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2. *Entheus talaus.* ♂.
3. " " ♀.
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6. *Heliopetes arsalte.*
7. *Mimoniades versicolor.*

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582

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BOOK NO.
172

A HAND-BOOK TO THE ORDER LEPIDOPTERA.

BY
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DEPARTMENT OF ZOOLOGY, BRITISH MUSEUM.
Author of "A Synonymic Catalogue of Lepidoptera Heterocera," "European Butterflies and Moths," "A Text-Book of Entomology," etc., etc.

VOL. III.

BUTTERFLIES (*Concluded*).—HESPERIID.E.
MOTHS.—PART I.

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PREFACE.

In this volume Mr. Kirby has completed the half of his Handbook to the *Lepidoptera*, and has commenced the description of the Moths.

As in the previous volumes, particular attention has been paid to the species inhabiting the British Islands, while at the same time the exotic forms have been passed in review.

R. BOWDLER SHARPE.

Sept. 6, 1896.

AUTHOR'S PREFACE.

THE present volume, the third of the proposed series of five on *Lepidoptera*, includes the *Hesperiidæ*, or Skippers, a Family usually regarded as intermediate between the Butterflies and the Moths, and the first twenty-six Families of Moths (commencing with one or two of rather doubtful position, which are sometimes placed in the *Hesperiidæ*) from the *Megathymidæ* to the *Notodontidæ* inclusive.

As before, I have drawn freely upon the figures from Newman's well-known work, and although the much greater number of the species of Moths has not allowed me to deal with them so fully as with the Butterflies, yet I have endeavoured to give a fairly representative selection of our native species, as well as illustrations of the principal Families, and of some of the most interesting genera of the exotic forms. The fourth volume, which is in the press, will complete the series of Families known as Sphinges and Bombyces.

In the preparation of these volumes, I have had the assistance of my son, Dr. W. Egmont Kirby, and have thus been enabled to complete them in a shorter time than would otherwise have been possible.

In the volumes of Moths I have followed the classification adopted in my "Catalogue of Lepidoptera Heterocera," in

which no great modification of the previous systems of classification was attempted. In the introductory portion of the next volume I propose to give a short *resumé* of the more important systems of classification of the *Lepidoptera* (especially in regard to Moths) which have been proposed since the time of Linnæus.

A considerable number of species are here figured for the first time. In the selection of new figures, unfigured species have usually been chosen, so far as they were sufficiently representative, and in the case of previously unfigured species, and little-known genera, I have thought it best to give the descriptions as far as possible in the words of the original describers. The discovery of the larva of *Micronia* (comp. p. 43) shews that the genus belongs to the *Uraniidæ* rather than to the *Geometræ*.

W. F. KIRBY.

Chiswick, September 5, 1896.

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INTRODUCTION.

The Hesperiidæ, or Skippers.

As stated in the Preface to our second volume, it had been intended to include the *Hesperiidæ* therein, and thus to complete our account of the Butterflies in two volumes; but our account of the preceding Families extended to a greater length than was expected, and it was finally decided to commence the third volume of *Lepidoptera* with them. It is, however, admitted that the *Hesperiidæ* approach nearer to the true Moths than to the true Butterflies; for while there are several transitional forms between the *Hesperiidæ* and the Moths, no such forms between the *Hesperiidæ* and the true Butterflies are known to exist. Hence, although the division of the Order Lepidoptera into the two great groups of *Rhopalocera*, or Butterflies, and *Heterocera*, or Moths, is more or less artificial, it is rendered more so by the inclusion of the *Hesperiidæ* in the former group; and I have always considered that if the distinction was worth retaining at all, except as a mere matter of convenience, the line of demarcation should be drawn before, instead of after, the *Hesperiidæ*. This Family was actually included by Duncan in his "British Moths," in Jardine's "Naturalist's Library," and was passed over altogether in the volumes on Exotic *Lepidoptera*. Two modern authors, Zebrawski and Meyrick, have proposed systems of classification, in which the Butter-

flies are placed in the middle of the Moths; but although a natural linear arrangement of any group of animals or plants is impossible, yet the Butterflies exhibit so many well-marked characteristics that they appear to have every claim to be treated as an isolated group, placed either at the head of the *Lepidoptera*, as the most highly organised group, if we follow the descending series of forms, as is usually done; or at the extremity, if we adopt the reverse arrangement, and conclude the series with the highest forms.

The Heterocera, or Moths.

The Moths are distinguished from the Butterflies rather by an aggregation of characters, none of which hold good throughout, than by any hard-and-fast line. Thus, the antennæ in Moths, are very various in form; and, although in a few genera, such as *Synemon*, Doubleday, they much resemble those of a Butterfly in shape, this occurs in conjunction with other characters, such as the possession of a frenulum, which are never found in Butterflies at all. In many Moths, simple eyes, or ocelli, are present, a character never found in Butterflies, and in some of the *Micro-Lepidoptera* the maxillary palpi are well developed, though they are obsolete in the Butterflies and in the larger Moths. In most Moths there is an apparatus called the frenulum, which consists of one or more bristles on the under side of the hind-wings near the base. These serve to connect the fore and hind-wings together during flight, but many Moths do not possess them; and in some cases a bristle is only found in the male. In the males the apparatus consists of one bristle only, but in the females which possess it, it generally consists of two or three. It is never found in any Butterfly, unless we regard the anomalous Australian *Euschemon rafflesiæ* (Macleay) as a Butterfly rather than a Moth. Moths are very

varied in their habits. The majority of the species fly at night or at dusk; but many fly by day, like Butterflies, while others are easily disturbed during the daytime. They hold their wings in different positions when at rest, but generally flat or expanded, though many *Saturniidæ*, *Geometræ*, &c., rest with their wings raised over the back, almost in the same way as a Butterfly.

Moths differ very much in size, too. The smallest Butterfly known ("*Lycæna*" *barberæ*, Trimen) is a brown South African species, which sometimes measures less than half an inch across the wings; and the largest Butterflies known (the females of the genus *Troides*, Hübner) rarely exceed ten inches in expanse. On the other hand, the smallest Moth known (*Nepticula microtheriella*, Stainton) measures only about one-seventh of an inch across the wings; and the largest specimens of *Attacus atlas*, Linnæus, probably expand not less than a foot (11¾ inches is the expanse of the largest specimen in the British Museum).

Great attention has been paid lately to the neuration of the wings in Moths, which, although much resembling that of Butterflies in the larger Moths, is frequently more variable and more complicated, while in the smaller Moths it is sometimes reduced to a few radiating lines. Frequently the cell is more or less divided by nervures, or the branches of the sub-costal nervure beyond the upper angle of the cell in the fore-wings are united in such a manner as to form a small closed cell. The sub-median nervures on both the fore- and hind-wings are often bifid at the base; and the costal nervure of the hind-wings is frequently absent, or united with the sub-costal for a great part of its length. In many Moths, too, the lowest discoidal nervule is united at its base with the upper median, making the median nervure appear four-branched, as in the *Equitidæ*. But it is easy to attach too much importance to a single character; and we can hardly agree with Prof. Comstock in forming two Families, other-

wise so dissimilar as the *Hepialidæ* and the *Micropterygidæ*, into a distinct Sub-order because there is a small lobe projecting backwards from the base of the fore-wings, instead of a frenulum on the hind-wings, and because the hind-wings are furnished with as many nervures as the fore-wings.

It is now becoming usual to number the nervures of the fore-wings from below upwards, in the manner adopted on the Continent; and it will therefore be well to explain this system more fully, and to compare it with the system which we have been using in the present work.

To begin at the lower part of the wing, then—the sub-median (or internal) nervures are numbered 1*a*, 1*b*, 1*c*, &c.; the median nervules, 2, 3, and 4; the discoidal nervules, 5 and 6; the branches of the sub-costal, 7 to 11; and the costal nervure, 12. On the hind-wings the branches of the sub-costal nervure (or the upper discoidal, and the sub-costal, if we regard them in this light) are numbered 6 and 7, and the costal nervure, 8. But as some of these nervures (especially no. 5) are frequently absent, this system may easily lead to ambiguity.

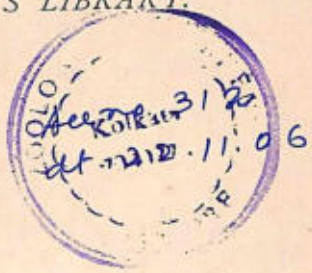
Several attempts have been made to work out the homologies of the nervures of the wings in the different Orders of Insects, but hitherto without any great success. The origin of the various Orders lies too far back, and the development of the wings has proceeded along such diverging lines that it is difficult to compare them satisfactorily. Thus, Prof. Comstock, in his "Manual for the Study of Insects" (Ithaca, N.Y., 1895), has attempted to trace out these analogies; and he numbers the nervures from above downwards, according to the following system:—

I. Costa.
II. Sub-costa. [Costal nervure.]
III. Radius. [Sub-costal nervure; and branches numbered III. 1 to III. 5.]

IV. Pre-media. [Absent in *Lepidoptera*.]
V. Media. [Discoidal nervules and upper median nervule.]
VI. Post-media. [Absent in *Lepidoptera*.]
VII. Cubitus. [Middle and lower discocellular nervules.]
VIII.–X. Anal. [Sub-median and internal nervures.]

This system is liable to the additional disadvantage of Nos. IV. and VI. being absent in *Lepidoptera*. It is, of course, highly desirable to have an uniform system of nomenclature for the Orders of Insects; and the want of precision at present existing in the nomenclature of the nervures, &c., is a matter of considerable inconvenience; but it will, perhaps, be necessary to wait till the subject has been more thoroughly worked out in detail in the separate Orders, before it will be possible to elaborate a completely satisfactory system.

INSECTS.



THE BUTTERFLIES AND MOTHS—ORDER LEPIDOPTERA.

THE BUTTERFLIES—LEPIDOPTERA RHOPALOCERA.

We commence this volume with the *Hesperiidæ*, the last Family of Butterflies, before proceeding to discuss the Moths.

FAMILY VII. HESPERIIDÆ.

Egg.—Very large, opaque, dome-shaped, smooth, or vertically and transversely ribbed.

Larva.—Long, cylindrical, naked (rarely hairy); head large, thorax narrowed in front, so as to form a sort of long neck.

Pupa.—Attached by the tail, a belt round the body, and often with other threads, forming a loose cocoon; often wrapped in a leaf.

Imago.—Of small or moderate size, rarely reaching two inches in expanse, and the largest known species not exceeding four inches; body large, head large, eyes prominent, antennæ placed widely apart, often more or less hooked at the tip; wings very thick, small in proportion to the size of the body; fore-wings triangular, often with a bar of raised scales in the

male; hind-wings rounded, produced towards the anal angle; rarely tailed, and still more rarely dentated. Fore-wings often with three small transparent spots towards the tip, but rarely with more extended vitreous markings. Fore-wings with the sub-costal nervure five-branched, the branches all rising near together at the end of the cell, where also the upper discoidal nervule rises, the upper disco-cellular nervule being absent; sub-median nervure not forked at base; no internal nervure on the fore-wings, though it is very long on the hind-wings, extending to the anal angle; hind-wings with a pre-costal nervure, and a cross-nervure between the sub-costal and median nervures near the base; disco-cellular nervules and discoidal nervule generally more or less imperfectly developed on hind-wings. Legs perfectly developed in both sexes, generally spined.

Range.—This Family is exceedingly numerous in Tropical America, to which a large number of genera and species are confined. It is also well represented in the Tropics of the Old World; and whereas in Europe the *Lycænidæ* form by far the largest family of Butterflies, and the *Hesperiidæ* are comparatively few, in North America the proportions are reversed, the *Hesperiidæ* being very numerous, and the *Lycænidæ* few. The *Hesperiidæ* are less exclusively a tropical family than the *Lemoniidæ*, but although some of the species of *Hesperia* are mountain insects, and one or two *Hesperiidæ* are met with as far north as Lapland and Labrador, these countries seem to be the extreme northern limits of their range, none having been brought from Greenland, where the families *Nymphalidæ*, *Lycænidæ*, and *Pieridæ* are all represented.

Habits.—The *Hesperiidæ* are remarkable for their very short, swift, and jerky flight, from which they have derived their English name of "Skippers." When in full flight, they fre-

quently pull up suddenly with a jerk, and settle on leaves, more especially the under side, on flowers, or on the ground. Different species hold their wings in different positions when at rest, the wings being open, closed, or with the hind-wings partly overlapping the fore-wings. The *Hesperiidæ* differ very much from all the other Butterflies, and are commonly regarded as a link between the Butterflies and Moths. There are no very close intermediate forms connecting them with other Butterflies, though certain genera of Moths, such as *Euschemon* and *Synemon*, Doubleday, and *Acentrocneme*, Scudder, approach them very closely. My own opinion is that, if the distinction between Butterflies and Moths is worth preserving at all, the line should be drawn in front of the *Hesperiidæ* rather than behind them, and that they have a better claim to be regarded as the first Family of Moths than as the last Family of Butterflies. Nevertheless, the *Hesperiidæ* have been classed with the Butterflies by almost all entomologists, and are therefore treated as such in the present work; it is in reality only an unimportant question of terms.

Classification.—Many eminent entomologists have lately been working at this Family; but the latest and most complete systematic arrangement is that published by Captain Watson in the "Proceedings of the Zoological Society of London," for 1893. It is based on the publications of previous authors, especially Scudder and Mabille, and on the collection of the British Museum. I shall follow Watson's system in the present work, but the space at my disposal will not allow me to do more than notice the British and other species which are here figured, and a few additional foreign species of special interest. I shall therefore deal with the general appearance of the insects, rather than with minute generic details. It has been thought best to quote Captain Watson's characters for the principal sections in full.

SUB-FAMILY PYRRHOPYGINÆ.

ANTENNÆ. Club very thick, ending in a blunt point, usually more or less bent into a hook.

PALPI. Second joint densely scaled, closely pressed against the face; third joint naked, minute.

Cell of fore-wing always more than two-thirds the length of costa. No costal fold, or other sexual character on fore-wing of male. Vein 5 of fore-wing nearer to 4 than to 6. Vein 5 of hind-wing usually wanting.* Hind tibiæ usually with two pairs of spurs. (*Watson.*)

The species of this Sub-family are confined to Tropical America, and are of comparatively large size, averaging about two inches in expanse. They rest with their wings expanded.

The typical species of this Sub-family is *Pyrrhopyga hyperici*, Hübner, a Brazilian Butterfly, measuring two inches across the wings. It is blue-black, with the head and tip of the abdomen red; the hind-wings have white fringes, and a large pale blue patch on the disc. The under side of the hind-wings is of a light silvery-blue, except on the borders. There are several allied species of *Pyrrhopyga* ("Fire-tail") still more simply marked, being blue-black, with white or yellow fringes, and a red head, and tip of abdomen.

As a representative of this Sub family we have figured:

MIMONIADES VERSICOLOR.

(*Plate LXIX. Fig.* 7.)

Hesperia versicolor. Latreille, Enc. Méth. ix. p. 735, no. 18 (1819); Perty, Delectus Anim. Artic, p. 153, pl. 30, figs. 5, 5*b* (1845).

* Captain Watson adopts the system by which the marginal nervures of the wings are numbered from below upwards, the sub-median nervure being numbered 1 (or 1*b*, when an internal nervure, 1*a*, is present). Consequently, vein 4 is the upper median nervule, and veins 5 and 6 the lower and upper discoidal (or radial) nervules respectively.

Mimoniades mulcifer, Hübner, Zutr. Exot. Schmett. iii. p. 9, figs. 413, 414 (1825).

This is a very pretty Butterfly, with rather long and pointed fore-wings, measuring two inches in expanse. The thorax has two blue stripes in the middle, and an outer orange stripe on each side. The fore-wings have a narrow blue transverse stripe at the base, followed by a broad orange-red band; nearer the tip are two large yellow spots. The hind-wings have two narrower transverse blue stripes. It is common in some parts of Brazil.

SUB-FAMILY HESPERIINÆ.

Section A.

Antennæ: Club usually bent into a hook, but sometimes sickle-shaped, always terminating in a fine point. Third joint of palpi either minute, or else porrected horizontally in front of the face, as in Section C of the *Pamphilinæ*, never curving over the vertex. Cell of fore-wings always more than two-thirds the length of costa. Disco-cellulars generally very oblique. Vein 5 slightly nearer either to 4 or to 5, never conspicuously close to either. Hind-wing frequently with a tail or tooth on sub-median. Vein 5 never fully developed, except in a few New-World genera. The male is usually provided with a costal fold on the fore-wing, and never with a discal stigma, but occasionally with a tuft on one of the wings, and very frequently with a tuft of long hair attached to the hind tibiæ, which are usually, but not invariably, furnished with two pairs of spurs. The epiphysis (or acute flattened appendage) on the fore tibiæ is invariably present. (*Watson.*)

A very extensive group, and, with few exceptions, entirely American. The position of the wings in repose is variable.

GENUS EUDAMUS.

Eudamus, Swainson, Zool. Ill. Ins. ii. p. 48 (1833).

The type of this genus is *E. proteus* (Linn.), a very common species throughout tropical America. It measures about two inches across the wings, which are brown, broadly green towards the base, and with several square vitreous spots on the outer part of the fore-wings. The hind-wings end in a long broad obtuse tail. We have figured another species, more varied in its colours.

EUDAMUS BRACHIUS.

(*Plate LXIX. Fig.* 1.)

Papilio orion, Drury (nec Cramer), Ill. Exot. Ent. iii. pl. 17, figs. 3, 4 (1782).

Goniurus brachius, Hübner, Zutr. Exot. Schmett. iv. p. 8, figs. 609, 610 (1832).

Eudamus doryssus, Swainson, Zool. Ill. Ins. ii. pl. 48, fig. 2 (1833).

A Brazilian species, about the same size as *E. proteus*, but with comparatively short tails, curved outwards. The wings are black, the fore-wings with about four square or oblong spots across the broadest part; and the tails and, on the under side, all the borders of the wings, except the costa, are white.

GENUS ENTHEUS.

Entheus, Hübner, Verz. bek. Schmett. p. 102 (1816).
Pharæas, Westwood, Gen. Diurn. Lepid. p. 515 (1852).

A small South American genus, including a few rather brightly-coloured species. The one figured is remarkable for the disparity of the sexes, which Linnæus not unnaturally regarded as distinct species.

ENTHEUS PRIASSUS.*

(*Plate LXIX. Figs.* 2 ♂, 3♀.)

Papilio priassus, Linn. Syst. Nat. (ed. x.) i. p. 487, no. 185 (1758); id. Mus. Ludov. Ulricæ, p. 319 (1764).

Papilio talaus, Johanssen, Amœn. Acad. vi. p. 407, no. 70 (1764); Clerck, Icones, pl. 45, fig. 1 (1764); Linn. Mus. Ludov. Ulricæ, p. 259 (1764); Cramer, Pap. Exot. iv. pl. 393, fig. C. (1782).

Hesperia talaus, Latr. Enc. Méth. ix. p. 757, no. 81 (1823).

Paramimus talaus, Hübner, Samml. Exot Schmett. ii. pl. 150 (1824?).

This species, which is common in South America, measures about 1½ inches across the wings. The male is black, the fore-wings with a broad transverse orange band beyond the middle, generally connected above with an oblique sub-apical band and throwing out a branch from the side towards the lower edge of this band. In the female, the fore-wings have an orange stripe at the base, and two white interrupted bands beyond; below the first is generally a white spot towards the inner margin, and between the bands a short oblique white stripe. On the hind-wings a broad greenish-white band runs from the inner-margin of the hind-wings to the middle of the wing.

SUB-FAMILY II. HESPERIINÆ.

Section B.

Antennæ seldom hooked, occasionally bluntly pointed. Palpi: third joint either minute or projected in front of the face, in the latter case stout and not slender as in the *Entheus* group in Section A; palpi never curving over the vertex. Fore-wing: cell less than two-thirds the length of costa; vein 5 invariably nearer to 6 than to 4. Hind-wing frequently

* *E. talaus* on plate.

falcate, but never with a distinct tail or tooth at the submedian; vein 5 never fully developed. . . . All the species of this group of which there is any record (with the exception of some species of *Hesperia*) rest with their wings extended flat when in a state of repose, frequently settling on the under side of a leaf.

This section occurs throughout both the New and the Old Worlds, some of the genera having a very wide range. Most of the New-World forms and a few of the Old-World ones are provided, in the male, with a costal fold on the fore-wing, and never with a discal stigma. A very large number of the genera are also provided in the male with a tuft of long hairs attached to the hind tibiæ or to the fore coxæ. There are invariably two pairs of spurs on the hind tibiæ, and the epiphysis of the fore tibiæ is invariably present, with the doubtful exception of some individuals of *Abantis tettensis*, Hopffer, an East African species. (*Watson.*)

GENUS PYTHONIDES.

Pythonides, Hübner, Verz. bek. Schmett. pp. 110, 111 (1816).

An extensive genus of Tropical American Butterflies, most of the species being of small size, and black, with grey and blue markings.

PYTHONIDES CRONION.

(*Plate LXIX. Fig.* 5.)

Leucochitonea cronion, Felder, Reise d. Novara, Lepid. iii. p. 525, no. 924, pl. 74, figs. 23, 24 (1867).

This Butterfly measures about 1¼ inches across the fore-wings, which are brown, dusted with grey. The hind-wings are black, with a broad blue transverse band. It is found in Brazil.

Some of the species of this group are of extremely dull

colours. Among them is *Eantis busirus* (Cramer), a dull brown species measuring two inches in expanse, with rather broad dark brown wings, crossed with darker striæ, and slightly hooked at the tip of the fore-wings; the hind-margin of the hind-wings is broadly bordered beneath with yellowish, dusted with brown. It inhabits Brazil.

GENUS HELIOPETES.

Heliopetes, Billberg, Enum. Ins. p. 81 (1820).

This genus includes a number of rather small white Butterflies, peculiar to Tropical America. I have figured the typical species.

HELIOPETES ARSALTE.

(*Plate LXIX. Fig.* 6.)

Papilio arsalte, Linn. Syst. Nat. (ed. x.) i. p. 469, no. 67 (1758); id. Mus. Ludov. Ulricæ, p. 246 (1764); Clerck, Icones, pl. 23, fig. 2 (1764).

Papilio niveus, Cramer, Pap. Exot. i. pl. 22, fig. C (1775).

Urbanus juvenis niveus, ♀, Hübner, Samml. Exot. Schmett. i. pl. 157 (1805?).

Hesperia arsalte, Latreille, Enc. Méth. ix. p. 786, no. 152 (1823).

This is a white Butterfly, expanding from 1¼ inches to 1½ inches across the wings. There is a black marginal line (the incisions are white) and the tips of the nervures are black, sometimes forming a slight border, interrupted with white, at the tip of the fore-wings. On the under side the base of the wing is marked with orange, and the costa of the fore-wings, and the costa, median nervure and lowest median nervule, and the sub-median nervure of the hind-wings, are black.

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GENUS HESPERIA.

Hesperia, Fabricius, Ent. Syst. iii. (1), p. 258 (1793); Cuvier, Tabl. Elem. d'Hist. Nat. p. 592 (1799); Latreille, Enc. Méth. pp. 11, 713 (1819–1823).

Pyrgus, Hübner, Verz. bek. Schmett. p. 109 (1816); Westwood, Gen. Diurn. Lepid. p. 516 (1852).

We have only one British representative of this genus, the type, *Hesperia malvæ* (Linn.), the Grizzled Skipper. The genus includes a considerable number of black, white-spotted species, scattered over the world. They differ somewhat in the tufts, &c., peculiar to the males. Some of the European species are Alpine. Our British species belongs to Captain Watson's Section D, in which the male is provided with a costal fold, and a tuft of hair on the hind tibiæ.

THE GRIZZLED SKIPPER. HESPERIA MALVÆ.

(*Plate LXX. Fig.* 1.)

Papilio malvæ, Linn. Syst. Nat. (ed. x.) i. p. 485, no. 167 (1758); id. Faun. Suec. p. 285 (1761); Esper, Schmett. i. (1) p. 345, pl. 36, fig. 5 (1778); Lewin, Ins. Brit. pl. 46, figs. 6, 7 (1795).

Papilio alveolus, Hübner, Eur. Schmett. i. figs. 466, 467, 597 (1803?).

Hesperia malvæ, Newman, Brit. Butterflies, p. 170 (1881); Kirby Eur. Butterflies and Moths, p. 63, pl. 15, fig. 9 (1879).

Syrichthus malvæ, Lang, Butterflies Eur. p. 344, pl. 81, fig. 1 (1884).

Thymele alveolus, Stephens, Ill. Brit. Ent. Haust. i. p. 97 (1828); Buckler, Larvæ of Brit. Lepid. i. p. 123, pl. 16, fig. 1 (1886).

Syrichthus alveolus, Barrett, Lepid. of Brit. Isl. i. p. 268, pl. 37 fig. 1, 1*a–f* (1893).

Var. *H. taras.*

Papilio taras, Bergsträsser, Nomencl. iv. pl. 91, figs. 5, 6 (1780).
Papilio malvæ, Esper, Schmett. i. (2) p. 149, pl. 51, fig. 2 (1780).
Papilio fritillum, Fabricius, Mant. Ins. ii. p. 91, no. 624 (1787); Lewin, *l. c.* pl. 45, figs. 4, 5 (1795).
Papilio lavateræ, Haworth (nec Esper; an Fabricius?), Lepid. Brit. p. 52, no. 72 (1803).
Papilio alveolus, Hübner, Eur. Schmett. i. figs. 847, 848 (1818?).
Hesperia lavateræ, Newman, Brit. Butterflies, p. 170 (1881).
Syrichthus malvæ, var. *taras*, Lang, Butterflies Eur. p. 345 pl. 81, fig. 2 (1884).

This is a conspicuous little Butterfly, measuring about an inch across the wings, which are dark brown above, with the fringes spotted with white, a sub-marginal row of small white spots, and two irregular rows of larger ones on the fore-wings; on the hind-wings is a large white spot at the apex, and another obliquely below it. The fore-wings are blacker beneath, with

Var. *H. taras.*

the white markings more extended; it is greenish grey between the black and white markings and the spotted fringes. The hind-wings are irregularly banded with white, and greenish-grey below. In the variety *H. taras*, which is not very uncommon, the white spots on the upper side are larger and confluent, covering the centre of the fore-wings.

The larva is greyish or yellowish-brown, with a darker dorsal line, and two lateral yellow lines varied with reddish; head black. The pupa is smooth and brown, with white markings. The larva feeds on bramble, raspberry, &c., and is double-brooded on the Continent, the Butterfly appearing throughout the summer; in England it is rarely seen except in May and June, the autumn brood seldom appearing with us. It is very common in many parts of the South of England, but more local in the midland and northern counties and in South Scotland. The single record of its occurrence in Ireland was probably an error.

This is the only Butterfly of the genus which is generally common in North-Western Europe. It is found in bushy places, open places in woods, lanes, &c., sitting with its wings partly open, or sometimes closed, with the fore-wings drawn down almost between the hind-wings. One or two specimens which have been referred to, the larger Continental species, *H. alveus* and *H. carthami* of Hübner, have been taken in England, but though no doubt has been thrown on the authenticity of the captures, England lies beyond the recognised range of these species, which renders it less probable that they are truly indigenous. Mr. Barrett suggests that the specimens were introduced with plants, or by casual migration, but the former supposition is by far the most probable.

GENUS THANAUS.

Thanaos, Boisduval, Icones, p. 240 (1833).

Nisoniades, pt. Hübner, Verz. bek. Schmett. p. 108 (1816); Westwood, Gen. Diurn. Lepid. p. 519 (1852).

There is but one species of *Thanaus* in Northern Europe. It is a rather larger Butterfly than *Hesperia malvæ*, with much more obscure markings. The name *Nisoniades* is now restricted to some American species.

THE DINGY SKIPPER. THANAUS TAGES.

(*Plate LXX. Fig.* 2.)

Papilio tages, Linn. Syst. Nat. (ed. x.) i. p. 485, no. 168 (1758); id. Faun. Suec. p. 286 (1761); Esper, Schmett. i. (1) p. 306, pl. 23, fig. 3 (1777); Hübner, Eur. Schmett. i. figs. 456, 457 (1803).

Hesperia tages, Latreille, Enc. Méth. iv. p. 780, no. 141 (1819); Newman, Brit. Butterflies, p. 170 (1881).

Thymele tages, Stephens, Ill. Brit. Ent. Haust. i. p. 98 (1828).

Nisoniades tages, Kirby, Eur. Butterflies and Moths, p. 61 (1879); Lang, Butterflies Eur. p. 348, pl. 80, fig. 3 (transf.), pl. 81, fig. 7 (1884); Barrett, Lepid. Brit. Isl. i. p. 304, pl. 40, figs. 2, 2*a–d* (1893).

Thanaus tages, Buckler, Larvæ of Brit. Lepid. i. p. 126, pl. 16, fig. 3 (1883).

The Dingy Skipper measures from an inch to an inch and a quarter across the wings. It is dull greyish brown, with a submarginal row of pale dots, and with two obscure greyish bands on the fore-wings, and one on the hind-wings. The under side is paler brown, with dull yellowish dots towards the hind-margins. The species varies, some specimens being very obscurely marked, while in others the markings are much more distinct and prominent.

The larva is bright green, with yellow stripes dotted with black on the sides; the head is brown. The pupa is dull green in front and reddish behind. The larva feeds on bird's-foot trefoil, and *Eryngium campestre*, and like *Hesperia malvæ*, the insect appears in May and June, and is occasionally double-brooded in the South.

This Butterfly is more generally distributed over England and Scotland than *Hesperia malvæ*, and has also been taken in Ireland; it is, however, usually considered to be a local insect.

It is more attached to dry places than *H. malvæ*, which is often found in damp as well as in dry woods; but *T. tages* prefers dry banks and lanes, where it flies close to the ground, on which it often settles. It has been found by several good observers at rest with the wings folded over its back in the exact position of a *Noctua*, and Mr. Barrett figures a specimen which shows this very clearly.

SUB-FAMILY III. PAMPHILINÆ.

Section A.

ANTENNÆ: Very varied, never much hooked, and usually sharply pointed. In all the genera in which the tip of the antennæ is blunt, the epiphysis on the fore tibiæ is wanting, excepting in one or two Australian forms.

PALPI: Third joint usually short and inconspicuous, in some few genera long and slender; in these it is also always erect, and never porrected horizontally in front of the face.

FORE-WINGS: Cell always less than two-thirds of length of costa; vein 5 slightly nearer to 4 than to 6, except in some aberrant Australian forms, in which it is slightly nearer to 6. Hind-wing never with a conspicuous tail or tooth, though frequently more or less lobate; vein 5 never well developed.

Male never with a costal fold, and only comparatively seldom with a discal stigma on the fore-wing; frequently with glandular patches and tufts of hair on the wings; never with a tuft on the hind tibiæ.

The epiphysis on the fore tibiæ and the medial pair of spurs on the hind tibiæ are occasionally wanting.

Confined almost entirely to the Old World. As far as is known the species of this group rest with their wings raised over their backs, assuming that position immediately on settling. (*Watson.*)

GENUS ERIONOTA.

Erionota, Mabille, Ann. Soc. Ent. Belg. xxi. p. 34 (1878); Distant, Rhop. Malay, p. 393 (1886).

The species of this, and one or two allied genera, are confined to the Indian Region, and are (with the exception of one African species) the largest *Hesperiidæ* known.

ERIONOTA THRAX.

(*Plate LXIX. Fig.* 4.)

Papilio thrax, Linn. Syst. Nat. (ed. xii.) i. (2) p. 794, no. 260 (1767); Donovan, Ins. Ind. pl. 49, fig. 2 (1800).

Hesperia thrax, Latreille, Enc. Méth. ix. p. 748, no. 53 (1823).

Erionota thrax, Distant, Rhop. Malay. p. 393, pl. 34, fig. 17; p. 367, figs. 111 (transf.) (1886).

Casyapa thrax, Staudinger, Exot. Schmett. i. p. 291, pl. 98 (1888).

This species, which sometimes measures nearly three inches in expanse, is brown, with three pale yellow spots on the fore-wings, one large square one before the end of the cell, a larger oblong one obliquely below it, between the two lowest median nervules; and a third smaller one, transverse, and placed between the two upper median nervules nearer the hind-margin; the under side is paler.

The larva, which feeds in Java on the "Pisang" (*Musa paradisaica*), is white, with long white woolly hair. It also feeds on *Platanus*. The pupa is yellowish-white.

This species is found in most parts of the Indo Malayan Region, and extends beyond it into Celebes.

Another species, closely resembling this, and equally common in India, Ceylon, Malacca, and Java, is *Gangara thyrsis* (Fabricius), a larger and darker insect, with broader hind-

wings. The spots are more widely separated, and of a deeper ochreous-yellow, and there are two or three small ones towards the tip of the fore-wings

GENUS PAMPHILA.

Pamphila, Fabricius, Illiger, Mag. f. Insect. vi. p. 287 (1807).
Cyclopides, pt. Hübner, Verz. bek. Schmett. p. 110 (1816).
Carterocephalus, Lederer, Verh. zool.-bot. Ges. Wien, ii. pp. 26, 49 (1852).

As now restricted, this genus, formerly employed almost as synonymous with *Hesperia*, or at least to include the great bulk of the tawny Skippers, is now restricted to two European species, one of which is British; one Siberian; and two or three North American species. This is the only genus of tawny Skippers found in Britain in which there is no patch of raised scales on the fore-wings of the male.

THE CHEQUERED SKIPPER. PAMPHILA PALÆMON.*

(*Plate LXX. Fig.* 3.)

Papilio palæmon, Pallas, Reise, i. p. 471 (1771).
Papilio paniscus, Fabricius, Syst. Ent. p. 531, no. 377 (1775); Esper, Schmett. i. (1) p. 322, pl. 28, fig. 2 (1777); i. (2) p. 14, pl. 95, fig. 5 (1788).
Papilio brontes, Denis & Schiffermüller, Syst. Verz. Schmett. Wien. p. 160, no. 6 (1776); Hübner, Eur. Schmett. i. figs. 475, 476 (1803?).
Hesperia paniscus, Latreille, Enc. Méth. ix. p. 773, no. 126 (1823); Newman, Brit. Butterflies, p. 171 (1881).
Pamphila paniscus, Steph. Ill. Brit. Ent. Haust. i. p. 100 (1828).
Cyclopides palæmon, Kirby, Eur. Butterflies and Moths, p. 64 (1879).

* *Pamphila paniscus* on plate.

1. *Hesperia malvæ.* 3. *Pamphila paniscus.*
2. *Thanaus tages.* 4. *Adopæa thaumas.*

Carterocephalus palæmon, Lang, Butterflies Eur. p. 556, pl. 82, fig 5; pl. 80, fig. 4 (transf.) (1884).

Steropes paniscus, Buckler, Larvæ of Brit. Lepid. i. pp. 129, 194, pl. 17, fig. 1 (1886).

Cyclopides paniscus, Barrett, Lepid. Brit. Isl. i. p. 298, pl. 40, figs. 1, 1*a-d* (1893).

This Butterfly is common in many places in Central Europe, but in North Germany and Denmark it is absent, reappearing in England and Finland. Eastwards it occurs throughout Northern and Central Asia. I do not remember having taken it, except at Heidelberg, where it was not very common. In England it is a very local insect, appearing at the end of May and June, in woods. It has been recorded from seven or eight counties of England, chiefly in the eastern and east midland counties, though it has also been met with in Hampshire and Devon. "Its principal haunts in this country appear now to be the larger woods of Northamptonshire and Lincolnshire." (*Barrett.*) Its occurrence in Devon is one of a series of observations which suggest some affinity between the specially Midland Fauna, and that of the south-western counties. The distribution of *Polyommatus arion* points in the same direction.

The Chequered Skipper, which measures an inch or rather more in expanse, is brown, with yellow fringes, and a row of sub-marginal spots of pale fulvous. The fore-wings have an oblique fulvous band on the disc, a fulvous spot above it on the costa, and some fulvous spots in the cell, and towards the base. On the hind-wings there are several pale fulvous spots towards the base, and the sub-marginal spots are larger than on the fore-wings. In the female, the sub-marginal spots are smaller, there are fewer spots towards the base of the fore-wings, and those on the hind-wings are much paler than in the male, being almost cream-colour or white. On the under

side of the fore-wings the fulvous markings are extended to cover much of the surface, and the hind-wings are yellowish-brown, with large tawny spots towards the base, and four large white spots on the middle of the wing (there is a smaller spot between the two outer ones), and some smaller white spots nearer the hind-margin. The larva is dark brown on the back, with the sides paler, and there are two yellow longitudinal stripes. The head is black, and there is an orange-coloured collar. It feeds on *Plantago major* in September. The pupa is white, with brown and buff lines; a sharp spike between the eyes, and another flat projection, spined at the end, at the other extremity of the body. The larvæ hibernate in a silk-lined tube in a rolled-up leaf. Hellius observed them leave the cases, and attach themselves by the tail and a belt round the body, but thought that if undisturbed, they might have turned to pupæ in the cases in which they had hibernated. This is a point which requires further investigation. (*See* Buckler's "Larvæ," cited above.)

SUB-FAMILY PAMPHILINÆ.

Section B.

ANTENNÆ very varied, but never hooked; the club either entirely without, or with, a crook of varying length. PALPI: third joint of several genera long, slender, and curving over the vertex, a character never found in the *Hesperiinæ;* in most of the other genera the third joint is minute, only very rarely being horizontally porrected, and when this is the case, it is always stout.

FORE-WING: Cell invariably less than two-thirds the length of costa; vein 5 curves downwards at its base, and consequently arises considerably nearer to 4 than to 6; the middle disco-cellular considerably longer than the lower

one, frequently more than twice as long as it. HIND-WING: usually rather elongate, but never with a conspicuous tail or tooth; vein 5 very rarely developed.

The male is frequently furnished with a discal stigma on the fore-wing, and never with a costal fold. Both pairs of spurs are invariably present on the hind tibiæ, and there never is a tuft of hair on the tibiæ in the male. The epiphysis on the fore tibiæ is invariably present.

This group is of world-wide distribution; the South American forms, however, are comparatively few.

The majority of the species, when sunning themselves on a leaf, depress their hind-wings, and elevate their fore-wings, an attitude peculiar to this section. When in a complete state of repose, both pairs of wings are raised till they meet over the back. (*Watson.*)

This section includes all the British tawny Skippers except *Pamphila palæmon*, and in all our species the black stripe of raised scales on the fore-wings of the males is more or less conspicuous.

GENUS ADOPÆA.

Thymelicus, pt. Hübner, Verz. bek. Schmett. p. 113 (1816).
Adopæa, Billberg, Enum. Ins. p. 81 (1820); Watson, Proc. Zool. Soc. Lond. 1893, p. 98.

We have three British species belonging to this genus, two of which are very local with us. The name *Thymelicus* is now restricted to a different genus, the type of which is the West Indian *T. vibex*, Hübner. The type of *Adopæa* is *A. thaumas* (Hufnagel), a species figured by Barbut under the name of *Urbicola comma*. As, however, *A. thaumas* is not a Linnean species, it cannot be allowed to be the type of *Urbicola*, and we are therefore spared the immediate necessity of considering

whether *Urbicola* (which must date from Linnæus, and not from Barbut, if used at all) is admissible as a generic name.

