate XLVII. figs. 11, 12, larva; fig. 13, pupa.)

*Larva.* Ground-colour bluish grey, each somite with a broad transverse indented black streak, thickest on 2nd somite, and two finer black transverse lines across the upper part of the body between the somites. Body broader in the middle than anteriorly or posteriorly. Above anal extremity a sharp-pointed black horn—a fine black spiracular line, and immediately below it a broad raised ferruginous line bearing a small black tubercle crowned with some short yellow hairs on each somite. Under surface and abdominal claspers pale yellow. Head, thoracic legs, and anal claspers black. A tuft of short hairs on the summit of the 2nd somite.

Feeds on *Jurrea heterophylla* (Smith), and undergoes its transformation underground; the period passed in pupa state (in March) was 17 days.

*Pupa* dark red-brown, abdominal somites strongly marked; chiefly remarkable for the long sharply-pointed tail resembling the point of a thorn.

The imago is a common species, flying by day, in the Berea Bush, Durban.

6. **Urota sinoe** (Westwood). (Plate XLVII. fig. 9, larva; fig. 10, pupa.)

*Larva.* Ground-colour velvety black, with a series of paired pale yellow humps formed by a thick raised transverse yellow streak, bearing a pair of short tubercles crowned with short yellow hairs dorsally on each somite, and a series of similar short tubercles laterally at the lower end of each streak. Spiracles pale yellow, and below them an interrupted, raised, subspiracular line covered with short yellow hairs. Head black, surmounted by a yellow transverse band where it joins 1st somite, and crowned with some yellow hairs. Thoracic legs black, abdominal claspers yellow banded with black, anal claspers and extremity yellow, all covered with yellow hairs.

Feeds in companies on the "Kaffir boom" tree (*Erythrina caffra*, Thb.).

*Pupa* dark red-brown and of the usual form, with a sharpish spur or horn at the anal extremity. The transformation is carried out underground.

Fairly common in Durban district.

7. **Ludia smilax** (Westwood). (Plate XLIX. fig. 6, larva; fig. 7, cocoon.)

*Larva.* Ground-colour rufous, with irregular pale blue spots surrounded by a thin white line. On each somite a short tuft of black hairs, surmounted by a tuft of longer and finer hairs of same colour, and the first five and last somites covered with short yellow hairs. Head, legs, and claspers brown.

This larva, which looks, through a microscope, like a piece of old china ware in colour, is one of the most unpleasant larvae to handle that I have ever met with. The short black hairs on each somite possess poisonous qualities, which produce on the hand a white rash akin to that produced by a bad stinging from nettles. It forms a
cocoon round itself, with its hairs, on the side of the box. Food-plant oak; but I have also reared the larva on Jasmine (Jasminum pubigerum).

On quitting South Africa on a short leave of absence home in May 1899, I left two specimens of this larva, in the pupal stage, together with all my larvae which had not completed their transformations, in the care of a friend who was remaining on in Pietermaritzburg, as I was afraid that, during the voyage, the heat of the tropics would cause them to emerge prematurely; but to prevent, as I thought, the possibility of any mistake in identifying the imagines, I placed each larva or pupa in a different box, with a small ticket, with a reference to the plate and figure of the larva in my sketch-book, which I requested my friend to attach to the pin of the imagos when it emerged.

I subsequently returned to South Africa when war broke out, and on the relief of Ladysmith was invalidated home; on passing through Pietermaritzburg in March 1900, my box containing the emerged imagines (which had all been placed in a large cork box which I had left with my friend) was returned to me, when I found my ticket referring to the drawing of this larva pinned to an imago of Ludia smilax (Westw.). On reaching England I forwarded a figure of the imagos to Mr. R. Trimen, and asked him for the name of the moth, as I was unacquainted with it. I was therefore much surprised to receive the following reply from him:—"I know the moth you figure in your note of yesterday very well, it is Ludia smilax (Westw.); but I am much surprised to hear that this species resulted from the 'old china' caterpillar figured by you, because I have by me figures of no fewer than three quite different larvae attributed to 'smilax'—I mean different from each other, as well as entirely different from yours. If you are quite certain about the moth resulting from the old china larva, then this stage of L. smilax presents amazing variability. W. D. Gooch and Dr. J. E. Seaman made drawings of this caterpillar; they are rather rough, but those of the apparently more prevalent variety agree in representing a pale greenish larva with broad black rings; Gooch thought that this was the male, but he does not seem to have proved this, though he bred a male from one of this pattern. Gooch's second form of larva is quite like the other in shape, tubercles, hairs, &c., but the black rings are almost everywhere broken up into mere scattered spots, and the ground-colour, generally, is dull yellow; he thinks this is the female.

"Much more amazing is Dr. Seaman's second form of smilax larva; it is black, marbled with white, and with vivid scarlet rings! There is no doubt that some larvae seem to vary almost indefinitely, but if this is a true case all through, I think it is unsurpassed."

It is therefore with some doubt that I append the description of this larva as the larva of Ludia smilax (Westw.), inasmuch as I cannot vouch myself, from personal observation, for its accuracy, though I have no reason to doubt the accuracy of my friend, who is certain that no mistake has been made.
Family SPHINGIDÆ.