THE SMALL SKIPPER. ADOPÆA THAUMAS.

(*Plate LXX. Fig.* 4; *pl. LXXI. Fig.* 1.)

Papilio thaumas, Hufnagel, Berl. Mag. ii. p. 62, no. 10 (1766); Von Rottenberg, Naturf. vi. p. 4 (1775); Esper, Schmett. i. (1) p. 344, pl. 36, figs. 2, 3 (1777); i. (2) p. 25, pl. 98, figs. 5–10 (1790?).

Papilio linea, Denis & Schiffermüller, Syst. Verz. Schmett. Wien. p. 160, no. 5 (1776); Hübner, Eur. Schmett. i. figs. 485–487 (1803?).

♀ *Papilio venula*, Hübner, Eur. Schmett. i. figs. 666, 669 (1818?).

Pamphila linea, Stephens, Ill. Brit. Ent. Haust. i. p. 101 (1828); Barrett, Lepid. Brit. Isl. i. p. 175, pl. 38, figs. 1, 1*a-e* (1893); Buckler, Larvæ of Brit. Lepid. i. pp. 139, 195, pl. 17, fig. 3 (1886).

Pamphila thaumas, Kirby, Eur. Butterflies and Moths, p. 66, pl. 15, fig. 14 (1879).

Hesperia thaumas, Lang, Eur. Butterflies and Moths, p. 350, pl. 81, fig. 9; pl. 80, fig. 5 (transf.) (1884).

The Small Skipper measures from an inch to an inch and a quarter across the wings, which are of a light fulvous or tawny above, with a black line at the base of the pale fringes; on the fore-wings of the male is generally a rather broad black streak. The hind-wings are greenish ash-colour beneath, broadly tinged with fulvous along the inner-margin. The antennæ are blackish, ringed with pale yellow, and yellowish beneath; the tip of the club is fulvous.

The larva is green, with a darker dorsal stripe divided by a pale thread, and two yellowish-white lines on the sides; it feeds on grass. The pupa is yellowish-green.

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This species, which appears in summer and autumn, is found over the greater part of Europe, the Mediterranean Region, and Western Asia, frequenting meadows, lanes, open places in woods, and similar localities, and is generally common, though somewhat local, in Britain. It is, however, met with (commonly, where it occurs) in many places in England and Wales, and in several parts of Ireland. Duncan says: "The fly appears in July, and is frequent in many parts of the country, both in England and Scotland;" but its presence in Scotland does not seem to have been confirmed by recent observers.

THE SCARCE SMALL SKIPPER. ADOPÆA LINEOLA.

(*Plate LXXI. Fig.* 2.)

Papilio lineola, Ochsenheimer, Schmett. Eur. i. (2) p. 230 (1808).

Papilio virgula, Hübner, Eur. Schmett. i. figs. 660–661 (1818?).

Hesperia lineola, Latreille, Enc. Méthod. ix. p. 771, no. 119 (1823); Duponchel, Lépid. France, Suppl. i. p. 253, pl. 41, figs. 1, 2 (1832); Lang, Butterflies Eur. p. 351, pl. 81, fig. 10 (1884); Barrett, Lepid. Brit. Isl. i. p. 279, pl. 38, figs. 2, 2*a–d* (1893).

Pamphila lineola, Kirby, Eur. Butterflies and Moths, p. 86 (1879).

This species is very similar to the last, and is of about the same size. It is darker, and the black line on the wings of the male is narrower, and generally longer. There are two characters by which it may be distinguished at once; the hind-wings are of a uniform greenish ash-colour, not shading into fulvous on the inner-margin, as in *A. thaumas;* and the tip of the antennæ is black.

The larva is pale yellowish-green, with yellowish-white lines on the back and sides; the head is reddish. It feeds on grass

in June, and the Butterfly appears in July. "Pupa long and rather slender, yellowish-green. In an open network cocoon among grass-stems. About four days before emergence the wing-cases of the pupa assume a golden-brown colour, and the eye-covers a brilliant crimson, changing in two days to black; the tips of the antennæ-cases also black. Attached to a carpet of silk by a silken girth and the anal hooks, within the chamber formed by the larva among the grass stems." (*Barrett.*)

This Butterfly is common throughout the greater part of Central and Southern Europe, the Mediterranean Region, and Northern and Central Asia. It is found in dry grassy places, along the edges of corn-fields, &c. It has been taken casually in England for some years, but was always confounded with *A. thaumas*, until 1888, when Mr. F. W. Hawes took a series of both species in Essex, and recognised specimens of *A. lineola* among them. It appears to be met with here and there in most of the counties on the South Coast of England, as well as in Cambridgeshire and Nottinghamshire, but chiefly in Essex and Suffolk. In Germany I have generally found it at least as abundant as *A. thaumas*, if not more so.

THE LULWORTH SKIPPER. ADOPÆA ACTÆON.

(*Plate LXXI. Figs.* 6, 8 ♂; 7 ♀.)

Papilio actæon, Von Rottenberg, Naturforscher, vi. p. 30, no. 18 (1775); Esper, Schmett. i. (1), p. 345, pl. 36, fig. 4 (1776); Hübner, Eur. Schmett. i. figs. 488-490 (1803).

Hesperia actæon, Latreille, Enc. Méthod. ix. p. 772, no. 120 (1823); Curtis, Brit. Ent. x. pl. 442 (1833); Newman, Brit. Butterflies, ii. p. 173 (1881); Lang, Butterflies Eur. p. 352, pl. 81, fig. 11 (1884); Barrett, Lepid. Brit. Isl. i. p. 283, pl. 37, figs. 2, 2*a-d* (1893).

Pamphila actæon, Stephens, Ill. Brit. Ent. Haust. iv. p. 383 (1835); Kirby, Eur. Butterflies and Moths, p. 66 (1879).

This Butterfly closely resembles the two last species, but is darker, and of a smaller average size. The wings are of a dark greenish fulvous, with a narrow curved black line in the male. The female has a fulvous stripe in the cell (slightly indicated in the male), and a curved row of fulvous spots on the upper part of the disc beyond. The wings are pale fulvous beneath, glossed with greenish; the antennæ are black above, and fulvous below.

The larva is pale green, with a darker dorsal line, edged with yellowish, and divided by a pale central line, and with two yellow lines on the sides. It feeds on *Calamagrostis epigejos* and *Arundo phragmites* on the Continent; in England its principal food appears to be *Brachypodium pinnatum*. It is full fed in June, the Butterfly appearing a little later. The pupa is pale greenish, and becomes pink before the Butterfly emerges. Like the other species of the genus, the larvæ form themselves silk-lined galleries among grass-blades, in which they live, and finally assume the pupa-state in them.

This is a rather sluggish, gregarious, and extremely local insect in Central Europe; in the Mediterranean district it appears to be much more generally distributed. It is, however, generally abundant wherever it is met with. It is found in sunny weedy places, and has some preference for a chalky soil. In Britain, so far as is known, it appears to be absolutely confined to a few localities along the coast of Dorset, Devon, and Cornwall, the two principal ones, and those longest known, being the Burning Cliff and Lulworth Cove in Dorsetshire. It was first discovered in the last locality (from which it derives its name) by the late Mr. J. C. Dale in 1832. It has been reported to have been taken at Shenstone, near Lichfield, and near Stratford-on-Avon, in Warwickshire; but these accounts have not been confirmed, and are now discredited. Yet, with the curious connection between the Faunæ, to which I have called atten-

tion elsewhere (*anteà*, p. 17), I am inclined to believe that the occurrence of this Butterfly in the Midland Counties is less improbable than Mr. Barrett thinks. The form which is found in the Canaries, and which has been supposed to be identical with this, is now considered by Dr. Rebel to be a distinct species, which he calls *Thymelicus christi*.

GENUS ERYNNIS.

Erynnis, Schrank, Fauna Boica, ii. (1) p. 157 (1801); Watson, Proc. Zool. Soc. Lond. 1893, p. 99.

This genus and *Augiades* include larger species than *Adopæa*, and the fore-wings are longer and more pointed, while the bar of raised black scales on the fore-wings of the male is much more conspicuous and strongly developed. The antennæ are hooked at the tips in both genera. There is but one European species each of *Erynnis* and *Augiades*, both of which occur in Britain. The present genus may be distinguished at once by the distinct white spots on the under side of the hind-wings.

THE PEARL SKIPPER. ERYNNIS COMMA.

(*Plate LXXI. Fig.* 9.)

Papilio comma, Linn. Syst. Nat. (ed. x.) i. p. 464, no. 162 (1758) id. Faun. Suec. p. 285 (1761); Esper, Schmett. i. (1) p. 300, pl. 23, figs. 1*a*, *b* (1777); Hübner, Eur. Schmett. i. figs. 479–481 (1803 ?).

Hesperia comma, Latreille, Enc. Méthod. ix. p. 769, no. 116 (1823); Newman, Brit. Butterflies, p. 172 (1881); Lang, Butterflies Eur. p. 353, pl. 82, fig. 2 (1884); Barrett, Lepid. Brit. Isl. i. p. 294, pl. 39, figs. 2, 2*a–d* (1893).

Pamphila comma, Stephens, Ill. Brit. Ent. Haust. i. p. 102 (1828); Kirby, Eur. Butterflies and Moths, p. 65, pl. 15, fig. 12 (1879); Buckler, Larvæ of Brit. Lepid. i. pp. 142, 198 (1886).

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1. *Adopæa thaumas.*
2. „ *lineola*
3. 5. *Augiades sylvanus.*
6. 8. *Adopæa actæon.*
9. *Erynnis comma.*

The Pearl Skipper measures from an inch and a quarter to an inch and a half across the wings, which are greenish-brown above, with fulvous markings. On the fore-wings there is a fulvous streak filling up the cell, and, in the male, extending over the costal area; below the cell is an oblique black bar of raised scales in the male, which is sometimes intersected by a slender silvery line, and beyond is a row of fulvous spots, mostly contiguous to each other, three small ones below the

Pearl Skipper, male.

Pearl Skipper, female.

costa, two moderate-sized square ones set back towards the inner margin, and then a row of three or four larger ones running obliquely to the inner margin. On the hind-wings there is a large fulvous blotch towards the base, and a more or less extended curved row of fulvous spots on the disc. The under side is yellowish-green, dusted with black, or sometimes brighter green; the fulvous markings on the fore-wings as above, but towards the tip there are some square white spots on a green ground; the hind-wings are greenish, with a row of square white spots across the disc, and several others towards the base. The fringes are pale, spotted with brown at the base.

The larva is dull green, varied with red, with rows of black dots on the back and sides; the head is black, and the collar white; it feeds on *Coronilla varia*, *Lotus corniculatus*, &c., in June and July, and the Butterfly appears in August.

Generally speaking, this is one of the most abundant species of the Family throughout Europe and Northern and Western Asia, frequenting meadows and hill-sides. In England it is a local insect, but abundant in many places in the southern counties, especially preferring dry chalky districts, where the grass is short. In the Midland and Northern counties it is still more local, and its reported occurrence in Scotland has not been confirmed by recent observers.

GENUS HYLEPHILA.

Hylephila, Billberg, Enum. Ins. p. 101 (1820); Scudder, Butterflies East U. S. p. 1625 (1889); Watson, Proc. Zool. Soc. Lond. 1893, p. 101.

Euthymus, Scudder, Rep. Peabody Acad. iv. p. 77 (1872).

The type of this genus is

THE GREAT-HEADED SKIPPER. HYLEPHILA PHYLÆUS.

Papilio phylæus, Drury, Ill. Exot. Ent. i. pl. 13, figs. 4, 5 (1773).

Papliio colon, Fabricius, Syst. Ent. p. 541, no. 376 (1775).

Hesperia phylæus, Latreille, Enc. Méth. ix. p. 723 (1823); Boisduval & Leconte, Lépid. Amér. Sept. pl. 78 (1833).

Pamphila bucephalus, Stephens, Ill. Brit. Ent. Haust. i. p. 102 note; pl. 10, figs. 1, 2 (1828).

Hylephila phylæus, Scudder, Butterflies East U. S. p. 1630 (1889).

This is a very common species in both North and South America, and it is mentioned here because two specimens are

said to have been taken near Barnstaple towards the beginning of the century, and the species was described and figured by Stephens as *Pamphila bucephalus*, though he did not believe it to be British. About the same time several North American Butterflies and Moths seem to have been accidentally introduced into England, but they did not establish themselves; and, with one or two exceptions, appear not to have revisited our shores.

The Great-headed Skipper is not unlike *Augiades sylvanus*, Esper, but is a stouter insect, with a much larger head, strongly tufted above, and shorter and more strongly clubbed antennæ. The black oblique stripe of raised scales on the fore-wings of the male is bordered below with a blackish patch, and the brown border runs up into the tawny part of the wings of the male in large curves. In the female, the tawny markings are reduced to an irregular row of large tawny spots. The under side is more uniformly coloured than in *A. sylvanus*. It has no pale spots, but is marked with a row of black spots beyond the middle. The larva is said to feed on crab-grass (*Panicum sanguinale*, Linn.).

GENUS AUGIADES.

Augiades, Hübner, Verz. bek. Schmett. p. 112 (1816); Watson, Proc. Zool. Soc. Lond. 1893, p. 101.

The single European species of this genus much resembles *Erynnis comma*, from which it may be at once distinguished by the absence of clear white spots on the under surface of the wings.

THE LARGE SKIPPER. AUGIADES SYLVANUS.

(*Plate LXXI. Figs.* 3♂, 4♀,5 *under side.*)

Papilio sylvanus, Esper, Schmett. i. (1) p. 343, pl. 36, fig. 1 (1778?); Hübner, Eur. Schmett. i. figs. 482–484 (1803?).

Hesperia sylvanus, Latreille, Enc. Méthod. ix. p. 770, no. 117 (1823); Newman, Brit. Butterflies, p. 172 (1881); Lang, Butterflies Eur. p. 352, pl. 82, fig. 1 (1884); Barrett, Lepid. Brit. Isl. i. p. 294, pl. 39, figs. 1, 1*a–d* (1893).

Pamphila sylvanus, Stephens, Ill. Brit. Ent. Haust. i. p. 101 (1828); Kirby, Eur. Butterflies and Moths, p. 65, pl. 15, fig. 13 (1879); Buckler, Larvæ of Brit. Lepid. i. pp. 141, 196, pl. 17, fig. 4 (1886).

This species, which is of about the same size as *Erynnis comma*, is greenish-brown, with large fulvous markings. On the fore-wings this colour is much extended, the greater part of the cell, and the portion of the wing above and below being fulvous, clouded with brown at the base, and (in the male) separated by an oblique black streak of raised scales running up to the outer part of the cell from an oblique band on the disc. This, beyond the cell, turns inwards along the costa, where it is cut by the nervures. In the female the black bar is absent, but the fulvous band on the disc is continued upwards, being separated from the costa by a broad brown curved band running from the costa round the end of the cell, but not continued further. On the hind-wings the centre is fulvous, clouded with brown at the end of the cell, and all the borders are broadly brown. The under side is greenish; the hind-wings are tinged with tawny at the anal angle, and there are several indistinct pale yellowish spots scattered over the wings.

The larva is dull green, with a dark dorsal line, and dotted with black. There are snow-white transverse spots on the tenth and eleventh segments beneath. The head is brown. It feeds on various grasses, especially *Holcus lanatus* and *Triticum repens* in April, the Butterfly, which is double-brooded, appearing from May to August. The pupa is long, and pale brown, formed among grass-blades folded together, and lined with silk.

The Butterfly is common throughout the greater part of Europe and Northern and Western Asia, and in most parts of England and Wales, extending to the South of Scotland. It is very fond of bushy places, especially in or near woods, preferring to rest on leaves rather than flowers, which is the habit of many of the *Hesperiidæ*.

SUB-FAMILY PAMPHILINÆ.

Section C.

ANTENNÆ: Club of varying robustness, always tapering to a fine point, occasionally hooked, in which case the terminal portion is always more than half the length of the remainder of the club.

PALPI: Second joint upturned, pressed closely against the face; third joint long, slender, naked, porrect, projecting horizontally in front of the face. Cell of fore-wing ranging from just over one-half to just over two-thirds the length of costa. Hind-wing more or less lobate; vein 5 of hind-wing usually well developed; vein 5 of fore-wing equi-distant from 4 and 6, or slightly nearer to 6.

MALE: Never with a costal fold on fore-wing, but with various other secondary sexual characters, both on wings and legs.

As far as is known, all the species rest with their wings raised above their backs, frequently settling on the under side of leaves. They are remarkably crepuscular in their habits, being specially active only in the very early morning, and at dusk. The section is confined entirely to the Old World.

The palpi of this section are very distinct, and readily separate them from nearly all the other genera. The few genera of *Hesperiinæ* (*Phanus*, *Entheus*, and allies) which have somewhat similar palpi, vary in the entirely different form of antennæ, in the constant absence of vein 5 of the hind-wing, and in some cases by the presence of the costal fold of the fore-wing. (*Watson.*)

Only five genera are included by Captain Watson in this section, which, however, comprises many large and handsome species, including the largest of all known *Hesperiidæ*, *Rhopalocampta iphis* (Drury).

GENUS ISMENE.

Ismene, Swainson, Zool. Ill. i. pl. 16 (1821?); Westwood, Gen. Diurn. Lepid. p. 514 (1852); Watson, Proc. Zool. Soc. Lond. 1893, p. 125.

A well-known East Indian genus, the type of which is *I. œdipodea*, Swainson, from Java and Sumatra. It measures from 2 to 2½ inches across the wings, which are brown, with a subcostal tawny stripe on the basal half of the fore-wings, and the hind-wings lobate at the anal angle; the fringes are tawny, especially towards the lobe. In the male, the base of the fore-wings is tawny, followed by a large square black blotch. In the female the hind-wings and the fore-wings also are greenish towards the base. The larva is pale grey, with a lateral yellow stripe; the head is black and orange. It feeds on *Hiptage*. The pupa is pale salmon-colour, covered with a thin pearly bloom.

GENUS RHOPALOCAMPTA.

Rhopalocampta, Wallengren, Lepid. Rhop. Caffr. p. 47 (1857); Watson, Proc. Zool. Soc. Lond. 1893, p. 129.

The type of this genus (which Captain Watson employs to include a large number of East Indian and African species) is the following:

RHOPALOCAMPTA FORESTAN.

Papilio forestan, Cramer, Pap. Exot. iv. pl. 391, figs. E, F (1782).

Hesperia forestan, Trimen, S. African Butterflies, iii. p. 360 (1889); i. pl. ii. figs. 6, 6*a* (transf.) (1887).

This is a brown Butterfly, measuring two inches in expanse; the hind-wings are covered with yellowish hair, and bordered with black; towards the anal angle is a lobe, edged with orange. On the under side of the hind-wings is a broad transverse white band, interrupted above the inner-margin. It is common in many parts of Africa. The larva is pale yellow, banded with purplish and crimson, and feeds on *Robinia pseudacacia*. The pupa is greenish, covered with whitish efflorescence, and spotted with black.

There are several very remarkable Butterflies of this genus found in West Africa. One is *R. bixæ* (Linnæus), a Butterfly expanding from 2 to 2½ inches; the wings are purplish-blue above, and the hind-wings are lobate at the anal angle; the head is streaked and spotted with white beneath; the pectus is clothed with orange hair, and the hind-wings are marked beneath with a pure white spot, running from the sub-costal nervure to about the end of the cell, and tapering towards the inner-margin.

Another is *R. iphis* (Drury), the largest of the *Hesperiidæ*, with which we will conclude our notice of the Family. The wings are long, and measure four inches in expanse; the fore-wings are slightly rounded off at the tips, and the hind-wings project slightly at the anal angle. The body is black, with the palpi and the tip of the abdomen beneath crimson. The wings are blue-black in the male, but with brassy-green reflections towards the hind-margins, and with the tip of the fore-wings narrowly edged with orange in the female. The under side is of a yellower brassy-green than the upper.

This species sits with its wings erect, and likes the company of small parties of *Euphædra eupalus* (Fabricius), and is frequently seen sipping water with them.

THE MOTHS. LEPIDPOTERA HETEROCERA.

Flight nocturnal or crepuscular, more rarely diurnal. Antennæ of very various shapes, but most frequently filiform, serrated, or (especially in the males) more or less pectinate or plumose; rarely thickened at or beyond the middle, in which case they are sometimes hooked; still more rarely thickened into a club at the extremity. Labial and maxillary palpi variously developed. A frenulum (or very rarely a jugum) generally present. Wings occasionally more or less aborted, especially in the females.

The first two families are of rather doubtful position, some authors regarding them as *Hesperiidæ*, and others as more nearly allied to the *Castniidæ*.

For further information respecting Moths in general, I refer my readers to the introduction.

FAMILY I. MEGATHYMIDÆ (GIANT SKIPPERS).

Egg.—Sub-conical, flattened at the top, and slightly depressed in the middle; not unlike an inverted pudding-basin in shape.

Larva.—With sixteen legs, white, sparsely clothed with short scattered hair; head small. Feeds in the stems and roots of the Agave and Yucca when adult. When young the head is proportionately larger, the hair longer, and the larva feeds in the open.

Pupa.—Cylindrical, the several coverings well marked. Abdomen with a row of very small spines on the back. The pupa is found in the long galleries formed by the larva.

Imago.—Of moderate size (expanding from two to three

inches); wings densely clothed with large scales, and, especially towards the base, with long hair; fore-wings rather long, more or less pointed at the tips; hind-wings rounded, the frenulum absent. Cells simple, closed, very long, the two lower submedian nervules rising in the male very near the base on the fore-wings. Body very stout. Antennæ strongly clubbed or thickened at the extremity.

Range.—Southern United States, to Mexico and Costa Rica.

Habits.—Flight diurnal, rapid, darting, and sometimes towering. They frequent open places, and generally settle near the ground. At rest they fold their wings vertically.

There are but two genera of this curious Family known. They include a few brown species with tawny or yellowish markings. In *Megathyma*, Scudder, the antennæ have a large knob-like club, and in *Acentrocneme*, Scudder (*Ægiale*, Felder), there is a long thickening before the tip, as in *Castnia*.

FAMILY II. EUSCHEMONIDÆ.

This Family may be suggested to include a very curious Australian species, *Euschemon rafflesiæ* (Macleay), respecting which authors differ, as to whether it is to be regarded as a Butterfly or a Moth. It measures upwards of two inches across the wings, which are dark brown. The fore-wings are rather narrow and pointed, and the hind-wings rounded. There is a narrow oblique yellow stripe on the fore-wings, and there are two large yellow patches on the hind-wings. The hairy palpi and the tip of the abdomen are scarlet. The antennæ are very long, much thickened, and slightly hooked at the tip. The cells are simple, and closed; but the presence of a frenulum is a character of so much importance as to remove it from the typical *Hesperiidæ*. Nothing appears to be recorded respecting its habits and metamorphoses.

FAMILY III. NEOCASTNIIDÆ.

This small Family has lately been established by Sir George Hampson to include two East Indian genera: *Tascina*, Westwood, and *Neocastnia*, Hampson. They have broad fore-wings with the base but slightly narrowed, the costa arched, and the tip more or less falcate; the hind-wings are broad and rounded; all the wing-cells are open. The antennæ are strongly thickened before the extremity, as in *Castnia*. *Tascina orientalis*, Westwood, from Singapore, measures 3½ inches across the fore-wings, which are sub-falcate, and dark brown, with a white stripe running from below the middle of the costa to the hind-margin, just above the hinder angle; the hind-wings are of a dull red, with a broad brown border. It is found at Singapore.

NEOCASTNIA NICEVILLEI.

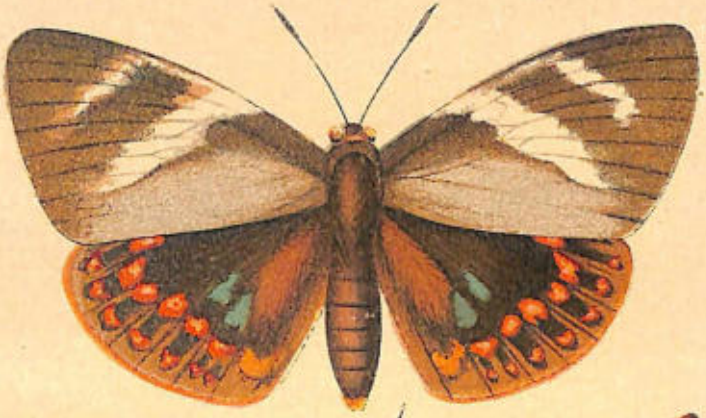
(*Plate LXXII. Fig.* 4.)

Neocastnia nicevillei, Hampson, Trans. Ent. Soc. Lond. 1895 p. 285, cum fig.

This species, which is found in Tenasserim, has golden-rufous fore-wings, with a broad white band running from the middle of the costa to the inner margin, within the hinder angle; the hind-wings are black, with a large blue patch in the middle. It is slightly larger than *Tascina orientalis*, and the tip of the fore-wings is less pointed. Another species of *Neocastnia*, *N. metallica* (Pagenstecher) from Celebes, has a narrower white band on the fore-wings, which, as well as the thorax, are suffused with blue.

FAMILY IV. CASTNIIDÆ.

Egg.—Much resembling a grain of wheat in shape and appearance, but rounded on both sides.



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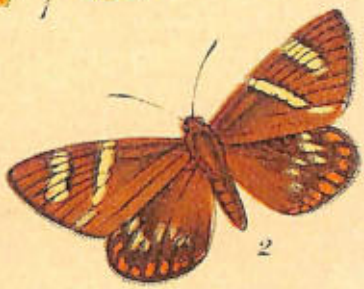

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1. *Castnia eu[illegible]smia.*
2. *,, huebneri.*
3. *Synemon calocaloides.*
4. *Neocastnia nicevillei.*

Larva.—Naked, with sixteen legs, feeding in the stems, roots, or bulbs of plants.

Pupa.—Rather long, with spines on the abdomen, and enclosed in a cocoon.

Imago.—Of large or moderate size; antennæ strongly thickened towards the tip; wings broad, often long, thickly clothed with scales, which are often very large; sometimes more or less transparent; discoidal cells usually more or less divided, or accompanied by accessory cells; frenulum present.

Range.—Tropical America, and Australia.

Habits.—Day-flying species, frequenting, however, the shades of the forests, rather than open country. The larvæ of the genus *Castnia* which have been observed, chiefly feed in the bulbous roots of various *Orchidaceæ* and *Bromeliaceæ*.

GENUS CASTNIA.

Castnia, Fabricius, in Illiger, Mag. Insekt. vi. p. 280 (1807); Latreille, Enc. Méth. ix. p. 794 (1823); Gray, Trans. Ent. Soc. Lond. ii. p. 15 (1838); Boisduval, Lépid. Héter. i. p. 495 (1875); Westwood, Trans. Linn. Soc. Lond. Zool. (2) i. p. 165 (1877).

The genus *Castnia* is widely distributed throughout the warmer parts of America, from Mexico to Chili. Its general characteristics have been expressed in our remarks on the family. There are now nearly 100 species known, differing very much in size, colour, and even in the shape, clothing, and neuration of the wings. Few of the species measure much less than two inches across the wings, and the larger species expand as much as seven or eight inches. Many exhibit strong metallic reflections.

The type is *Castnia icarus* (Cram.).

CASTNIA ICARUS.

Papilio icarus, Cramer, Pap. Exot. i. pl. 18, figs. A, B (1775).
Urbanus celebris icarus, Hübner, Samml. Exot. Schmett. i. pl 146 1805?).
Castnia icarus, Latreille, Enc. Méth. ix. p. 798, no. 5 (1823); Boisduval, Lépid. Héter. i. p. 503 (1875); Westwood, Trans. Linn. Soc. Zool. (2) i. p. 170, no. 9 (1877).

This species measures from three to five inches across the wings, which are broad and gradually rounded, with the hind-wings hardly longer than the fore-wings. The fore-wings are brown, with green or violet reflections, and two or three oblique white bars slightly bordered with red, while the hind-wings are brick-red, with the base grey, some short curved black marks running from the costa, and the outer third of the wing mostly black, with irregular rows of round or oval red spots. The body is grey, banded with red.

We have figured *Castnia eudesmia*, Gray, because its transformations are better known than those of any other species.

CASTNIA EUDESMIA.

(*Plate LXXII. Fig.* 1.)

Castnia eudesmia, Gray, Trans. Ent. Soc. Lond. ii. p. 145, no. 14 (1838); Gay, Fauna Chilena, p. 45, pl. v. fig. 8 (1852); Herrich-Schäffer, Ausser-eruop. Schmett. i. figs. 140, 141 (1854); Philippi, Stett. Ent. Zeit. xxiv. p. 337 (1863); Boisduval, Lépid. Héter. i. p. 517 (1875); Westwood, Trans. Linn. Soc. Lond. (2) i. p. 177, no. 29 (1877); Butler, Ill. Lepid. Heter. B. M. i. p. 3, pl. i. fig. 2 (1875).

This insect is the only species of *Castnia* known to occur in Chili, and thus marks the southern limit of the range of the genus. It measures about 3½ inches across the wing. The fore-wings are of a greyish-brown, with a broad oblique white

band running from the costa just beyond the middle, and a short oblique white stripe beyond; hind-wings black, with blue and green reflections, and with two rows of sub-marginal red spots, pupilled with white; above the inner row is a large white spot on the costa; the base is also reddish.

This Moth is common in December in many parts of Chili, where it flies by day round the flowers of Bromeliaceous plants, belonging to the genus *Pourretia*. Its flight is heavy, and resembles that of *Aglia tau*, a well-known European species of *Saturniidæ*, and in repose it is said to hold its wings erect, like a Butterfly.

The egg, as already mentioned, resembles a grain of wheat in size, shape, and colour. The larvæ feed in the trunk of *Pourretia coarctata*, and their presence is indicated by the exuding gum; where no gum appears, it is useless to examine the tree. The larvæ, which measure 4½ inches in length, are of a greenish semi-transparent white, with the head and anal extremity brown, and some brown markings on the back of the first segment behind the head, which is much enlarged. They are provided with a few short scattered hairs, and the legs, pro-legs, and claspers are all rather short. The larvæ are very similar, both in size and appearance, to those of various large wood-feeding beetles. The pupa is enclosed in a large cocoon formed of fragments of leaves, scales, &c., in the trunk of the tree. The pupa is brown, with a row of small spines on the back of the abdomen, and the cases of the wings, legs, antennæ, and proboscis are all more or less separated, an unusual character in *Lepidoptera*.

CASTNIA HUEBNERI.

(*Plate LXXII. Fig.* 2.)

Castnia hübner, Latreille, in Cuvièr, Règne Anim iii. p. 439, pl. 20, fig. 2 (1830).

Castnia huebneri, Gray, Trans. Ent. Soc. Lond. ii. p. 146, no. 19 (1838); Boisduval, Lépid. Héter. i. p. 516 (1875); Westwood, Trans. Linn. Soc. Lond. Zool. (2) i. p. 182, no. 45 (1877).

This species, which is a native of Brazil, is one of the smallest of the genus, scarcely measuring as much as two inches across the wings. The fore-wings are reddish-brown, with two more or less continuous oblique white bands, or rows of spots, and the hind-wings are brown at the base and inner-margin, reddish towards the costa, but on the outer half of the wing black, crossed by a row of seven bluish-white spots; beyond this is a sub-marginal row of fulvous spots.

In addition, I may mention one or two more interesting species of *Castnia*. *C dædalus* (Cram.), found in Guiana, is a large species, measuring from six to eight inches across the wings, which are blackish-brown, with a strong purplish reflection; the fore-wings have one or two oblique white stripes running from the costa, and there are two sub-marginal rows of white spots on the hind-wings, and one on the fore-wings. *Castnia licus* (Drury) is one of the commonest species throughout South and Central America; it measures from three to four inches in expanse. The fore-wings are brown, with a white stripe running from the middle of the costa towards the anal angle; between this and the tip, an irregular row of white spots runs from the costa. On the hind-wings a broader white band runs from the costa beyond the middle to the anal angle, and there is a more or less complete row of rather large spots close to the hind margin. Other species, again, have long and comparatively slender bodies, and long brown wings, with tawny and yellow markings, very similar to various species of *Lycorea*,

Heliconius, &c., found in the same localities. *C. linus* (Stoll) is four or five inches in expanse, and is black, with broad yellowish semi-transparent bands, and white sub-marginal spots, very like the genus *Thyridia*.

GENUS SYNEMON.

Synemon, Doubleday, in Stokes, Australia, i. p. 515 (1846); Walker, List Lepid. Ins. Brit. Mus. i. p. 33 (1854); Boisduval, Lépid. Héter. i. p. 548 (1875).

This genus, which represents *Castnia* in Australia, includes small insects, not much exceeding an inch in expanse, and very unlike the large American *Castniidæ*. The species of *Synemon* are very like *Hesperiidæ*, the antennæ being more or less abruptly clubbed at the tips, and much more resembling those of a Butterfly than of a Moth. The insects also much resemble *Hesperiidæ* in shape and colour, having oval fore-wings and oblong hind-wings. The fore-wings are brownish-grey, with lighter or darker markings, and the hind-wings are yellow or red, with brown or black bases, borders, bands, or spots. But they differ entirely from the *Hesperiidæ* in the more or less divided cells, the partly open cells of the hind-wings, and in the presence of a frenulum, an organ not found in any true Butterfly, unless *Euschemon rafflesiæ*, Doubleday, which is likewise an Australian insect, is to be regarded as a Butterfly rather than as a Moth. The type of the genus was originally described as a *Hesperia*.

SYNEMON SOPHIA.

Hesperia sophia, White, in Grey's Australia, ii. p. 474, fig. 7 (1841).

Synemon sophia, Doubleday, in Stokes' Australia, i. p. 516, pl. 3, fig. 5 (1846); Klug, Abhandl. Akad. Berl. 1848, p. 248,

figs. 1, 2 (1850); Westwood, Trans. Linn. Soc. Lond. Zool. (2) i. p. 194, no. 1 (1877); Butler, Ill. Lepid. Heter. Brit. Mus. i. p. 6, pl. 3, fig. 6 (1877).

This species was brought from King George's Sound, and measures an inch and three-quarters across the fore-wings, which are brown, with irregular black spots and markings, and three curved transverse rows of grey and white spots. The hind-wings are black, with a large orange spot near the base, a broad orange band beyond the centre, interrupted towards its extremity, and a sub-marginal row of orange spots, the three nearest the anal angle large, and the four towards the tip small.

SYNEMON CATOCALOIDES.

(*Plate LXXII. Fig.* 3.)

Synemon catocaloides, Walker, List Lepid. Ins. Brit. Mus. xxxi. p. 44 (1864); Westwood, Trans. Linn. Soc. Lond. Zool. (2) i. p. 195, no. 6 (1877).

This species, which is rather smaller than the last, has brown fore-wings dusted with grey; the hind-wings are black, with some yellowish hairs at the base, and are crossed by two irregular bright red and partly connected bands, which are abbreviated towards the costa, and there is also a broken sub-marginal band, narrowed towards the costa; on the under side, all the wings are banded and spotted with red.

This species was brought from Swan River by Mr. Diggles. There are several other species found in Australia, most of which, though not all, have brightly coloured hind-wings, like those which we have noticed.

FAMILY V. COCYTIIDÆ.

This is another small Family, including only the genus *Cocytia*, of which the few known species are confined to New

Guinea and the adjacent islands. They are stout-bodied, day-flying Moths, with long palpi, antennæ considerably thickened before the tip, and transparent black-bordered wings about three inches in expanse; towards the base is frequently a large orange patch. The hind-wing cell is divided; and on the fore-wings, the basal half of the inner margin is much expanded, the sub-median nervure being bent downwards at this point almost at a right angle. The typical species is *Cocytia durvillii*, Boisduval.

FAMILY VI. CYDIMONIDÆ (PAGES).

This Family, which is usually known under the name *Uraniidæ*, has been discussed by Westwood in the "Transactions of the Zoological Society," x. pp. 507–542. Summing up the work of previous authors, he tabulates the group as follows:—

A. Fore-wings with the fifth branch of the sub-costal vein emitting the upper discoidal vein at a considerable distance beyond the discoidal cell.

a. (*Cydimon*, Dalm.) Palpi with the terminal joint very short.

* (*Cydimonidæ*, Blanchard, Guenée.) Hind-wings with the second and third branches of the median vein produced into the long tail; second branch of the sub-costal vein free. —Genus URANIDIA, Westw.; type, *U. leilus*.

** (*Urania*, Blanchard, Guenée). Each of the veins of the hind-wings prolonged into a tail; second branch of the sub-costal vein of the fore-wing coalescing with the third branch halfway between the cell and the tip of the wing.—Genus CHRYSIRIDIA, Hb.; type, *U. rhipheus*.

b. (*Nyctalemon*, Dalm., *Nyctalemonidæ*, Guenée). Palpi with the terminal joint long, slender, and pointed.

* Each of the veins of the hind-wings produced into a short scallop; post-costal vein of fore-wings wanting the second branch.—Genus ALCIDIA, Westw.; type, *U. orontes*.

** Hind-wings with the second and third branches of the median vein produced into a long tail.—Genus LYSSIDIA, Westw.; type, *U. patroclus*.

B. (*Sematuridæ*, Guenée.). Fore-wings with the upper discoidal vein arising at a short distance beyond the discoidal cell, between the cell and the origin of the second branch of the sub-costal vein.

a. Discoidal cell of the hind-wings terminating at a distance before the emission of the first branch of the median vein.—Genus MANIDIA, Westw.; type, *U. lunus*.

b. Discoidal cell of the hind-wings extending nearly to the emission of the third branch of the median vein.—Genus CORONIDIA, Westw.; type, *U. orithea*.

Both the larvæ and perfect insects differ considerably in structure and appearance, even without extending the limits of the Family to include a number of forms which have hitherto been included in the *Geometræ*, as some recent authors have proposed. I therefore propose to divide the *Cydimonidæ* into three Sub-families, the *Cydimoninæ*, *Nyctalemoninæ*, and *Coronidiinæ*, each containing two very distinct genera. Westwood has incorrectly represented the wing-cells of several species as open, but they are really closed by a more or less atrophied nervule.

Sir G. Hampson, in his work on the Moths of India, has lately extended the Family *Uraniidæ* (here called *Cydimonidæ*) so as to include a number of large and small white Moths belonging to the genera *Urapteroides*, Moore; *Strophidia*, Hübner; *Micronia*, Guenée, &c., most of which have hitherto been regarded as *Geometræ*. Many of these have a short lobe or tail at the extremity of the upper median nervule of the hind-wings, and at the base of the tail are several black spots. He likewise includes in the same Family the genus *Chatamla*, Moore, a black Moth, with large white and yellow markings, which has a superficial resemblance to the genus *Euschema*, Hübner, in the *Geometræ*, and several other genera, of duller colours, which have long wing-cells and rounded hind-wings, frequently provided with two sub-median nervures of nearly equal length. How far this extension of the Family is tenable will be tested when we are better acquainted with the transformations of these Moths.

SUB-FAMILY I. CYDIMONINÆ.

Egg.—More or less spheroidal, ribbed, smooth at the summit

Larva.—Sixteen-legged, cylindrical, with scattered hairs or short bristles, gregarious, sometimes feeding under a web; head small.