Subfamily ACHERONTIÆ.

8. Acherontia atropos (Linnaeus).

No description is necessary of the larva of this well-known species; and I will merely remark that I reared it on a species of Spathodia, an imported tree which is often met with in Berea Bush, Durban. The larva underwent its transformation on 14th February, and the imago emerged on 17th March after a pupation of 38 days. This is one of the instances of larva feeding on imported trees in Natal.

I also reared the dark form (body uniformly fuscous, first three somites pink subdorsally) at Maritzburg, on Jasminium pubigerum (also an imported plant in Natal). This larva underwent its transformation on 6th April, and hibernated in the pupal stage; this form is much rarer than the green and yellow form.

Subfamily SMERINTHINÆ.

9. Lophostethus dumolinii (Latreille) t. (Plate XLVIII. fig. 7, larva; fig. 8, pupa.)

Larva. Ground-colour very pale green, a pair of blue-black steely branched spines with pale yellow bases and basal areas subdorsally on each somite from 2nd to 10th. The 1st somite has no spines, and the 11th has only one spine, thicker than the others and replacing the horn in other species. A lateral row of smaller black spines springing from the upper edge of a spiracular row of large yellow spots; a subspiracular row of small black spines springing from lower edge of above-mentioned spots, and, below these, two spines placed diagonally on the 4th, 6th, 7th, 8th, and 9th somites just above the claspers; the 5th somite having three spines, and the 2nd, 3rd, and 10th somites one spine each in this series. Abdominal claspers yellow, with black extremities, each extremity bearing three short black divergent spines; anal extremity and claspers horny and rufous, with a broad black edging. Head pale green superiorly, pale ferruginous inferiorly; two black vertical stripes on the face, ending with a detached black spot above them. Sides of head black, as in the larva of Acherontia atropos. Thoracic legs pale ferruginous, banded with black.

1 "A brief description of the extraordinary spiny larva of this Hawk-moth—drawn up by me from a coloured drawing by Mr. W. D. Gooch, and a coloured photograph by the late Dr. J. E. Seaman—was published by Prof. Maldon in his English edition of Weismann’s ‘Studies in the Theory of Descent,’ vol. ii. pp. 527, 528 (1883)."—R. Trimen.

Vol. XV.—Part VI. No. 3.—April, 1901.
Feeds on *Hibiscus tiliaceus* (Linnaeus). When full-fed the larva burrows under ground, and forms a sort of chamber with a web, in which it undergoes its transformation.

The *pupa* is dark reddish brown, and only distinguishable from that of *A. atropos* by its greater thickness and the abdominal somites being more horny.

The specimens reared remained in the pupal state from February till the following October.

The imago is not uncommon in Durban and the coast districts.

**Subfamily Chærocampinae.**

10. *Chærocampa capensis* (Linnaeus). (Plate XLVII. figs. 17, 18, larva; fig. 19, pupa.)

*Larva.* Ground-colour pale green, thickly irrorated subdorsally with darker green diamond-shaped spots, from 5th to 11th somites; these spots coalesce into a series of diagonal streaks along the somites subdorsally and spiracularly. A paler green lateral stripe from 5th to 11th somite, with a dark green stripe along its upper edge; horn very short and pink; a reddish "eye"-like spot edged with white superiorly on 4th somite. Head and claspers green, thoracic legs pink; spiracles red.

When ready for its transformation the larva becomes dull pink flesh-coloured, the lateral line only remaining green; the eye-like spot and diamond-shaped irruptions become black, and the ground-colour of the dorsal region becomes dull yellowish. The figure is taken from a larva in this final stage.

Feeds on common vine.

*Pupa.* Head, wing-covers, and dorsal region dark brown, with black markings; abdomen pale pink flesh-coloured. Time passed in pupa state about five weeks. When about to change the larva spins a web amongst leaves, &c., on the surface of the ground in some sheltered place, and undergoes its transformation inside.

The imago is fairly common in the evening in flower-gardens in Maritzburg.

I have also reared a red form of this larva, which may be described as follows:—

Ground-colour uniformly ferruginous; a pale subdorsal stripe from 2nd somite to horn, white above, darkening to yellow beneath, bounded inferiorly by dark red diagonal stripes on each somite from 4th to 10th. On 4th somite a conspicuous "eye"-like spot, black superiorly, white inferiorly.

Mr. R. Trimen writes to me of this larva:—"The red form of *C. capensis* larva is, at Cape Town (where the species feeds on the cultivated vine), very much rarer than the green one; the colour of the latter is decidedly protective on the cultivated vine, but that of the red one was not so (except slightly, perhaps, when the larva is on
the older woody stems). I imagine, however, from one of the red ones which I found on its native food-plant, the wild Cape vine (Cissus capensis), that this tint was probably acquired in relation to the latter plant, which is densely clothed with red down on the younger shoots and underside of the leaves. I have noticed the common Cape Butcher-bird (Ficus collaris) taking capensis-larvae from the cultivated vines at Cape Town and spiking them on thorns; such persecution would seem to show that these larvae are in need of protective resemblance to their food-plants."

11. Chaerocampa osiris (Dalman). (Plate XLVIII. figs. 3, 4, larva; figs. 5, 6, pupa.)

Larva. Ground-colour pale green, thickly irrorated with darker green diamond-shaped spots as in C. capensis. A paler green lateral stripe from 5th to 11th somites, ending at a very small yellow horn. Two large "eye"-like spots (green with a light blue centre, on which are placed six minute white spots), surrounded by a narrow light yellow iris, on 4th somite; two smaller round yellow spots on 5th somite. Head, spiracles, and claspers green; mandibles and thoracic legs pink.

When ready for transformation the larva becomes pale reddish brown with a violaceous suffusion; the intersections of the somites and lateral stripe become white, while the diamond-shaped spots become black where they are most thickly placed near the junction of the somites; the large "eye-like" spots become brown with a green iris, while the yellow spot becomes black. The effect of these changes is to give the larva, when viewed dorsally, a very startling resemblance to a snake of the banded Krait species.

Feeds on the common vine.

Pupa light brown dorsally, variegated with black spots and streaks defining head, eyes, antennae, wing-covers, nervures, and abdominal somites; breast, wing-covers, and underside of abdomen pale pink flesh-coloured.

This pupa is chiefly remarkable for its abnormally long snout, the palpi-covers being produced to form a shield or covering for the haustellum.

The transformation takes place amongst leaves on the surface of the ground, without much attempt at making a chamber with a web, the leaves being loosely strung together by means of a silken thread.

This larva was received from Bellevue, a suburb of Durban; the imago seems to be rather uncommon.

12. Chaerocampa balsaminae (Boisduval). (Plate XLVIII. fig. 1, larva; fig. 2, pupa.)

Larva. Ground-colour bright grass-green; from 6th to 11th somites a brown inter-
rupted dorsal streak, and traces of two double subdorsal streaks mainly formed by small brown spots arranged in transverse rows across the somites. On the 4th somite a pair of black "eye"-like spots with a white iris; on the 5th somite a pair of red "eye"-like spots with a white iris, and between these the dorsal streak above mentioned is continued, green in colour, to the head; thoracic legs pink; head and claspers green; horn light brown and straight, ending in a point.

Feeds on *Jussiaea repens* (Linnaeus).

*Pupa.* Head, thorax, and wing-covers yellowish brown, remainder of body reddish brown, paler dorsally and abdominally; palpi-covers slightly produced and prominent. The pupa is formed in a light web amongst leaves on the surface of the ground, in the usual manner of the larvae of *Chborocampine.*

The imago emerges in about a fortnight (in February).
Found in Durban district.

18. *Chborocampa idricus* (Drury). (Plate XLIX. fig. 1, larva; fig. 2, pupa.)

*Larva.* Ground-colour pale green; each somite, from 4th to 10th, with a pair of triangular spots, brown superiorly, yellow inferiorly, at its anterior edge. The pair of spots on 11th somite are lengthened into a brown and yellow streak, and end in the horn, which is brown, and sharp-pointed like a horn. The pair of spots on the 4th somite are larger than the remainder, and bear on their yellow area an oval, black, "eye"-like spot with a white pupil near its upper edge; each spot has three minute white points on its brown area; spiracles white; a pinky-white subspiracular line, and above it a collection of brown points at each intersection of the somites. Head and claspers green, thoracic legs light brown.

Feeds on *Spermacoce natalensis* (Hochst.), a common herb among the grass of the veld.

*Pupa.* Pale golden brown, with small black spots defining the nervures on the wing-covers, and sprinkled over the abdominal somites; spiracles black. Period of pupation about 25 days. Habits and transformation similar to other species of the genus.

The imago is very common, hovering over flowers in gardens in Maritzburg, from the early afternoon till dusk.

The larva and pupa are here figured $\times \frac{5}{8}$ in size on nature.


The transformations of this insect are so well known that figures and detailed descriptions are unnecessary here; but it may be as well to note that numerous specimens were reared from the larva on oleander, which plant is a common shrub in gardens in Maritzburg. The colour of the larva in Natal is very pale green (almost
yellow) dorsally, darker below; a white lateral line with numerous small silver-white spots sprinkled over, above, and below it, the lower edge of the line is bounded by a broad light blue area extending downwards as far as the spiracles from 6th to 10th somites. On 3rd somite a pair of large, black, double-pupilled, eye-like spots, the pupils being white, surrounded by a blue and a crimson iris.

*Pupa* pale ferruginous; habits and transformation similar to those of *C. capensis*.

Duration of pupa state 10th or 11th February to 4th March.

Subfamily *Sphinginae*.

15. *Protoparce mauritii*, Butler. (Plate XLVIII. figs. 9, 10, larva; fig. 11, pupa; fig. 12, larva, dorsal view of 1st four somites.)

I am informed at the British Museum that the name *Macrosila solani*, by which this species is usually known in South Africa, should be applied to the Mascarene form.