Pupa.—Enclosed in a slight cocoon, or attached by a few threads round the body.

Imago.—Diurnal, of large size and brilliant colours; the hind-wings tailed. Antennæ pointed, more or less thickened before the tips. Wings ample, with no internal nervures, but sometimes with pre-costal cells; cells of both wings closed by an imperfect nervule. This Family includes two genera of brightly coloured tailed Moths, which were originally placed with the *Equites*. Later authors regarded them as allied to the *Hesperiidæ*, but

they are now universally regarded as Moths, though Entomologists are not quite in accord concerning their actual position. Some of the old authors called them "Pages," doubtless in allusion to their liveries of black and golden-green.

Only two genera are known, one South American, and the other African. It should be noted that green black-striped and swallow-tailed *Equitidæ* occur in the same countries.

GENUS CYDIMON.

Urania, Fabricius, in Illiger, Mag. Insect. vi. p. 279 (1807).
Cydimon, Dalman, Vet. Akad. Handl. Stockholm, 1824, p. 407; Guenée, Uranides et Phalénides, i. p. 6 (1857).
Uranidia, Westwood, Trans. Zool. Soc. Lond. x. p. 521 (1879).

This genus inhabits Tropical America, from Mexico to Brazil, and several of the West Indian Islands. It may be distinguished from the next by the single long tail on the hind-wings. The name *Urania*, by which this genus is generally known, cannot be retained, as it was previously given to a genus of plants. There are not many known species, but they are gregarious, and several of them migrate, especially *C. fulgens*, Walker.

All the species are black, with bright green transverse bands, which are sometimes more or less coppery. On the fore-wings there is a broad band, more or less forked towards the costa, and the other bands are linear. On the hind-wings there is generally a row of sub-marginal green markings, sometimes connected. That nearest the apex is bluish, and there are often some whitish markings towards the anal angle. The long tail on the hind-wings is traversed by the upper median nervule, the middle nervule coinciding with the lower side of the tail. The tail is black, generally more or less bordered with snow-white.

We must notice several species of this beautiful Sub-family. The typical species (*C. leilus*) was first figured by Madame Merian, in her work on the Insects of Surinam, as early as 1705.

CYDIMON LEILUS.

Papilio leilus, Linn. Syst. Nat. i. p. 462, no. 25 (1758); id. Mus. Ludov. Ulr. p. 206 (1764); Clerck, Icones, pl. 27, fig. 1 (1759).

Lars heroicus leilaria, Hübner, Samml. Exot. Schmett. i. pl. 197 (1806?).

Leilus surinamensis, Swainson, Zool. Illustr. (2) iii. pl. 125 (1833).

The present species, which is common in the northern parts of South America, much resembles the next, but the green submarginal markings on the hind-wings are broader, and form a continuous band, here and there marked with black. The white markings towards the anal angle are also more extended, and the tail is almost wholly white, often with scarcely as much as the line of the intersecting nervure remaining black. The earlier stages are unknown, for it is not possible that the larva figured by Madame Merian, with long branching spines as hard as iron wire, can belong to a *Cydimon*, in view of Macleay's description and figures of the transformations of *C. boisduvalii*. Bates describes *C. leilus* as flying in flocks over the tops of the trees at daybreak.

CYDIMON BRASILIENSIS.

(*Plate LXXIII. Fig.* 1.)

Papilio leilus, Cramer (nec Linnæus), Pap. Exot i. pl. 85, figs. C, D (1776).

Leilus braziliensis, Swainson, Zool. Illustr. (2) iii. pl. 126 (1833).

Cydimon brasiliensis, Guenée, Uran. et Phal. i. p. 7, pl. i. fig. 1 (1857).

This species, which is common in Brazil, is banded with black and green in a manner very similar to the last species. The pattern will be better understood from our figure than from a description. It measures three or four inches across the wings, and may be distinguished from the true *C. leilus*, for which Cramer mistook it, by the markings of the hind-wings. There is less white towards the anal angle, the tail is more broadly black along the intersecting nervules, and the sub-marginal green markings are divided into distinctly separated oblong spots. Swainson records a flight observed by him at Pernambuco on June 12, 1817, from north to south. They flew near the ground, against a rather strong wind, but mounted over every obstacle in their path; and their flight was so rapid that he could not secure a single specimen. They flew singly, about 50 or 60 passing thus before mid-day, and this flight continued for three or four days.

CYDIMON BOISDUVALII.

Urania boisduvalii, Guérin, Icon. R. Anim. Ins. p. 490, pl. 82, fig. 1 (1829-1844); Gray, in Griffiths' Anim. Kingdom, xv. p. 595, pl. 99, figs. 1, 1*a* (1832).

Urania fernandinæ, Macleay, Trans. Zool. Soc. Lond. i. p. 180, pl. 26 (transf.) (1835).

This is the species which is found in Cuba. It may be known by the fore-wings being marked with eleven transverse green stripes of nearly uniform width, the seventh bifid; the hind-wings have a broad central green band, and some linear markings beyond; the incisions are white, and the tail is black.

The habits and transformations of this Moth have been de-

scribed at great length by Macleay. The Moth flies very rapidly by day, sporting about flowering shrubs, on the leaves of which it settles, with all the wings expanded horizontally, and its flight is most lofty at mid-day. Like the *Nymphalidæ*, it frequently returns to the same spot. It is never found many miles from the coast, and the larvæ feed on the leaves of *Omphalea triandra*, a tree about fifteen feet high, which grows on the sandy shores of Cuba, and which, although belonging to the poisonous family of the *Euphorbiaceæ*, yields a sweet and wholesome fruit, called the Cob- or Hog-nut in Jamaica.

The eggs are laid separately, rarely more than two on a leaf, though the larvæ are sometimes so abundant as to completely strip the trees of their leaves. The eggs are of a pearly lustre, green, sometimes turning to yellow, and more or less spherical. "A circular space on their summit is smooth, but from the circumference of this circle proceed about twenty-four longitudinal ribs, the intervals between which are crossed at right angles by obsolete striæ."

The young larvæ are pale green, with a yellowish head, and seven longitudinal rows of long black hairs. The full-grown larva grows to a length of about two inches; the body varies from pale yellowish-green to flesh-colour, with about six long slender white hairs on each segment. The head and legs are red, the next segment is varied with black, white, and red, and there are some black spots and dots on the head and body. The larvæ conceal themselves under a transparent web by day, and feed by night; the pupa is enclosed in a very loose cocoon of dirty yellow silk. The pupa is yellowish-brown, with black spots and lines.

CYDIMON FULGENS.

Urania fulgens, Walker, List Lepid. Ins. Brit. Mus. i. p. 5, no. 3 (1854).

Cydimon fulgens, Guenée, Uran. et Phal. i. p. 9 (1857).
Uranidia fulgens, Druce, Biol. Centr. Amer. Lepid. Heter. ii. p. 3, pl. 41, fig. 16 (1891).

This species is common in Mexico and Central America, and may be known by having no green lines beyond the broadest band of the fore-wings, which is only slightly bifid. On the hind-wings the tail is black, slightly bordered with white, and there are no conspicuous green markings within the interrupted sub-marginal series.

This species is remarkable for its migratory habits. It is described as migrating in vast flocks, flying at a great height by day, from north to south, or from east to west. The exact seasons, direction, starting-points, and goals of these migrations have not yet been fully worked out. The Moths also fly by night, and Mr. Champion describes them as attracted by light, and as settling with outspread wings on white walls in the city of Mexico, about two or three o'clock in the morning.

CYDIMON SLOANUS.

(*Plate LXXIII. Fig.* 2.)

Papilio sloanus, Cramer, Pap. Exot. i. pl. 85, figs. E, F (1776).
Leilus occidentalis, Swainson, Zool. Ill. (2) iii. pl. 129 (1833).
Cydimon sloane, Guenée, Uran. et Phalén. i. p. 9 (1857).

This species, which is confined to the island of Jamaica, is one of the smallest of the genus, the largest specimens not exceeding three inches in expanse. Both the fore- and hind-wings are rather long and narrow, and the green bands are more or less strongly suffused with reddish-copper, especially on the under surface. The central band of the fore-wings is rather narrow, and there are one or two green lines between it and the tip. On the hind-wings, the green bands are confluent.

1. Cydimon brasiliensis.
2. „ sloanus.

This Moth was first figured in 1725 by Sir Hans Sloane in the second volume of his work on the Natural History of Jamaica, but it was confounded by Linnæus with *C. leilus*, and was first recognised as distinct by Cramer. Gosse has published an account of its habits, which differ considerably from those of *C. boisduvalii*. It appears in April, and sometimes in June, flying round the Avocado Pear (*Persea gratissima*) from a little before sunrise till eight or nine o'clock, when it retires during the heat of the day, reappearing again after the usual rain which falls almost every afternoon at the season when the Moths fly. They flutter about the blossoms of the *Persea*, but rarely frequent other trees, except occasionally the Mango. Sometimes they soar to a vast height, 500 feet or upwards. As in the case of the Swallow-tailed Butterflies, to which they present such a strong superficial resemblance, they often lose the tails of their wings, even before the wings themselves are otherwise worn or defaced. "When one alights, unless it is to suck the blossom, it chooses a leaf or other surface that is nearly vertical, and instantly turns head-downwards, and rests with the wings expanded in the plane of the body; the anterior pair, however, inclined backwards, so as to form an angle with each other, and partly covering the posterior. They chase each other about playfully; half-a-dozen or more sometimes joining in the gambols, when their wings glitter in the sun like the plumage of the Humming-birds. Their manner of flight is much more like that of a Moth than a Butterfly." The eggs are yellowish-white, and resemble those of *C. boisduvalii*.

GENUS CHRYSIRIDIA.

Chrysiridia, Hübner, Verz. bek. Schmett. p. 289 (1822 ?).
Thaliura, Duncan, in Jardine's Nat. Libr. Foreign Butterflies, p. 195 (1837).

Urania, Guenée, Uran. et Phalén. i. p. 10 (1857).

The species of this splendid genus, which includes perhaps the most beautiful Moths known, may be at once distinguished from *Cydimon* by their shorter and broader wings, and by the hind-wings throwing off a rounded projection at the extremity of each nervule, which intersects it, those at the extremity of the median nervules forming rather long tails, of which the uppermost is the longest. They are found in Madagascar, in the adjacent island of Sainte-Marie, and in Zanzibar, but not on the west side of Africa, unless the small specimen figured by Drapiez in 1819 under the name of *Urania prometheus* (Ann. Sci. Phys. ii. p. 356, pl. 30, figs. 1, 2) was really obtained from St. Helena. No doubt all the larger and more conspicuous insects indigenous to that island must have become extinct, with the almost total extermination of the native vegetation, and so much has disappeared even within the last hundred years, that it is by no means impossible that an indigenous species of *Chrysiridia* may have inhabited the island during the last century.

CHRYSIRIDIA MADAGASCARIENSIS.

(*Plate LXXIV.*)

Papilio rhipheus, Cramer (nec Drury), Pap. Exot. iv. pl. 385, figs. A, B (1782).

Urania ripheus, var. *madagascariensis*, Lesson, Ill. Zool. pl. 33 (1831).

Leilus orientalis, Swainson, Zool. Ill. (2) iii. pl. 130 (1833).

Urania rhipheus, Boisduval, Faun. Madag. p. 112, pl. 14, figs. 1, 2 (1833); id. Rev. Mag. Zool. (3) ii. p. 33 (1874); Guenée, Uran. et Phal. i. p. 12 (1857).

Thaliura rhipheus, Duncan, in Jardine's Nat. Lib. Foreign Butterflies, p. 197, pl. 28 (1837).

Urania crameri, Maassen, Stett. Ent. Zeit. xl. p. 115 (1879).

Chrysiridia madagascariensis.

This species expands from three to nearly five inches across the wings, and is velvety black. The fore-wings are marked with a broad transverse golden-green band, which is bifid on the upper half of the wing, and between this and the base a row of short green stripes runs from the costa across the cell. Beyond the band is a series of green stripes broken into spots, the largest extending parallel with the margin nearly to the hinder angle. On the hind-wings the broad green band is continued, but merges into a large space covering most of the lower part of the wing towards the anal angle, which is brilliant coppery-red, with a violet reflection, and marked with four or five black spots, and there is also a marginal green band, spotted and lined with black; the three tails are also green, slightly lined with black. The under surface of the wing is still more richly coloured; the fore-wings, and the base of the hind-wings, as well as half their marginal area from the apex golden-green, lined and spotted with black. The whole anal region is bright flame-colour inclining to purple, with a changeable lustre, and this colour, inclining more or less to golden or yellow, is continued upward as a central band between the green, black-spotted portions of the wing to the costa.

The larva has been rather fully described by Boisduval from the observations of his correspondent Sganzin. The eggs are laid in August on the leaves of the mango. They are white, and are not laid singly, as in *Cydimon boisduvalii*, but in a mass adhering together. When the larvæ emerge from the egg they are smooth and greenish, but after the first moult they become darker and darker, and are provided with numerous small yellow spines, and have two small retractile tentacles on the first segment [behind the head?]. Unless there is some error in the position assigned to these retractile tentacles, they would appear to have some analogy to those of

the larvæ of the Swallow-tailed Butterflies, but they do not appear to be protective, for instead of being exserted when the larva is disturbed, as in the *Equitidæ*, they are retracted, especially in darkness. The full-grown larva is about two or three inches long, considerably thickened in the middle, and slender at the extremities. On each side is a festoon composed of many irregular bands of white, green, and yellow points; the tentacles, which were at first of a delicate rose-colour, become carmine-red, and the first pair of pro-legs becomes almost rudimentary, causing the larva to "loop" somewhat in walking, as in the *Geometræ*. When at rest it generally curves itself into a ring. The pupa is attached by the tail, and by a belt round the body, as in the *Equitidæ* and *Pieridæ*, and in the *Ephyridæ* among the *Geometræ*. The pupa is conical, and but slightly angulated; it is green, with gilded bands placed horizontally from the head to the tail; the extremity is of a much darker green, and is sprinkled with a great number of gilded points.

It is to be regretted that the larva and pupa have not been figured, for there are some ambiguities in the above description which could probably be cleared up at once by a reference to a figure.

The Moth appears in about three weeks. When exposed to the sun, it acquires its full development in two or three hours, but the Moths which emerge in the shade take nearly a day to develop, and are usually less brilliant.

The East African species, *C. crœsus* (Gerstaecker), is very similar to the present one. *C. madagascariensis* appears in the perfect state in September, but Sganzin states that a smaller and very distinct species, which appears in March and April, inhabits the neighbouring island of Sainte-Marie. I am not aware that any further account of this insect has been published, or any specimens sent to Europe. It is possible that it

may be only a seasonal form of the well-known *C. madagascariensis*.

There has been much difference of opinion respecting the tailless insect with the head of a Butterfly, originally figured by Drury under the name of *Papilio rhipheus*, and said to come from China. It is usually regarded as a broken specimen of *C. madagascariensis*, or an allied form, with the head of one of the *Equitidæ* attached; but as we now know that at least some species of the latter Family mimic species of *Alcidis*, Hübner (Moths belonging to the Sub-family *Nyctalemoninæ*, which are closely allied to the *Cydimoninæ*), it does not appear to be quite impossible that an anomalous Butterfly agreeing with Drury's figure may yet be discovered.

SUB-FAMILY II. NYCTALEMONINÆ.

Egg.—Not described.

Larva.—With sixteen legs, not hairy, but with short, conical tubercles on each segment, bearing short bristles.

Pupa.—On the ground, among leaves.

Imago.—Of large size, and with broad wings, the hind-wings dentated and tailed, the longest tail traversed by the upper median nervule. Flight diurnal.

There are but two genera of this Family, one, *Alcidis*, Hübner, confined to the Moluccan Islands from Amboina to Australia,* while the other, *Nyctalemon*, Dalman, has a wider extension, from India and China to Australia. The species of *Alcidis* are blue-black Moths measuring four inches across the fore-wings, which are crossed by two green bands, the innermost broadest; the hind-wings have one broad central band,

* The alleged occurrence of *A. zodiaca*, Butler, in China must be considered very doubtful.

and the fringes are white. The hind-margins are scalloped, each projection being intersected by a nervule, that at the extremity of the upper median nervule forming a short broad tail. The green bands differ in width and colour, according to the species, and are sometimes tinged with coppery, or even pink, but they never exhibit the bright green colour seen in the species of *Cydimon*. A species of this genus has been seen sporting in large numbers round Pandanus trees in North Australia, but its transformations are still unknown.

The genus *Nyctalemon*, Dalman, contains larger and duller coloured species, with long hind-wings, produced into a curved tail at the end of the lower sub-costal nervule, and a very long, spatulate tail at the end of the first median nervule, the middle nervule running into the broader lobe which forms the basal half of this tail. The wings expand five or six inches, and are of a brown colour, traversed by a white band of variable width, and with the hind margin and tails of the hind-wings more or less bordered with white. The species are very similar, and some authors regard most of them as forms of one species, *N. patroclus* (Linn.).

The larva is described by Dr. Kühn as yellowish-white, with black, symmetrical, but not very constant, markings. The segments five, six, and ten are always very dark. Head and legs reddish-brown. The whole body is covered with black warts, each bearing a short bristle. Some larvæ are greenish-white, with faint greenish markings. The pupa is enclosed in leaves spun together on the ground. The larvæ spin threads while walking, from which they sometimes suspend themselves. The pupa is dark reddish-brown, with a yellowish-brown space round the first three stigmata. The pupa-state lasts about fourteen days, and the Moths appear at night, from 11 p.m. to 1 a.m. The larva feeds on a shrub common in mangrove swamps, which has a bluish-green bark, while the young leaves

are trifid, and as large as the hand, but the older ones oval and pointed.

NYCTALEMON ZAMPA.

(*Plate LXXV. Fig.* 1.)

Nyctalemon zampa, Butler, Entomologist's Monthly Magazine, v. p. 217 (1869); Preiss, Abbild. Nachtschmett, p. 6, pl. vii. fig. 1 (1888).

Nyctalemon najabula, Moore, Proc. Zool. Soc. Lond. 1877, p. 620.

This is a pale brown Moth, six inches or more in expanse, with a narrow, greyish-white transverse stripe, and the tail bordered with white. The under surface (which is figured) is yellowish-grey, with the basal area reticulated with brown, and the transverse stripe broader and whiter. It is a common North Indian insect. Our figure is taken from the type of *N. najabula*, Moore, which is a small form found in the Andaman Islands.

SUB-FAMILY III. CORONIDIINÆ.

Egg.—Not described.

Larva.—With sixteen legs; head and pro-thorax small, body with conical tubercles and curved spines.

Pupa.—Enclosed in a loose cocoon at the base of a folded leaf; the sheath for the proboscis continued beyond the wing-cases, and the extremity of the body forming a short deflexed spine.

Imago.—Of moderate size, with broad wings; hind-wings with the discoidal cell completely closed, and with a broad spatulate tail, traversed by the lowest discoidal nervule, and the upper median nervule; an internal nervure sometimes present. Antennæ long, sometimes shortly pectinated in the males.

The two genera included in this Sub-family are confined to

Tropical America, and are rather dissimilar. *Mania*, Hübner (*Sematura*, Dalman; *Manidia*, Westwood), includes brown species, with wings measuring about 3 or 3½ inches in expanse, and traversed by numerous rows of undulating yellowish lines, some of which are connected along the nervures, and enclose spots darker than the ground-colour. The neighbourhood of the anal angle is often tinged with reddish, and there are three large black, pale-bordered, ocellated spots, two on the broad and rather long tail, and one towards its base.

This genus is found in the West Indian Islands, as well as on the Continent of America; but the other genus of the Sub-family, *Coronidia*, Westwood, seems to be confined to the mainland. The species measure about two inches across the wings, and are not very unlike Butterflies of the genus *Anartia*, Hübner (see vol. i. p. 108), in size and colour. The fore-wings are brown or black, with transverse whitish or yellowish lines, and the hind-wings are darker, and marked with a broad blue, red, or yellow band or blotch. The transformations of *Coronidia* are only known from preserved specimens; but it will be seen, from the notice given under the Sub-family, that they greatly resemble those of *Nyctalemon*.

FAMILY VII. AGARISTIDÆ.

Egg.—Not described.

Larva.—With sixteen legs, and long tufts of hair.

Pupa.—Naked, or enclosed in a slight cocoon.

Imago.—With rather long antennæ, slightly thickened in the middle; palpi rather long, the second joint compressed, tufted, the third naked; body long, moderately stout, and sometimes tufted at the extremity. Wings rather long, brightly coloured, the cells always closed; internal nervure of the hind-wings

1. *Nyctalemon zampa.*
2. *Hespagarista echione.*
3. *Hecatesia fenestrata.*
4. *Ipana diversa.*

nearly as long as the sub-median. Frenulum present; tibiæ spurred. Abdomen often tufted at the extremity.

A Family of moderate extent, well represented in Africa, and in the Indo- and Austro-Malayan Regions generally, as well as in Australia. They are also represented by several genera in North America, but very few have been described from the tropical parts of the New World. Many of the species fly by day.

GENUS HESPAGARISTA.

Hespagarista, Walker, List Lepid. Ins. Brit. Mus. i. p. 13 (1854).

This is a small genus of South African Moths with short antennæ, thickened before the tips, and in the male, slightly pectinated. The fore-wings are rather long and narrow, subtrigonate, and much longer than the rounded hind-wings. The accessory cell is large, and the lowest discoidal and upper median nervule are parallel, and close together. The legs are tufted, but the most remarkable character is the very large anal tuft, which is half as long as the whole of the abdomen, in the male.

HESPAGARISTA ECHIONE.

(*Plate LXXV. Fig* 2.)

Agarista echione, Boisduval, in Delegorgue, Voy. Afr. Austr. ii. p. 595, no. 115 (1847).

—— —— Angas, Kaffirs Illustrated, pl. 30, fig. 10 (1849).

Hespagarista interlecta, Walker, List Lepid. Ins. Brit. Mus. i. p. 14 (1854).

Amazela echione, Boisduval, Rev. Zool. (3) ii. p. 67 (1874).

Hespagarista interjecta, Westwood, Trans. Linn. Soc. Lond. Zool. (2) i. p. 203 (1877).

Eusemia novem-maculata, Mabille, Ann. Soc. Ent. France, (6) x. p. 54 (1890); id. & Vuillot, Nov. Lepid. p. 56, pl. 9, fig. 1 (1892).

This Moth, which is found at Natal, Delagoa Bay, and other parts of South-eastern Africa, measures about two inches across the wings. It is black; the thorax is clothed with luteous hair, and the fore-wings are marked with five or six large yellowish-white spots, and some smaller ones; on the hind-wings there are two interrupted yellowish-white bands.

GENUS HECATESIA.

Hecatesia, Boisduval, Mon. Zyg. p. 11 (1829); id. Rev. Zool. (3) ii. p. 48 (1874); Westwood, Trans. Linn. Soc. Lond. Zool. (2) i. p. 199 (1877).

We may here notice a curious Australian genus, which is usually placed in the *Agaristidæ*, but which Westwood referred, with doubt, to the *Castniidæ*, on account of the presence of an accessory cell on the fore-wings, a character, however, which it shares with many genera of *Agaristidæ*. In *Hecatesia* the antennæ are gradually, but considerably, thickened before the tips. The fore-wings are striped or spotted with white or yellow, and the hind-wings are orange, with broad black borders. The abdomen is comparatively short and stout, but is distinctly tufted at the extremity, and the thorax and palpi are very hairy. In the male, the fore-wing is dilated by a horny vitreous sub-costal lunule, transversely striated, and forming a stridulating organ. This forces the sub-costal nervules almost together beneath it. On the fore-wings, the median and sub-median nervures spring from a common stalk. This curious stridulating apparatus is also found, though less conspicuously developed, in some of the species of *Ægocera*, Latreille, a genus containing several Indian and African species, which have brown or reddish fore-wings, traversed by a broad longitudinal white bar, generally interrupted twice, and yellow hind-wings, bordered with black, brown, or, more rarely, reddish.

HECATESIA FENESTRATA.

(*Plate LXXV. Fig.* 3.)

Hecatesia fenestrata, Boisduval, Mon. Zyg. p. 11, pl. i. figs. 1, 2 (1829); id. Spec. Gén. Lépid. i. pl. 14, p. 7 (1836); id. Rev. Zool. (3) ii. p. 49 (1874); White, in Grey's Australia, ii. p. 476, pl. 8, fig. 2 (1841); Westwood, Trans. Linn. Soc. Lond. Zool. (2) i. p. 199 (1877).

This species, which is not uncommon in Australia, measures rather less than an inch and a half across the fore-wings, which are black, crossed by two transverse white stripes; the thorax is also marked with three white spots. The hind-wings are orange, with very broad black borders.

GENUS IPANA.

Ipana, Jordan, in Rothschild's Novitates Zoologicæ, iii. p. 54 (1896).

This genus has just been established by Dr. Jordan, for two very handsome Australian species which have hitherto been placed in the genus *Ægocera*, to which we have already alluded. The type is *I. cornigera* (Butler); and the species which we have figured is closely allied to it.

IPANA DIVERSA.

(*Plate LXXV. Fig.* 4.)

Agarista diversa, Walker, List Lepid. Ins. Brit. Mus. xxxi. p. 49 (1864).

"Mas. *Fusca; caput pallide flavum, fusco triguttatum; palpi porrecti, pallide flavi, apice fusci; thoracis latera, pectus pedesque flavæ; abdominis segmenta luteo marginata; alæ anticæ lituris tribus basalibus fasciisque tribus incompletis pallide flavis, fascia 2a e maculis duabus, 2a lata undulata; posticæ fascia latissima lutea.*

"**Male.**—Brown. Head pale yellow, with a brown dot on each side of the vertex and with a third in front. Proboscis black. Palpi pale yellow, porrect, shorter than the breadth of the head; third joint brown, elongate-conical, less than half the length of the second. Thorax on each side, pectus and legs yellow. Abdomen with a luteous band on the hind border of each segment. Fore-wings with three small pale yellow marks at the base, and with three incomplete pale yellow bands; first band abbreviated at each end; second composed of two widely separated spots; third much broader than the others, undulating along each side, not joining the costa nor the interior angle. Hind-wings with a very broad luteous band, which is abbreviated towards the costa, and occupies nearly all the outer half of the interior border. Length of the body, 7 lines; of the wings, 20 lines.

"North Australia." (*Walker.*)

GENUS AGARISTA.

Agarista, Leach, Zool. Misc. i. p. 37 (1815).

The type of this genus, here figured, has strongly arched fore-wings, with the hind margin rounded. The abdomen is rather slender, and is about as long as the hind-wings, which are slightly oblong. The legs are of moderate length, and the front femora are furnished with a strong brush of hair. It is an Australian Moth; but the bulk of the Australian *Agaristidæ* belong to the allied genus *Phalænoides*, Lewin, which includes smaller Moths, rarely exceeding an inch and a half in expanse, with the costa of the fore-wings nearly straight to the tip, and the hind margin gradually curved; the hind-wings are short and rounded. Most of the species are brown, with yellow spots and markings, and often more or less varied with pale blue. The larva of the typical species, *P. glycinæ*, Lewin,

1. *Agarista agricola.*
2. *Episteme maculatrix.*
3. " *lectrix.*

is cylindrical and hairy, with a slight hump on the back of the last segment. It feeds indiscriminately on a variety of plants. Before changing to a pupa, it spins a slight web on the under side of a branch, in the month of January. The Moth bred by Lewin appeared in April, the pupa-state having lasted seventy-two days.

AGARISTA AGRICOLA.

(*Plate LXXVI. Fig.* 1.)

Papilio agricola, Donovan, Ins. New Holland, pl. 32, fig. 1 (1805).

Agarista picta, Leach, Zool. Misc. i. p. 37, pl. 15 (1815); Duncan, in Jardine's Nat. Libr. Exot. Moths, p. 82, pl. 2, fig 1 (1841).

This species is one of the most beautiful Moths found in Australia. In measures about two inches and a half across the fore-wings, which are black, with a short longitudinal bar of pale green scales at the base, continuous with a green transverse band on the thorax. Beyond this is a curved and rather indistinct fascia of bluish scales, followed by a large oval orange-coloured blotch. Beyond this, again, is a row of six oval orange spots, beyond which are several patches of greenish scales; the extreme tip is white. The hind-wings are black, with a green transverse band running from the inner margin outwards for two-thirds of the length of the wing, while a shorter and broader deep crimson band runs outward from just above the anal angle between the green band and the lower part of the hind margin. The thorax and abdomen are black, the former spotted and banded with green, and the latter with an orange apical tuft. The female has the thorax and basal area of the fore-wings entirely greenish-yellow. The palpi, orbits, and tips of the tarsal joints are white, and the pectus and femora are clothed with long red hairs.

A few Moths not found in Australia have been referred to this genus, one of which, *A. albomarginata* (Moore), a Burmese insect, is steel-blue, with rather narrow, but very conspicuous, snow-white borders.

GENUS EPISTEME.

Episteme, Hübner, Verz. bek. Schmett. p. 180 (1822); Moore, Lepid. Ceylon, ii. p. 33 (1882).

Eusemia, Dalman, Mon. Castnia, p. 26 (1825); Westwood, in Jardine's Nat. Library, Exot. Moths, p. 88 (1841); Boisduval, Rev. Zool. (3) ii. p. 81 (1874); Butler, Entom. M. Mag. xii. p. 166 (1875).

This genus includes larger species than *Agarista*, with longer wings, and the costa of the fore-wings is not arched, but runs nearly straight to the apex. Structurally it differs from most of the other genera of the *Agaristidæ* by there being no closed cell beyond the upper angle of the discoidal cell between the two upper discoidal nervules at their base. The femora are not tufted, and the tarsi are very long, and almost naked. It includes a considerable number of handsome Moths, averaging about three inches in expanse, which are very numerous in India and the Indo-Malayan Region, while a few species are met with as far north as China, and as far east as New Guinea. Their usual colour is black, with white, yellow, red, blue, or black markings, and their general appearance is well shown in our figures. The type of the genus is *E. lectrix* (Linn.), the most northerly species of the genus *Episteme*, and also the longest known.

EPISTEME LECTRIX.

(*Plate LXXVI. Fig.* 3.)

Noctua lectrix, Linnæus, Mus. Ludov. Ulricæ, p. 389 (1764).
Bombyx lectrix, Cramer, Pap. Exot. ii. pl. 192, fig. C (1779).
Phalæna lectrix, Donovan, Ins. China, pl. 43, fig. 2 (1798).

Eusemia lectrix, Boisduval, Rev. Zool. (3) ii. p. 84 (1874).

This Moth, which is common in China, expands about three inches. The fore-wings are black, with the base spotted with white and bluish, and are crossed by two rows of large yellow spots, the first broadest and connected so as to form a band, the second composed of a large spot towards the costa, a smaller one below, divided by a nervure, and sometimes a small one just above the hinder angle; there is also a sub-marginal row of white spots. The hind-wings are black, with the basal half red, crossed by an irregular macular band; there is also a sub-marginal row of white spots. The thorax is black, with an oblong yellow spot on each side; and the abdomen is black, with broad transverse black bands.

EPISTEME IRENEA.

Eusemia irenea, Boisduval, Rev. Zool. (3) ii. p. 84 (1874).
Eusemia communis, Butler, Ann. Nat. Hist. (4) xv. p. 140, pl. 13, fig. 1 (1875).

This species is of the size of *E. lectrix*. The fore-wings are black, with three narrow transverse white bands, the first composed of two spots, the second slightly interrupted towards the costa and the hinder angle, and the third, which is sub-marginal, is macular, and composed of six small elongated white spots. The hind-wings are dull red, crossed by a transverse black band, widely interrupted on its upper part. The black border is sinuous, and is marked with a row of small white spots. The base of the hind-wings is black; and the thorax is black, spotted with white. The abdomen is black, belted with yellow. The type was supposed to have come from Sumatra. *E. communis* (Butler), which was described about the same time as *E. irenea*, and which agrees with Boisduval's description of the latter, given above, is found in Silhet. I notice this species here, because the next has been mistaken for it.

EPISTEME MACULATRIX.

(*Plate LXXVI. Fig.* 2.)

Eusemia maculatrix, Westwood, in Jardine's Nat. Library, Exot. Moths, p. 88, pl. ii. fig. 3 (1841).

Eusemia irenea, Hampson (nec Boisd.), Faun. Brit. Ind. Moths, ii. p. 153 (1894).

For reasons given below, we quote Westwood's original description in full.

"Expansion of the wings nearly three and a half inches; colour of the anterior pair intense black, with some slight patches of blue scales at the base; this is succeeded by a small white triangular patch, then two large sub-oval ones, then three placed wider apart, and between these and the apex are five small oval spots. Hind-wings bright orange, black at the base, with a black costal spot, and a large black discoidal one extending to the anal angle, and posteriorly emitting two narrow longitudinal bars, which are connected with the very broad and irregular black margin; in the latter are two white spots, that nearest the fore-wings being largest. The head and thorax are black, the shoulders pale yellow; abdomen orange, with black transverse stripes. In the specimen here figured, the abdomen is terminated by two broad triangular, horny lobes, externally covered with orange-coloured hairs. The sides of the thorax beneath are black, with an orange-coloured stripe down the breast; the belly is also orange with black spots. The legs are long and black.

"The specimen we have here the pleasure of figuring is unique. It was recently brought from the Assam territories, and is one of the numerous rarities in the Rev. F. W. Hope's collection."

This species has been the occasion of an extraordinary series of errors, somewhat resembling the confusion which has

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1. *Burgena splendida*.
2. *Euthisanotia sancti-johannis*.
3. *Pais gordoni*.
4. *Xanthospilopteryx africana*.

arisen respecting the true *Papilio hyale* of Linnæus. While my son, Dr. W. Egmont Kirby, was comparing some of the figures in Jardine's "Naturalist's Library" with the British Museum collection, he noticed that the original figure of *E. maculatrix* had nothing to do with the species bearing that name in the collection, but agreed with a specimen labelled *E. irenea* (Boisduval). On investigating the matter, it was discovered that after figuring and describing *E. maculatrix* in 1841, Westwood himself figured and described a totally different species in 1848, which has gone by the same name ever since; the true *E. maculatrix* having again been mistaken for *E. irenea* (Boisduval), which I have noticed above, and which proved, on comparison with Boisduval's description, to be the same as *E. communis*, Butler, the description of which was published about the same time as Boisduval's description of *E. irenea*.

The true *E. maculatrix* appears to be a rare species, of which the British Museum possesses only one specimen. Westwood's second *E. maculatrix* is herewith named

EPISTEME WESTWOODI.

Eusemia maculatrix, Westwood, Cab. Orient. Ent. p. 67, pl. 33, fig. 1 (1848) *et auct. seq.; nec E. maculatrix*, Westwood, (1841).

This species is common in collections from India. I reproduce Westwood's original description in full :—

"Eusemia alis anticis nigris basi cæruleo maculatis, puncto stramineo approximato maculis 4 discoidalibus, 2 majoribus, 2 minoribus, stramineis et pone has maculis 7 albis 6ta minuta; posticis fulvo-rufis, basi costa macula angulata costali fimbria irregulari (in qua 1 vel 2 maculæ albæ) maculaque magna discoidali cum margine anali connexa, lineisque duabus ad fim-

briam extensis, nigris: capite albo et parte antica thoracis stramineo-maculato; abdomine fulvo nigroque cingulato.

"Eusemia with the four wings black, the base spotted with pale blue scales, and with an adjacent straw-coloured small patch, followed by four discoidal spots of the latter colour, two larger, and two smaller, the latter followed by a curved row of seven white spots, the sixth being very small; hind-wings rich orange-red; the base and costa, the latter emitting an angulated spot, a broad, irregular, apical border (in which are one or two white spots), and a large discoidal spot connected with the anal margin, and emitting two black lines which extend to the fimbria, all black; head spotted with white, and front of the thorax with straw-colour; abdomen orange; banded with black (female).

"Expansion of the fore-wings 3½ inches.

"Inhabits Assam. In Coll. Westwood. Communicated by Major Jenkins."

GENUS XANTHOSPILOPTERYX.

Xanthospilopteryx, Wallengren, Œfvers. Vet. Ahad. Förhandl. Stockh. xv. p. 82 (1858); Kirby, Trans. Ent. Soc. Lond. 1891, pp. 279–292.

This genus contains the largest African species of *Agaristidæ*, and is closely allied to *Episteme*, with which it was formerly included. The fore-wings, however, are longer and narrower, especially at the base, and are provided with an accessory cell, and the legs are shorter and thicker. They vary from two to four inches in expanse, and their colour and pattern is very uniform. The fore-wings are generally black, with white or ochreous-yellow transverse spots, one or two near the base, two towards the middle of the wing, a dash on the inner margin, a large oval sub-apical spot, and often a

small one near the hinder angle. The thorax is black, and, as well as the base of the fore-wings, is marked with small white and yellowish spots. The hind-wings are red (rarely yellow), with a black border, and the long abdomen is generally yellow, banded with black, and tufted at the extremity. Between the spots on the fore-wings there are usually some indistinct blue marks.

XANTHOSPILOPTERYX AFRICANA.

(*Plate LXXVII. Fig.* 4.)

Eusemia africana, Butler, Ann. Nat. Hist. (4) xv. p. 142 (1875)

Eusemia meretrix, Westwood, in Oates, Matabeleland, p. 355 (1881).

Xanthospilopteryx africana, Kirby, Trans. Ent. Soc. Lond. 1891, p. 287.

The general description given above will apply to most of the species of this rather extensive genus. The present species measures from 1¾ to 2¼ inches in expanse. The fore-wings are black, with yellow spots, the arrangement of which can be seen in the figure; the basal spot forms a short band, and the sub-apical spot is long, deeply indented on the inside towards its lower end. The hind-wings are crimson, with black borders, and the fringes are white at the tips of all the wings. The body is black, the head, thorax, and extreme base of the fore-wings being spotted with white or bluish-white, and the abdomen is belted with yellow.

This pretty species is found in Natal and Zululand.

GENUS PAIS.

Pais, Hübner, Verz. bek. Schmett. p. 279 (1822); Walker, List Lepid. Ins. Brit. Mus. i. p. 61 (1854).

Southern Africa is peculiarly rich in curious and interesting forms of *Agaristidæ*, several of which we have already mentioned. *Pais* is a small genus, having considerable resemblance to *Ægocera*, but is very differently coloured, having the fore-wings edged with a black line, and the centre filled up with red and yellow black-bordered spots and markings; the hind-wings are reddish, with indistinct yellowish markings; the fringes are yellow, spotted or tipped with black.

PAIS GORDONI.

(*Plate LXXVII. Fig.* 3.)

Pais gordoni, Butler, Entomologist's Monthly Magazine, xvi. p. 10 (1879).

This species was taken by Miss J. K. Lorimer at the Gordon Mission, on the Tugela River, South Africa. The fore-wings are yellow, with numerous transverse and interlacing black lines and loops, some of which enclose yellow spaces centred with black. A red transverse stripe runs from the base below the middle of the wing for half its length, and there is a transverse red stripe, curved inwards, at about three-quarters of the length of the wing, beyond which the broadly-black nervures and terminal line enclose long yellow spots; fringes yellow, tipped with black. Hind-wings brick-red, with indistinct yellow markings in the centre, and a more distinct row of round yellow spots within the black terminal line. The basal half of the fringes is black, and the terminal half yellow. Head and thorax black, spotted and striped with yellow; abdomen yellow, broadly belted with black; legs black, banded with yellow.

GENUS BURGENA.

Burgena, Walker, List Lepid. Ins. Brit. Mus. xxxi. p. 5[illegible] (1864).

This is a small genus confined to Australia, New Guinea, and some of the adjacent islands. The fore-wings are long, narrow, and rather pointed, with an accessory cell, and the costa is nearly straight; the hind-wings form a long oval. They are black, with white spots on the fore-wings, and a yellow band on the hind-wings. I have figured one of the handsomest of the four known species.

BURGENA SPLENDIDA.

(*Plate LXXVII. Fig.* 1.)

Eusemia splendida, Butler, Ann. Nat. Hist. (5) xix. p. 214 (1887).

This species was brought by Mr. C. M. Woodford from Guadalcanar, in the Solomon Islands. It measures rather more than two inches across the fore-wings, which are velvety-black, with a brilliant blue reflection, changing to green in certain lights, except upon the border. The fore-wings are spotted with white; and the hind-wings are blackish-brown, shot with blue, and crossed by a bright orange band. The head and thorax are black, the former marked with white, and the latter shot with green; the collar and abdomen orange, the abdomen with four bands, and the anal tuft black, shot with green.

The North American species of *Agaristidæ* are mostly rather small Moths, measuring an inch and a half or less across the wings, which are rather short and broad. They are black, with yellow or white markings, and are most numerous in the Western States; but the commonest species is *Alypia 4-maculata* (Stoll), the larva of which is destructive to the vine in the United States generally. It is black, with two large

white spots on each wing, and a white stripe on each side of the thorax. It usually goes by the name of *A. octomaculata* (Fabricius), but this species inhabits the Southern States, and the spots on the fore-wings are yellow instead of white.

GENUS EUTHISANOTIA.

Euthisanotia, Hübner, Zutr. Exot. Schmett. iii. p. 22 (1825).
Eudryas, Boisduval, Spec. Gén. Lépid. i. pl. 14, fig. 9 (1836); id. Rev. Zool. (3) ii. p. 57 (1874); Walker, List Lepid. Ins. Brit. Mus. ix. p. 143 (1856); Packard, Proc. Essex Instit. iv. p. 24 (1864); Stretch, Zyg. & Bomb. N. Amer. p. 145 (1872).

The species of this genus are larger than *Alypia*, with longer wings. There are several common species in North America, with white fore-wings, bordered with reddish-brown, and yellow hind-wings, similarly bordered. They differ somewhat from the more typical *Agaristidæ* in appearance, and they were referred by Walker to the Family *Glottulidæ*, of Guenée, in the *Noctuæ*. The following species is probably American; it has not been figured before.

EUTHISANOTIA SANCTI-JOHANNIS.

(*Plate LXXVII. Fig.* 2.)

Eudryas sanctæ-johannis, Walker, List Lepid. Ins. Brit. Mus. ix. p. 144, no. 3 (1856).

"Olive green; sides of the thorax tufted with white hairs; abdomen yellow, with an olive-green dorsal stripe towards the base. Fore-wings with some darker marks and with some white streaks towards the base, and with an oblique irregular white discal band, which is widened in front and includes some olive marks; a broad reddish band, including an undulating bluish line along the tip and the apical part of the

hind border; under side yellow, pale reddish towards the tips, and with two black spots, the one nearer the base much smaller than the other. Hind-wings yellow. Legs white, femora and tibiæ striped with white. Length of the body, 7 lines; of the wings, 22 lines."

"North America (?)"

"'Taken on the door of the church at Horseleydown by Mr. Bydder.'"

The specimen above described is in the British Museum. It is undoubtedly an accidentally introduced species, and may be known from the other species of the genus by the absence of any dark border to the yellow hind-wings.

FAMILY VIII. CHALCOSIIDÆ.

Egg.—Not described.

Larva.—Tuberculated, with hairs springing from the tubercles.

Pupa.—Enclosed in a dense cocoon.

Imago.—Measuring four inches or under in expanse; body rather short and slender; antennæ pectinated, especially in the males; wings generally broad, rounded, and entire, never dentated, and rarely tailed, brightly coloured; cells closed, and bisected by a nervure; fore-wings usually with two submedian nervures, and hind-wings with three.

This is a Family of moderate extent, peculiarly characteristic of the Indo-Malayan Region, though a few species are found in other parts of the world, Europe, North America, and Australia (?) excepted. They are day-flying Moths, and are perhaps specially protected, as is the case with so many brightly-coloured insects; nevertheless, several species mimic *Danainæ* of the *Euplœa* group very exactly. Several handsome species are figured in this volume.

GENUS ERASMIA.

Erasmia, Hope, Trans. Linn. Soc. Lond. xviii. p. 446 (1841); Walker, List Lepid. Ins. Brit. Mus. ii. p. 418 (1854).

Antennæ bi-pectinated, head conical in front, palpi short. Body rather slender; abdomen about as long as the hind-wings. Fore-wings oval, the costa arched, and the hind-margin obliquely rounded; hind-wings rounded, longer than broad.

A small genus, confined to the Indo-Malayan Region. The following species is the type, and also the commonest of the genus.

ERASMIA PULCHELLA.

(*Plate LXXVIII. Fig.* 2.)

Erasmia pulchella, Hope, Trans. Linn. Soc. Lond. xviii. p. 446, pl. 31, fig. 5 (1841); Westwood, in Jardine's Nat. Libr. Exot. Moths, p. 91, pl. 3, fig. 2 (1841); Walker, List Lepid. Ins. Brit. Mus. ii. p. 419, no. 1 (1854); Hampson, Faun. Brit. India, Moths, i. p. 273, fig. 181 (1892).

This Moth, which measures upwards of three inches in expanse, was first brought from Assam, but is likewise found in most of the adjoining countries of Northern India. The prevailing colour is silvery-green; the fore-wings are black, ornamented with greenish-blue silvery spots; there is an irregular orange-red band before the middle, separated by a bluish-green band from a series of large white spots beyond the middle; the hind-wings are straw-coloured, black at the base, and with a black border, not extending to the anal angle; and the nervures are greenish-blue.

Concerning this species, Hope wrote as follows:—"The above insect is one of the most lovely in colouring of all the *Lepidoptera*. When viewed by individuals standing in dif-

1. *Devanica tricolor.*
2. *Erasmia pulchella.*
3. *Amesia sanguiflua.*

ferent lights the blue appears to one person to be a vivid green, to another of a lazulite blue. I have had drawings made by different persons; the first contends that the colour is green, the second that it is blue; in short, both are right; all depends on the situation in which the individual views the specimens."

GENUS AMESIA.

Amesia, Westwood, in Jardine's Nat. Libr. Exot. Moths. p. 93 (1841); Hampson, Faun. Brit. India, Moths, i. p. 272 (1892).

This genus is closely allied to *Erasmia*, but the antennæ are longer and more slender, and shortly bi-pectinated. The fore-wings are broader and more oblong, the costa being much less arched, and the nervures are very strongly incrassated; the hind-wings are also longer, and less rounded. As is likewise the case in *Erasmia*, the uppermost nervule running from the extremity of the lower discoidal cell on the fore-wings throws off two branches considerably beyond the cell. The genus is confined to the Indo-Malayan Region, and several closely allied species are met with in Northern India.

AMESIA SANGUIFLUA.

(*Plate LXXVIII. Fig.* 3.)

Noctua sanguiflua, Drury, Ill. Exot. Ent. ii. pl. 20, figs. 1, 2 (1773).

Amesia sanguiflua, Westwood, in Jardine's Nat. Libr. Exot. Moths, p. 93, pl. iii. fig. 3 (1841); Hampson, Faun. Brit. India, Moths, i. p. 272, fig. 180 (1892).

Cyclosia sanguiflua, Walker, List Lepid. Ins. Brit. Mus. ii. p. 455, no. 1 (1854).

This Moth measures four inches and upwards in expanse, and is found in Northern India and Burma, though it was

originally erroneously described by Drury as inhabiting Suriman. The fore-wings are black, with one or two blue spots at the base, and five yellow ones beyond. Beyond these, the nervures are very broadly red, with numerous white spots placed within their forks; and there is a sub-marginal row of oblong white spots, each bisected by a nervure. The hind-wings are black to beyond the middle, and marked with several white spots bordered with blue; the hind margin is broadly bordered with brilliant mazarine blue, traversed by a row of divided sub-marginal white spots, similar to those on the fore-wings. On the under surface, the white spots are much more numerous, and bordered with blue. The head and thorax are bluish-black, and the abdomen is green, with the penultimate segment blue.

This species has a distant resemblance to a *Euplœa*; but there are several other East Indian genera, such as *Epyrgis*, Herrich-Schäffer, and *Mimeuplœa*, Butler, which present such a striking likeness to various blue and brown species of *Euplœa* and the allied genera, that no one who was not an entomologist would imagine that one was a Butterfly and another a Moth, unless he happened to notice the antennæ. Other species are much more Moth-like, as, for example, the harlequin-coloured *Campylotes histrionicus*, Westwood, another Himalayan form allied to *Erasmia* and *Amesia*, but with narrower and less rounded wings, with but one nervule thrown off from the lower discoidal cell of the fore-wings, which throws off two branches at about equal distances before the hind margin. It is black, with longitudinal red and yellow streaks and spots between the nervures; and with large white spots towards the tip of the fore-wings. In some genera of *Chalcosiidæ*, such as *Histia*, Hübner, and *Elcysma*, Elwes, the hind-wings are produced into a long broad tail. In colour, they are very various, ranging from white to black. I have already spoken of the

resemblance of some species to *Euplœa*, but there are others having a similar analogical resemblance to *Tirumala* in the *Danainæ*, *Euschema* in the *Geometræ*, and to various species of *Equitidæ*, *Zygænidæ*, *Arctiidæ*, *Lithosiidæ*, &c.; in fact, the Family *Chalcosiidæ* exhibits the phenomenon called, rightly or wrongly, "mimicry," to an unusual extent.

I will conclude my notice of this Family with another Indian genus.

GENUS DEVANICA.

Eterusia, Hope, Trans. Linn. Soc. Lond. xviii. p. 445 (1840); Walker, List Lepid. Ins. Brit. Mus. ii. p. 427 (1854).
Heterusia, Doubleday, Zoologist, ii. p. 468 (1844); Hampson, Faun. Brit. India, Moths, i. p. 259 (1892).
Sephisa, Moore, Lepid. Ceylon, ii. p. 41 (1882).
Devanica, Moore, Trans. Ent. Soc. Lond. 1884, p. 358.

This genus is exclusively Indo-Malayan as far as is known at present, and most of the species are met with in Northern India. The wings are longer and narrower than in most other genera of the Family, and on the fore-wings, the discoidal cells form acute angles, and the nervule that springs from the angle of the upper cell throws off four branches, and that springing from the lower cell two, the nervules being nearly straight, instead of some being strongly arched, as in *Erasmia*, &c.

Heterusia (as *Eterusia* should be written, if used at all) and *Sephisa*, Moore, are both pre-occupied names. The types of *Devanica* are *D. cingala* (Moore), a species with white spots, and white hind-wings, found in Ceylon, and *D. bicolor*, Moore, from Cachar, which has green fore-wings, with an oblique row of pale yellow spots separated by blue nervures; and orange hind-wings, veined with black, and the inner margin green.

DEVANICA TRICOLOR.

(*Plate LXXVIII. Fig.* 1.)

Eterusia tricolor, Hope, Trans. Linn. Soc. Lond. xviii. p. 445 pl. 31, fig. 8 (1840); Duncan, in Jardine's Nat. Libr. Exot. Moths, p. 39, pl. 3, fig. 1 (1841); Walker, List Lepid. Ins. Brit. Mus. ii. p 428, no. 1 (1854).

Heterusia tricolor, Hampson, Faun. Brit. India, Moths, i. p. 261, fig. 174 (1892).

This is another of the many beautiful species of *Chalcosiidæ* found in Northern India, and it was first recorded from Assam. The fore-wings measure nearly three inches in expanse, and are green, with a yellowish-white patch at the base, two yellowish-white spots placed obliquely before the middle, a third at the end of the cell, and an irregular sub-marginal row of smaller and whiter spots. The hind-wings have the basal half orange-yellow (with the extreme base black), passing into violet towards the apex, and marked with two rather large white spots. The thorax is velvety-black, shading into violet at each extremity. The abdomen is orange, with the base violet. The under side of the body is violet-blue, the segments of the abdomen alternately variegated with white and black; the black portions of the wing are also strongly glossed with blue beneath.

This species has some resemblance in pattern and in the distribution of its colours to *Episteme*, and other genera of *Agaristidæ*.

FAMILY IX. PSEUDOPONTIIDÆ.

Antennæ very short, gradually thickened from the base to the middle, but not beyond; they consist of about twenty well-separated oval joints, those towards the base cylindrical and longer; terminal joint conical. Palpi very short, almost naked,

terminal joint pointed. Eyes large, semi-circular; proboscis spiral; eyes rounded, very large; tibiæ not spurred; claws bifid. Body very short and slender. Wings rounded, with very short cells; anterior wings with the costal nervure long, extending nearly to the tip; the first and second sub-costal nervules strongly arched forwards, the second springing from the end of the cell, the third throwing off two discoidal nervules, one at a little more than a quarter, the other about half the distance between the discoidal cell and the hind margin; the lowest sub-median nervule and the sub-median nervure approximate, but do not touch. The hind-wings have a pre-discoidal cell, and instead of a regularly-formed costal and sub-costal nervure, the discoidal cell is slightly angulated upwards at two-thirds of its length, and here throws off a nervure running obliquely upwards, and then turning outwards towards the hind margin just below the tip. From the angulated extremity of the pre-costal cell another nervure is thrown off, which curves downwards, crossing the first, and running into the hind margin below it. At a quarter of the distance between the cell and the hind margin, the discoidal nervules diverge from a common stalk. The lower median nervule is angulated downwards towards the upper sub-median nervure, which is nearly straight; the lower sub-median nervure is much shorter, and strongly arched downwards.

Nothing appears to have been recorded of the habits or transformations of this singular insect, for which I have ventured to erect a new Family, *Pseudopontiidæ*. But one genus and species are known.

GENUS PSEUDOPONTIA.

Globiceps, Felder, Petites Nouvelles Entomologiques, i. p. 30 (1869).

Pseudopontia, Plötz, Stett. Ent. Zeit. xxxi. p. 348 (1870); Butler, Cist. Ent. i. p. 57 (1870); Kirby, Cat. Diurn. Lepid. pp. 438, 638 (1871); Schatz, Exot. Schmett. ii. p. 65 (1886).

Gonophlebia, Felder, *op. cit.* i. p. 95 (1870).

This genus has been formed for a very curious insect from West Africa, an insect so remarkable that it has always been disputed whether it should be considered as a Butterfly or a Moth; and Dr. Staudinger observes that it looks like a survivor from some former creation. It will be best to give full references to the only known species, and then to discuss the genus and species together. It may be well to mention that although the name *Pseudopontia* was published in the part of the "Stettiner Zeitung" for "July-Sept., 1870," it is referred to in the "Petites Nouvelles" for June 1, whereas Felder's name *Gonophlebia* was only published in "Petites Nouvelles" for June 15 of that year, and is therefore necessarily posterior to *Pseudopontia*. The name *Globiceps* had been previously used for a genus of *Hemiptera*.

PSEUDOPONTIA PARADOXA.

(*Plate LXXIX. Fig.* 3.)

Globiceps paradoxa, Felder, Pet. Nouv. Ent. i. p. 30 (1869); Kirb. *op. cit.* p. 54; Hewitson, *op. cit.* p. 57 (1870).

Pseudopontia calabarica, Plötz, Stett. Ent. Zeit. xxxi. p. 348, pl. 2, figs. 1*a–f* (1870).

Gonophlebia paradoxa, Felder, *l. c.* i. p. 95, cum fig. (1870).

Pseudopontia paradoxa, Kirby, Cat. Diurn. Lepid. p. 438 (1871); Staudinger & Schatz, Exot. Schmett. i. p. 26, pl. 16; ii. p. 65, pl. 4 (1884–1886).

It is a curious circumstance that while all the German authors have considered this insect to be an aberrant Butterfly belonging to the *Pieridæ*, all English authors have regarded it as a

Moth. Its short and non-clavate antennæ, pure white colour, and greatly rounded wings, with very abnormal neuration will prevent its being confounded with any other insect. It has some external resemblance to the genus *Leptosia* (*cf.* our vol. ii. p. 176), as well as to some of the rounder-winged genera of *Liparidæ* among the Moths, such as *Pantana*, Walker. The genus stands at present in the British Museum collection among the *Chalcosiidæ*, and although it differs from them greatly in the structure of its antennæ, the curiously irregular neuration of the insect may show some affinity to that Family, though we prefer to separate it as quite distinct from any other.

The two Felders were the first authors to notice this insect, which they received from Calabar, and pointed out its resemblance to a *Cicada* (or rather a *Flata*). "The wings are wholly without markings, short, shining, and much rounded; the antennæ nearly filiform, and very distinctly jointed; the eyes are large and round, but not prominent, and this gives the head a completely rounded appearance; the cell of the fore-wings is very narrow, and the first subcostal nervure is much curved. We believe it to be allied to *Pontia*." Some correspondence on the subject ensued in the "Petites Nouvelles," where this preliminary notice first appeared; and Hewitson expressed his opinion that the insect was a Moth (in which he was afterwards followed by Butler), and also pointed out that Plötz' figure, published in the interim, represented the antennæ as clavate, thus giving the insect more of the appearance of a Butterfly than it actually possesses. Rudolf Felder then published a figure in the "Petites Nouvelles," remarking:—"It evidently belongs to the great division of *Rhopalocera*, according to the character indicated by Herrich-Schäffer (Schmett. Eur. i. pp. 13, 15); the joints of the antennæ being longer than broad. It has also all the appearance of one, though it has some resemblance to certain

Liparidæ (*Cozistra*, Walker), and *Geometræ* (*Leucula*, Guen.), and it has some affirmities in its neuration with the *Zygænidæ* of the group including *Gynautocera*, *Chalcosia*, &c. All its characters approximate it to the group of *Pieridæ* . . . the channel formed by the hind-wings, and embracing the abdomen; the junction of the discoidal nervules with branches of the sub-costal nervure on the fore-wings, and the bifid claws, provided with distinct pads."

Plötz gives a much longer description of the insect, accompanied by figures, in the "Stettiner Entomologische Zeitung," and its identity with Felder's species was pointed out by Hewitson. His specimen was stated to come from "Old Calabar (Guinea)," and to be contained in Pogge's collection. Plötz also regarded the insect as one of the *Pieridæ*, and placed it between *Pontia* and *Leucophasia* (our *Leptosia* and *Leptidia*).

Staudinger, in his great work on Exotic Butterflies, again figured and described the insect among the *Pieridæ*, in which he was (perhaps unavoidably) followed by Schatz, who placed it at the end of the *Pierinæ*, between *Pontia* (*Leptosia*) and *Leucidia*. Although admitting the abnormal characters of the insect, he yet considered that the neuration and bifid claws showed it to be undoubtedly a species of the *Pieridæ* allied to *Leptosia*. The Felders had compared the insect with a *Cicada*; Schatz thought that the distinct neck and large semicircular eyes gave it the appearance of a Lace-winged Fly (*Chrysopa*). The Moth measures about two inches in expanse, and Schatz well observes:—"The wings are only thinly scaled, nearly transparent, and shine in certain lights with the most delicate rainbow hues. The head and body are wonderfully small in comparison with the wings. The scales of the wings have a very curious bifid shape, which gradually passes into a simple pointed form towards the margin."

1. *Thymara papilionaria.*
2. *Epicopia caudata.*
3. *Pseudopontia paradoxa.*

When the details of insect morphology have been more systematically worked out, the last-mentioned character may help us to come to some more positive conclusion respecting the real affinities of this remarkable insect.

FAMILY X. EPICOPIIDÆ.

Egg.—Not described.

Larva.—Covered with a white waxy excretion.

Pupa.—Enclosed in a slight cocoon.

Imago.—Of moderate or rather large size, black, with red and white (sometimes ocellated) markings, and much resembling *Equitidæ* of the genus *Byasa*, Moore. This Family has lately been founded by Sir G. Hampson to include the genus *Epicopia*. The few species known are found in North India, China, and Japan.

GENUS EPICOPIA.

Epicopeia, Westwood, Arcana Entomologica, i. p. 17 (1841); Walker, List Lepid. Ins. Brit. Mus. i. p. 409 (1854).

Epicopia, Hampson, Faun. Brit. India, Moths, iii. p. 108 (1865).

The body is rather short and slender, and the antennæ are bi-pectinated. The wings are long, with one sub-median nervure on the hind-wings and two (the upper one imperfect) on the fore-wings. The discoidal cells are closed, and bisected by an imperfect nervure, which forms a short fork just before the extremity of the cell, at least on the fore-wings, but there are no accessory cells beyond the discoidal ones. The fore-wings are long, oval, and entire; the hind-wings are deeply concave below the tip, and are produced into a broad lobe or tail, curving outwards, at the outer angle. The frenulum is rudimentary.

This genus has been referred by several authors to the *Chalcosiidæ*, *Liparidæ*, and *Cydimonidæ*. I myself am disposed to consider *Epicopia* most nearly allied to such genera of *Chalcosiidæ* as *Gynautocera*, Guérin, and *Histia*, Hübner; though the *Chalcosiidæ* have nearly always three sub-median nervures on the hind-wings, instead of only one.

EPICOPIA CAUDATA.

(*Plate LXXIX. Fig.* 2.)

Epicopia caudata, Butler, Illustr. Lepid. Heter. Brit. Mus. v. p. 47, pl. 88, fig. 8 (1881).

This Moth was described and figured by Dr. Butler from specimens collected in Bhotan by the celebrated traveller and naturalist, Dr. Lidderdale. It measures upwards of 4½ inches across the wings, which are black, the anterior wings longitudinally striped with black and grey on the disc; the nervures being black, with intermediate black lines, resembling additional nervures. The hind-wings are hardly concave on the hind margin, and therefore appear more drawn out; below the middle are three oval white spots, separated by the nervures, and there are two projections between the anal angle and the tail. At the anal angle is a linear red mark, and there are two small red spots near the margin, opposite the concavities of the wing. The head, collar, apex of abdomen, and some markings on the wings beneath are red; and the abdomen above (except at the tip) is shot with dark green. On the under side the fore-wings are more grey, and the white spots of the hind-wings are united into a large patch.

Sir G. Hampson treats all the described Indian forms of *Epicopia* except *E. philenora*, Westwood, as simple varieties of *E. polydora*, Westwood, the type of the genus. The true *E. polydora* is a larger and broader-winged insect than *E. caudata*,

with the hind-wings deeply concave on the hind margin, and curved outwards below into a broad obtuse lobe, sinuated between the anal and outer angles, and with a sub-marginal row of five ocellated spots between the nervures, along thispart of the wing, centred with black, and ringed with red.

FAMILY XI. THYMARIDÆ.

Under this name we may include a few small Indian and African Moths, with pectinated antennæ, no frenulum, closed and divided discoidal cells, while the hind-wings are produced or even wholly modified into a long filiform tail. The fore-wings are generally more or less transparent, and the hind-wings are opaque, clothed with hair-like scales. The neuration of the latter is sometimes almost obsolete, at other times it is as simple as in many *Tineæ*. The Moths are more or less related to several different Families; and those interested in the subject may consult the various references in my "Synonymic Catalogue of Lepidoptera Heterocera," i. pp. 60, 61, and Mr. H. J. Elwes' paper on Moths allied to *Himantopterus*, in the "Transactions of the Entomological Society of London" for 1890, pp. 328–338, pl. 1. Since then Sir G. Hampson (Faun. Brit. Ind. Moths, 1, p. 288) has referred them to the Sub-family *Phaudinæ* of the *Zygænidæ*, but adds the information that "they are degraded forms which have arisen from an ancestral type."

GENUS THYMARA.

Thymara, Doubleday, Zoologist, i. p. 197 (1843); Walker, List Lepid. Ins. Brit. Mus. ii. p. 383 (1854).

Hind-wings half as broad as long, with the anal angle well marked, and a filiform tail, longer than the wing. There is a long bisected cell, ending at the base of the tail, which is tra-

versed by a nervure proceeding from its extremity; from the outer nervures one or two short branches are thrown off to the costa and anal angle.

It is useless to mention further characters in the case of such an imperfectly-known group; besides, the type of *Thymara* is *T. zaida*, Doubleday, a rare insect said to come from Assam, whereas I have figured an African species which may not be strictly congeneric. *T. zaida* measures less than an inch across the wings; the fore-wings are yellowish-grey, with black borders, and the hind-wings are yellow, with the tail black, and a large round black spot at the tip, and another at the anal angle.

THYMARA PAPILIONARIA.

(*Plate LXXIX. Fig.* 1.)

Thymara papilionaria, Walker, List Lepid. Ins. Brit. Mus. xxxi. p. 277 (1864); Elwes, Trans. Ent. Soc. Lond. 1890, p. 334.

Walker described both sexes of this insect, and Mr. Elwes states that the types are now in the museum of Highgate School, but I have not been able to ascertain if they are still in existence, or can be identified. Our figure is taken from a much-injured specimen in the British Museum, and under these circumstances I think it better to reproduce Walker's original description in full.

"Mas et fœm.—Ochracea, pilosissima; alæ dimidio apicali nigro maculam ochraceam includente. Mas.—Antennæ pectinatæ; alæ posticæ cauda longa. Fœm.—Antennæ pilosæ, alæ posticæ cauda longissima.

"**Male and Female.**—Ochraceous, very pilose. Proboscis and palpi obsolete. Antennæ rather broadly pectinated in the male, pilose in the female. Abdomen of the female thick. Tibiæ without spurs; tarsi with black tips. Apical half of the

wings black, including an ochraceous spot. Fore-wings rounded at the tips; exterior border extremely oblique; first and second inferior veins approximate at the base; third very remote from the second, and equally remote from the fourth. Hind-wings prolonged into a very slender tail, which is much longer and more pilose in the female than in the male. Length of the body, 4 lines; of the wings, 11–14 lines.

"East Africa. Discovered by Horace Waller, Esq. In Mr. Walker's collection."

FAMILY XII. ZYGÆNIDÆ (BURNETS).

The *Zygænidæ* are a very extensive Family of rather small Moths, with long, narrow, and sometimes pointed wings, closed and sometimes divided discoidal cells, and provided with a frenulum. The antennæ are thickened or pectinated; the abdomen is rarely tufted. Most of the species fly by day, and are found in June and July. The larvæ feed exposed; some species mine into leaves when young; but this is an unusual habit in the Family. They are divided into several Sub-families, some of which are represented in Europe. I have devoted three plates to the illustration of this extensive Family, the first representing types of all the principal European groups.

SUB-FAMILY I. ANTHROCERINÆ.

Egg.—Round or oval.

Larva.—Cylindrical, with sixteen legs, clothed with short hairs. Colour most often green, with longitudinal bands formed of approximating blackish spots. Feeding on clover and other low plants.

Pupa.—Enclosed in a long cocoon.

Imago.—With long wings, usually densely scaled, and

never actually hyaline. The fore-wings are spotted or streaked with red or yellow, and the hind-wings are of the same colour as the spots, with dark borders. Antennæ stout, much thickened before the tips, and slightly hooked; proboscis well-developed. Body moderately stout; abdomen obtuse at the extremity. Flight heavy, diurnal.

The Burnet Moths are very abundant both in species and individuals in the Mediterranean Region, but hardly extend beyond the Palæarctic Region. One or two species touch the north-western frontiers of India, and a few species are South African, but the latter appear not to be gregarious like the European kinds, but are met with singly, and are generally rare in collections.

GENUS ANTHROCERA.

Zygæna (part), Fabricius, Syst. Ent. p. 550 (1775); id. in Illiger, Mag. vi. p. 289 (1807); Cuvier, Tabl. Elém. d'Hist. Nat. p. 593 (1799); Ochsenheimer, Schmett. Eur. ii. p. 20 (1808).

Anthrocera, Scopoli, Introd. Hist. Nat. p. 454 (1777); Stephens, Ill. Brit. Ent. Haust. i. p. 106 (1828).

Adscita (part), Retzius, Gen. Spec. Ins. pp. 8, 35 (1783).

This genus includes all the European species of the Sub-family, and the species belonging to it are known to every entomologist as Burnet Moths. They are found in meadows and open places in woods, flying slowly, with a booming flight like a bumble-bee, from flower to flower, or resting on the heads of thistles, scabious, and similar plants, several often on the same flower. They are gregarious, and generally abundant where found; but many species are very local. They feed on vetch, trefoil, and other low plants, and their long spindle-shaped cocoons of tough yellow silk may often be

found attached to blades of grass. We have six species in Britain: one with the fore-wings streaked with red; four with five red spots on the fore-wings; and one with six spots. Varieties are sometimes met with or bred, in which the red spots are replaced with yellow. In some of the European species the red spots are surrounded with white or yellow rings.

THE IRISH BURNET. ANTHROCERA PURPURALIS.

Sphinx purpuralis, Müller, Zool. Dan. p. 116, no. 1345 (1776).

Sphinx minos, Denis & Schiffermüller, Syst. Verz. Schmett. Wien. p. 45, no. 1 (1776); Hübner, Beitr. Gesch. Schmett. ii. (1) p. 20, taf. 3, fig. O (1790); id. Eur. Schmett. ii. fig. 8 (1797).

Zygæna pythia, Fabricius, Gen. Ins. p. 275 (1777); Fuessly, Mag. Ent. i. p. 140, pl. 1, fig. 6 (1778).

Sphinx piloselle, Esper, Schmett. ii. p. 186, t. 24, figs. 2*a*, *b* (1781); ii. (2) p. 14, taf. 40, figs. 3–6, p. 32, taf. 44, fig. 10 (1789).

Zygæna minos, Ochsenheimer, Schmett. Eur. ii. p. 22 (1808); Kirby, Eur. Butterflies & Moths, p. 88, pl. 21, figs. 4, 4*a*, 4*b* (1879); Barrett, Lepid. of Brit. Isl. ii. p. 117, pl. 58, figs. 4, 4*a*, 4*b* (1894).

Var. *a*. *Anthrocera nubigena*.

Zygæna nubigena, Lederer, Verh. Zool.-Bot. Ges. Wien, ii. p. 93 (1852); Birchall, Ent. M. Mag. iii. p. 33, pl. 1, fig. 6, *b* (1866); Kirby, Eur. Butterflies & Moths, p. 88 (1879).

Anthrocera nubigena, Buckler, Larvæ of Brit. Lepid. ii. p. 9, pl. 18, fig. 4 (1887).

This Moth is common in North and West Europe, as well as in parts of Asia. It expands from 1¼ to 1½ inch. It is greyish-blue or greyish-green, with three longitudinal red streaks.

The hind-wings are crimson, with a very narrow black hind margin. The antennæ have a short abruptly thickened club. The abdomen is covered with velvety steel-blue hair.

The variety *A. nubigena* occurs in Galway and other parts of the West of Ireland, where the true *A. purpuralis* is much less common. It differs from the type in being smaller, and having the red costal streak of the fore-wings meeting the central streak, the tendency being towards a suffusion of the whole wing with red. The hair on the abdomen is black and shaggy.

The Irish Burnet was first found in Galway by the late Mr. A. G. More in 1851; but it was at first mistaken for a variety of *A. trifolii* with confluent spots. In Britain it seems to be

Irish Burnet. *Anthrocera purpuralis.*

an insect which generally occurs near the coast. It is very abundant in some localities in the West of Ireland, and is also found here and there on the West coast of Scotland, the coast of Wales, and, I believe, also in Cornwall. Its reputed occurrence on the East coast of Scotland was an error, though it is curious that it should be exclusively confined to the Western coasts of both Great Britain and Ireland.

The larva is light yellow or greenish, with a blackish head and fore-legs. There are two rows of twelve black spots on each side of the body. It feeds on various kinds of vetches and trefoils.

1

2

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5

1. *Zygæna phegea.*
2. *Aglaope infausta.*
3. *Dysauxes ancilla.*
4. *Anthrocera exulans.*
5. " *filipendulæ.*
6. *Adscita statices.*

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THE MOUNTAIN BURNET. ANTHROCERA EXULANS.

(*Plate LXXX. Fig.* 4.)

Sphinx exulans, Hochenwarth & Reimer, Bot. Reisen, p. 55, taf. 6, fig. 1 (1792); Esper, Schmett. ii. (2) p. 17, taf. 41, figs. 1, 2 (1793); Hübner, Eur. Schmett. ii. figs. 12, 101 (1803?).

Zygæna exulans, Ochsenheimer, Schmett. Eur. ii. p. 40 (1808); Kirby, Eur. Butterflies & Moths, p. 89 (1879); Barrett, Lepid. of Brit. Isl. ii. p. 121, pl. 58, figs. 5, 5*a*, 5*b*.

Anthrocera exulans, Buckler, Larvæ of Brit. Lepid. ii. p. 13, pl. 19, fig. 1 (1887).

Var. *a*. *Anthrocera subochracea*.

Zygæna subochracea, White, Scot. Nat. i. p. 175 (1872); Kirby, Eur. Butterflies & Moths, p. 90 (1879).

Var. *b*. *Anthrocera vanadis*.

Zygæna vanadis, Dalman, Vet. Akad. Handl. Stockh. 1816, p. 223.

This species is found in all the higher mountains of Europe, from Lapland to the Caucasus, and is often very abundant. It flies at a much greater elevation in Southern than in Northern Europe, and abounds in the Alps and Pyrenees, where the palest specimens are said to be found at the greatest elevation. I predicted its occurrence in Scotland as long ago as 1859 ("Entomologist's Weekly Intelligencer," vii. p. 69), but it was not till 1871 that the late Dr. Buchanan White met with it on the mountains near Braemar; and up to the present time, no other locality for it has been discovered in Britain.

The body is covered with shaggy black hair, and the legs are pale yellow. There is a pale yellow collar, at least in the female. The wings are thinly scaled, the fore-wings being greyish-black with five carmine spots. The hind margin of the hind-wings, which is greyish-black, is broad in the male and narrow in the female. The club of the antennæ is short

and thick, with a rounded end. It expands a little more than an inch.

Like other species of the genus, *A. exulans* varies somewhat in colour and in the density or otherwise of its scaling, and some of the Scotch specimens have been called *A. subochracea*, but this form does not appear to have been separated on any constant characters.

The larva is black, with a greenish-black head, and a row of yellow oval spots on each side. The incisions are yellowish. It feeds on *Azalea procumbens*.

THE BROAD-BORDERED FIVE-SPOT BURNET. ANTHROCERA TRIFOLII.

Sphinx trifolii, Esper, Schmett. ii. (2) (1) p. 223, taf. 34, figs. 4, 5 (1783); Hübner, Eur. Schmett. ii. figs. 99, 134, 135 (1818?).

Sphinx pratorum, De Villers, Ent. Linn. ii. p. 114, no. 60 (1789).

Zygæna scabiosæ, Haworth (nec Scheven), Lepid. Brit. i. p. 74 (1803).

Zygæna trifolii, Ochsenheimer, Schmett. Eur. ii. p. 47 (1808); Kirby, Eur. Butterflies & Moths, p. 90 (1879); Barrett, Lepid. of Brit. Isl. ii. p. 127, pl. 59, figs. 1, 1*a–c* (1894).

Anthrocera trifolii, Stephens, Ill. Brit. Ent. Haust. ii. p. 108 (1828); Buckler, Larvæ of Brit. Lepid. ii. p. 94, pl. 19, fig. 2 (1887).

This is the commonest of the five-spotted Burnets, and is very variable, the spots sometimes coalescing to such a degree that the insect resembles *A. purpuralis*, but the wings are much more densely scaled. *A. trifolii* is found in damp woods and meadows, and is a local insect in Britain, though in many places on the Continent it is far more abundant and generally distributed than *A. filipendulæ*.

Dark bluish-green with five carmine spots, the basal pair

being confluent, and the central pair usually also confluent. The hind-wings are carmine with a broad black hind margin. The antennæ have a short, stout, obtusely-tipped club. It expands from 1¼ to nearly 1½ inch.

Broad-bordered Five-spot Burnet.

The larva is green or yellowish-green with two rows of black spots on the back, and a similar row on the sides. It feeds on horse-shoe vetch (*Hippocrepis comosa*) and various species of trefoil.

THE NARROW-BORDERED FIVE-SPOT BURNET. ANTHROCERA LONICERÆ.

Sphinx loniceræ, Scheven, Naturf. x. p. 97 (1777); Fuessly, Mag. i. p. 140, taf. 1, fig. 1 (1778); Esper, Schmett. ii. (1) p. 183, taf. 24, figs. 1, *a*, *b* (1781); ii. (2) p. 12, taf. 39, figs. 9–14 (1789); Hübner, Eur. Schmett. ii. figs. 7, 160 (1797–1818).

Zygæna fulvia, Fuessly, Mag. i. pp. 114, 139, taf. 1, fig. 1 (1778.)

Sphinx graminis, De Villers, Ent. Linn. ii. p. 115, no. 61 (1789).

Zygæna loti, Haworth, Lepid. Brit. p. 74 (1803).

Zygæna loniceræ, Ochsenheimer, Schmett. Eur. ii. p. 49 (1808); & Kirby, Eur. Butterflies & Moths, p. 90, pl. 21, figs. 7, *a–c* (1879); Barrett, Lepid. of Brit. Isl. ii. p. 130, pl. 59, figs. 3, 3*a–d* (1894).

Anthrocera loti, Stephens, Ill. Brit. Ent. Haust. ii. p. 109 (1828).

Anthrocera trifolii, Wood, Ind. Ent. pl. 4, fig. 3 (1839).

Anthrocera loniceræ, Buckler, Larvæ of Brit. Lepid. p. 18, pl. 19, fig. 3 (1887).

Var. *a*. *Anthrocera eboraca*.

Zygæna eboraca, Prest. Ent. xvi. p. 273 (1883); id. Proc. Ent. Soc. Lond. 1883, p. xxviii.

This species expands from 1 to 1½ inch. It is blackish-blue or blackish-green with five carmine spots, of which the basal pair are nearly confluent, and the central pair never united. The hind-wings are carmine, with a somewhat narrow hind margin. The antennæ are long with an elongated, gradually-expanding club, which is gradually pointed.

Narrow-bordered Five-spot Burnet.

It is widely distributed in Northern and Western Europe and Asia, but, like most of the Burnets, is a local insect in Britain.

The larva is apple-green with two black lateral stripes, interrupted between the segments, and with a row of black dots between the two stripes. It feeds on horse-shoe vetch (*Hippocrepis comosa*) and bird's-foot trefoil (*Lotus corniculatus*).

Many experienced entomologists consider this insect to be only a variety of the last.

THE NEW FOREST BURNET. ANTHROCERA VICIÆ.