*Larva*. Ground-colour grass-green, under surface darker. Paired humps on 1st and 2nd somites; a purple dorsal stripe from 4th somite to horn; lateral oblique purple stripes from 4th to 10th somites; these stripes join the dorsal stripe on every somite, and are defined inferiorly by parallel narrow white oblique stripes; horn ferruginous, long, and beset with yellowish tubercles; spiracles small, red, with black centres. Head green, with vertical black stripes on the face and sides, as in larva of *A. atropos*. Thoracic legs black, claspers green.

Feeds on *Duranta plumieri*, a common shrub in gardens in Natal; but which, according to Mr. Medley Wood, “is included in the flora of Natal by mistake, and is most certainly not indigenous.”

I have also reared a dark form of this larva, which may be described as follows:—

Ground-colour very pale brown, the oblique purple stripes of the green form being represented in this form by oblique stripes of dark violaceous grey covered with blackish atoms. Head pink, with lateral and frontal vertical black stripes; first three somites pink subdorsally, surmounted by paired dorsal diamond-shaped fuscous spots. It will be observed from this description that the head and first three somites of this larva bear a striking resemblance to the dark form of the larva of *Acherontia atropos*. Spiracles black; prolegs and claspers pale brown with fuscous bands; horn yellow and serrated.

The specimen figured fed on *Dahlia variabilis* (an imported plant in Natal).

*Pupa*. Dark reddish brown, with a long external sheath for the proboscis. The transformation is effected underground, where, as in the case of *A. atropos*, the larva constructs a sort of chamber for the pupa.

Mr. Trimen states “the case of *M. solani* seems to me especially interesting, because not only is the larva imitative of that of *A. atropos* in both forms, but the moth also
is decidedly imitative of *atropos*-moth, so much so that I have taken it for *atropos*
when at rest on a tree-trunk. At Cape Town both the dark forms (of *solani* and
*atropos* larvæ) are rare in comparison with the green ones."

**Subfamily MacroGLOSSINÆ.**

16. *Cephonodes hylas* (Linnaeus). (Plate XLVIII. figs. 13–18, larva; fig. 19, pupa.)

This well-known insect has been reared from six different forms of larva in Natal,
which show almost every gradation from an almost wholly green larva with white
subdorsal stripes to an almost wholly black one, in which the subdorsal stripes are
replaced by very dark grey ones.

The various forms will now be described in detail.

**Larva. 1st form.** Ground-colour pale green, a white-bordered light blue dorsal line,
and a thin white subdorsal line bordered superiorly by a thin carmine line, the combined
lines ending in a yellow streak at the base of the horn. Spiracles white, bordered
with red edges, that on 11th somite surrounded by a rufous area. Head green, 1st
somite beset with yellow tubercles superiorly; thoracic legs and claspers brownish; horn
green, curved and pointed, and beset with yellow tubercles. Plate XLVIII. fig. 13.

This seems to be the Indian form described by Hampson in 'Fauna of British India.'

**2nd form.** Ground-colour pale green; a white-bordered blue dorsal line; a subdorsal
white line defined in places superiorly and inferiorly by small black oval spots; under
surface, legs, and claspers pale brown. Spiracles white, surrounded by oval red areas;
a yellow subspiracular line, interrupted and defined inferiorly with black, which curves
up vertically on the posterior half of each somite from 6th to 9th, otherwise as in 1st form. Plate XLVIII. fig. 14.

**3rd form.** Similar to 2nd form, but differing in the following characters:—The dorsal
line is dark grey; the black oval spots defining the white subdorsal line inferiorly are
much more numerous and extend downwards between the spiracles till they meet a
black subspiracular line. The red areas surrounding the spiracles more enlarged. Plate XLVIII. fig. 15.

**4th form.** Similar to 3rd form, but differing as follows:—Dorsal line darker, the
black oval spots defining the white subdorsal line inferiorly are coalesced into a con-
tinuous black lateral line; and the whole body below it is pale brown, with only an
isolated patch of green on each somite round the red spiracular areas. 1st somite
yellow, covered with small yellow tubercles. Plate XLVIII. fig. 16.

**5th form.** Dorsal and subdorsal stripes as in 4th form. Ground-colour black;
a rufous area round each spiracle, and a few irregular yellow marks on each somite;
a few traces of the yellow subspiracular line, and a yellow patch at base of horn;
claspers and anal extremity brown; head and 1st somite yellowish. Plate XLVIII.
fig. 17.
6th form. Entirely black, with the exception of the red areas surrounding the spiracles, and the head, base of horn, and anal extremity and claspers, which are dull ferruginous; dorsal line black; subdorsal line and 1st somite dark grey. Plate XLVIII. fig. 18.

All these forms of larva were found at the same time feeding on Gardenia and also on Kraussia lanceolata (Sond.). When ready for their transformations the larvae burrowed underground, and there underwent their change to pupae; the perfect insects emerged in from 3 to 4 weeks. In order to test whether all the different forms of larva produced the same imago, each form of larva was placed in a separate box and carefully labelled, but when the imagines emerged it was impossible to detect any difference between them.