Sphinx loniceræ, var. Esper, Schmett. ii. (1) p. 195, taf. 25, fig. 3 (1781).
Sphinx viciæ, Fuessly, Neues Mag. ii. p. 208 (1785).
Sphinx meliloti, Esper, Schmett. ii. (2) p. 10, taf. 39, figs. 1–8 (1789).
Sphinx loti, Hübner, Eur. Schmett. ii. fig. 82 (1803).
Zygæna meliloti, Ochsenheimer, Schmett. Eur. ii. p. 43 (1808); Kirby, Eur. Butterflies & Moths, p. 90, pl. 21, fig. 9 (1880); Barrett, Lepid. of Brit. Isl. ii. p. 124, pl. 59, figs. 1, 1*a–c* (1894).

This species was included in the British list by the older authors, but its occurrence was afterwards discredited. Latterly, however, it has been found plentifully in the New Forest. On the Continent it is well known, but is said not to occur in France, except in the extreme east of that country. It is probably often confounded with some of the closely allied species of this group of the genus.

Bluish-green, with the fringes brownish at the tips, and five or six carmine spots, the central pair being very unequal in size. Border of the hind-wings blackish, often very broad in the male, narrow in the female. The abdomen has frequently a dull red ring, generally open beneath. The antennæ have a slender club, slightly pointed. The Moth expands rather over one inch.

The larva is pale sea-green, with a black head and legs, a whitish stripe on the back, a similar one above the spiracles, and a row of black dots between. It feeds on *Trifolium* and various grasses.

The pupa is pale yellow, with a black back and wing-cases.

THE SIX-SPOTTED BURNET. ANTHROCERA FILIPENDULÆ.

(*Plate LXXX. Fig.* 5.)

Sphinx filipendulæ, Linnæus, Syst. Nat. i. (ed. x.) p. 494, no. 32 (1758); id. Faun. Suec. p. 290 (1761); Esper, Schmett. ii. (1) p. 138, taf. 16, figs. *a–e* (1780); p. 233, taf. 36, fig. 8 (1783).
Adscita aries, Retzius, Gen. Sp. Ins. p. 35, no. 35 (1783).
Sphinx filipendulæ major, Esper, Schmett. ii. (2) p. 19, taf. 41, fig. 4 (1789).
Zygæna filipendulæ, Ochsenheimer, Schmett. Eur. ii. p. 54 (1808); Curtis, Brit. Ent. xii. pl. 547 (1835); Kirby, Eur. Butterflies & Moths, p. 91, pl. 21, figs. 10, *a*, *b* (1879); Barrett, Lepid. Brit. Isl. ii. p. 133, pl. 60 (1894).
Anthrocera filipendulæ, Stephens, Ill. Brit. Ent. Haust. i. p. 110 (1828); Buckler, Larvæ of Brit. Lepid. ii. p. 97, pl. 19, fig. 4 (1887).

Var. *a*. *Anthrocera hippocrepidis*.

Anthrocera hippocrepidis, Stephens (nec Hübner), Ill. Brit. Ent. Haust. i. p. 109, no. 5 (1828); Wood, Ind. Ent. pl. 4, fig 6 (1839).

Bluish-green, with six equal-sized carmine spots, the basal pair confluent, the central pair sometimes confluent, as are also the external pair occasionally; hind-wings carmine, with a gently curved black hind-margin, which is generally very narrow. The expanse of the wings is about the same as in *A. loniceræ*.

The larva is yellow, with a black head and fore-legs, and three rows of black spots on the back, and a row of smaller ones on each side. It feeds on plantain, trefoil, &c.

The variety *A. hippocrepidis* differs in having the black border of the hind-wings more distinct.

Stephens mentions that he took specimens in the vicinity of London in 1810.

This is the commonest and most widely-distributed Burnet in the British Isles, and it is likewise one of the commonest species on the Continent. There is a large southern form named *A. transalpina* (Esper).

GENUS ARICHALCA.

Arichalca, Wallengren, Œfv. Vet. Akad. Förh. Stockh. xv. p. 137 (1858); id. K. Vet. Akad. Handl. Stockh. (2) v. (4) p. 15 (1865).

The South African *Anthrocerinæ*, though not numerous in species, have been divided into several genera, differing slightly from *Anthrocera*. In *Arichalca* the fore-wings are marked with red transverse bands bordered by black lines, instead of being spotted, or longitudinally streaked. Three species from South-eastern Africa have been referred to the genus *Arichalca*. Except the Mediterranean species of true *Anthrocera*, all the African *Anthrocerinæ* and *Adscitiæ* appear to be found in Southern or Eastern Africa, and of the latter, only one or two species have been recorded from tropical regions. In West Africa these Sub-families do not appear to be found at all.

ARICHALCA ERYTHROPYGA.

(*Plate LXXXI. Fig.* 2.)

Arichalca erythropyga, Wallengren, Wien. Ent. Mon. iv. p. 38, no. 23 (1860); id. K. Vet. Akad. Handl. Stockh. (2) v. (4) p. 15, no. 2 (1865).

Zygæna negamica, Walker, List Lep. Het. Brit. Mus. xxxi. p. 61 (1864).

This species was brought from "Eastern Caffraria"* by Wahlberg, and from Lake N'Gami by Andersson. Both Wahlberg and Andersson were well-known explorers and hunters in their

*This probably means the Transvaal of the present day.

day, and the former was at last killed by an elephant on one of his expeditions. Wahlberg's collections went to Stockholm, where the *Lepidoptera* were described by the late Pastor Wallengren, who was for many years almost the only working Lepidopterist in Sweden, though he did not confine his attention to *Lepidoptera*, but studied at other orders of insects as well. He died a few months ago, and an obituary notice of him was published by Professor Aurivillius, of Stockholm, who now occupies as prominent a position as an Entomologist as that formerly filled by Wallengren. From this notice we learn that Wallengren left a large family, to whom, and especially to the girls, he gave three or four names apiece, all taken from the old Eddas and Sagas.

On my first visit to the Entomological Room in the British Museum, in Bloomsbury, at Easter, 1860, when Frederick Smith and Adam White were in charge of the insects, I remember that Andersson's specimens of the present species (still unset, and not described till some years afterwards) specially attracted my attention. One of them is here figured for the first time. Walker's description runs as follows :—

"**Female.**—Glossy metallic-green. Head and fore-border of the thorax crimson. Antennæ and legs black. Abdomen with a broad crimson stripe on each side. Posterior tibiæ with a broad crimson stripe. Fore-wings with a crimson dot at the base of the costa, and with three crimson black-bordered bands; first band straight, second hardly undulating, third more or less undulating. Hind-wings crimson towards the base. Length of the body, 6 lines; of the wings, 18 lines."

Wallengren's example, previously described, appears to be the same species, and is said to have the abdomen black, with red spots on the back, and the hind-wings red, with the border blue-black, throwing out a large tooth into the disc.

1

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1. *Charidea smaragdina.*
2. *Arichalca erythropyga.*
3. *Thyretes monteiroi.*
4. *Agyrta micilia.*
5. *Euchromia siamensis.*

SUB-FAMILY II. ADSCITINÆ (FORESTERS).

This Sub-family resembles the *Anthrocerinæ* in many respects, but the species are more slender, and the antennæ are not thickened before the tip. If at all, they are thickened throughout, the tip being blunt or pointed, and they are generally more or less pectinated, slightly in *Adscita*, but very strongly in the Australian genus *Pollanisus*, Walker. The wings are shorter than in *Anthrocera*, and are generally very differently coloured, the fore-wings ranging from brown to golden-green, and the hind-wings being brown. One or two South African genera, however, form exceptions, being coloured like *Anthrocera*, from which they differ in their antennæ.

In *Adscita* the antennæ of the male are bi-pectinated, and those of the female serrated; the proboscis is well developed. The fore-wings are shorter and broader than in *Anthrocera*, and more rounded at the extremity.

The larvæ resemble those of the *Anthrocerinæ*, but are shorter and thicker.

GENUS ADSCITA.

Adscita, Retzius, Gen. Spec. Ins. pp. 8, 35 (1783).
Zygæna, Sect. C, Schrank, Fauna Boica, ii. (1) p. 242 (1801).
Procris, Fabricius, Illiger's Mag. vi. p. 289 (1807); Hübner, Verz. bek. Schmett. p. 119 (1822; *nom preocc.*).
Atychia, Ochsenheimer, Schmett. Eur. ii. p. 9 (1808).
Chrysaor, Hübner, Tentamen, p. 1 (1810?).
Ino, Leach, Edinb. Encycl. ix. p. 436 (1815); Stephens, Ill. Brit. Ent. Haust. i. p. 105 (1828); Curtis, Brit. Ent. iv. pl. 396 (1834).

The species of this genus are all very similar, and there are three species in Britain, with coppery-green or bluish-green

fore-wings, and brown hind-wings; they may be distinguished by their differently formed antennæ. They are all very local in this country. They appear in June, and fly by day. The Green Forester (*A. statices*, Linn.), the type of the genus, is a meadow insect, and was formerly generally distributed, having been taken in Kensington Gardens almost within the memory of persons now living. The other two species are found in restricted localities in the South of England, chiefly on the chalk, and are found flying together near Brighton and Lewes, and also in Gloucestershire. Isolated species of the genus are met with in most parts of the world, but they are most numerous in Europe and the Mediterranean Regi... One species, *A. ampelophaga* (Boyle), is very destructive to the vine; another, common in most parts of Europe, feeds on heath, though it has been improperly named *A. pruni* (Den. & Schiff.), and has greenish-brown fore-wings. Some of the arvæ mine the leaves of their food-plants when young. The pupæ are enclosed in an oval cocoon.

THE GREEN FORESTER. ADSCITA STATICES.

(*Plate LXXX. Fig* 6.)

Sphinx statices, Linnæus, Syst. Nat. (ed. x.) i. p. 495, no. 38 (1758); id. Faun. Suec. p. 290 (1761); Esper, Schmett. ii. p. 158, taf. 18, figs. 2*a*, *b* (1780); Hübner, Eur. Schmett. ii. figs. 1, 144 (1797).

Atychia statices, Ochsenheimer, Schmett. Eur. ii. p. 11 (1808).

Ino statices, Stephens, Ill. Brit. Ent. Haust. ii. p. 105 (1828); Curtis, British Ent. ix. pl. 396 (1834); Kirby, Eur. Butterflies & Moths, p. 87, pl. 21, fig. 3 (1879).

Procris statices, Buckler, Larvæ of Brit. Lepid. ii. p. 87, pl. 18, fig. 1 (1887); Barrett, Lepid. of Brit. Isl. ii. p. 112, pl. 58, figs. 2, 2*a*, *b* (1894).

Bluish-green with dark grey hind-wings. It is distinguished

by the antennæ, which terminate in a blunt club. In the male the serrations become less marked towards the club, and the antennæ are not dentated in the female.

Varieties are sometimes met with in which the fore-wings are blue, whilst sometimes the abdomen is reddish-golden. The expanse of the wings varies from an inch to an inch and a quarter. The larva is ashy-grey, with a dorsal row of triangular black marks, and a whitish lateral stripe above a broader reddish one; the head and fore-legs are black. It feeds on sorrel.

This Moth, though always local, is still common in meadows in many parts of England; it has also been taken at Oban and elsewhere in Scotland.

THE CISTUS FORESTER. ADSCITA GERYON.

Sphinx geryon, Hübner, Eur. Schmett, ii. figs. 130, 131 (1818?).
Ino geryon, Kirby, Eur. Butterflies & Moths, p. 87 (1879).
Procris geryon, Buckler, Larvæ of Brit. Lepid. ii. p. 91, pl. 18, fig. 3 (1887); Barrett, Lepid. Brit. Isl. ii. p. 115, pl. 58, figs. 3, 3*a* (1894).

Fore-wings shining green; hind-wings smoky black, semi-transparent. The head and body are golden green. The antennæ are slightly thickened towards the tip, being serrated in the male, but simple in the female. The expanse of the wings is about an inch.

The larva, which has a black head and legs, is brown, with a dingy white median dorsal stripe narrowly bordered with reddish-purple. It feeds on the common sun-cistus (*Helianthemum vulgare*), but will also eat sorrel in captivity.

This species is of a more bluish-green than *A. statices*, and the sexes do not differ in size, whereas in *A. statices* the males are much larger than the females. It is a hill-side rather than a meadow insect, and has been found in various parts of England, but was for many years confounded with *A. statices*.

When it was first reputed distinct, it was mistaken for some time for a South European species called *A. tenuicornis* (Zeller), notwithstanding the unusual thickness of its antennæ.

THE SCARCE FORESTER. ADSCITA GLOBULARIÆ.

Sphinx globulariæ, Hübner, Eur. Schmett, ii. taf. 1 *bis*, figs. 2, 3 (1797).

Atychia globulariæ, Ochsenheimer, Schmett. Eur. ii. p. 13 (1808).

Procris globulariæ, Godart, Lépid. France, iii. p. 160, pl. 22, fig. 16 (1821); Buckler, Larvæ of Brit. Lepid. ii. p. 1, pl. 18, fig. 2 (1887); Barrett, Lepid. of Brit. Isl. ii. p. 100, pl. 58, figs. 1, 1*a* (1894).

Ino globulariæ, Kirby, Eur. Butterflies & Moths, p. 86, pl. 21, figs. 2, 2*a*, *b* (1879).

Green or bluish-green, with dark grey hind-wings. The antennæ are pointed at the tip, and are sharply serrated in the female. The abdomen is sometimes coppery in the male.

The male expands a little over an inch, the female about ¾ inch.

The species inhabits Europe and Western Asia. In England it is confined to a few localities in the south, though, like the other species, it is abundant wherever it is found.

The larva is blackish with a dorsal series of triangular green spots, and a lateral blue stripe containing a row of yellow dots. It feeds on *Centaurea scabiosa*, mining the young leaves.

GENUS AGLAOPE.

Aglaope, Latreille, Gen. Crust. Ins. iv. p. 214 (1809).

Antennæ bi-pectinate, the branches slightly thickened at the tips.

Proboscis obsolete. Wings broad and rounded at the tips; fore-wings not much longer than the hind-wings.

Abdomen not extending beyond the anal angle. The females are provided with an ovipositor.

AGLAOPE INFAUSTA.

(*Plate LXXX. Fig.* 2.)

Sphinx infausta, Linnæus, Syst. Nat. (ed. xii.), i. (2) p. 807, no. 43 (1767); Fuessly, Archiv. t. 2, figs. 1, 2 (1781); Esper, Schmett. ii. p. 226, t. 35, fig. 4 (1783); Hübner, Eur. Schmett, ii. fig. 5 (1797).

Atychia infausta, Ochsenheimer, Schmett. Eur. ii. p. 17 (1808).

Aglaope infausta, Kirby, Eur. Butterflies & Moths, p. 85, pl. 21, fig. 1 (1879).

Black with brown wings. The fore-wings are narrowly red on the costa, inner margin, and towards the base. The hind-wings are broadly red on the inner margin. It expands about an inch.

The larva is violet, with a broad yellow stripe on the back, and a whitish stripe above the legs. The head is small and black. It feeds on sloe (*Prunus spinosa*) and other trees, and is often very destructive in Southern France and Spain, the young larva beginning by eating the parenchyma, and afterwards the whole leaf.

This Moth is very local in Central Europe, but is met with in some localities in Western Germany, where *Zygæna phegea*, *Dysauxes ancilla*, and other interesting species, several of which are hardly to be found elsewhere north of the Alps, likewise occur. The Moth flies about sloe-bushes at dusk.

SUB-FAMILY III. ZYGÆNINÆ.

The antennæ are filiform, and the fore-wings are much longer than the hind-wings, and pointed. The hind-wings are small and rounded. The colour is usually dark, with trans-

parent spots, which are sometimes so much extended as to cover the greater part of the wing, except the borders. The costal nervure is wanting on the hind-wings, and there is only one sub-median nervure on the fore-wings, and one or two on the hind-wings. The Moths are gregarious, and have a rapid flight, wheeling round and over bushes in the daytime, though they will also settle on flowers. The larva is furnished with tubercles bearing tufts of hair, and the pupa is enclosed in a slight cocoon.

Zygæna, Fabricius, the typical genus of this Sub-family, is extremely numerous in species in Asia and Africa. One species only is found in Europe.

GENUS ZYGÆNA.

Zygæna, Fabricius, Syst. Ent. p. 550 (1775); id. in Illiger, Mag. vi. p. 289 (1807).

Zygæna, Sect. A. Schrank, Fauna Boica, ii. (1) p. 236 (1801).

Amata, Fabricius, in Illiger, Mag. vi. p. 289 (1807).

Syntomis, Ochsenheimer, Schmett. Eur. ii. p. 104 (1808); Hübner, Verz. bek. Schmett. p. 121 (1822?).

Cœnochromia, Hübner, Verz. bek. Schmett. p. 121 (1822?).

It is hardly necessary to say much more respecting the genus than we have already said respecting the Family. There is one sub-median nervure on the hind-wings. The European species is sufficiently characteristic of the whole genus.

ZYGÆNA PHEGEA.

(*Plate LXXX. Fig.* 1.)

Sphinx phegea, Linnæus, Syst. Nat. (ed. x.) i. p. 494, no. 33 (1758); id. Mus. Ludov. Ulr. p. 364 (1764); Fuessly, Mag. i. pp. 122, 135. pl. 1. fig. E (1778); Drury, Ill. Exot. Ent. i. pl. 25, fig. 2 (1773); Esper, Schmett. ii. p. 144, taf. 17, figs. 1, 2 (1780); Hübner, Eur. Schmett. ii. figs. 99, 100 (1803?).

Sphinx ligata, Allioni, Mél. Phil. Math. Turin, 1762–65, p. 193 (1766).

Sphinx quercus, Fabricius, Ent. Syst. iii. (1) p. 388, no. 6 (1793).

Syntomis phegea, Ochsenheimer, Schmett. Eur. ii. p. 105 (1808); Kirby, Eur. Butterflies & Moths, p. 93, pl. 21, fig. 15 (1879); Barrett, Lepid. of Brit. Isl. ii. p. 137 (1894).

Dark blue, with semi-transparent white spots on the wings, and two ochre-yellow bands on the abdomen. The fore-wings have six spots and the hind-wings two. The antennæ are filiform, slightly thickened towards the extremity, which is tipped with white. It expands 1½ inch, or a little more.

The larva is black with tubercles, on which stand tufts of erect brownish-grey hair. The head and feet are brownish-red. It feeds on heath, dandelion, plantain, and *Rumex*.

This species is very common in South Europe and Western Asia, but north of the Alps it is found only in one or two isolated localities in Northern and Western Germany, and in Holland and Belgium. It is, however, a gregarious species, and is common wherever it is found. One or two specimens are said to have been taken in England, but, if it was really a British insect, not an isolated specimen, but at least a colony would be found.

GENUS DYSAUXES.

Dysauxes, Hübner, Verz. bek. Schmett. p. 171 (1822?); Walker, List Lepid. Ins. Brit. Mus. i. p. 134 (1854).

Naclia, Boisduval, Gen. Ind. Meth. p. 60 (1840).

The hind margin of the fore-wings is shorter, and the hind-wings are broader than in *Zygæna*, the palpi somewhat longer, with smooth scales. This genus differs from *Zygæna* in having two sub-median nervures on the hind-wings. It comprises

only two or three South European species, one of which is found in many localities in Central Europe. It is absent in Northern and North-Western Europe, and its reputed occurrence in the British Islands is still considered to require confirmation. It is found by day in sunny bushy places, such as openings in woods, but is not gregarious like *Zygæna phegea*, and has a lower and weaker flight. The larvæ feed on lichens.

THE HAND-MAID. DYSAUXES ANCILLA.

(*Plate LXXX. Fig.* 3.)

Noctua ancilla, Linnæus, Syst. Nat. (ed. xii.) i. (2) p. 835, no. 93 (1767); Esper, Schmett. iv. p. 51, taf. 85, figs. 1. 2 (1786); id. Naturf. iii. p. 8, taf. 1, fig. 9 (1774).

Bombyx ancilla, Hübner, Eur. Schmett. iii. figs. 114, 245 (1804?).

Lithosia ancilla, Ochsenheimer, Schmett. Eur. iii. p. 157 (1810).

Naclia ancilla, Kirby, Eur. Butterflies & Moths, p. 94, pl. 53, fig. 7 (1879); Barrett, Lepid. of Brit. Isl. p. 138 (1894).

Ochreous brown, with three white spots, or sometimes four or five, on the fore-wings. The hind-wings are ochreous-brown in the male, with a yellow inner margin; ochre-yellow with a brown marginal band in the female. The head, collar, pectus, and legs are yellow.

The larva is black, with a broad yellow dorsal stripe, and two lines of the same colour on the sides. It weaves a thin web in which it forms a reddish-brown pupa.

It feeds on lichens and moss (*Jungermannia complanata*).

SUB-FAMILY IV. THYRETINÆ.

This Sub-family much resembles the last, but differs in having the antennæ more or less strongly pectinated, especially

in the males, which are also furnished with a small anal tuft. It includes a great number of genera and species, inhabiting the warmer parts of the Old World. They only touch the Palæarctic Region in North China, Japan, and Amurland, unless *Dysauxes*, which we have included in the *Zygæninæ*, should be regarded as belonging to this Sub-family. Many of the *Thyretinæ* have a strong resemblance to *Zygæna phegea* and its allies, and were formerly included in the same genus. The African species here figured belongs to one of the more distinct genera.

GENUS THYRETES.

Thyretes, Boisduval, in Delegorgue, Voy. Afr. Austr. ii. p. 596 (1847); Walker, List Lepid. Ins. Brit. Mus. viii. p. 74 (1856).

Body very pubescent, legs and abdomen long. Wings long and narrow, the fore-wings much longer than the hind-wings, with the costa straight, the tips rounded, and the hind-margin very oblique. In the male the antennæ are strongly pectinated.

THYRETES MONTEIROI.

(*Plate LXXXI. Fig.* 3.)

Thyretes monteiroi, Butler, Journ. Linn. Soc. Lond. Zool. xii. p. 359, no. 4 (1876).

This delicate little species, which comes from Ambriz in Angola, measures about 1¼ inch, or a little less, across the wings.

"Body ochre-yellow; antennæ, centre of dorsum, and edges of abdominal segments black-brown; a line down each side of the abdomen of the same colour; wings dark brown; a testaceous hyaline band from centre of inner margin round lower edge of cell to lower radial nervure, cut by the median

Butler, Journ. Linn. Soc. Lond. Zool. xii. p. 363. pl. 28 fig. 20 (1876; neuration); id. Trans. Ent. Soc. Lond. 1888, p. 109.

This genus includes a number of species inhabiting the warmer regions of the Old World. They measure about an inch across the fore-wings, which are about twice as long as the hind-wings, and rather pointed. The wings are marked with large yellow or hyaline spots, and the body is pubescent, rather stout, and belted with red and blue; the abdomen extends for the greater part of its length beyond the hind-wings. The larva is furnished with erect tufts of hair, with longer ones before and behind; the pupa is enclosed in a thick cocoon.

EUCHROMIA SIAMENSIS.

(*Plate LXXXI. Fig.* 5.)

Euchromia siamensis, Butler, Journ. Linn. Soc. Lond. Zool. xii. p. 365, no. 13 (1876).

This Moth, which is allied to *E. polymena* (Linn.), the type of *Euchromia*, belongs to an East Indian section of the genus which is black, with extensive ochreous- or orange-yellow markings on the fore-wings. *E. siamensis* measures nearly two inches across the fore-wings, which have an oblong orange-yellow mark near the base, between the median and sub-median nervures; a larger one beyond, separated from a narrow one in the cell above it, by the median nervure; and four long sub-apical ones, divided by the nervures, with the two middle ones separated by a wider black space. Hind wings with two spots, one near the base, and one sub-apical, each divided into three by the nervures. Body black; antennæ pectinated; vertex metallic blue; collar red; a red spot above the base of each fore-wing; abdomen with an ochreous band at the base; segments two and three broadly edged with white behind on the sides, and marked behind

with some blue and red scales on the upper surface; segments four and five red, with a black crescent in front; segment seven blue; the terminal segment scaled with metallic green.

GENUS AGYRTA.

Agyrta, Hübner, Verz. bek. Schmett. p. 177 (1822 ?).
Dioptis, Group 8, *Agyrta*, Walker, List Lepid. Ins. Brit. Mus. ii. p. 326 (1854.)

We have here an American genus, including only a few species, which have a great resemblance to the Family *Dioptidæ*, in which they were actually included by Walker. The body is more slender, and the wings are much broader and more oval than in *Euchromia*.

AGYRTA MICILIA.

(*Plate LXXXI. Fig.* 4.)

Bombyx micilia, Cramer, Pap. Exot. iii. pl. 228, fig. G (1780 ?).
Limacodes micilia, Duncan, in Jardine's Naturalist's Library, Exot. Moths, p. 179, pl. 22, fig. 1 (1841).
Dioptis micilia, Walker, List Lepid. Ins. Brit. Mus. ii. p. 329, no. 16 (1854).

This species, which is found in Surinam, measures nearly two inches across the wings, which are suffused with bright blue towards the base of the fore-wings, and on the borders of the hind-wings. The fore-wings have a short whitish hyaline basal streak, a broad oblique streak descending over the upper part of the cell towards the hinder angle, and a narrower white sub-apical streak. The hind-wings have a broad hyaline-white stripe running through the middle nearly to the hind margin. On the sub-hyaline parts of the wings the nervures are black. The body is blue, with a white longitudinal stripe on the abdomen; and the legs are red, as is also the head, in some of the allied species of *Agyrta*.

Stoll has figured a larva not unlike that of *Doratifera vulnerans* (Lewin) (see Plate XCII, figs. 4–6, for the latter) as that of *Agyrta micilia*, but almost certainly in error. Consequently, Duncan referred *A. micilia* to the genus *Limacodes*.

GENUS ISANTHRENE.

Isanthrene, Hübner, Verz. bek. Schmett. p. 125 (1822 ?); Butler, Journ. Linn. Soc. Lond. Zool. xii. p. 374, pl. xxvii fig. 4 (neuration) (1876).

Glaucopis, group 8. *Isanthrene*, Walker, List Lepid. Ins. Brit Mus. i. p. 154 (1854).

The transparent-winged *Zygænidæ*, which are very numerous in Tropical America, and many of which much resemble *Hymenoptera*, were classed together by Walker under the genus *Glaucopis*, Fabricius, which, however, is an inadmissible name, as it had been previously used by Gmelin for a genus of Birds. Walker also employed the genus *Euchromia*, Hübner, to include the bulk of the tropical *Zygænidæ*, with opaque wings. Both these magazine genera he divided into numerous named groups, most of which have been raised to generic rank by Dr. Butler, and other recent authors.

The species of *Isanthrene* are among the largest of the transparent *Zygænidæ*, many of the species measuring two inches across the wings. The wings are transparent, except on the borders, and strongly tinged with yellow, and the abdomen is long, moderately stout, nearly naked, and cylindrical; the antennæ are also long, and are slightly pectinated; the legs likewise are long and stout.

Some of the transparent-winged *Zygænidæ* have extremely small hind-wings, which increase their resemblance to *Hymenoptera*, or even *Diptera*.

ISANTHRENE FLAVICORNIS.

(*Plate LXXXII. Fig.* 3.)

Zygæna flavicornis, Fabricius, Mant. Ins. ii. p. 104, no. 25 (1787).

Glaucopis vespoides, Walker, List Lepid. Ins. Brit. Mus. i. p. 155, no. 23 (1854).

This South American species expands nearly two inches.

It is black, with a black and yellow head, and rather long tawny palpi. The antennæ and legs are yellow, and the antennæ are pectinated. The thorax is striped and spotted with yellow. The abdomen has four yellow spots at the base, three interrupted yellow bands to beyond the middle, and three spots of the same colour on each side. The wings are yellowish and semi-transparent; the fore-wings bordered with black towards the tips, which are widely black, and with a yellowish stripe, bordered with black, along part of the hind border. The hind-wings are black above, yellowish beneath in front and behind. The hind tibiæ have four rather small spurs.

This fine species has been known to entomologists for more than a century, but does not appear to have been figured before.

GENUS COSMOSOMA.

Cosmosoma, Hübner, Samml. Exot. Schmett. ii. pl. 152 (1824?); Harris, Amer. J. Sci. xxxvi. p. 317 (1839); Clemens, Proc. Acad. Sci. Philad. 1860, p. 544 (1861); Butler, Journ. Linn. Soc. Lond. Zool. xii. p. 386, t. 27, fig. 3 (neuration) (1876).

Glaucopis, Group 13, *Cosmosoma*, Walker, List Lepid. Ins. Brit. Mus. i. p. 168 (1854).

This is another transparent-winged genus, but it is smaller, with much shorter wings, and a brightly-coloured body, shorter,

broader, and more pubescent than in *Isanthrene;* the legs, too, are shorter and stouter. Many species are found in Mexico and South America; the best known species is *C. auge* (Linn.), which extends as far north as Florida, and is also common in the West Indies. It has a bright scarlet body and legs, with the tip of the abdomen black.

COSMOSOMA FESTIVUM.

(*Plate LXXXII. Fig.* 2.)

Glaucopis festiva, Walker, List Lepid. Ins. Brit. Mus. i. p. 171, no. 54 (1854).

This species comes from Honduras. The expanse of the wings is $1\frac{1}{6}$ inch. The following is Walker's description of the female :—

"Bright metallic blue or green, according to the reflection; linear, rather short. Proboscis, palpi, and antennæ black. Palpi nearly straight, rather long; third joint moderately long, about half the length of the second. Antennæ minutely pectinated, white above towards the tips. Thorax ferruginous, with two luteous spots in front, and with a luteous stripe on each side. Pectus partly ferruginous. Wings limpid. Fore-wings broad, testaceous at the base and along most of the fore border, and partly so along half of the hind border; black at the tips for one-fourth of the length, and with black hind borders; a black band across the middle, interrupted on part of the median vein, and of the fourth inferior veinlet; veins black, testaceous at the base; discal fold not apparent on the discal areolet, but distinct beyond it. Hind-wings with the base, the fore border and the veins testaceous; tips and hind borders black. Abdomen black, with two rows of blue or green spots above and beneath. Legs black, slender; tooth of the fore tibiæ small; middle and apical spurs of the hind tibiæ very small."

1. *Philoros opaca.*
2. *Cosmosoma festivum.*
3. *Isanthrene flavicornis.*
4. *Trichura cerberus.*
5. *Antichloris quadricolor.*
6. *Cyanopepla cinctipenni*

broader, and more pubescent than in *Isanthrene;* the legs, too, are shorter and stouter. Many species are found in Mexico and South America; the best known species is *C. auge* (Linn.), which extends as far north as Florida, and is also common in the West Indies. It has a bright scarlet body and legs, with the tip of the abdomen black.

COSMOSOMA FESTIVUM.

(*Plate LXXXII. Fig.* 2.)

Glaucopis festiva, Walker, List Lepid. Ins. Brit. Mus. i. p. 171, no. 54 (1854).

This species comes from Honduras. The expanse of the wings is $1\frac{1}{6}$ inch. The following is Walker's description of the female :—

"Bright metallic blue or green, according to the reflection; linear, rather short. Proboscis, palpi, and antennæ black. Palpi nearly straight, rather long; third joint moderately long, about half the length of the second. Antennæ minutely pectinated, white above towards the tips. Thorax ferruginous, with two luteous spots in front, and with a luteous stripe on each side. Pectus partly ferruginous. Wings limpid. Fore-wings broad, testaceous at the base and along most of the fore border, and partly so along half of the hind border; black at the tips for one-fourth of the length, and with black hind borders; a black band across the middle, interrupted on part of the median vein, and of the fourth inferior veinlet; veins black, testaceous at the base; discal fold not apparent on the discal areolet, but distinct beyond it. Hind-wings with the base, the fore border and the veins testaceous; tips and hind borders black. Abdomen black, with two rows of blue or green spots above and beneath. Legs black, slender; tooth of the fore tibiæ small; middle and apical spurs of the hind tibiæ very small."

1. *Philoros opaca*.
2. *Cosmosoma festivum*.
3. *Isanthrene flavicornis*.
4. *Trichura cerberus*.
5. *Antichloris quadricolor*.
6. *Cyanopepla cinctipennis*

SUB-FAMILY VIII. TRICHURINÆ.

Dr. Butler distinguishes this Sub-family (which he calls *Eunomiinæ*) from the last by the median nervure of the hind-wings having more than two branches, one of which is always emitted before the end of the discoidal cell. The Moths which it includes are all American, and are of smaller average size than the *Euchromiinæ*, and generally have transparent wings. Some of them are provided with a very remarkable appendage at the extremity of the abdomen in the males. The antennæ are pectinated, and the abdomen is sometimes contracted or violated at the base, increasing the resemblance to the *Hymenoptera*, which so many of the transparent-winged *Zygænidæ* exhibit. The *Trichurinæ* are not a very extensive Sub-family. The more opaque species are generally larger and more brightly coloured than the others, and in these the abdomen is often tufted at the extremity.

GENUS TRICHURA.

Trichura, Hübner, Verz. bek. Schmett. p. 126 (1822 ?).

Glaucopis, Group 23, *Trichura*, Walker, List Lepid. Ins. Brit. Mus. i. p. 192 (1854).

Cercophora, Herrich-Schäffer, Aussereurop. Schmett. i. pp. 22, 23 (1854 ?).

These are slender-bodied Moths, with pectinated antennæ and transparent, dark-bordered wings. The legs are slender, and the wings are transparent with black borders. The abdomen is contracted at the base, and is furnished with a long hairy appendage in the males.

TRICHURA CERBERUS.

(*Plate LXXXII. Fig.* 4.)

Sphinx cerberus, Pallas, Spic. Zool. ix. p. 27, pl. 2, fig. 8 (1772).

Zygæna caudata, Fabricius, Gen. Ins. p. 277 (1777).
Cercophora urophora, Herrich-Schäffer, Aussereurop. Schmett. i. fig. 266 (1855).

This species, which is found over a large part of South America, has yellowish-hyaline wings with black borders, and a black streak at the end of the cell of the fore-wings, which expand about an inch and a half. The body is black, with golden spots; and the abdominal appendage is as long or longer than the rest of the body.

SUB-FAMILY IX. ANTICHLORINÆ.

The *Antichlorinæ* are a small group of Moths, with long narrow opaque wings, and rather small and short bodies. They are all American, and are more uniformly coloured than most of the allied Families.

GENUS ANTICHLORIS.

Antichloris, Hübner, Zutr. Exot. Schmett. i. p. 9 (1818); id. Verz. bek. Schmett. p. 124 (1822?); Butler, Journ. Linn. Soc. Lond. Zool. xii. p. 413, pl. 22, fig. 5 (1876; neuration).
Euchromia, Group 19, *Antichloris*, Walker, List Lepid. Ins. Brit. Mus. i. p. 247 (1854).

These are slender-bodied Moths, mostly of a green colour, with the abdomen spotted with white. The antennæ are rather strongly pectinated. The fore-wings are rather pointed, and obtusely angulated behind; and the hind-wings are obliquely truncated, and slightly angular at the tips, with the hind-margin a little sinuated.

ANTICHLORIS QUADRICOLOR.

(*Plate LXXXII. Fig.* 5.)

Charidea quadricolor, Walker, List Lepid. Ins. Brit. Mus. xxxv. p. 1867 (1866).

This species comes from Brazil, and expands about 1½ inch.

"**Male.**—Greenish-blue. Head and thorax with an æneous tinge. Palpi short, slender, decumbent; third joint minute, lanceolate. Antennæ moderately pectinated. Abdomen extending rather beyond the hind-wings; sexualia very small. Legs smooth; spurs short. Fore-wings rather narrow, rounded at the tips, obliquely tinged with æneous at the base and about the tips. Hind-wings black, whitish along the costa, hardly more than half the length of the fore-wings; a broad crimson lanceolate streak extending from the disc to the exterior border, which is also crimson." (*Walker.*)

FAMILY XIII. ARCTIIDÆ.

Egg.—Smooth, globular.

Larva.—Clothed with long shaggy hair, or tufted; sixteen legs; generally feeding on low plants.

Pupa.—Enclosed in a cocoon.

Imago.—With ocelli; the antennæ sometimes pectinated in the male. Body stout, rather short, more or less hairy; collar well developed. Wings generally brightly coloured and entire. On the fore-wings the lowest discoidal nervule is generally stalked with the upper median nervule, making the median nervule appear to be four-branched; and on the hind-wings the costal nervure, which in the *Zygænidæ* is often practically non-existent, is thrown off from the sub-costal considerably before the cell. The fore-wings are generally oval, and the hind-wings rounded. The hind-wings are sometimes lobate, but never tailed, and have usually two sub-median nervures. In one or two genera the wings of the female are more or less rudimentary. Some species fly by day.

The Tiger Moths may be divided into several Sub-families, which I will now discuss more in detail.

SUB-FAMILY I. CHARIDEINÆ.

The *Charideinæ* are a group of Moths resembling *Zygænidæ*, with which, indeed, they are connected through the *Anticlorinæ*; but they are stouter, shorter, and more pubescent Moths, with more rounded wings, which are generally adorned with bright colours. Most of the species inhabit Central and South America, though some few are African, and one or two occur in the East Indies and Australia.

GENUS CYANOPEPLA.

Euchromia, Group 7, *Automolis*, Walker, List Lepid. Ins Brit. Mus. i. p. 213 (1854).

Cyanopepla, Clemens, Proc. Acad. Nat. Sci. Philad. 1860, p. 545 (1861).

Charidea, Butler (nec Dalman), Journ. Linn. Soc. Lond Zool. xii. p. 415, pl. 29, fig. 11 (neuration) (1876).

This genus, which is one of the largest of the Sub-family, contains a considerable number of very pretty little species, which are mostly black, more or less glossed with metallic blue, and marked with red spots and borders. The names *Automolis* and *Charidea* are more properly applicable to other genera.

CYANOPEPLA CINCTIPENNIS.

(*Plate LXXXII. Fig.* 6.)

Charidea cinctipennis, Walker, List Lepid. Ins. Brit. Mus. xxxi. p. 97 (1864).

This species, from Bogota, expands two inches.

"**Female.**—Brilliant green. Palpi obliquely ascending, shorter than the breadth of the head. Antennæ black, very slightly pectinated. Abdomen extending a little beyond the

hind-wings; fourth and fifth segments with a transverse semi-circular black spot on each side; sixth segment with a black band; seventh segment with a black spot on each side; under side with a white stripe. Wings rather broad, bordered with ochreous along the exterior border. Fore-wings black, slightly acute; costa ochreous; under side with a large crimson discal patch. Hind-wings very dark blue, with a broad crimson stripe along the outer part of the interior border." (*Walker.*)

GENUS CHARIDEA.

Charidea, Dalman, Vet. Akad. Handl. Stockholm, 1816, p. 225.
Pompostola, Hübner, Verz. bek. Schmett. p. 120 (1822 ?).
Euchromia, Group 1, *Pompostola*, Walker, List Lepid. Ins. Brit. Mus. i. p. 206 (1854).

In this genus the body and wings are brilliantly metallic. The antennæ are setaceous, nearly as long as the body, not pectinated in the male. The long, narrow wings are completely opaque, with green and gilded spots. The hind-wings are not angular. The hind tibiæ have very long spurs, and are plumose in the males.

This is one of the few African genera of the Sub-family. It includes about half-a-dozen species.

CHARIDEA SMARAGDINA.

(*Plate LXXXI. Fig.* 1.)

Pompostola smaragdina, Butler, Proc. Zool. Soc. Lond. 1888, p. 97.

This beautiful species comes from Kilimanjaro. The expanse of the wings is about 1¼ to 1¾ inch.

"Wings blue-black, the basal fifth and the costal border to the end of the cell mottled with brilliant metallic emerald-green spots and dashes; two cuneiform spots confluent behind,

within the cell, the inner one metallic green, the outer one hyaline-white, richly glossed with emerald-green; a quadrate green-glossed hyaline spot immediately beyond the cell; a long oblique tapering green-glossed hyaline streak from the median vein just below the double discoidal spot almost to the external angle; in some specimens, however, this streak is widely interrupted in the middle, leaving only two small spots; a sub-costal metallic green streak, from the centre of which a transverse irregular green-glossed hyaline band runs almost to the outer margin at about the apical fourth; costal border of secondaries rufous-brown; a small hyaline-white sub-costal spot, followed by a metallic emerald-green streak; an oblique cuneiform trifid green-glossed hyaline-white spot across the middle; two large patches almost filling the interno-median and the abdominal areoles, and a minute spot near outer margin on the second median interspace; thorax blue-black; frons and vertex of head metallic emerald-green; collar above with two large spots of metallic golden-green; a triangular dorsal spot of the same colour; posterior half of patagia metallic fiery-copper; meta-thorax and the two basal segments of abdomen metallic golden-green; the two following segments deep brick-red edged with black; remaining segments blue-black, banded in front with metallic emerald-greeen; primaries below purplish towards the base, otherwise nearly as above; secondaries with a broad metallic green costal stripe from base to apex; pectus bronze-brown sprinkled with metallic green scales; legs blackish-brown, the coxæ of the first pair and the tibiæ of the other pairs with a large white spot; venter blue-black, with two unequal central white spots." (*Butler.*)

SUB-FAMILY II. CTENUCHINÆ.

This is another American group; one species is common in the United States, and others are found in various parts of

America, as far south as Buenos Aires and Chili; but they are most numerous in California, and the other Eastern United States. The typical species are very easily recognisable. They are black, or blue-black, the head and thorax being often marked with red or yellow, and the abdomen extends for nearly half its length beyond the hind-wings. The antennæ are pectinated in the males, and thickened in the middle, and very slightly pectinated in the female. The fore-wings expand about two inches, and are generally lighter in colour than the hind-wings, and are sometimes interlined with white or yellow. The fore-wings form a long oval, and are considerably produced at the tips, but rounded; the hind-wings are nearly as broad as the fore-wings, and half as long; they are also oval, and rounded at the extremity, and the hind margin, especially of the hind-wings, is sometimes slightly sinuated.

GENUS CTENUCHA.

Ctenucha, Kirby, Faun. Bor. Amer. iv. p. 305 (1837); Harris, Amer. Journ. of Sci. xxxvi. p. 318 (1839); Walker, List Lepid. Ins. Brit. Mus. ii. p. 281 (1854); Packard, Proc. Essex Inst. iv. p. 33 (1864); Stretch, Zyg. & Bomb. N. Amer. p. 23 (1872).

The type of this genus is *C. virginica* (Charpentier = *C. latrellana*, Kirb.), which is common in Canada and in the Eastern and Central United States. It is blue-back above, and black below; the top and sides of the head, the palpi, and the sides and under surface of the thorax are orange. The fore-wings are blackish, without metallic gloss, and the fringes of all the wings are white. The Moth flies in the hot sun, hovering heavily over flowers, and may be found clinging to the latter in dull, cloudy weather. The larva, which feeds on grass, is rather short and thick, and is covered with tubercles

bearing long white and yellow hairs, which become black or grey before the last moult. The head and fore-legs are red, and there are two rows of yellow spots on each side. The cocoon is formed entirely of the hairs of the larva, without a trace of silk. The eggs of the Moth are smooth and green.

GENUS PHILOROS.

Ctenucha, Group 2, *Philoros*, Walker, List Lepid. Ins. Brit. Mus. ii. p. 283 (1854).

Philoros, Grote, Bulletin Buffalo Soc. i. p. 34 (1873).

The species of this genus are smaller and slenderer than in typical *Ctenucha*; the abdomen is longer, and the wings are generally lined with white, and are narrower than in *Ctenucha*.

PHILOROS OPACA.

(*Plate LXXXII. Fig.* 1.)

Ctenucha opaca, Boisduval, Consid. Lépid. Guatemala, p. 84 (1870).

This Moth, which expands about an inch and a half, has brown fore-wings, with the fringes white at the tip. The hind-wings are darker, with the fringes white at the tip and along the upper part of the hind margin. The collar is orange-yellow. The insect appears to be found throughout Mexico and Central America generally.

SUB-FAMILY III. PERICOPINÆ.

The *Pericopinæ* are another exclusively American Sub-family which contains a considerable number of brightly coloured Moths, measuring two or three inches across the wings, which are very ample, being broad as well as long, and the hind-wings are nearly as long as the fore-wings. The body is comparatively slender, and only moderately long. The antennæ are

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1. *Composia credula.*
2. *Anthomyza tiresias var.*
3. *Calodesma temperata.*

only slightly pectinated. On the hind-wings the lowest discoidal nervule is widely separated at its base from the upper sub-median nervule, instead of being stalked with it, as in the typical *Arctiidæ*. In shape and general appearance these Moths greatly resemble some of the *Ithomiinæ* or *Heliconinæ* among the Butterflies, and several species are more or less transparent, like many of the *Ithomiinæ*.

GENUS CALODESMA.

Calodesma, Hübner, Verz. bek. Schmett. p. 177 (1822?)
Eucyane, Hübner, *loc. cit.*; Walker, List Lepid. Ins. Brit. Mus ii. p. 361 (1854).

In *Calodesma* the fore-wings are shorter and less rounded at the tips than in some of the allied genera. The moths are black, more or less suffused with brilliant blue, especially towards the base, and are generally marked with a broad transverse hyaline-white band on the fore-wings, and sometimes also on the hind-wings.

Other species have bright scarlet bands instead of white ones.

CALODESMA TEMPERATA.

(*Plate LXXXIII. Fig.* 3.)

Eucyane temperata, Walker, List Lepid. Ins. Brit. Mus. vii. p. 1656 (1856).

This species was brought from the Tapajos, a tributary of the Amazons, by the late Mr. H. W. Bates. It measures nearly two inches in expanse.

"Male.—Bright blue. Head with white dots. Palpi black, white beneath. Antennæ black, very minutely pectinated. Abdomen beneath mostly black, with a broad crimson stripe, and with a slender white band on the hind border of each seg-

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Wyman & Sons, Limited

1. *Composia credula*.
2. *Anthomyza tiresias var.*
3. *Calodesma temperata*.

only slightly pectinated. On the hind-wings the lowest discoidal nervule is widely separated at its base from the upper sub-median nervule, instead of being stalked with it, as in the typical *Arctiidæ*. In shape and general appearance these Moths greatly resemble some of the *Ithomiinæ* or *Heliconinæ* among the Butterflies, and several species are more or less transparent, like many of the *Ithomiinæ*.

GENUS CALODESMA.

Calodesma, Hübner, Verz. bek. Schmett. p. 177 (1822?)
Eucyane, Hübner, *loc. cit.*; Walker, List Lepid. Ins. Brit. Mus ii. p. 361 (1854).

In *Calodesma* the fore-wings are shorter and less rounded at the tips than in some of the allied genera. The moths are black, more or less suffused with brilliant blue, especially towards the base, and are generally marked with a broad transverse hyaline-white band on the fore-wings, and sometimes also on the hind-wings.

Other species have bright scarlet bands instead of white ones.

CALODESMA TEMPERATA.

(*Plate LXXXIII. Fig.* 3.)

Eucyane temperata, Walker, List Lepid. Ins. Brit. Mus. vii. p. 1656 (1856).

This species was brought from the Tapajos, a tributary of the Amazons, by the late Mr. H. W. Bates. It measures nearly two inches in expanse.

"Male.—Bright blue. Head with white dots. Palpi black, white beneath. Antennæ black, very minutely pectinated. Abdomen beneath mostly black, with a broad crimson stripe, and with a slender white band on the hind border of each seg-

ment. Legs black, white beneath. Wings black, bright blue at the base; cilia white at the tips of the fore-wings and on part of the exterior border of the hind-wings; fore-wings with an oblique pale red semi-hyaline band; hind-wings with a discal spot of the same hue." (*Walker.*)

GENUS COMPOSIA.

Composia, Hübner, Verz. bek. Schmett. p. 179 (1822?); Walker, List Lepid. Ins. Brit. Mus. ii. p. 360 (1874).

This is a small genus including only a few West Indian and other Tropical American species. The wings are somewhat narrow, and much rounded, the hinder-angle of the fore-wings being completely rounded off. The wings are black, covered with pearly white spots, and are generally more or less marked with red likewise.

COMPOSIA CREDULA.

(*Plate LXXXIII. Fig.* 1.)

Bombyx credula, Fabricius, Syst. Ent. p. 584, no. 94 (1775).
Noctua sybaris, Cramer, Pap. Exot. i. pl. 71, fig. E (1775).
Phalæna sybaris, Beauvois, Ins. Afr. Amér. p. 266, pl. 24, fig. 7 (1821?).
Composia credula, Hübner, Samml. Ex. Schmett. ii. taf. 150 (1824); Walker, List Lepid. Ins. Brit. Mus. ii. p. 361, no. 1 (1854).
Hypercompa (?) *sybaris*, Duncan, in Jardine's Nat. Libr. Exot. Moths, p. 186, pl. 23, fig. 1 (1841).

This fine Jamaican Moth expands 2½ inches. It is black with twenty white spots on each of the fore-wings and eighteen on each of the hind-wings; the latter being placed in three irregular rows. The sides of the head are white; there are four minute white dots on the collar, succeeded by a row of eight

on the front of the thorax ; there are also two on the scutellum, and the apex of each of the lappets is white ; there are also two on the post-scutellum, and four on each of the abdominal segments.

Very similar, if not identical, species are found in Cuba and Haiti. A still more beautiful species, *C. olympia* (Butler), is found on the mainland of America ; it is flushed with blue, spotted with white, and marked with red spots towards the base of the fore-wings.

GENUS ANTHOMYZA.

Anthomyza, Swainson, Zool. Ill. (2) iii. pl. 124 (1833).

These, like the other day-flying *Arctiidæ* of the same group, are distinguished by having the antennæ slightly pectinated in the male only ; palpi pointing vertically ; fore-wings with the inner-margin longer than the hind-margin. Hind-wings lengthened horizontally, but narrow and rounded. They fly slowly and heavily during the middle of the day, and on the least touch counterfeit death ; when handled, they discharge a brown liquid, like the *Heliconiinæ*, to which Butterflies they bear a striking resemblance. *Anthomyza* is a genus remarkable for its unusually long wings.

ANTHOMYZA TIRESIAS, VAR.

(*Plate LXXXIII. Fig.* 2.)

Attacus tiresias, Cramer, Pap. Exot. i. pl. 85, fig. B. (1776).

Anthomyza tiresia, Swainson, Zool. Ill. (2) iii. pl. 124, fig. 1 (1833) ; Duncan, in Jardine's Nat. Libr. Exot. Moths, p. 97, pl. 4, fig. 2 (1841).

This Moth inhabits South America and extends to Nicaragua. It measures three inches and three-quarters between the extremities of the wings. The fore-wings are black with two broad, opaque, deep yellow bands situated obliquely, the first near the middle, the other, somewhat shorter, towards the

apex; with a patch of the same colour on the inner margin before the middle. There are several small white spots at the base and a remote series of the same running close to and parallel with the hind-margin. The hind-wings are yellow, with a broad black border containing a marginal row of white spots. The anterior part of the thorax is spotted with white. The abdomen is brown. The variety figured by Swainson differs a little from the type, as figured by Cramer. Our figure represents Swainson's insect.

SUB-FAMILY IV. PHÆGOPTERINÆ.

This is an extensive group of foreign Moths, the larger proportion of which are American. They resemble the typical *Arctiidæ* in many respects, but the body is more slender, and the fore-wings are longer, narrower, and more pointed. Some of the species are very like *Zygænidæ*, and they are occasionally brightly coloured, but the greater part of them are uniformly coloured, being white or buff. The abdomen is often marked with a row of black dots down the middle, and the hind-wings are occasionally produced into a lobe, the only approach to a tail which we find in the *Arctiidæ*. Black spots or rings on a white ground are a very frequent style of colouring. As an illustration of this Sub-family we have figured one of the largest species, which is not uncommon in the United States and Canada.

GENUS ECPANTHERIA.

Ecpantheria, Hübner, Verz. bek. Schmett. p. 183 (1822 ?); Walker, List Lepid. Ins. Brit. Mus. iii. p. 688 (1855); Clemens, Proc. Acad. Nat. Sci. 1860, p. 523 (1861); Stretch, Zyg. & Bomb. N. Amer. p. 174 (1872); Oberthür, Études d'Ent. vi. p. 99 (1881).

Ecpantheria is a very extensive genus of white Moths, with black rings on the thorax and fore-wings. Nearly sixty species are described from different parts of America, but only one is common in the United States, though several are found in Mexico, one or two of which perhaps extend northwards beyond the frontier. The male is much smaller than the female, and the anal angle of the hind-wings is often produced into a lobe.

THE GREAT LEOPARD ERMINE MOTH. ECPANTHERIA OCULARIA.

(*Plate LXXXIV. Fig. 1.*)

Bombyx ocularia, Fabricius, Syst. Ent. p. 564, no. 29 (1775).
Noctua scribonia, Stoll, Suppl. Cram. v. pl. 41, fig. 2 (1790).
Phalæna oculatissima, Abbot & Smith, Lepid. Georg. ii. pl. 69 (1797).
Ecpantheria scribonia, Hübner, Samml. Ex. Schmett, ii. pl. 139 (1824); Stretch, Zyg. & Bomb. N. Amer. p. 174, pl. 7, figs. 20, 21 (1872).
Bombyx cunegunda, Beauvois, Ins. Afr. Amér. pl. 22, fig. 4 (1824?).
Arctia oculatissima, Duncan, Nat. Libr. Exot. Moths, p. 169, pl. 20, fig. 4 (1841).

This Moth is remarkable for the disparity in the size of the sexes. The wings of the female expand three inches and three quarters, those of the male nearly an inch less. Antennæ black; head white, with a black dot on each side near the insertion of the antennæ. Thorax with ten or twelve black spots, some or all of them with a pale bluish-white centre, making them appear annular: the two hinder spots largest, and somewhat curved. Ground colour of the wings white, the surface of the fore-wings varied with black spots, most of which are ocellated, placed irregularly towards the

base, but having a tendency to form transverse rows towards the hind margin. The hind-wings are almost white, with a few faint black spots behind. Abdomen blue-black, varied on the back and sides with orange-yellow; legs white, the extremities with black rings.

The larva, when young, has one half orange-coloured and the other black. At its full growth it becomes brownish-black, with an orange-red band along each side; the incisions and legs being of this colour also. The hairs are placed on tubercles alternately nearer the anterior edges of each segment, so that they form a somewhat broad band, and leave the rest of the body naked. When about to change into the pupa, it spins a thin gummy yellow web, something like that formed on the same occasion by the common Tiger Moth. Some observed by Abbot spun on the 14th of March came out on the 18th of April; others spun on the 15th of June appeared on the wing on the 7th of July.

It feeds on wild sun-flower (*Polymnia*), wild cherry, persimmon (*Diospyros virginiana*), and several other plants.

Another very pretty genus allied to this is *Arachnis*, Packard. It includes a few species found in Mexico, California, &c., with grey fore-wings and pink hind-wings, both covered with slate-coloured or brown spots or partly connected markings bordered with black. They expand about two inches.

SUB-FAMILY V. SPILOSOMATINÆ (ERMINES).

The preceding Sub-families of *Arctiidæ* have been almost exclusively American, but we now come to a group which is mainly Asiatic, though it is fairly represented in other parts of the world, including Europe. The Moths have moderately broad white, yellow, or brown wings, more or less spotted with black; the fore-wings are not much longer than the hind-wings, and

the abdomen is generally red or yellow, with one or more rows of black spots on the back. The antennæ are generally strongly pectinated in the male. Two of our British species, *Spilosoma lubricipeda* (Linn.) and *Spilarctia lutea* (Linn.), called respectively the White and the Buff Ermine, are common everywhere, even in many London gardens. I used to find them in the garden when I lived in Mornington Crescent, and they are most likely found there still. One genus (*Palustra*, Bar.), found chiefly in Buenos Aires, though one species is described from the adjoining state of Uruguay, and another from Cayenne, is remarkable for the aquatic habits of the larva. It is also interesting on account of its locality, for it is possibly a primæval form derived from the great southern continent that is believed by some naturalists to have connected the southern parts of Africa and America with Australia, &c. Some of the East Indian species of this Family are very pretty, being white, more or less spotted with black, and with a slender scarlet stripe along the costa of the fore-wings.

GENUS ESTIGMENE.

Estigmene, Hübner, Verz. bek. Schmett. p. 184 (1822?)
Leucarctia, Packard, Proc. Ent. Soc. Philad. iii. p. 124 (1864); Stretch, Zyg. &. Bomb. N. Amer. p. 98 (1872).

Estigmene differs from the allied European genera by the greater length both of the thorax and abdomen, the longer and more pointed fore-wings, with the decidedly more oblique hind margin, and the shape of the hind-wings, which are considerably longer than broad, with the inner margin sloping outwards, and the abdomen extending considerably beyond them. The genus is found from Hudson's Bay to Central America, but does not seem to extend to South America.

ESTIGMENE ACRÆA.

(*Plate LXXXIV. Figs.* 2 (*imago*), 3 (*larva*), 4 (*pupa*).)

Bombyx acrea, Drury, Ill. Ex. Ent. i. pl. 3. fig. 2 (1773).

Bombyx acria, Fabricius, Ent. Syst. iii. (1) p. 451, no. 137 (1793); Abbot & Smith, Lepid. Georg. ii. pl. 67 (1797).

Estigmene acrea, Hübner, Samml. Ex. Schmett. ii. pl. 140 (1824 ?).

Spilosoma acrea, Duncan, in Jardine's Nat. Libr. Ex. Moths, p. 171, pl. 20, figs. 1–3 (1841); Walker, List Lepid. Ins. Brit. Mus. iii. p. 667, no. 4 (1855).

Leucarctia acræa, Stretch, Zyg. & Bomb. N. Amer. p. 99, pl. 4, figs. 1–3 (1872), pl. 10, fig. 6 (1874).

Var. *a*. *Estigmene caprotina*.

Bombyx caprotina, Drury, Ill. Ex. Ent. i. pl. 3, fig. 3 (1773); Cramer, Pap. Exot. iii. pl. 287, fig. C (1780).

Arctia pseuderminea, Harris, Rep. Ins. Injur. Veget. p. 251 (1841).

Leucarctia californica, Packard, Proc. Ent. Soc. Philad. iii. p. 121 (1864).

Leucarctia packardii, Schaup, Check-List Brooklyn Ent. Soc. p. 8 (1882).

This species, which inhabits North America and Mexico, appears to be very plentiful in many parts of the United States, particularly in Maryland, Virginia, and the vicinity of New York.

The wings expand about two inches in the male, and two and three-quarters in the female.

The head, thorax, and fore-wings of the male are cream-coloured, the latter with numerous small black spots, five of which are placed in a regular row along the costa and six on the hind margin. The hind-wings are yellow, with a black spot near the centre and several others near the hind margin.

1. *Ecpantheria ocularia*.
2. *Estigmene acræa*.
3. ,, ,, *larva*.
4. ,, ,, *pupa*.

abdomen is yellow with a dorsal row of black spots, and a similar row on each side. The tip of the abdomen is cream-coloured.

In the female all the wings are white, with numerous black spots, which are very variable in their distribution, but there is a marginal row on the hind-wings, which does not exist in the other sex. The abdomen is coloured nearly as in the male. The eyes and antennæ are black in both sexes.

The larva is said to be white when young, and to become nearly black when full-grown, a transition to two extremes not common even in a race of creatures subject to great variation in regard to colour. In its intermediate stages the prevailing hue is reddish-brown. When it has attained the period of its growth at which we have figured it (Plate LXXXIV. fig. 3) it is brownish-black, with two yellow lines along the sides and a transverse series of orange-coloured spots on each segment. From the back of each segment arises a scopiform tuft of blackish hairs of considerable length. The cocoon is oblong and of a yellowish-brown colour. We have figured the pupa (Plate LXXXIV. fig. 4).

In the European species of this Sub-family the wings are shorter and rounder than in *Estigmene*, and the abdomen does not extend beyond the hind-wings. Hence they more resemble the Sub-family *Arctiinæ* in form.

GENUS SPILOSOMA.

Spilosoma, Stephens, Ill. Brit. Ent. Haust. ii. p. 74 (1828); Curtis, Brit. Ent. ii. pl. 92 (1825); Walker, List Lepid. Ins. Brit. Mus. iii. p. 633 (1855); Clemens, Proc. Acad. Nat. Sci. Philad. 1860, p. 531 (1861); Stretch, Zyg. & Bomb. N. Amer. p. 130 (1872).

In this genus the body is stout and downy, with the abdomen scarcely extending beyond the hind-wings; the fore-wings are oval, rounded at the tips, and the hind-wings are rounded, and not much longer than broad. The sexes are coloured alike, but can be distinguished by the more strongly pectinated antennæ of the male. This genus is met with in Europe, Asia, and North America.

THE WHITE ERMINE MOTH. SPILOSOMA LUBRICIPEDA.

Bombyx lubricipeda, Linnæus, Syst. Nat. (ed. x.) i. p. 555, no. 47 (1758); id. Faun. Suec. p. 303 (1761).

Phalæna lubricipeda, Scopoli, Ent. Carn. p. 208, no. 5[illegible] (1763).

Bombyx lubricipeda alba, Hufnagel, Berl. Mag. ii. p. 412, no. 25 (1766).

Bombyx menthastri, Esper, Schmett. ii. p. 334, taf. 66, figs. 6–10 (1786); Hübner, Eur. Schmett. iii. figs. 152, 153 (1804?).

Phalæna erminea, Marsham, Trans. Linn. Soc. Lond. i. p. 70, pl. i. fig. 1 (1791).

Eyprepia menthastri, Ochsenheimer, Schmett. Eur. iii. p. 354 (1810).

Chelonia menthastri, Godart, Lépid. France, iv. p. 362, pl. 37, fig. 5 (1822).

Spilosoma menthastri, Stephens, Ill. Brit. Ent. Haust. ii. p. 75, pl. 16, fig. 3 (1828); Kirby, Eur. Butterflies & Moths, p. 105, pl. 23, fig. 10 (1880); Buckler, Larvæ Brit. Butterflies & Moths, iii. pl. 45, fig. 2 (1889); Barrett, Lepid. Brit. Isl. ii. p. 286, pl. 77 (1894).

Var. *a*. *Spilosoma walkeri*.

Spilosoma walkeri, Curtis, Brit. Ent. ii. pl. 92 (1825).

Chelonia menthastri, var., Godart, Lépid. France, iv. p. 362, pl. 37, fig. 6 (1822).

The White Ermine Moth is common throughout Europe and Northern and Western Asia. It expands from 1½ to 1¾ inch. The fore-wings are whitish, with more or less of a yellow tinge, and numerous small black spots. The hind-wings are

White Ermine (*Spilosoma lubricipeda*).

whiter, with a black spot in the centre, and two or three other black spots nearer the hind margin. The antennæ are black; the head and thorax white; and the abdomen is yellow, with three rows of black dots. In the variety, *S. walkeri*, the spots run together into bands.

The larva is brown, with long hairs, and an orange dorsal stripe. The spiracles are white.

It feeds on many kinds of low plants.

It spins a slight cocoon, and changes into a dark brown pupa, remaining in this state during the winter.

Water Ermine (*Spilosoma urticæ*).

The other British species of this genus, the Water Ermine,

Spilosoma urticæ (Esper), or *S. papyratia* (Marsham), though of equally wide general distribution with the last, is a rarity in England, though still found occasionally in marshy localities, where its larvæ feeds on water-plants. It may be known by having only one or two black dots on the fore-wings.

GENUS SPILARCTIA.

Spilarctia, Butler, Cist. Ent. ii. p. 39 (1875); id. Ill. Lepid. Heter. Brit. Mus. iii. p. 6 (1879); Moore, Lepid. Ceylon, iii. p. 71 (1882).

This genus principally differs from *Spilosoma* in the greater distance between the emission of the two lowest median nervules of the fore-wings, the longer and more deeply fringed tegulæ, or shoulder-lappets, and the generally longer palpi of the species associated under it. (*Butler.*)

This is a considerably larger genus than *Spilosoma*, numbering about fifty species, but it is not represented in Africa or America. We have one British species.

I may take this opportunity of emphasising the reply to an objection frequently made against modern entomologists, that they make a separate genus for almost every species. A century ago, when only a few hundred insects were known, it was easy to classify them under one or two genera; but now the species are reckoned literally by hundreds of thousands. In the present instance, a single British species, which it would not be necessary, as a British species, to separate generically from its nearest allies, is our sole representative of a group numbering fifty closely-allied species, and the establishment of genera on more minute characters becomes a necessity. In dealing with the insects of the world, it is necessary to treat them in a manner which would be unnecessary, if not actually reprehensible, in discussing a small local fauna only.

THE BUFF ERMINE. SPILARCTIA LUTEA.

Bombyx lubricipeda, β. Linnæus, Syst. Nat. i. (ed. x.) i. p. 506, no. 47 (1758).

Bombyx lubricipeda, ♂. Linnæus, Faun. Suec. p. 303 (1761).

Bombyx lubricipeda lutea, Hufnagel, Berl. Mag. ii. p. 412, no. 26 (1766).

Bombyx lubricipeda, Esper, Schmett. iii. p. 330, taf. 66, figs. 1–5 (1786); Marsham, Trans. Linn. Soc. Lond. i. p. 71, pl. 1, fig. 2 (1791); Hübner, Eur. Schmett. iii. figs. 155, 156 (1804).

Eyprepia lubricipeda, Ochsenheimer, Schmett. Eur. iii. p. 358 (1810).

Chelonia lubricipeda, Godart, Lépid. France, iv. p. 358, pl. 37, fig. 3 (1822).

Spilosoma lubricipeda, Stephens, Ill. Brit. Ent. Haust. ii. p. 77 (1828); Kirby, Eur. Butterflies & Moths, p. 105 (1880); Buckler, Larvæ of Brit. Lepid. iii. p. 50, pl. 45, fig. 4 (1889); Barrett, Lepid. of Brit. Isl. ii. p. 281, pl. 76 (1894).

Var. *a*. *Spilarctia zatima*.

Noctua zatima, Cramer, Pap. Exot. iv. pl. 381, fig. F (1781).

Bombyx radiatus, Haworth, Ent. Trans. i. p. 336 (1812).

Spilosoma radiata, Stephens, Ill. Brit. Ent. Haust. ii. p. 77 (1828); Westwood & Humphreys, Brit. Moths. i. pp. 88, 92, pl. 18, fig. 19 (1843).

The Buff Ermine is a native of Europe and Northern Asia. It expands from 1½ to 1¾ inch.

The Moth is pale yellow, the male being darker than the female. The fore-wings have two, or three, small black spots towards the base, and an oblique row of spots running from the costa to the inner margin; besides these there are a

few other spots. The hind-wings have two or three black spots.

Buff Ermine (*Spilarctia lutea*).

The larva is whitish, with long brown hairs, and a narrow white dorsal line, bounded on either side by a broad dark-grey stripe. The sides are marked with oblique pale grey stripes. It feeds on dock and other low plants.

The chrysalis is dark-coloured, and is contained in a loose cocoon.

GENUS DIAPHORA.

Cycnia (partim), Hübner, Verz. bek. Schmett. p. 184 (1822?); Walker, List Lepid. Ins. Brit. Mus. iii. p. 680 (1855).
Diaphora, Stephens, Ill. Brit. Ent. Haust. ii. p. 77 (1828).

This is a genus with rather shorter, broader, and rounder wings than *Spilosoma* or *Spilarctia*, and it is remarkable for the great dissimilarity of the sexes. There is only one species which is common in Europe, and in Northern and Western Asia.

THE SPOTTED MUSLIN MOTH. DIAPHORA MENDICA.

Bombyx mendica, Clerck, Icones, pl. 3, fig. 5 (1759); Linnæus, Faun. Suec. p. 299 (1761); Marsham, Trans. Linn. Soc. Lond. i. p. 72, pl. i. fig. 3 (1791); Esper, Schmett. ii. (2) p. 218, pl. 42 (1785); Hübner, Eur. Schmett. iii. [illegible] 148, 149 (1804?).

Lyprepia mendica, Ochsenheimer, Schmett. Eur. iii. p. 351 (1810).

Chelonia mendica, Godart, Lépid. France, iv. p. 336, pl. 37, figs. 1, 2 (1822).

Diaphora mendica, Stephens, Ill. Brit. Ent. Haust. ii. p. 78 (1828); Buckler, Larvæ of Brit. Lepid. iii. pl. 45, fig. 5 (1889).

Spilosoma mendica, Kirby, Eur. Butterflies & Moths, p. 106 (1880); Barrett, Lepid. of Brit. Isl. ii. p. 277, pl. 75, figs. 2, 2*a–i* (1894).

The Muslin Moth is common, and has a wide range throughout Europe and Northern and Western Asia. It expands from 1¼ to 1½ inch.

The male is reddish-grey, and the female white, with semi-transparent wings. Both sexes have the wings marked with

Muslin Moth ♂.

Muslin Moth ♀.

sparsely scattered small black spots. On the abdomen are five rows of black dots. The antennæ are black in the female.

The larva is brownish-green, with light reddish-brown or

grey hairs. It has a fine, often almost imperceptible, pale dorsal line, and a rust-coloured head and legs.

It feeds on nettle, plantain, dandelion, &c. The chrysalis is smooth and brown, and is contained in a slight brownish cocoon on the ground.

SUB-FAMILY VI. ARCTIINÆ.

The *Arctiinæ* include a large number of brightly-coloured Moths of moderate size, with short, stout, pubescent bodies, and pectinated antennæ. The hind-wings are almost always adorned with bright red or yellow, and the fore-wings have interlacing white lines or bands. They are peculiarly characteristic of the Northern Hemisphere, and comparatively few species are described from Africa or South America.

GENUS PHRAGMATOBIA.

Phragmatobia, Stephens, Ill. Brit. Ent. Haust. ii. p. 73 (1828); Walker, List Lepid. Ins. Brit. Mus. iii. p. 628 (1855); Clemens, Proc. Acad. Nat. Sci. Philad. 1860, p. 536 (1861).

This genus includes the smallest British species of *Arctiidæ*. The smoky-brown, slightly transparent, wings, stained with red, and the short antennæ, serrated and ciliated in the male, and simple in the female, will at once distinguish it from any other. A very similar species to ours (*P. rubricosa*, Harris) is found in the United States.

THE RUBY TIGER MOTH. PHRAGMATOBIA FULIGINOSA.

(*Plate LXXXV. Fig.* 2)

Noctua fuliginosa, Linnæus, Syst. Nat. (ed. x.) i. p. 509, no. 70 (1758); id. Faun. Suec. p. 308 (1761); Esper, Schmett. iv. p. 56, pl. 86, figs. 1–5 (1786); Hübner, Eur. Schmett. iii. fig. 143 (1804?).

1. *Diacrisia sannio.*
2. *Phragmatobia fuliginosa.*
3. *Arctia villica.*

Cyprepia fuliginosa, Ochsenheimer, Schmett. Eur. iii. p. 346 (1810).

Chelonia fuliginosa, Godart, Lépid. France, iv. p. 351, pl. 36, fig. 4 (1822).

Phragmatobia fuliginosa, Stephens, Ill. Brit. Ent. Haust. ii. p. 74 (1828); Kirby, Eur. Butterflies & Moths, p. 106 (1880); Buckler, Larvæ of Brit. Lepid. iii. pl. 45, fig. 1 (1889); Barrett, Lepid. Brit. Isl. ii. p. 274, pl. 75, figs. 1, 1*a–d* (1894).

This Moth occurs throughout Europe, and in Northern and Western Asia. It expands from 1¼ to 1½ inch.

The Ruby Tiger varies much in colour, but has the fore-wings and thorax usually reddish-brown, and the hind-wings rosy-red, with a series of black marks running together to form a band on the hind margin. Near the centre of all the wings are two black points, and the fringes are red. The abdomen is carmine-red, with a row of black dorsal spots, and a similar row on each side.

The larva is thickly covered with hairs, which vary in colour in different individuals, but are commonly brown or reddish, the head and legs being of a corresponding hue; the head is coppery-brown or black. Scarcely any of our ordinary plants are rejected by it as food. Fabricius has remarked of this larva, that when it is seen to run over the snow in winter, it may be taken as a sign that the ensuing summer will be cold and ungenial, "*Hyeme in nive obambulans, æstates frigidiores et annonæ caritatem prænunciat*," a prognostication which the French naturalist Godart proves not to be infallible by gravely stating the result of his observations to the contrary, and he has actually known a beautiful summer and plentiful harvest to follow the phenomenon alluded to.

The pupa is black, with yellow incisions, and is enclosed in a brownish elongated oval cocoon.

GENUS DIACRISIA.

Diacrisia, Hübner, Verz. bek. Schmett. p. 169 (1822?); Walker, List Lepid. Ins. Brit. Mus. iii. p. 635 (1855).
Euthemonia, Stephens, Ill. Brit. Ent. Haust. ii. p. 68 (1828).

In this genus, the antennæ are only slightly pectinated in the male; the colour is more uniform, and the abdomen more slender than in most of the Tiger Moths. The sexes, too, are very dissimilar, and the male is considerably larger than the female, contrary to the usual rule in insects.

THE CLOUDED BUFF. DIACRISIA SANNIO.

(*Plate LXXXV. Fig.* 1.)

Bombyx sannio, Linnæus, Syst. Nat. (ed. x.) i. p. 506, no. 48 (1758); id. Faun. Suec. p. 302 (1761).
Geometra vulpinaria, Linnæus, Syst. Nat. (ed. x.) i. p. 520, no. 136 (1758).
♀ *Bombyx russula*, Linnæus, *op. cit.* p. 510, no. 78 (1758); Clerck, Icones, pl. 4, fig. 1 (1759); Esper, Schmett. iii. p. 337, pl. 67, figs. 2–7 (1786); Hübner, Eur. Schmett. iii. figs. 124, 125 (1804?).
Noctua russula, Linnæus, Faun. Suec. p. 308 (1761).
Eyprepia russula, Ochsenheimer, Schmett. Eur. iii. p. 309 (1810); Curtis, Brit. Ent. i. pl. 21 (1824).
Euthemonia russula, Stephens, Ill. Brit. Ent. Haust. ii. p. 68 (1828); Buckler, Larvæ of Brit. Lepid. iii. pl. 44, fig. 2 (1889); Barrett, Lepid. of Brit. Isl. ii. p. 257, pl. 74, figs. 1, 1*a–c* (1894).
Nemeophila russula, Kirby, Eur. Butterflies & Moths, p. 102, pl. 23, fig. 4 (1880).

The species known as the Clouded Buff differs from the generality of Moths in that the female is considerably less than the male; the latter measuring from about an inch and a half to over an inch

and three-quarters between the tips of the wings, whilst the former seldom exceeds an inch and a quarter to an inch and a half in expanse. The sexes are likewise very dissimilar in colour. The male has the fore-wings lemon-yellow, with the costa and inner margin, as well as the fringes, rosy-red; the disc is marked with a large, somewhat crescent-shaped, brown spot edged with red. The hind-wings are yellowish-white, with a dusky crescent in the middle anteriorly, a broad dusky band near the hind margin, and rose-coloured fringes. The female is rusty-yellow, with brownish-red nervures and fringes; the hind-wings are dusky, with a marginal band. The spots are as in the other sex.

Clouded Buff ♀.

The larva is dark brown, with a yellow dorsal line dotted with red, reddish or orange-yellow tufts of short hair, longest towards the hinder extremity, and white spiracles. It feeds on a variety of plants, including plantain, dandelion, field scabious, hound's tongue (*Cynoglossum officinale*), &c.

It spins a light web, in which it changes into a reddish-brown pupa, the Moth emerging in about fourteen days.

It is found in open bushy places among ferns, throughout Europe and Northern and Western Asia.

GENUS PARASEMIA.

Parasemia, Hübner, Verz. bek. Schmett. p. 181 (1822 ?).
Nemeophila, Stephens, Ill. Brit. Ent. Haust. ii. p. 72 (1828).

This is a genus containing rather small species, with the antennæ slightly pectinated in the male, and serrated in the female; the fore-wings are not much longer than the hind-wings, and the hind margin is distinctly rounded. The wings are black, with anastomosing cream-coloured bands and spots on the fore-wings. The Wood Tiger varies a good deal on the Continent in colour, more especially in that of the hind-wings; but in England it varies little. There are one or two closely-allied species in California.

THE WOOD TIGER MOTH. PARASEMIA PLANTAGINIS.
(*Plate LXXXVII. Fig.* 1.)

Bombyx plantaginis, Linnæus, Syst. Nat. (ed. x.) i. p. 501, no. 25 (1758); id. Faun. Suec. p. 301 (1761); Esper, Schmett. iii. p. 188, pl. 36, figs. 1–8 (1784); Hübner, Eur. Schmett. iii. figs. 127, 128 (1804 ?).

Euprepia plantaginis, Ochsenheimer, Schmett. Eur. iii. p. 312 (1810).

Nemeophila plantaginis, Stephens, Ill. Brit. Ent. Haust. ii. p. 72 (1828); Kirby, Eur. Butterflies & Moths, p. 103, pl. 23, figs. 5, 5*a–c* (1880); Buckler, Larvæ of Brit. Lepid. iii. pl. 44, fig. 5 (1889); Barrett, Lepid. Brit. Isl. ii. p. 260, pl. 74, figs. 2, 2*a–f* (1894).

This pretty Moth is common in most parts of Europe and Northern Asia. The male expands about an inch and a half, and the female is a little larger. The fore-wings are black, with yellowish or cream-coloured markings. These consist of two transverse bands meeting a longitudinal one, and one or two spots near the apex. The hind-wings are ochreous-yellow in the male, with two black stripes at the base, and a nearly continuous series of black spots along the hind margin. In the female the hind-wings are yellowish-red or cinnabar-red, with a broad black undulating hind margin, two or three

roundish spots in front of it, and two longitudinal stripes running from the base to the inner margin and to the centre of the wing, the latter touching the central spot. The head, thorax, and abdomen are black; the first with a yellow tuft on each side, and the thorax with lateral streaks of light-coloured hair in the male, but not in the female. In the latter sex the abdomen is reddish, with a black dorsal line.

The larva is black, with the six middle segments brick-red on the back and sides. It hybernates after the first moult, and feeds till May on broad and narrow-leaved plantain, chickweed, &c. It weaves a thin cocoon, and changes into a dark brown pupa, the Moth emerging in June or July.

Next to this genus is placed the North American genus *Haploa*, Hübner, which contains species with rather narrow subtriangular fore-wings, very broad hind-wings, and rather long and slender bodies. The fore-wings are white, with more or less of the borders irregularly blackish; and the hind-wings are white or yellow, sometimes marked with a large black spot beyond the middle.