Pupa. Dark reddish brown.

The imago seems common all over Natal.

Family ZYGÆNIDÆ.

17. Zygæna (Anteris) ampla (Walker). (Plate XLIX. figs. 27, 28, larva; fig. 29, cocoon.)

Larva. Ground-colour white, with pink stripes and black spots. A white dorsal line bordered by two subdorsal rows of black spots, two on each somite; beneath these a pink lateral line bordered inferiorly by a white spiracular line, on which is situated a row of smaller black spots in groups of two on each somite. A subspiracular pale fulvous line, and below it an interrupted line of black lunules, one on each somite; under surface and claspers white; head black, with a white bifid frontal stripe.

General form of larva thick in middle, tapering towards extremities, and very similar to larvae of Lycænidæ in shape.

Feeds on a bush with very large leaves with spiny edges (like holly) of which I have not been able to obtain the name.

The pupa is formed in a strongly-woven oval cocoon, usually pale fulvous, and affixed to a leaf of the food-plant; time passed in pupal stage about 25 days (March 3rd or 4th to March 29th, 1899).

Found in large numbers on the food-plant in the Back Beach Bush, Durban.

Family LASIOCAMPIDÆ.

18. Gonometta postica (Walker). (Plate XLIX. figs. 3, 4, larva; fig. 5, cocoon.)

Larva. There are two common forms of this larva in Natal, one with long grey hair and one with long fulvous hair.

1st form. Ground-colour deep velvety black, thickly covered on sides with long grey hair; a thin black dorsal line and paired black subdorsal patches of short black hairs on each somite from 4th to 12th. Head black, covered with brownish-grey hairs;
spiracles, thoracic legs, and claspers red. The 2nd form is similar to the 1st, but with the long hairs bright fulvous. Both forms feed on the same food-plant at the same time, grow to the same size, and produce male and female imagines irrespectively.

This larva should not be handled without gloves, as its hair penetrates the skin of the hand and causes much irritation. It appears in great numbers in November and early December, feeding on common wattle (Elephantorrhiza burchelli) and also on a species of thorny acacia; the second brood appearing in March and April.

The pupa is formed inside a cocoon beset with the hairs of the larva, which cause a very irritating effect to the fingers if it is grasped carelessly, and is affixed to a branch of the food-plant, as shown in the figure.

Pupæ formed in April hibernate in this state, and emerge as imagines in the middle of October.

In common with species of Saturniidae, the male of this moth seems to possess in a high degree the power of discovering the whereabouts of the female, and the possession of one female will enable a collector to secure a large number of males.

Common and widely distributed in Natal.

Family LYMANTRIDÆ

19. Dulichia fasciata (Walker). (Plate XLIX, figs. 13, 14, larva.)

Larva. Ground-colour velvety black; dorsal area white, thickly covered with white hairs, except on the 4th, 5th, 11th, and 12th somites, which are surmounted by tufts of long black hairs; a dorsal red spot on the 9th and 10th somites; a spiracular line of red spots, and below this an interrupted white line bearing long white hairs. Head black; thoracic legs and claspers red.

Feeds on species of Bauhinia, and also on rose-bushes and oak, the two latter being imported plants in Natal.

When ready for its transformation, the larva forms a silky cocoon with its hairs, inside which it changes and remains as a pupa for about 24 days (Dec. 30th to Jan. 23rd).

Common in gardens in Maritzburg.

20. Dasychira Georgiana, sp. n. (Plate XLIX. fig. 19, imago; fig. 20, larva; fig. 21, pupa.)

Allied to D. horsfieldii. Head and thorax white; branches of antennae fulvous. Fore wing white, irrurated with black scales; the antemedial lines more angled than in D. horsfieldii; the hind wing white, with some darker hairs on the internal area. Abdomen orange, with a dorsal line of black spots on first four somites. Underside white, no cell-spots.
TRANSFORMATIONS OF SOME SOUTH-AFRICAN LEPIDOPTERA.

Larva. Ground-colour velvety black, with very long pale yellow hairs; each somite with two red and four greyish tubercles, from which spring the long silky yellow hairs, except the 4th, 5th, 6th, and 7th somites, on which the two dorsal tubercles coalesce, and from these spring four thick dorsal tufts of shorter grey hairs, and 11th somite, which bears a tuft of shorter blackish hairs. Head red above, black beneath; thoracic legs and claspers red, and a red transverse band on 12th somite.

Feeds on common wattle (Elephantorrhiza burchellii).

The pupa is formed in a slight web constructed from the hairs of the larva, and is pale fulvous with black markings; wing-covers greyish, with veins delineated by thin black lines. The descriptions are made from two specimens reared in Maritzburg in February and March. There is a female specimen of the imago in the British Museum unnamed.

Family HYPSIDÆ.

21. HYPSA APHIDAS (Hopffer) = II. subretracta (Walker). (Plate XLVII. fig. 16, larva.)

Larva. Chocolate-brown; under surface greyish; an indistinct dark dorsal line. Three red tubercles, one dorsally and two subdorsally, on 1st to 3rd somites; paired red subdorsal tubercles, four on each somite, on a black subdorsal line, from 4th to 12th somite; a broad white spiracular streak on 5th, 6th, 10th, and 11th somites. Head dark brown; thoracic legs and claspers fuscous. A few sparse brown hairs on the body.

Feeds on the common fig, both cultivated and wild; the specimen figured fed on the cultivated fig, but I have reared others which I found as pupae in hollows on the trunks of the wild fig-trees round the gardens in the square at Durban. When about to change, the larva rolls up a fig-leaf in which it spins a web, and the same process is gone through in the hollows of fig-tree trunks. The specimen figured remained as a pupa from 18th February to 22nd March.

Pupa black, with polished surface.
Imago fairly common in Durban and Maritzburg.

Family ARCTIIDÆ.

22. SPILOSOMA FUELLA (Druce). (Plate XLIX. fig. 15, larva.)

Larva. Ground-colour dark fuscous, each somite with six large and two small black tubercles surmounted by tufts of black hairs. A pale ferruginous dorsal line, darker on the summit of each somite; under surface paler; head and thoracic legs black, spiracles ferruginous.

Feeds on the Grenadilla passion-flower.
**Pupa** black, with polished surface, formed inside a cocoon constructed out of the hairs of the larva. The imago emerged in about 17 days (March 8–26).

**Common in Maritzburg.**

**Subfamily Arctiinae.**

23. **Phissama flava** (Walker). (Plate XLIX. fig. 8, larva.)

**Larva.** Ground-colour pale fuscous, each somite with a red-brown area superiorly, on which is situated a dorsal line of white spots surrounded by black, one on each somite; also a series of black tubercles bearing tufts of black and reddish hairs. Head, thoracic legs, and claspers ferruginous.

**Feeds on Ornithogalum eckloni,** a species of lily, and other plants.

When ready for its transformation the larva weaves a cocoon with its hairs and remains a pupa for about 17 days (1st to 17th December in the case of the specimen figured).

The imago is common in Maritzburg district.

24. **Phissama screabile** (Walker). (Plate XLIX. fig. 9, larva.)

**Larva.** Ground-colour greyish white, the somites broadly black transversely and beset with long black and white hairs; the white spaces between the somites traversed by fine black transverse lines; under surface black. Head, thoracic legs, and claspers bright red.

**Feeds on Ornithogalum eckloni,** also on mealie: a larva reared on the latter plant differed from the individual figured in its lighter parts being buff instead of white; this larva produced a female imago.

The **pupa** is formed inside a cocoon constructed with the hairs of the larva. Duration of the pupal stage about three weeks (9th to 29th December, specimen figured).

**Imago is common in Maritzburg district.**

**Subfamily Nysteclinæ.**

25. **Earias insulana** (Boisduval). (Plate XLIX. fig. 25, larva; fig. 26, cocoon.)

**Larva.** Ground-colour pale bluish-black, with deep black markings; 1st to 3rd somites pale brown; 4th somite with a white transverse streak; an interrupted white dorsal line from 4th to 8th somite; 9th to 12th somite pale brown dorsally. A sub-dorsal line of paired short brownish spines with scarlet bases; a lateral line of similar paler spines. Head and legs pale brown.

**Feeds on Hibiscus.**

The **pupa** is formed in a stout thickly-woven cocoon attached to stem of food-plant. The larva is figured × 4, to get in detail.

**Common in gardens in Maritzburg.**
Family AGARISTIDÆ.

26. EUSEMIA BUTLERI (Walker). (Plate XLVII. fig. 14, larva; fig. 15, pupa.)

Larva. Ground-colour light bluish-grey, with fine black transverse stripes and spots on each somite; a reddish spiracular line. Head, thoracic legs, and 1st and 11th somites superiorly reddish ochreous; a few sparse hairs distributed over the somites; thoracic legs fuscous; ventral claspers blue-grey, anal claspers reddish ochreous.

Feeds on common vine (cultivated).

The larva undergoes its transformation underground, and remains a pupa about one month.

Pupa reddish fuscous, very rugged in appearance, the abdominal somites very strongly defined.

The imago has a very strong penetrating scent.

Not uncommon in Maritzburg.

Family NOCTUIDÆ.

Subfamily TRIFINÆ.

27. GLOTTULA PANCRATH (Cyr.). (Plate XLIX. fig. 17, larva; fig. 18, stem of food-plant showing hole.)

Larva. reddish brown, each somite with three small black warty spots, one dorsally, two subdorsally, and two small pale yellow subdorsal spots; between each two somites a transverse row of five oblong pale yellow spots, divided mesially by the intersection of the somites. Head, legs, and claspers ferruginous; a few short fulvous hairs on the somites.

This larva feeds on a species of lily, eating the flowers as well as the stems; also making a burrow inside the stem (as shown in fig. 4 c). It can eat its way out of any box, except tin. When full-grown it undergoes its transformation underground.

Pupa red-brown, with strongly-marked somites.

The imago is noteworthy owing to its exceedingly small and short pale green haustellum, which would seem to be of little use to it.