GENUS CALLIMORPHA.

Callimorpha, Latreille, Gen. Crust. Ins. iv. p. 220 (1809); Leach, Edinb. Encycl. ix. p. 133 (1815).

Hypercompa, Stephens, Ill. Brit. Ent. Haust. ii. p. 67 (1828).

In this genus the antennæ are long, ciliated, but not pectinated; the wings are ample, and the body moderately long and stout. The fore-wings are black, glossed with metallic-green, and spotted with cream-colour, and the hind-wings are bright scarlet, with black spots.

THE SCARLET TIGER MOTH. CALLIMORPHA DOMINULA.

(*Plate LXXXVII. Fig.* 2.)

Noctua dominula, Linnæus, Syst. Nat. (ed. x.) i. p. 509, no. 68 (1758); i. (2) p. 834, no. 90 (1767); Esper, Schmett. iv. (1) p. 38, pl. 83, figs. 1–4 (1786).

Bombyx domina, Hübner, Eur. Schmett. iii. figs. 117, 118 (1804 ?).

Eyprepia dominula, Ochsenheimer, Schmett. Eur. iii. p. 316 (1810).

Hypercompa dominula, Stephens, Ill. Brit. Ent. Haust. ii. p. 67 (1828); Buckler, Larvæ of Brit. Lepid. iii. pl. 44, fig. 1 (1889).

Callimorpha dominula, Kirby, Eur. Butterflies & Moths, p. 101, pl. 23, figs. 1, 1*a*, *b* (1880); Barrett, Lepid. Brit. Isl. ii. p. 249, pl. 70, figs. 1, 1*a*–*f* (1894).

This handsome species is found in most parts of Europe in damp woods. It expands from 2 to 2½ inches. The fore-wings are glossy-black, shot with green and each marked with about a dozen cream-coloured or yellowish spots of various sizes on each, the two largest being somewhat beyond the middle. The hind-wings are of a rich carmine, with several large black spots, one central, the others near the hind margin. The fringes of all the wings are black. The thorax is greenish-black like the fore-wings, with two yellow longitudinal stripes; the abdomen is carmine above, with a black dorsal stripe.

Several varieties occur, in one of which the red colour is replaced by pale yellow.

The larva is at first dirty yellow, with the head and numerous small spots on the body yellow. After its first moult it becomes black, with three yellow longitudinal stripes spotted with white, and small pale blue tubercles, from which issue diverging greyish hairs. It feeds on various low plants.

GENUS HYPERCOMPA.

Hypercompa, Hübner, Tentamen, p. 1 (1810 ?).

Eyprepia, Ochsenheimer, Schmett. Eur. iii. p. 299 (1810); Curtis, Brit. Ent. i. pl. 21 (1824).

Zoote, Hübner, Verz. bek. Schmett. p. 181 (1822?).
Euprepia, Stretch, Zyg. & Bomb. N. Amer. p. 94 (1872).

This genus includes a few European, Asiatic, and North American species, with finely pectinated antennæ in the males, stout pubescent bodies, and brown fore-wings, with white spots and markings, which form an irregular cross on the outer half of the fore-wings; the abdomen and hind-wings are red, with black markings. The hind-wings are broad, but form a long oval, and the fore-wings, which are not much longer, are very broad towards the hind margin, which is gradually curved inwards from the tip, which is not very pointed, to the hinder angle.

Like other *Arctiinæ*, very dark varieties of this species are sometimes met with (sometimes nearly black); but they are far more frequently observed among specimens reared from the larva than in a state of nature. It has been stated that sprinkling the food of the larvæ with brine increases the tendency to melanistic variation in the Moths bred from them.

THE COMMON TIGER MOTH. HYPERCOMPA CAIA.

Bombyx caia, Linnæus, Syst. Nat. (ed. x.) i. p. 500, no. 22 (1758); id. Faun. Suec. p. 300 (1761); Esper, Schmett. iii. p. 165, taf. 30–32 (1784); Hübner. Eur. Schmett. iii. figs. 130, 131, 262, 301 (1804–27).
Eyprepia caja, Ochsenheimer, Schmett. Eur. iii. p. 335 (1810).
Arctia caja, Stephens, Ill. Brit. Ent. Haust. ii. p. 19 (1828); Kirby, Eur. Butterflies & Moths, p. 103, pl. 23, figs. 6, 6*a–c* (1880); Buckler, Larvæ of Brit. Lepid. iii. pl. 44, fig. 3 (1889); Barrett, Lepid. Brit. Isl. p. 265, pls. 71, 72 (1894).

The Common Tiger Moth is widely distributed in Europe,

Bombyx domina, Hübner, Eur. Schmett. iii. figs. 117, 118 (1804 ?).

Eyprepia dominula, Ochsenheimer, Schmett. Eur. iii. p. 316 (1810).

Hypercompa dominula, Stephens, Ill. Brit. Ent. Haust. ii. p. 67 (1828); Buckler, Larvæ of Brit. Lepid. iii. pl. 44, fig. 1 (1889).

Callimorpha dominula, Kirby, Eur. Butterflies & Moths, p. 101, pl. 23, figs. 1, 1*a*, *b* (1880); Barrett, Lepid. Brit. Isl. ii. p. 249, pl. 70, figs. 1, 1*a–f* (1894).

This handsome species is found in most parts of Europe in damp woods. It expands from 2 to 2½ inches. The fore-wings are glossy-black, shot with green and each marked with about a dozen cream-coloured or yellowish spots of various sizes on each, the two largest being somewhat beyond the middle. The hind-wings are of a rich carmine, with several large black spots, one central, the others near the hind margin. The fringes of all the wings are black. The thorax is greenish-black like the fore-wings, with two yellow longitudinal stripes; the abdomen is carmine above, with a black dorsal stripe.

Several varieties occur, in one of which the red colour is replaced by pale yellow.

The larva is at first dirty yellow, with the head and numerous small spots on the body yellow. After its first moult it becomes black, with three yellow longitudinal stripes spotted with white, and small pale blue tubercles, from which issue diverging greyish hairs. It feeds on various low plants.

GENUS HYPERCOMPA.

Hypercompa, Hübner, Tentamen, p. 1 (1810 ?).

Eyprepia, Ochsenheimer, Schmett. Eur. iii. p. 299 (1810); Curtis, Brit. Ent. i. pl. 21 (1824).

Zoote, Hübner, Verz. bek. Schmett. p. 181 (1822?).
Euprepia, Stretch, Zyg. & Bomb. N. Amer. p. 94 (1872).

This genus includes a few European, Asiatic, and North American species, with finely pectinated antennæ in the males, stout pubescent bodies, and brown fore-wings, with white spots and markings, which form an irregular cross on the outer half of the fore-wings; the abdomen and hind-wings are red, with black markings. The hind-wings are broad, but form a long oval, and the fore-wings, which are not much longer, are very broad towards the hind margin, which is gradually curved inwards from the tip, which is not very pointed, to the hinder angle.

Like other *Arctiinæ*, very dark varieties of this species are sometimes met with (sometimes nearly black); but they are far more frequently observed among specimens reared from the larva than in a state of nature. It has been stated that sprinkling the food of the larvæ with brine increases the tendency to melanistic variation in the Moths bred from them.

THE COMMON TIGER MOTH. HYPERCOMPA CAIA.

Bombyx caia, Linnæus, Syst. Nat. (ed. x.) i. p. 500, no. 22 (1758); id. Faun. Suec. p. 300 (1761); Esper, Schmett. iii. p. 165, taf. 30–32 (1784); Hübner. Eur. Schmett. iii. figs. 130, 131, 262, 301 (1804–27).
Eyprepia caja, Ochsenheimer, Schmett. Eur. iii. p. 335 (1810).
Arctia caja, Stephens, Ill. Brit. Ent. Haust. ii. p. 19 (1828); Kirby, Eur. Butterflies & Moths, p. 103, pl. 23, figs. 6, 6*a–c* (1880); Buckler, Larvæ of Brit. Lepid. iii. pl. 44, fig. 3 (1889); Barrett, Lepid. Brit. Isl. p. 265, pls. 71, 72 (1894).

The Common Tiger Moth is widely distributed in Europe,

Northern Asia, and North America.* It expands from two to three inches.

The fore-wings of this richly-coloured species are coffee-brown, marked with sinuous cream-coloured or white lines. The hind-wings are red, or occasionally yellow, with large rounded blue-black spots. The collar is often edged with

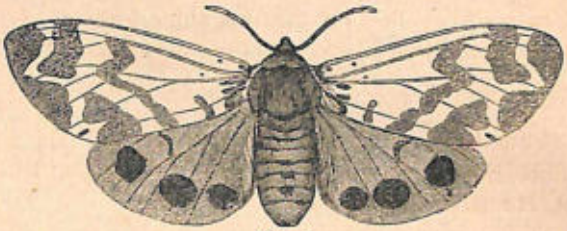


Fig. 1.

Fig. 2.

Varieties of the Common Tiger Moth.

red. The abdomen is red with broad blackish spots on segments three to seven.

This Moth varies immensely. Sometimes the creamy markings of the fore-wings extend as in fig. 1. In others the fore-wings become uniform brown, and the hind-wings blue as far as the fringes (fig. 2).

* The American Moth has been called *Arctia americana*, Harris; but it is doubtful whether it possesses any sufficiently constant characters wherewith to regard it as a distinct species.

The larva, which is well-known throughout the country as the "Hairy Worm" and the "Woolly Bear," and in the South of Scotland as the "Hairy *oubit*," feeds on almost all our garden plants. It hybernates at various stages of its growth, but is usually full-grown by the end of May or beginning of June. It is velvety-black, with whitish warts, on which grow long tufts of hair, rusty-yellow on the first three segments and on the sides, but otherwise black. At the extremities the hairs are whitish.

GENUS ARCTIA.

Arctia, Schrank, Fauna Boica, ii. (2) p. 151 (1802); Leach, Edinb. Encycl. ix. p. 133 (1815); Stephens, Ill. Brit. Ent. Haust. ii. p. 69 (1828).

In the present genus, the fore-wings are rather narrower than in *Hypercompa*, the costa is more rounded, and the whole outline of all the wings likewise. The pattern of the fore-wings is quite different, as they are marked with a double row of large cream-coloured spots diverging from the base, parallel to the costa and the hind margin; the hind-wings are orange, not red, spotted and tipped with black.

THE CREAM-SPOT TIGER MOTH. ARCTIA VILLICA.

(*Plate LXXXV. Fig.* 3.)

Bombyx villica, Linnæus, Syst. Nat. (ed. x.) i. p. 501, no. 24 (1758); Esper, Schmett. iii. p. 185, Taf. 35 (1784); Hübner, Eur. Schmett. iii. fig. 136 (1804?).

Bombyx vidua, Poda, Mus. Græc. p. 88, no. 15 (1761).

Eyprepia villica, Ochsenheimer, Schmett. Eur. iii. p. 330 (1810).

Arctia villica, Stephens, Ill. Brit. Ent. Haust. ii. p. 71 (1828); Kirby, Eur. Butterflies & Moths, p. 103, pl. 23, fig. 7 (1880); Buckler, Larvæ of Brit. Lepid. iii. pl. 44, fig. 4 (1889); Barrett, Lepid. of Brit. Isl. ii. p. 270, pl. 73 (1894).

This handsome Moth has an extended range throughout Europe and Western Asia, but is local in Britain. It measures from two to two and a half inches across the fore-wings, which have the ground-colour black, each with about eight yellowish or cream-coloured spots of various sizes. The hind-wings are rather deep yellow, with a few scattered small black spots, and a large black patch on the outer angle, enclosing a few irregular spots of the ground-colour.

The larva is velvety-black after its last moult, with light brown tufts of hair, white spiracles, and reddish-brown legs and head. It feeds on most of our common field plants.

The cocoon is whitish-grey, and the pupa black, with reddish-brown incisions.

GENUS EUPLAGIA.

Euplagia, Hübner, Verz. bek. Schmett. p. 180 (1822 ?).

This genus has much resemblance to *Callimorpha*, in which it is sometimes included, but the fore-wings are much shorter, with the tip distinctly angulated, and streaked instead of spotted; the hind-wings, which are red with black spots, are likewise more rounded. The antennæ are simple and ciliated, and the abdomen is rather long, and moderately stout.

THE JERSEY TIGER MOTH. EUPLAGIA QUADRIPUNCTARIA.

Noctua quadripunctaria, Poda, Mus. Græc. p. 89, no. 20 (1761).

Noctua hera, Linnæus, Syst. Nat (ed. xii.) i. (2) p. 834, no. 97 (1767); Esper, Schmett. iv. (1) p. 41, Taf. 83, figs. 5–7 (1786).

Bombyx hera, Hübner, Eur. Schmett. iii. fig. 116 (1804 ?).

Eyprepia hera, Ochsenheimer, Schmett. Eur. iii. p. 319 (1810).

Callimorpha hera, Kirby, Eur. Butterflies & Moths, p. 101, pl. 23, figs. 2, 2*a*, *b* (1880); Barrett, Lepid. of Brit. Isl. p. 253, pl. 70, figs. 2, 2*a*, *b* (1894).

This, which is one of the most beautiful of the Tiger Moths, is a native of Europe and Western Asia. It expands about two inches. The fore-wings are of a rich silky dark brown, with pale yellow or cream-coloured stripes and streaks. One of the largest of these runs from near the tip, parallel to the hind-margin, to the hinder angle, and another, equally broad, runs from near the middle of the costa to meet the first near the hinder angle, thus completing a Y or V. A third stripe which starts from the costa nearer the base also runs towards the hinder angle, but is narrower, and ends in a point before reaching it. The hind-wings are cinnabar-red with a large black central spot, and two large and one or two small ones near the hind margin. The thorax is dark brown, like the fore-wings, with yellow edges to the tegulæ, and the abdomen is rich yellow with four rows of small black dots.

The larva is greyish-brown or black, with a deep yellow, sometimes orange, dorsal stripe, a yellow or whitish lateral line, and rusty-yellow warts bearing hairs of the same colour. It feeds on various low plants, such as plantain, clover, and lettuce, and on oak, willows, beech, &c.

The pupa is shining reddish-brown, and is enclosed in a grey cocoon.

This species is common in weedy places in Southern and Central Europe, flying by day. It has long been known as an inhabitant of Jersey, and has also been reputed to be British; but it is only of late years that it seems to have permanently established itself in Devonshire as a British insect.

GENUS EUCHARIA.

Eucharia, Hübner, Verz. bek. Schmett. p. 181 (1822?).
Ammobiota, Wallengren, Skand. Heter. ii. p. 304 (1886).

The type of this genus is a handsome European Moth, not

found in England. It has some resemblance in the distribution of its colours to *Hypercompa caia*, but is a much stouter insect, with more strongly pectinated antennæ, and a longer abdomen; and the wings are longer and narrower, the fore-wings being more uniformly broad, and not nearly so much narrowed at the base as in *Hypercompa*.

EUCHARIA FESTIVA.

(*Plate LXXXVI. Fig.* 1.)

Bombyx festiva, Hufnagel, Berlin. Mag. ii. (4) pp. 416, 437, no. 31 (1766).

Bombyx hebe, Linnæus, Syst. Nat. (ed. xii.) i. (2) p. 820, no. 40 (1767); Esper, Schmett. iii. p. 181, Taf. 34 (1784); Hübner, Eur. Schmett. iii. figs. 129, 296 (1804 ?).

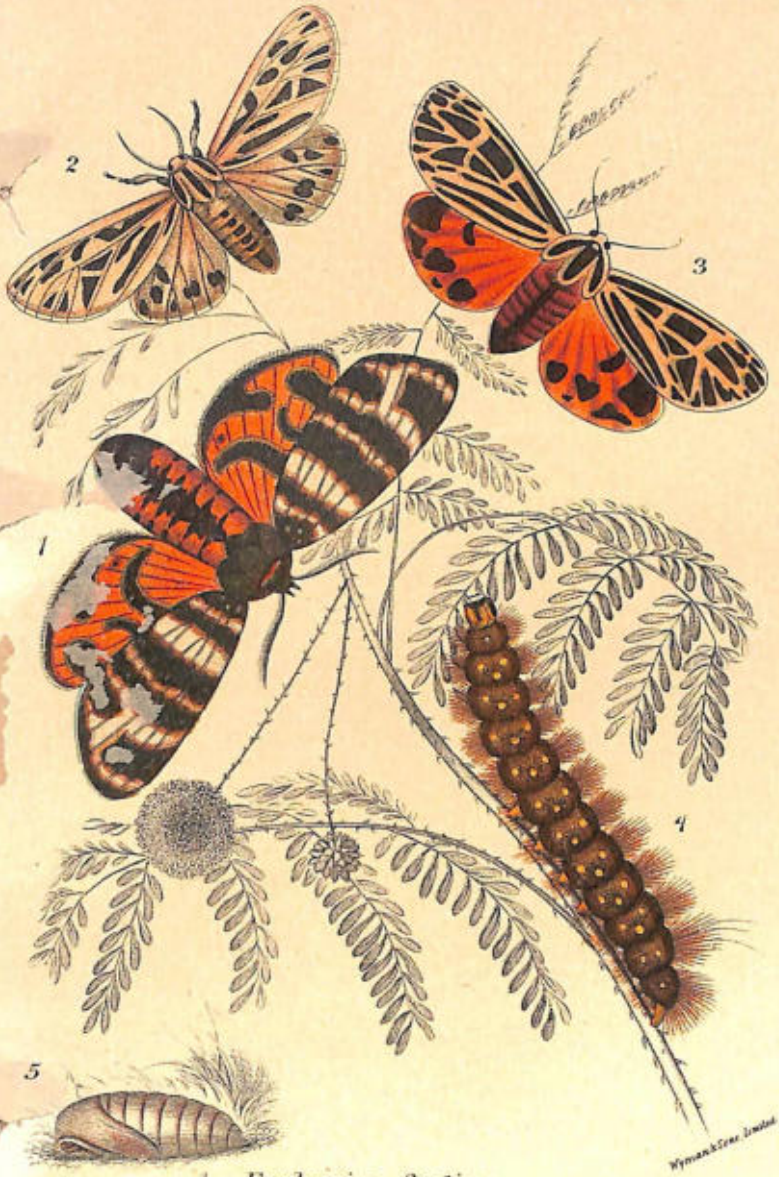
Eyprepia hebe, Ochsenheimer, Schmett. Eur. iii. p. 339 (1810).

Arctia hebe, Kirby, Eur. Butterflies & Moths, p. 104, pl. 23, fig. 9 (1880).

This species occurs in many parts of Europe and Northern and Western Asia, preferring warm sandy places. The expanse of the wings is from 2 to 2¼ inches.

The fore-wings are rich velvety-black, with five irregular white bars bordered with orange, the two posterior being united by a longitudinal one. The hind-wings are rose-coloured in the male, blood-red in the female, with black spots. The fringes are black. The head and thorax are black, and the abdomen is of the same colour as the hind-wings, with a black dorsal stripe and a black tip.

The larva is black, with tubercles of the same colour, each bearing rather long hairs, grey on the back, greyish-yellow on the sides, and deep red near the belly. It feeds on a great variety of common plants, such as dandelion, millefoil, &c. It hybernates, and passes through its metamorphoses about



1. *Eucharia festiva*.
2. *Apantesis arge*.
3. ,, *virgo*.
4. ,, ,, *larva*.
5. ,, ,, *pupa*.

the beginning of May in the following year. The cocoon is white and soft, but rather dense, and the pupa is black.

GENUS APANTESIS.

Apantesis, Walker, List Lepid. Ins. Brit. Mus. iii. p. 631 (1855).

This genus includes a large number of North-American species, of moderate size, with oval dark fore-wings covered with crossed and interlacing cream-coloured bands or spots, and with red, white, yellow, or black hind-wings, generally spotted with black. We have figured two examples of the genus.

APANTESIS VIRGO.

(*Plate LXXXVI. Fig.* 3 (*imago*), 4 (*larva*), 5 (*pupa*).)

Bombyx virgo, Linnæus, Syst. Nat. (ed. x.) i. p. 501, no. 23 (1758); id. Mus. Ludov. Ulricæ, p. 381 (1764); Clerck, Icones, pl. 45, fig. 5 (1759).

Phalæna virgo, Abbot & Smith, Lepid. Georg. ii. pl. 62 (1797).

Euplagia virgo, Hübner, Samml. Exot. Schmett. ii. pl. 130, (1824?).

Spilosoma virgo, Duncan, in Jardine's Nat. Libr. Exot. Moths, p. 266, pl. 19 (1841).

Arctia virgo, Walker, List Lepid. Ins. Brit. Mus. iii. p. 608, no. 23 (1855); Stretch, Zyg. & Bomb. N. Amer. p. 126, pl. 6, figs. 1, 2 (1872).

This handsome Moth is an inhabitant of most parts of North America. It expands from 2 to 2½ inches.

The head and thorax are cream-coloured or pale flesh-coloured, the latter with two black spots in front, and three rather broad black longitudinal streaks. The fore-wings are velvety-black, with numerous cream-coloured or flesh-coloured stripes, dividingthe ground-colour into many triangular, quadrate, and linear spots. The hind-wings are red, of a more or

less pinkish shade, sometimes inclining to orange, with several angular black spots massed towards the hind margin. These are occasionally narrowly edged with yellow ochre.

The larva is brown, with several yellow tubercles on each segment bearing tufts of hair; head and pro-legs yellow. "It feeds," says Abbot, "on several species of mimosa, commonly called the sensible briar, panting briar, &c., as well as on some other plants. It spun upon June 10th, and on the 20th September the Moth came out. In Virginia it spins in April, and comes forth in May. This is not a common kind. The caterpillar, when kept in confinement, is apt to die before it changes to a chrysalis." The chrysalis is of a delicate lilac colour.

APANTESIS ARGE.

(*Plate LXXXVI. Fig.* 2.)

Noctua arge, Drury, Ill. Ex. Ent. i. pl. 18, fig. 3 (1773).
Bombyx dione, Fabricius, Syst. Ent. p. 572, no. 54 (1775).
Phalena dione, Abbot & Smith, Lepid. Georg. ii. pl. 63 (1797).
Spilosoma arge, Duncan, in Jardine's Nat. Libr. Exot. Moths, p. 174, pl. 19, fig. 2 (1841).
Arctia arge, Stretch, Zyg. & Bomb. N. Amer. p. 225, pl. 9, figs. 10, 11 (1874).

This species, like the last, inhabits North America. It expands 1½ to 2 inches.

Nearly all the Tiger and Ermine Moths are subject to great variation in their markings, but the present species appears even to exceed the usual limits in this respect. The ground-colour of the fore-wings and thorax is generally cream-colour, but may be delicate pink. There are numerous black lines and angular spots. The hind-wings are either cream-colour or tinged with red, having a fulvous marginal line and many oblong black spots posteriorly. The antennæ are black at the

extremities; collar red, with two small black streaks above it; thorax with a black stripe in the centre, and another on each side; abdomen with three rows of black spots, those on the back being the largest. The anterior femora have two black spots on them close to the head.

Abbot has accurately figured the larva. It is dark brown, with five whitish or yellow longitudinal stripes. On each segment is a transverse row of fulvous tubercles, from which grow dense tufts of brown hairs. It feeds on a variety of plants, but is said to prefer plantain (*Plantago major*), Indian corn, and peas. A specimen kept by Abbot was hatched on the 23rd of July, and spun upon the 28th August, the Moth appearing on the 9th of September. The pupa has five reddish bands, and terminates in a point.

GENUS CALLARCTIA.

Euprepia, Hübner, Verz. bek. Schmett. p. 181 (1822?); Herrich-Schäffer, Schmett. Eur. ii. p. 141 (1847).

Callarctia, Packard, Proc. Ent. Soc. Philad. iii. p. 114 (1864).

Tympanophora, Laboulbène, Ann. Soc. Ent. France (4) iv. p. 704 (1864).

Cymbalophora, Rambur, Cat. Lépid. And. ii. p. 231 (1866).

This genus resembles *Apantesis*, but the wings are rather narrower and more rounded, and the pale bands are so much broken that the fore-wings might equally well be described as pinkish-white, with large black spots, or black with narrow interlacing and crossing pinkish-white stripes. The hind-wings are pinkish-white, with black spots; the antennæ are ciliated in the male, and the body is stout, and the abdomen rather long. The typical species is European, but not British, and is remarkable for its stridulatory powers.

CALLARCTIA PUDICA.

Bombyx pudica, Esper, Schmett. iii. p. 177, Taf. 33, fig. 1 (1784); iii. (2) pp. 26, 48, pl. 84, fig. 1, Taf. 87, fig. 4 (1786?); Hübner, Beitr. Schmett. ii. (4) p. 87, Taf. 1, figs. G, 1, 2 (1793); id. Eur. Schmett. iii. figs. 134, 269 (1804?).

Noctua tessellata, De Villiers, Ent. Linn. ii. p. 274, no. 347, pl. 5, fig. 18 (1789).

Euprepia pudica, Ochsenheimer, Schmett. Eur. iii. p. 334 (1810).

Chelonia pudica, Godart, Lépid. France, iv. p. 313, pl. 32, figs. 1, 2 (1822).

Euprepia pudica, Herrich-Schäffer, Schmett. Eur. ii. p. 141, figs. 116, 117 (1847); Kirby, Eur. Butterflies and Moths, p. 102, pl. 51, fig. 3 (1880).

This is a South European and North African species, which flies at dusk. It expands from 1¼ to 1½ inches.

The fore-wings are greenish-black, with numerous pinkish-white waved intersecting lines, which break up the ground-colour into a number of spots. The hind-wings are pinkish-white, with a few rose-coloured hairs at the base, and several black spots towards the hind margin. These spots are occasionally wanting, especially in the male. The thorax is black, with a pale pink collar and two longitudinal streaks of the same colour. The abdomen is rose-coloured, with a row of black dorsal spots and a black extremity. The antennæ are also black, ciliated in the male, and filiform in the female.

The larva hibernates, and is full grown by the end of April. It feeds almost exclusively on grasses.

The perfect insect appears in May or June, and is remarkable for possessing a musical organ, by means of which it is able to produce sounds. This peculiarity was first noticed by De Villiers, a French entomologist, who says (Ann. Soc. Ent. France,

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1

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4

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1. *Parasemia plantaginis*.
2. *Callimorpha dominula*.
3. *Hylophila prasinana*.
4. ,, ,, *larva*.
5. ,, *bicolorana*.

1832, p. 203):—"Whilst collecting *Lepidoptera* in the South of France, on the beautiful summer evenings so common in the neighbourhood of Montpellier, I noticed that the *Ecaille pudique* made a little sound when flying around me, which I can best compare to the noise made by a stocking-frame." Since then many other entomologists have noticed this interesting phenomenon. The organs by which the sound is produced are situated on each side of the metathorax. Each consists of a small cavity with raised and rounded edges, covered by a thin, stiff membrane, capable of vibration.

FAMILY XIV. CYMBIDÆ.

This is a small Family of doubtful position, the few genera which it includes having been referred by various authors to the *Tortrices* (to which the smaller species bear much resemblance), the *Pyrales*, the *Noctuæ*, and to different Families of *Bombyces*. They are now, however, considered by most authors to be nearest allied to the *Arctiidæ*. They are insects of moderate size, with the antennæ slightly ciliated in the males, the palpi clothed with hair or scales, and the thorax and abdomen smooth. The larvæ have sixteen legs, and feed on trees, and the pupa is enclosed in a firm, boat-shaped cocoon. Most of the species of this Family have bright green fore-wings, and white hind-wings. The two larger British species are here figured; a smaller one, *Earias chlorana* (Linnæus), has much shorter and squarer green fore-wings, expanding rather less than an inch. The larva feeds on the shoots of the willow. The Moth greatly resembles the Green Oak Tortrix (*Tortrix viridana*, Linnæus) in size and appearance, but may be distinguished at a glance by its white instead of brown hind-wings. A closely-allied species (*Earias insulana*, Boisduval) is common throughout the warmer parts of the Old World, and is very destruc-

tive to cotton in Egypt, and other countries where cotton is grown.

GENUS HYLOPHILA.

Hylophila, Hübner, Verz. bek. Schmett. p. 396 (1827?); Stephens, Ill. Brit. Ent. Haust. iv. p. 65 (1834).

Halias, Treitschke, Schmett. Eur. vii. p. 227 (1829), viii. p. 3 (1830); Curtis, Brit. Ent. xii. pl. 575 (1835).

Chloëphora, Stephens, Cat. Brit. Ins. ii. p. 168 (1829).

The larger size and streaked wings of the species of this genus will prevent their being confounded with *Earias*. Our two species differ somewhat in shape and neuration, and some authors treat them as belonging to different genera. In that case, Curtis having specified *H. bicolorana* as the type of *Halias*, *H. prasinana* will remain as the type of *Hylophila*.

THE GREEN SILVER-LINES. HYLOPHILA PRASINANA.

(*Plate LXXXVII. Figs.* 3 (*imago*), 4 (*larva*).)

Tortrix prasinana, Linnæus, Syst. Nat. (ed. x.) i. p. 530, no. 202 (1758); id. Faun. Suec. p. 342 (1761); Hübner, Eur. Schmett. vii. fig. 158 (1803).

Pyralis fagana, Fabricius, Spec. Ins. p. 276, no. 5 (1781).

Pyralis sylvana, Fabricius, Ent. Syst. iii. (2) p. 244, no. 6 (1794).

Halias prasinana, Treitschke, Schmett. Eur. viii. p. 4 (1830); Kirby, Eur. Butterflies and Moths, p. 295, pl. 42, fig. 9, *a–d* (1881); Barrett, Lepid. of Brit. Isl. ii. p. 175, pl. 64, figs. 5, 5*a*, *b* (1894).

Hylophila prasinana, Stephens, Ill. Brit. Ent. Haust. iv. p. 66 (1834).

The present species is found throughout Europe and Northern Asia. It expands from somewhat more than an inch to an inch and a half. The fore-wings are light green,

with three oblique silvery-white stripes, the costa being of this colour also. The abdomen and hind-wings are yellowish-white, darker in the male than in the female. The antennæ are reddish brown. The costa, inner margin, and tips of the fringes of the fore-wings are purplish-red in the male, yellow in the female.

The larva is light green, with a yellow lateral line and two red streaks behind. It feeds on a variety of common trees, and changes into a reddish-brown pupa, which is enclosed in a dense boat-shaped cocoon.

The Moth flies early in the evening, and, like *Callarctia pudica* (Esper; vide *antea*, p. 152) stridulates during flight.

Concerning this species, Mr. Meyrick writes:—"Although showing relationship to the group of *Callimorpha* and the exotic family *Agaristidæ* (which also originate from *Callimorpha*), the actual ancestry of this curious form is obscure." We abstain from commenting on this remarkable utterance.

THE SCARCE GREEN SILVER-LINES. HYLOPHILA BICOLORANA.

(*Plate LXXXVII. Fig.* 5.)

Tortrix prasina, Poda, Mus. Græc. p. 93, pl. 2, fig. 10 (1761)
Tortrix bicolorana, Fuessly, Verz. Schweiz. Ins. p. 41 (1775).
Tortrix prasinana, Fabricius, Syst. Ent. p. 145, no. 3 (1775).
Tortrix quercana, Denis & Schiffermüller, Syst. Verz. Schmett. Wien, p. 125, no. 1 (1776); Hübner, Eur. Schmett. vii. fig. 159 (1803).
Halias quercana, Treitschke, Schmett. Eur. viii. p. 7 (1830); Curtis, Brit. Ent. xii. pl. 575 (1835); Barrett, Lepid. Brit. Isl. ii. p. 179, pl. 64, figs. 6, 6*a* (1894).
Hylophila quercana, Stephens, Ill. Brit. Ent. Haust. iv. p. 67 (1834).
Chloephora bicolorana, Kirby, Eur. Butterflies and Moths, p. 295, pl. 42, fig. 10*a–d* (1881).

tive to cotton in Egypt, and other countries where cotton is grown.

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Halias, Treitschke, Schmett. Eur. vii. p. 227 (1829), viii. p. 3 (1830); Curtis, Brit. Ent. xii. pl. 575 (1835).

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Pyralis fagana, Fabricius, Spec. Ins. p. 276, no. 5 (1781).

Pyralis sylvana, Fabricius, Ent. Syst. iii. (2) p. 244, no. 6 (1794).

Halias prasinana, Treitschke, Schmett. Eur. viii. p. 4 (1830); Kirby, Eur. Butterflies and Moths, p. 295, pl. 42, fig. 9, *a–d* (1881); Barrett, Lepid. of Brit. Isl. ii. p. 175, pl. 64, figs. 5, 5*a*, *b* (1894).

Hylophila prasinana, Stephens, Ill. Brit. Ent. Haust. iv. p. 66 (1834).

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with three oblique silvery-white stripes, the costa being of this colour also. The abdomen and hind-wings are yellowish-white, darker in the male than in the female. The antennæ are reddish brown. The costa, inner margin, and tips of the fringes of the fore-wings are purplish-red in the male, yellow in the female.

The larva is light green, with a yellow lateral line and two red streaks behind. It feeds on a variety of common trees, and changes into a reddish-brown pupa, which is enclosed in a dense boat-shaped cocoon.

The Moth flies early in the evening, and, like *Callarctia pudica* (Esper; vide *anteà*, p. 152) stridulates during flight.

Concerning this species, Mr. Meyrick writes:—"Although showing relationship to the group of *Callimorpha* and the exotic family *Agaristidæ* (which also originate from *Callimorpha*), the actual ancestry of this curious form is obscure." We abstain from commenting on this remarkable utterance.

THE SCARCE GREEN SILVER-LINES. HYLOPHILA BICOLORANA.

(*Plate LXXXVII. Fig.* 5.)

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Tortrix prasinana, Fabricius, Syst. Ent. p. 145, no. 3 (1775).

Tortrix quercana, Denis & Schiffermüller, Syst. Verz. Schmett. Wien, p. 125, no. 1 (1776); Hübner, Eur. Schmett. vii. fig. 159 (1803).

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Hylophila quercana, Stephens, Ill. Brit. Ent. Haust. iv. p. 67 (1834).

Chloephora bicolorana, Kirby, Eur. Butterflies and Moths, p. 295, pl. 42, fig. 10*a–d* (1881).

This species is a native of Europe and Western Asia.

It expands nearly two inches.

The thorax and fore-wings are deep grass-green, the latter being crossed by two oblique whitish lines. The hind-wings and abdomen are glossy white. The palpi, antennæ, and legs are tinged with red.

The larva is green, with a lateral yellowish line and a dorsal tubercle on the second segment. It frequents various trees, but seems most partial to the oak. The pupa is pale green, with a black dorsal line. The Moth appears about the middle of June, and is much scarcer in Britain than the last species.

FAMILY XV. LITHOSIIDÆ.

Eggs.—Usually resembling round pearly beads.

Larva.—Cylindrical, with sixteen legs, clothed with short or moderately long hair, arranged in tufts; gregarious, and often feeding on lichens.

Pupa.—Enclosed in a cocoon.

Imago.—Allied to the *Arctiidæ*, but the ocelli are generally absent; the fore-wings are long and narrow; and the hind-wings rounded. The neuration is usually simple, and the colours seldom much varied. Most of the species fly in the evening, but some of the more brightly-coloured species by day. When the former are beaten out by day they simulate death in the net.

The *Lithosiidæ* are a very extensive Family, with ciliated or slightly pectinated antennæ, slender bodies and large wings; in most cases the fore-wings are much narrower than the hind-wings, and overlap above them when at rest. The fore-wings are rounded at the tips, and the hind-wings are rounded. The species are generally simply coloured, being white or

yellowish, with black markings, but some species are black, while others are suffused, spotted, or striped with red; and a few exotic species with green or blue. The larvæ are generally brightly coloured, with hairy warts.

Although this Family has numerous representatives in all parts of the world, it attains its maximum of development, both in the variety, and in the size of the species, in the East Indies, and especially in India itself.

GENUS MILTOCHRISTA.

Miltochrista, Hübner, Verz. bek. Schmett. p. 166 (1822?); Walker, List Lepid. Ins. Brit. Mus. ii. p. 553 (1854).
Calligenia, Duponchel, Cat. Lépid. Eur. p. 59 (1844).

The European species of this genus, which is the representative of a very large Indian group, differs from others of the Family by the arched costa and rounded fore-wings (the costa in most genera of *Lithosiidæ* being nearly straight), its red colouring, and the zig-zag transverse lines on the fore-wings. The latter are nearly as broad as the hind-wings, which is also unusual in European *Lithosiidæ*. It flies at dusk in the neighbourhood of woods, and is not uncommon.

The larva feeds on lichens.

THE ROSY FOOTMAN. MILTOCHRISTA MINIATA.

Geometra miniata, Forster, Nov. Spec. Ins. p. 75 (1771).
Bombyx rosea, Fabricius, Syst. Ent. p. 587, no. 109 (1775); Esper, Schmett. iii. p. 386, Taf. 77, figs. 1–3 (1786).
Noctua rubicunda, Denis & Schiffermüller, Syst. Verz. Schmett. Wien, p. 68, no. 10 (1776).
Bombyx rubicunda, Hübner, Eur. Schmett. 1, ii. fig. 111 (1804).
Lithosia rosea, Ochsenheimer, Schmett. Eur. iii. p. 145 (1810).

This species is a native of Europe and Western Asia.

It expands nearly two inches.

The thorax and fore-wings are deep grass-green, the latter being crossed by two oblique whitish lines. The hind-wings and abdomen are glossy white. The palpi, antennæ, and legs are tinged with red.

The larva is green, with a lateral yellowish line and a dorsal tubercle on the second segment. It frequents various trees, but seems most partial to the oak. The pupa is pale green, with a black dorsal line. The Moth appears about the middle of June, and is much scarcer in Britain than the last species.

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Pupa.—Enclosed in a cocoon.

Imago.—Allied to the *Arctiidæ*, but the ocelli are generally absent; the fore-wings are long and narrow; and the hind-wings rounded. The neuration is usually simple, and the colours seldom much varied. Most of the species fly in the evening, but some of the more brightly-coloured species by day. When the former are beaten out by day they simulate death in the net.

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Miltochrista, Hübner, Verz. bek. Schmett. p. 166 (1822?); Walker, List Lepid. Ins. Brit. Mus. ii. p. 553 (1854).
Calligenia, Duponchel, Cat. Lépid. Eur. p. 59 (1844).

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The larva feeds on lichens.

THE ROSY FOOTMAN. MILTOCHRISTA MINIATA.

Geometra miniata, Forster, Nov. Spec. Ins. p. 75 (1771).
Bombyx rosea, Fabricius, Syst. Ent. p. 587, no. 109 (1775); Esper, Schmett. iii. p. 386, Taf. 77, figs. 1–3 (1786).
Noctua rubicunda, Denis & Schiffermüller, Syst. Verz. Schmett. Wien, p. 68, no. 10 (1776).
Bombyx rubicunda, Hübner, Eur. Schmett. 1, ii. fig. 111 (1804).
Lithosia rosea, Ochsenheimer, Schmett. Eur. iii. p. 145 (1810).

Callimorpha rosea, Godart, Lépid. France, iv. p. 383, pl. 39, figs. 5, 6 (1822).

Callimorpha miniata, Stephens, Ill. Brit. Ent. Haust. ii. p. 90 (1829).