28. AGROTES SEGERTIS (Schiff.). (Plate XLIX. fig. 16, larva.)

Larva. Ground-colour pale brown, with small black spots placed irregularly on the somites; fuscous dorsal and lateral lines, the former narrow, the latter rather broad and bounded inferiorly by a narrow white spiracular line. Under surface, thoracic legs, and claspers pale fulvous. Head ferruginous, the eyes defined by two crescentic black frontal lines.

Feeds on the cultivated vine, and undergoes its transformation underground.

The pupal stage lasted about one month, in March.

Imago common in Maritzburg in February and March.
Subfamily QUADRIFINÆ.

29. POLYDESMA GLAUCINANS (Guen.). (Plate XLIX. fig. 22, larva; fig. 23, pupa in web.)

Larva. Ground-colour bright grass-green, with a broad white dorsal line from head to 12th somite, which bears on its centre a narrow pale blue dorsal line; an interrupted white lunular lateral line, bordered with black superiorly. Head, thoracic legs, and claspers green; the first pair of abdominal claspers aborted; the 12th somite tapering to a point above the anal claspers.

Feeds on wattle (Elephantorhiza burchellii).

Pupa pale brown, formed in a cocoon among the stems of the food-plant.

Imago very common in Maritzburg in March.

30. TÆNIOPYGÆ SYLVINA (Stoll). (Plate XLIX. figs. 10, 11, larva; fig. 12, pupa in cocoon.)

Larva (early moult). Ground-colour buff; on each somite, except 1st and 11th, a broad very dark crimson transverse band; on 1st and 11th somites the band is pale ferruginous and bears some small black spots. In the final moult the above-mentioned bands become deep velvety black, with the exception of those on the 1st and 11th somites, which remain the same, the ground-colour becoming pale greenish. Head, legs, and claspers pale ferruginous.

Feeds on Ornithogalum eckloni (Sch.), a species of lily common in swampy places. When full-fed the larva burrows underground and constructs a chamber for the pupa, which is surrounded by a strong hard envelope, of a consistency similar to cement, with a small hole at one end for the exit of the imago.

Pupa deep red, with black antemedial and postmedial lines on the wing-covers.

The period of pupation lasts about five weeks.

The imago is not uncommon in Maritzburg in January and February.

Family GEOMETRIDÆ.

31. BOARMIA ACACIARIA (Boisdruval). (Plate XLIX. fig. 24, larva.)

Larva. Ground-colour pale reddish brown, inclined to olive-green subdorsally; a pair of dorsal processes with whitish centres on 5th somite, and a pair of dorsal white spots on 11th somite. Head, legs, and claspers reddish.

Feeds on a small species of sunflower, which is a common plant in gardens at Maritzburg.

The transformation to pupa is effected underground.
My specimens of the imago were identified as *B. acaciaria* at the British Museum, but they are much paler and have fewer transverse bands than the examples in that collection, or the specimen figured by Hampson in ‘Fauna of British India,’ vol. iii. p. 265.

IV. EXPLANATION OF THE PLATES.

PLATE XLVI.

Fig. 1. Larva of *Acraea petraea* (Boisd.), p. 294.
Figs. 2, 3. Pupa of ditto.
Figs. 4, 5. Larva of *Acraea encedon* (Linn.), p. 294.
Fig. 6. Pupa of ditto.
Fig. 7. Larva of *Acraea rahira* (Boisd.), p. 294.
Figs. 8, 9. Pupa of ditto.
Fig. 10. Larva of *Acraea buxtoni* (Butler), p. 295.
Figs. 11, 12. Pupa of ditto.
Fig. 13. Pupa of *Junonia cebrena* (Trimen), p. 295.
Fig. 14. Larva of *Junonia clelia* (Cramer), p. 296.
Fig. 15. Pupa of ditto.
Fig. 16. Larva of *Charaxes candiope* (Godart), p. 296.
Fig. 17. Pupa of ditto.
Fig. 18. Larva of *Pieris severina* (Cramer), p. 297.
Figs. 19, 20. Pupa of ditto.
Fig. 21. Larva of *Pieris hellica* (Linn.), p. 297.
Fig. 22. Pupa of ditto.
Fig. 23. Larva of *Papilio polices* (Cramer), 1st stage, p. 298.
Figs. 24, 25. Ditto, 2nd stage (dorsal and lateral views).
Fig. 26. Ditto, 3rd stage.
Figs. 27, 28. Ditto, final stage (dorsal and lateral views).
Figs. 29, 30. Pupa of ditto (dorsal and lateral views).
Fig. 31. Head of larva with V-shaped tentacles protruded.
Fig. 32. Larva of *Papilio brasidas* (Felder), early moults, p. 298.
Figs. 35, 36. Pupa of ditto (lateral and dorsal views).
Figs. 37, 38. Larva of *Papilio moronia* (Angas), early mouls (lateral and dorsal views), p. 299.
Fig. 39. Ditto, final moult.
Fig. 40. Pupa of ditto.
Fig. 41. Larva of *Papilio nireus* (var. *lyaeus*) (Cramer), 1st stage, p. 301.
Fig. 42. Ditto, 2nd stage.
Figs. 43, 44. Larva of *Papilio nireus* (var. *lyaeus*) (Cramer), final stage, p. 301.
Fig. 45. Head of larva with V-shaped tentacles protruded.
Fig. 46. Larva of *Papilio demodocus* (Esper), early mouls, p. 300.
Figs. 47, 48. Ditto, final moult. Fig. 48 shows the attitude adopted by the larva when the V-shaped tentacles are protruded.
Figs. 49, 50. Pupa of ditto (dorsal and lateral views).
Fig. 51. Head of larva with V-shaped tentacles protruded.

**PLATE XLVII.**

Fig. 1. Larva of *Actias mimosae*, early mouls, p. 302.
Fig. 2. Ditto, final moult.
Fig. 3. Cocoon of ditto, showing ventilating holes.
Fig. 4. Larva of *Nudaurelia wahlbergi* (Wallengren), p. 303.
Fig. 5. Pupa of ditto.
Fig. 6. Larva of *Gynanisa maia* (Klug), p. 304.
Fig. 7. Pupa of ditto.
Fig. 8. Larva of *Bunaea caffraria* (Stoll), p. 303.
Fig. 9. Larva of *Urota sinope*, p. 305.
Fig. 10. Pupa of ditto.
Figs. 11, 12. Larva of *Pseudaphelia apollinaris* (Westwood) (dorsal and lateral views), p. 305.
Fig. 13. Pupa of ditto.
Fig. 14. Larva of *Eusemia butleri* (Walker), p. 317.
Fig. 15. Pupa of ditto.
Fig. 16. Larva of *Hypsa aphidas* (Hopfl.), p. 315.
Fig. 17. Larva of *Charocampa capensis* (Linnaeus) (green form, final stage), p. 308.
Fig. 18. Ditto, red form.
Fig. 19. Pupa of ditto.
PLATE XLVIII.

Fig. 1. Larva of Charocampa balsamine (Boisduval), p. 309.
Fig. 2. Pupa of ditto.
Fig. 3. Larva of Charocampa osiris (Dalman), p. 309.
Fig. 4. Ditto, final change before pupation.
Figs. 5, 6. Pupa of ditto (ventral and lateral views).
Fig. 7. Larva of Lophostethus dunolinii (Latreille), p. 307.
Fig. 8. Pupa of ditto.
Fig. 9. Larva of Protoparce mauritii (Butler), green form, p. 311.
Fig. 10. Ditto, dark form.
Fig. 11. Pupa of ditto.
Fig. 12. Dorsal view of first four somites of larva, dark form.
Fig. 13. Larva of Cephonodes kylas (Linn.), 1st form, p. 312.
Fig. 14. Ditto, 2nd form.
Fig. 15. Ditto, 3rd form.
Fig. 16. Ditto, 4th form.
Fig. 17. Ditto, 5th form.
Fig. 18. Ditto, 6th form.
Fig. 19. Pupa of ditto.

PLATE XLIX.

Fig. 1. Larva of Charocampa idriuces (Drury), X \( \frac{2}{4} \), p. 310.
Fig. 2. Pupa of ditto, X \( \frac{2}{4} \).
Fig. 3. Larva of Gonometia postica (Walker), red form, p. 313.
Fig. 4. Ditto, grey form.
Fig. 5. Cocoon of ditto.
Fig. 6. Larva of Ludia smilax (Westwood), p. 305.
Fig. 7. Cocoon of ditto.
Fig. 8. Larva of Phisama flava (Walker), p. 316.
Fig. 9. Larva of Phisama screable (Walker), p. 316.
Fig. 10. Larva of Teniopyga sylvina (Stoll), early moult, p. 318.
Fig. 11. Ditto, final moult.
Fig. 12. Pupa of ditto, in underground chamber.
Fig. 13. Larva of Dulichia fasciata (Walker), p. 314.
Fig. 14. Ditto, dorsal view.
Fig. 15. Larva of Spilosoma puella (Druce), p. 315.
Fig. 16. Larva of Agrotis segetis (Schiff.), p. 317.
Fig. 17. Larva of Glottula pancratii (Cyr.), p. 317.
Fig. 18. Stalk of food-plant, showing entrance to chamber made by larva.
Fig. 19. Dasychira georgiana, sp. n., p. 314.
Fig. 20. Larva of ditto.
Fig. 21. Pupa of ditto in web.
Fig. 22. Larva of Polydesma glaucinans (Guen.), p. 318.
Fig. 23. Pupa of ditto in web.
Fig. 24. Larva of Boarmia acaciaria (Boisduval), p. 318.
Fig. 25. Larva of Earias insulana (Boisduval), × $\frac{4}{3}$, p. 316.
Fig. 26. Cocoon of ditto.
Figs. 27, 28. Larva of Zygaena (Antonis) ampla (Walker), p. 318.
Fig. 29. Cocoon of ditto.
TRANSFORMATIONS OF SOUTH-AFRICAN HETEROCERA
TRANSFORMATIONS OF SOUTH-AFRICAN HETEROCEERA