Calligenia miniata, Kirby, Eur. Butterflies and Moths, p. 96, pl. 22, fig. 2, *a–c* (1879); Barrett, Lepid. Brit. Isl. ii. p. 201, pl. 66, figs. 3, 3*a* (1894).

Miltochrista miniata, Buckler, Larvæ of Brit. Lepid. iii. p. 13, pl. 40, fig. 3 (1889).

This species is found in Southern and Central Europe and in Northern Asia. It expands from 1¼ to 1½ inch. It has the fore-wings dark rose-coloured with one or two black spots at the base, an oblique zig-zag black line beyond the middle and

Rosy Footman.

a series of distinct black dots on the hind margin varying in number. The hind-wings are paler and without spots.

The larva is brown with tufts of long grey hair; the head is reddish-brown with orange downy hairs. It feeds on lichens growing on oak, birch, ash, &c.

The pupa is brown and is enclosed in a stout cocoon.

GENUS GNOPHRIA.

Atolmis (*partim*), Hübner, Verz. bek. Schmett. p. 164 (1822?); Walker, List Lepid. Ins. Brit. Mus. ii. p. 482 (1854); Moore, Proc. Zool. Soc. Lond. 1878, p. 9.

Gnophria, Stephens, Ill. Brit. Ent. Haust. ii. p. 98 (1829).

The only European representative of this genus has rather squarer fore-wings and narrower hind-wings than in typical *Lithosiæ*, but may be distinguished at a glance from almost any British Moth at all resembling it in size and shape, by its sooty black colour. As usual in this Family, the insect, which is not uncommon in England, feeds on lichens in the larva state, and constructs a cocoon.

THE RED-NECKED FOOTMAN. GNOPHRIA RUBRICOLLIS.

Noctua rubricollis, Linnæus, Syst. Nat. (ed. x.) i. p. 511, no. 83 (1758); Clerck, Icones, pl. 2, fig. 3 (1759); Esper, Schmett. iv. p. 90, Taf. 92, fig. 1 (1786).

Noctua rubicollis, Linnæus, Faun. Suec. p. 307 (1761); id. Mus. Ludov. Ulric. p. 386 (1764).

Bombyx rubricollis, Hübner, Eur. Schmett. iii. fig. 94 (1800?).

Lithosia rubricollis, Ochsenheimer, Schmett. Eur. iii. p. 142 (1810); Godart, Lépid. France, v. p. 22, pl. 42, fig. 3 (1824); Barrett, Lepid. Brit. Isl. ii. p. 229, pl. 68, figs. 1, 1*a–c* (1894).

Gnophria rubricollis, Stephens, Ill. Brit. Ent. Haust. ii. p. 98 (1829); Kirby, Eur. Butterflies & Moths, p. 99, pl. 22, fig. 10 (1879); Buckler, Larvæ of Brit. Lepid. iii. p. 34, pl. 42, fig. 2 (1889).

The Red-necked Footman is common throughout Europe, Northern and Western Asia. It expands from 1 inch to 1½ inch.

Red-necked Footman.

It is a black insect with a red collar and the tip of the abdomen rich golden-yellow.

The larva is greenish-grey with black longitudinal lines, dotted with red and white. The head is dark brown with two white streaks.

It feeds on *Jungermannia*, and various lichens.

The larva is reddish-brown, and is contained in a brownish-grey cocoon.

GENUS LITHOSIA.

Lithosia, Fabricius, Ent. Syst. Suppl. p. 459 (1798); Latreille, Hist. Nat. Crust. Ins. iii. p. 408 (1802); Ochsenheimer, Schmett. Eur. iii. p. 125 (1810); Stephens, Ill. Brit. Ent. Haust. ii. p. 93 (1829).

Brunia, Moore, Proc. Zool. Soc. Lond. 1878, p. 15.

Collita, Moore, Proc. Zool. Soc. Lond. 1878, p. 16.

This genus and its immediate allies present the characteristics of the Family in the highest perfection—the long, narrow fore-wings, with the costa nearly straight, and the broad rounded hind-wings. The fore-wings are usually pale-coloured, varying from yellowish to pale grey, generally with a paler line on the costa, and sometimes with one or two black dots. The hind-wings vary from whitish to pale brownish-grey.

We have several closely-allied species in England, of which the best known is the following:

THE COMMON FOOTMAN. LITHOSIA LURIDEOLA.

Noctua complana, Esper (nec Linn.), Schmett. iv. (1) p. 95, Taf. 92, fig. 7 (1786); Hübner, Beitr. Schmett. i (3) p. 12, Taf. 1, F (1788).

Lithosia lurideola, Zincken, Allgem. Literaturzeitung, 1817, p. 68; Treitschke, Schmett. Eur. x. (1) p. 162 (1834); Fischer von Rösslerstamm, Abbild. Schmett. p. 106, Taf. 42, figs. *2a–c* (1840?); Kirby, Eur. Butterflies & Moths, p. 98 (1879).

Lithosia complanula, Boisduval, Icones Lépid. ii. p. 97 (1834); Duponchel, Lépid. France, Suppl. iii. p. 15, pl. 1, fig. 4 (1836); Buckler, Larvæ of Brit. Lepid. iii. p. 21, pl. 41, fig. 3 (1889); Barrett, Lepid. Brit. Isl. ii. p. 224, pl. 67, figs. 6, 6*a* (1894).

Lithosia plumbeola, Herrich-Schäffer, Schmett. Eur. ii. p. 158, no. 17 (1847).

The Common Footman is found throughout Europe and Asia Minor. It expands about 1¼ inch.

The fore-wings are dark leaden-grey, with a yellow stripe on the costa, gradually narrowed to the tip. The hind-wings are of a uniform pale yellow.

Common Footman.

The larva is black and hairy, without spots. There is a reddish stripe on each side above the legs extending from the fifth to the eleventh segments.

It feeds on lichens growing on walls and trees, especially on those of the poplar.

This species is very similar to *L. complana* (Linnæus), the type of the genus, which is a scarce Moth in England, and may be distinguished by the pale stripe on the costa not being narrowed, but running in equal breadth throughout, to the tip of the wing. Most of the other British species of *Lithosia* are more or less local.

GENUS ŒONISTIS.

Lithosia (*partim*), Fabricius, Ent. Syst. Suppl. p. 459 (1798); Latreille, Consid. Générales, p. 364 (1810); Leach,

Edinb. Encycl. ix. p. 133 (1815); Moore, Proc. Zool. Soc. Lond. 1878, p. 44.

Œonistis, Hübner, Verz. bek. Schmett. p. 165 (1822?).

The British species of this genus is the largest of the Family. The sexes differ considerably in colour and appearance, and were formerly regarded as distinct species. The fore-wings are more arched than in *Lithosia*, and the sub-costal nervure throws off a branch to the costa, which is not the case in *Lithosia*. The single species is not very uncommon in England, and its larva is a lichen-feeder.

THE FOUR-SPOTTED FOOTMAN. ŒONISTIS QUADRA.

Noctua quadra, Linnæus, Syst. Nat. (ed. x.) i. p. 511, no. 84 (1758), i. (2) p. 840, no. 114 (1767); Esper, Schmett. iv. p. 92, Taf. 92, figs. 2–6 (1786).

Noctua flava, Müller, Faun. Fridr. p. 46 (1764).

♂ *Noctua deplana*, Linnæus, Mant. Plant. p. 539 (1771).

Bombyx quadra, Hübner, Eur. Schmett. iii. figs. 101, 102 (1800).

Lithosia quadra, Ochsenheimer, Schmett. Eur. iii. p. 126 (1810); Stephens, Ill. Brit. Ent. Haust. ii. p. 97 (1829); Godart, Lépid. France, v. p. 13, pl. 41, figs. 2–4 (1837).

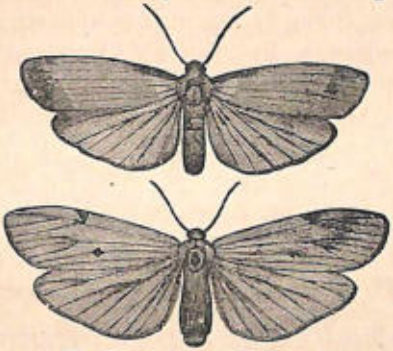
Œonistis quadra, Kirby, Eur. Butterflies & Moths, p. 99, pl. 22, figs. 9, *a–c* (1879); Buckler, Larvæ of Brit. Lepid. iii. p. 29, pl. 42, fig. 1 (1889); Barrett, Lepid. Brit. Isl. ii. p. 232, pl. 68, figs. 3, 3*a*, *b* (1894).

The Four-Spotted Footman is found locally throughout Europe, and Northern and Western Asia. The female expands about two inches, and the male a little less.

The antennæ are dark brown, and the head and body ochre-yellow. The fore-wings are yellowish-grey in the male, deep yellow at the base, with the hind margin bluish-grey, and the

costa blue-black from the base. The hind-wings are ochre-yellow, with the costa bluish-grey.

The female has canary-yellow fore-wings, with two steel-blue spots of variable size, one on the costa, the other nearly opposite the middle of the inner margin. The hind-wings are paler.



The Four-Spotted Footman.

The larva is dark grey, with a double zig-zag yellow line on each side of the back, in which are situated red, hairy tubercles. On the third, eighth, and last segments is a black spot. The head is small and black. It feeds on lichens, which grow on several kinds of fruit-trees, as well as on oak, beech, fir, horse-chestnut, &c.

The pupa is reddish-brown, short and stout; and is contained in a thin oval cocoon.

GENUS COSCINIA.

Coscinia, Hübner, Verz. bek. Schmett. p. 169 (1822 ?).

Spiris, Hübner, Verz. bek. Schmett. p. 169 (1822 ?); Walker, List Lepid. Ins. Brit. Mus. ii. p 472 (1854).

Eulepia, Curtis, Brit. Ent. ii. pl. 56 (1825); Stephens, Ill. Brit. Ent. Haust. ii. p. 91 (1829).

Emydia, Boisduval, Ind. Méth. p. 39 (1829); id. Gen. Ind. Méth. p. 56 (1840).

The Moths belonging to the present genus resemble *Lithosia* in shape, having long narrow fore-wings, and broad, though somewhat less rounded, hind-wings, but they are much more gaily coloured, the fore-wings being longitudinally striated. The antennæ are short, and distinctly pectinated in the male, and the larvæ feed, not on lichens, but on grass and heather, and construct cocoons. We have noticed the two best-known European species, but neither is common in England, and the first is so rare that its claim to be considered a British species has been regarded as doubtful. They prefer warm, dry, heathy localities.

THE FEATHERED FOOTMAN. COSCINIA STRIATA.

Bombyx striata, Linnæus, Syst. Nat. (ed. x.) i. p. 502, no. 31 (1758).

Bombyx grammica, Linnæus, Syst. Nat. App. p. 822 (1758); id. Faun. Suec. p. 301 (1761); Esper, Schmett. iii. p. 342, Taf. 68, figs. 5–8 (1786), iii. (1) p. 21, Taf. 83, fig. 3 (1786?).

Eyprepia grammica, Ochsenheimer, Schmett. Eur. iii. p. 306 (1810).

Lithosia grammica, Godart, Lépid. France, v. p. 19, pl. 42, figs. 1, 2 (1824).

Eulepia grammica, Curtis, Brit. Ent. ii. text (1825); Stephens, fol. 56, Ill. Brit. Ent. Haust. ii. p. 91, pl. 17, fig. 3 (1829); Barrett, Lepid. Brit. Isl. ii. p. 236, pl. 69, figs. 1, 1*a*, *b* (1894).

Emydia striata, Kirby, Eur. Butterflies and Moths, p. 100, pl. 22, fig. 11 (1879).

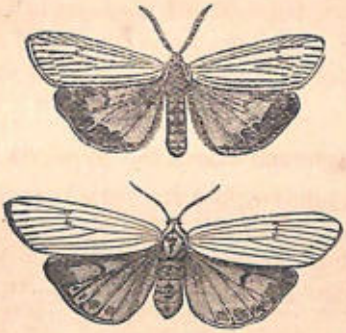
Coscinia striata, Kirby, Cat. Lepid. Het. i. p. 343 (1892).

This pretty Moth is found throughout the greater part of Europe and Western Asia. It expands about 1½ inch or a little less.

The male has the fore-wings yellow, numerous narrow black

longitudinal lines running nearly parallel to one another, and two small central dots. The hind-wings are more orange-coloured, with a black central lunule and a broad black border. The fringes of all the wings are yellow.

The female is paler, with the longitudinal lines of the fore-wings much less strongly marked, and sometimes quite



Feathered Footman.

absent. The hind-wings are orange-coloured, with a few black streaks near the base, a black central dot and a row of small black spots on the hind margin.

The larva is dark brown, with an orange-coloured dorsal stripe, a white lateral line, and with reddish-brown tubercles clothed with reddish-yellow hair.

THE SPECKLED FOOTMAN. COSCINIA CRIBRARIA.

Bombyx cribraria, Linnæus, Syst. Nat. (ed. x.) i. p. 507, no. 52 (1758).

Bombyx cribrum, Linnæus, Faun. Suec. p. 302 (1761); id. Syst. Nat. (ed. xii.) i. (2) p. 831, no. 76 (1767); Esper, Schmett. iii. p. 353, Taf. 69, fig. 1 (1786).

Eyprepria cribrum, Ochsenheimer, Schmett. Eur. iii. p. 302 (1810).

Eulepia cribrum, Curtis, Brit. Ent. ii. pl. 56 (1825); Stephens, Ill. Brit. Ent. Haust. ii. p. 92 (1829); Buckler, Larvæ of Brit. Ins. iii. pl. 46, fig. 2 (1889); Barrett, Lepid. Brit. Isl. ii. p. 238, pl. 62, figs. 2, 2*a*, *b* (1894).

Lithosia cribrum, Godart, Lépid. France, v. p. 26, pl. 43, figs. 1, 2 (1837).

Emydia cribrum, Kirby, Eur. Butterflies and Moths, p. 100 (1879).

Coscinia cribraria, Kirby, Cat. Lepid. Het. i. p. 343 (1892).

This is a European species, which occurs also in some parts of Western Asia. It expands 1¼ inch, or a little more, the female being generally rather smaller than the male. The

The Speckled Footman.

fore-wings are white, with four transverse rows of blackish-brown spots, and two smoky stripes running from the base to the hind margin. The hind-wings are grey.

The larva is hairy and black, with a whitish dorsal stripe, and a narrow white lateral line above the feet. It feeds on heather.

GENUS UTETHEISA.

Utetheisa, Hübner, Verz. bek. Schmett. p. 168 (1822?); Stretch, Zyg. & Bomb. N. Amer. p. 55 (1872); Moore, Lepid. Ceylon, ii. p. 67 (1882); Möschler, Ent. Amer. ii. p. 73 (1886).

Deiopeia, Stephens, Ill. Brit. Ent. Haust. ii. p. 92 (1829).
Utethesia, Moore, Cat. Lep. Mus. E. Ind. Co. ii. p. 306 (1859).

This is a beautiful genus of moderate-sized Moths, with narrow, oblong fore-wings, not much longer than the hind-wings, and with the hind margin very slightly oblique, and the hinder angle just rounded off. The fore-wings are white, red, or yellow, spotted with black, and the hind-wings are red or white, rather broadly bordered with black, and often with one or more black spots towards the end of the cell. The species are not numerous, but have representatives in most tropical countries; they reach the extreme northern limit of their range in Central Europe and Massachusetts. They fly by day.

THE CRIMSON-SPECKLED FOOTMAN. UTETHEISA PULCHELLA.
(*Plate LXXXVIII. Fig.* 2 (*imago*), 3 (*larva*).)

Tinea pulchella, Linnæus, Syst. Nat. (ed. x.) i. p. 534, no. 238 (1758); Sulzer, Gesch. Ins. Taf. 23, fig. 11 (1776).
Noctua pulchra, Denis & Schiffermüller, Syst. Verz. Schmett. Wien. p. 68, no. 9 (1776); Esper, Schmett. iv. p. 570, Taf. 164, figs. 3–5 (1786?).
Geometra lotrix, Cramer, Pap. Exot. ii. pl. 109, figs. E, F (1779?).
Lithosia pulchra, Ochsenheimer, Schmett. Eur. iii. p. 304 (1810).
Eulepia pulchra, Curtis, Brit. Ent. iv. pl. 169 (1827).
Deiopeia pulchella, Stephens, Ill. Brit. Ent. Haust. ii. p. 93 (1829); Kirby, Eur. Butterflies & Moths, p. 101, pl. 22, figs. 12, *a*, *b* (1879); Buckler, Larvæ of Brit. Lepid. iii. p. 52, pl. 46, fig. 3 (1889); Barrett, Lepid. Brit. Isl. ii. p. 241, pl. 69, figs. 3, 3*a*, *b* (1894).
Utetheisa pulchella, Moore, Lepid. Ceylon, ii. p. 67, pl. 104, fig. 5 (1882).

Eyprepria cribrum, Ochsenheimer, Schmett. Eur. iii. p. 302 (1810).

Eulepia cribrum, Curtis, Brit. Ent. ii. pl. 56 (1825); Stephens, Ill. Brit. Ent. Haust. ii. p. 92 (1829); Buckler, Larvæ of Brit. Ins. iii. pl. 46, fig. 2 (1889); Barrett, Lepid. Brit. Isl. ii. p. 238, pl. 62, figs. 2, 2*a*, *b* (1894).

Lithosia cribrum, Godart, Lépid. France, v. p. 26, pl. 43, figs. 1, 2 (1837).

Emydia cribrum, Kirby, Eur. Butterflies and Moths, p. 100 (1879).

Coscinia cribraria, Kirby, Cat. Lepid. Het. i. p. 343 (1892).

This is a European species, which occurs also in some parts of Western Asia. It expands 1¼ inch, or a little more, the female being generally rather smaller than the male. The

The Speckled Footman.

fore-wings are white, with four transverse rows of blackish-brown spots, and two smoky stripes running from the base to the hind margin. The hind-wings are grey.

The larva is hairy and black, with a whitish dorsal stripe, and a narrow white lateral line above the feet. It feeds on heather.

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Utethesia, Moore, Cat. Lep. Mus. E. Ind. Co. ii. p. 306 (1859).

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THE CRIMSON-SPECKLED FOOTMAN. UTETHEISA PULCHELLA.

(*Plate LXXXVIII. Fig.* 2 (*imago*), 3 (*larva*).)

Tinea pulchella, Linnæus, Syst. Nat. (ed. x.) i. p. 534, no. 238 (1758); Sulzer, Gesch. Ins. Taf. 23, fig. 11 (1776).
Noctua pulchra, Denis & Schiffermüller, Syst. Verz. Schmett. Wien. p. 68, no. 9 (1776); Esper, Schmett. iv. p. 570, Taf. 164, figs. 3–5 (1786?).
Geometra lotrix, Cramer, Pap. Exot. ii. pl. 109, figs. E, F (1779?).
Lithosia pulchra, Ochsenheimer, Schmett. Eur. iii. p. 304 (1810).
Eulepia pulchra, Curtis, Brit. Ent. iv. pl. 169 (1827).
Deiopeia pulchella, Stephens, Ill. Brit. Ent. Haust. ii. p. 93 (1829); Kirby, Eur. Butterflies & Moths, p. 101, pl. 22, figs. 12, *a*, *b* (1879); Buckler, Larvæ of Brit. Lepid. iii. p. 52, pl. 46, fig. 3 (1889); Barrett, Lepid. Brit. Isl. ii. p. 241, pl. 69, figs. 3, 3*a*, *b* (1894).
Utetheisa pulchella, Moore, Lepid. Ceylon. ii. p. 67, pl. 104, fig. 5 (1882).

This pretty Moth is found nearly all over the Old World as far North as the Baltic. In England it is rare, though less so than formerly.

It expands from 1½ to nearly 1¾ inch.

The head, thorax, and fore-wings are yellowish-white, the thorax being spotted with black and yellow. The fore-wings are covered with many small black and scarlet spots, the former of which are arranged, more or less, in fine transverse lines, the others being between them. The abdomen and hind-wings are white, slightly tinged with bluish, the latter with a broad, dusky, marginal band, situated on the inner side and becoming narrow towards the anal angle. The fringe of all the wings is pale yellow.

The larva, which is covered with blackish hair, is bluish-grey, spotted with black and red, and having a broad white dorsal line. It feeds on *Heliotropium europeum*, *Solanum tomentosum*, and field scorpion grass (*Myosotis arvensis*). Only the last-mentioned is indigenous in this country.

UTETHEISA BELLA.

(*Plate LXXXVIII. Fig.* 1.)

Tinea bella, Linnæus, Syst. Nat. (ed. x.) i. p. 534, no. 237 (1758); id. Mus. Ludov. Ulr. p. 399 (1764); Drury, Ill. Ex. Ent. i. pl. 24, fig. 3 (1773).

Utetheisa bella, Stretch, Zyg. & Bomb. N. Amer. p. 56, pl. 2, fig. 15 (1872).

This handsome Moth resembles the Crimson-Speckled Footman, but is much more richly coloured. It is generally common in the United States. The expanse of the wings is about 1½ inch.

The fore-wings are yellow, varying from lemon to orange, with six white transverse bands, each containing a series of black dots. The hind-wings are pink, with an irregular black

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Wyman & Sons, Limited.

1. *Utetheisa bella*.
2. " *pulchella*.
3. " " *larva*.
4. *Hipocrita jacobææ*.
5. " " *larva*.

marginal band, narrowly bordered with white. The fringes of all the wings are white. The thorax and abdomen are whitish, the former spotted with black, and the antennæ are black.

UTETHEISA VENUSTA.

Tinea bella, Cramer (nec Linn.), Pap. Exot. ii. pl. 109, figs. C, D (1777).

Euprepia venusta, Dalman, Anal. Ent. p. 28 (1823).

Deiopeia speciosa, Walker, List Lepid. Ins. Brit. Mus. ii. p. 568, no. 5 (1854).

Utetheisa speciosa, Stretch, Zyg. & Bomb. N. Amer. p. 57, pl. 2, fig. 16 (1872).

This Moth is noteworthy as showing another stage in intensity of colour. It is an inhabitant of the West Indies and the Atlantic States of North America, and is of about the same size as *U. bella*. The yellow on the fore-wings of the latter is, in this species, replaced by red, and the thorax is also of that colour.

GENUS HIPOCRITA.

Callimorpha (*partim*), Latreille, Gen. Crust. Ins. iv. p. 220 (1809); Cuvier, Règne Anim. iii. p. 570 (1817); Stephens, Ill. Brit. Ins. Haust. ii. p. 89 (1829); Curtis, Brit. Ent. xi. pl. 499 (1834).

Hipocrita, Hübner, Tentamen, p. 1 (1810?).

Tyria, Hübner, Verz. bek. Schmett. p. 166 (1822?).

Euchelia, Boisduval, Ind. Méth. p. 39 (1829); id. Gen. Ind. Méth. p. 56 (1840).

The only British species of this genus has short and simple antennæ, short and oval fore-wings, very narrow at the base, and very broad, rounded hind-wings. The abdomen is moderately slender, and hardly longer than the hind-wings. It is remarkable for its strongly-contrasted colours, in which it

resembles the Burnets, and like them, is liable to have the red portion of the wings occasionally replaced with yellow. Some authors think that it is related to the *Agaristidæ;* and in one of his later works, Guenée speaks of it as an European representative of that Family. It flies by day.

THE CINNABAR MOTH. HIPOCRITA JACOBÆÆ.

(*Plate LXXXVIII. Fig.* 4 (*imago*), 5 (*larva*).)

Noctua jacobææ, Linnæus, Syst. Nat. (ed. x.) i. p. 511, no. 81 (1758); id. Faun. Suec. p. 307 (1761); Esper, Schmett. iv. (1) p. 87, t. 91, figs. 6-8 (1786).

Lithosia jacobææ, Ochsenheimer, Schmett. Eur. iii. p. 154 (1810).

Callimorpha jacobææ, Stephens, Ill. Brit. Ent. Haust. ii. p. 90 (1829); Curtis, Brit. Ent. xi. pl. 499 (1834); Buckler, Larvæ of Brit. Lepid. iii. pl. 46, fig. 1 (1889).

Callimorpha senecionis, Godart, Lépid. France, iv. p. 377, pl. 42, fig. 4 (1822).

Euchelia jacobææ, Kirby, Eur. Butterflies & Moths, p. 101, pl. 22, figs. 13, *a*, *b* (1879); Barrett, Lepid. of Brit. Isl. ii. p. 247, pl. 69, figs. 4, 4*a*, *b* (1894).

Hipocrita jacobææ, Kirby, Cat. Lepid. Heter. i. p. 351 (1892).

The Cinnabar Moth, or Pink Underwing, as it is sometimes called, is found in Europe and Western Asia to the Altai. The colouring is very peculiar, and it presents this additional singularity, that the upper and under surfaces are precisely alike. The fore-wings are greyish-black, with a carmine stripe near the costa, extending from the base nearly to the apex, with two spots of the same colour on the hind margin. The hind-wings are bright red, with black fringes. The antennæ, body, and legs are deep black.

The larva is slightly hairy, with broad transverse black and orange rings, and a black head. It feeds usually in companies on the flowers of the ragwort (*Senecio jacobæa*), whence its name.

This is a very common species in many places in England, South Scotland, and Ireland, but in the north of Scotland it becomes scarce.

GENUS SETINA.

Setina, Schrank, Fauna Boica, ii. (2) p. 165 (1802); Stephens, Ill. Brit. Ent. Haust. ii. p. 98 (1829).

Endrosa, Hübner, Verz. bek. Schmett. p. 167 (1822?).

Philea, Zetterstedt, Ins. Lapp. p. 931 (1840).

This is a genus comprising several species which are common in Europe and Asia, with moderately broad and rounded yellow wings, spotted or streaked with black. The abdomen is slender, and extends beyond the hind-wings.

The Moths fly by day, or towards dusk. Several species are common in the Alps, but only one is British, and this is a rather local insect, which is generally found, where it occurs, in the neighbourhood of the coast.

THE DEW MOTH. SETINA IRRORELLA.

Tinea irrorella, Linnæus, Syst. Nat. (ed. x.) i. p. 353, no. 241 (1758); id. Faun. Suec. p. 383 (1761); Clerck, Icones, pl. 4, fig. 5 (1759).

Noctua irrorea, Denis & Schiffermüller, Syst. Verz. Schmett. Wien. p. 68, no. 3 (1776); Esper, Schmett. iv. p. 103 pl. 94, figs. 3, 4 (1787).

Lithosia irrorata, Fabricius, Ent. Syst. Suppl. p. 461, no. 12 (1798).

Bombyx irrorea, Hübner, Eur. Schmett. ii. fig. 105 (1800?)

Lithosia irrorea, Ochsenheimer, Schmett. Eur. iii. p. 148 (1810).

Callimorpha irrorata, Godart, Lépid. France, iii. p. 392, pl. 40, figs. 3, 4 (1822).

Setina irrorella, Stephens, Ill. Brit. Ent. Haust. ii. p. 99, pl. 17, fig. 1 (1829); Kirby, Eur. Butterflies and Moths, p. 96, pl. 22, fig. 3 (1879); Barrett, Lepid. of Brit. Isl. ii. p. 204, pl. 66, figs. 4, 4*a*, *b* (1894).

Philea irrorella, Buckler, Larvæ of Brit. Lepid. iii. p. 36, pl. 42, fig. 4 (1889).

This is a widely distributed European and Asiatic species, and expands about ¾ to 1½ inch.

The colour is ochre-yellow or dull orange. The fore-wings have three rows of black dots, one before the middle, the second rather beyond the middle, and the third near the hind

The Dew Moth.

margin. The number of spots in this last row varies from one to six. The hind-wings have one or two black dots towards the hind margin anteriorly. They are paler than the fore-wings.

The larva is black with obliquely-placed quadrilateral yellow spots on the back, and elongated spots of the same colour on the sides. It feeds on lichens among stones.

The pupa is reddish-brown, and is enclosed in a slight cocoon.

Newman says the Moth flies at early morning. I used to take it at dusk near Shoreham Harbour.

GENUS NUDARIA.

Nudaria, Haworth, Lepid. Brit. p. 156 (1809); Stephens, Ill. Brit. Ent. Haust. ii. p. 83 (1829).
Paidia, Hübner, Verz. bek. Schmett, p. 159 (1822 ?).
Derrhis, Wallengren, Skand. Heter. ii. p. 259 (1885).

This is a genus including a few Moths easily recognisable by their small size, and rather short, broad, rounded, and thinly-scaled wings. We have two species in England, one of which is here noticed.

THE MUSLIN MOTH. NUDARIA MUNDANA.

Tortrix mundana, Linnæus, Faun. Suec. p. 349 (1761).
Attacus mundana, Linnæus, Syst. Nat. (ed. xii.) i. (2) p. 816, no. 17 (1767).
Bombyx mundana, Esper, Schmett. iii. p. 45, pl. 6, figs. 1, 2 (1782), pl. 93, figs. 1–7 (1807).
Bombyx munda, Fabricius, Ent. Syst. iii. (1) p. 482, no. 236 (1793).
Bombyx nuda, Hübner, Eur. Schmett. iii. figs. 63, 64 (1800).
Bombyx hemerobia, Hübner, Eur. Schmett. iii. fig. 65 (1800).
Nudaria munda, Haworth, Lepid. Brit. p. 156, no. 1 (1809).
Lithosia mundana, Ochsenheimer, Schmett. Eur. iii. p. 160 (1810).
Callimorpha mundana, Godart, Lépid. France, iv. p. 397, pl. 40, fig. 7 (1822).
Nudaria mundana, Stephens, Ill. Brit. Ent. Haust. ii. p. 83 (1829); Kirby, Eur. Butterflies and Moths, p. 95, pl. 22, fig. 1 (1879); Buckler, Larvæ of Brit Lepid. iii. p. 37, pl. 43, fig. 1, (1889); Barrett, Lepid. of Brit. Isl. ii. p. 199, pl. 66, figs. 2, 2*a*, *b* (1894).

Nudaria hemerobia, Stephens, Ill. Brit. Ent. Haust, ii. p. 84 (1829).

The Muslin Moth is a common species throughout most parts of Europe. It measures a little over ¾ inch in expanse. The wings of this little Moth are brownish-yellow and semi-transparent, with two brown zig-zag transverse lines and a brown

The Muslin Moth.

central spot situated between them. The hind-wings are without markings.

The larva is yellowish-grey, with long black hair, and six rows of tufted tubercles. The head is light shining brown.

It feeds on lichens.

GENUS NYCTEOLA.

Nycteola, Hübner, Tentamen, p. 1 (1810?).
Sarrothripus, Curtis, Brit. Ent. i. pl. 29 (1824); Steph. Ill. Brit. Ent. Haust. iv. p. 145 (1834).
Axia, Hübner, Verz. bek. Schmett. p. 395 (1827?).
Sarrothripa, Duponchel, Lépid. France, ix. pp. 19, 44 (1834).
Sarotricha, Meyrick, Proc. Linn. Soc. N. S. Wales (2) ii. p. 924 (1888).

This is a small genus of doubtful position which was formerly classed among the Tortrices, but is now placed by some authors with the *Cymbidæ*, and by others with the *Lithosiidæ*. In appearance the British species resembles a large *Tortrix*; the fore-wings are rather narrow, with the costa arched. The moth is provided

with ocelli. There is a tuft between the eyes, the palpi are long, and, as well as the legs, are tufted. The fringes are very long. The larva feeds on willow, and the pupa is enclosed in a cocoon. The Moth is not uncommon in England, and is very variable.

THE LARGE BROWN. NYCTEOLA REVAYANA.

Tortrix revayana, Scopoli, Annus Nat. Hist. v. p. 116, no. 130 (1772); Denis & Schiffermüller, Syst. Verz. Schmett. Wien. p. 130, no. 17 (1775).
Pyralis duplana, Fabricius, Gen. Ins. p. 293 (1777).
Pyralis ilicana, Fabricius, Spec. Ins. ii. p. 283, no. 44 (1781).
Pyralis rivagana, Fabricius, Mant. Ins. ii. p. 233, no. 77 (1787).
Tortrix ramosana, Hübner, Vögel u. Schmett. pl. 75 (1793).
Tortrix dilutana, *undulana*, *degenerana*, *punctana*, et *ramosana*, Hübner, Eur. Schmett. vii. figs. 6–10 (1796).
Sarrothripus ramosanus, Curtis, Brit. Ent. i. pl. 29 (1824).
Sarrothripus stoninus, Curtis, Brit. Ent. i. fol. 29 p. 2 (1824).
Penthina revayana, Treitschke, Schmett. Eur. viii. p. 22 (1830).
Sarrothripa revayana, Kirby, Eur. Butterflies & Moths, p. 294 (1881).
Nycteola revayana, Kirby, Cat. Lepid. Heter. i. p. 369 (1892).

This species is confined to Europe. It expands about an inch. Its variability is so extreme that Hübner described it under no less than five different names.

The fore-wings are grey or brown, marbled with lighter and darker, and with a waved band edged on both sides by fine transverse lines and a dark central spot enclosed in lighter. Then generally comes a suffused area bounded by whitish, close to which are small shades, and near the fringes a

uniform row of black dots. The fringes are rusty-brown or whitish.

In the variety *N. degenerana*, Hübner, white is the predominating colour, *N. undulana* and *N. dilutana*, Hübner, are varieties without any white, but made up only of brown, grey, and rust-colour. None of these forms are rare. It is only occasionally, however, that the variety *N. punctana*, in which the dark shades are reduced to spots, is met with.

The hind-wings of all specimens are brownish-grey, varied with reddish-brown, with a silky gloss.

The fringes are of the same colour, and of unusual length.

The larva has sixteen legs, and is uniform pale green, with long white hair. It feeds between the leaves of *Salix caprea*.

GENUS NOLA.

Nola, Leach, Edinb. Encycl. ix. p. 135 (1815); Stephens, Ill. Brit. Ent. Haust. iv. p. 61 (1834).

Rœselia, Hübner, Verz. bek. Schmett. p. 397 (1827?).

This is a genus including several small species, with broad oval fore-wings, more or less rounded at the tip, and short rounded hind-wings, hardly broader than the fore-wings.

There are three tufts of raised scales on the wings; the palpi are long, drooping, and scaly, and ocelli are present. The larvæ are tufted, with only fourteen legs, and the pupa is enclosed in a boat-shaped cocoon.

The species of this genus more resemble small *Geometræ* or *Pyrales* than *Lithosiidæ*, and were frequently classed among the *Pyrales* until recently. Several species are found in England, most of them, except *N. cucullatella*, being rather rare with us. Two species are here mentioned.

THE SHORT CLOAKED MOTH. NOLA CUCULLATELLA.

Tinea cucullatella, Linnæus, Syst. Nat. (ed. x.) i. p. 537, no 258 (1758); id. Faun. Suec. p. 358 (1761).

Tinea ludwigella, Müller, Faun. Fridr. p. 58 (1764).
Noctua palliola, Denis & Schiffermüller, Syst. Verz. Schmett Wien. p. 69, no. 1 (1776).
Bombyx cucullatella, Esper, Schmett. iii. p. 388, pl. 77, figs. 4–9 (1786).
Pyralis palliolalis, Hübner, Eur. Schmett. vi. figs. 13, 149 (1793).
Hercyna palliolalis, Treitschke, Schmett. Eur. vii. p. 188 (1829).
Nola palliolalis, Duponchel, Lépid. France, viii. (2) p. 264, pl. 228, figs. 3, 4 (1831).
Nola cucullatella, Stephens, Ill. Brit. Ent. Haust. iv. p. 62 (1834); Kirby, Eur. Butterflies and Moths, p. 292 (1881); Buckler, Larvæ of Brit. Lepid. iii. pl. 43, fig. 3 (1889); Barrett, Lepid. Brit. Isl. ii. p. 183, pl. 65, figs. 1*a*, *b*.

Var. *Nola fuliginalis*.

Nola fuliginalis, Stephens, Ill. Brit. Ent. Haust. iv. p. 63 (1834).

This is a common European species. It expands about ¾ inch. It is ashy-grey, with the basal area of the fore-wings brown, bounded by a thick black curved line. The

The Short Cloaked Moth.

central area has a spot on the costa, from which springs a dark streak. In the outer area is a dark brown zig-zag transverse line, and the marginal area is varied with rust-colour. On the fringes may be seen a white zig zag line. The hind-wings are without markings.

The variety *N. fuliginalis* has the "wings smoky-bluish, with the base, and a very obscure central line, darker." (*Stephens.*)

The larva has fourteen legs, and a black head. The sides of the body are reddish-blue, with light brown tubercles and hairs. On the back is a rather broad, interrupted, white band, striped with slate-colour in the middle. It is darkest on segments 5, 7, 9, and 10, on which it takes the form of double crescents.

It feeds on sloe, white-thorn, mountain ash, &c.

The pupa is brown and thickened, depressed in the middle. It is enclosed in a silky cocoon.

THE SCARCE BLACK ARCHES. NOLA ÆRUGULA.

Phalæna ærugula, Hübner, Vögel u. Schmett. Taf. 61 (1792).
Pyralis centonalis, Hübner, Eur. Schmett. vi. fig. 15 (1796).
Hercyna centonalis, Treitschke, Schmett. Eur. vii. p. 193 (1829).
Nola centonalis, Duponchel, Lépid. France, viii. (2) p. 275, pl. 228, fig. 5 (1831); Kirby, Eur. Butterflies and Moths, p. 393 (1881); Buckler, Larvæ of Brit. Lepid. iii. p. 44, pl. 43, fig. 6 (1889); Barrett, Lepid. Brit. Isl. ii. p. 190, pl. 65, figs. 4. 4*a–d* (1894).
Nola ærugula, Kirby, Cat. Lepid. Heter. i. p. 374 (1892).

The Scarce Black Arches.

This little Moth is only found in Europe. It expands about ¾ inch. The fore-wings are glossy white, with three yellowish-

brown transverse lines, the two outer ones near together and parallel with the hind margin, the other nearer the base, with a sharp angle in its middle. On the costa is a small double streak of the same colour. The hind-wings are brownish-white. The head, antennæ, and body are white. It is a somewhat rare species in England.

Exotic Genera of Lithosiidæ.

The *Lithosiidæ* are a very numerous Family, and I cannot here attempt to do more than briefly notice a few of the more interesting and important foreign genera.

Josiodes, Felder, includes a number of Tropical American species, which are very much alike, and share a style of coloration which is frequently met with in various Families of Butterflies and Moths inhabiting the same countries. They generally measure rather less than 1½ inch across the fore-wings, which are much longer than the hind-wings, with the costa slightly curved, and the hind margin very obliquely rounded; the hind-wings are two-thirds as long as the fore-wings, but not broader, and the hind margin is rounded. The colours are black, with one or two tawny transverse bands or large blotches on the fore-wings, and sometimes one on the hind-wings also.

Bizone, Walker, is a very pretty and rather extensive genus of Moths, chiefly found in India and the adjacent countries, though not unrepresented in Africa, Madagascar, the Moluccas, &c. They generally measure from one to two inches in expanse. The fore-wings are oval, and not much longer than the hind-wings, which are almost equally broad. Most of the species can be recognised at a glance, for they have white fore-wings, with two transverse red lines in the middle, and the hind margin narrowly bordered with red; between the central lines is a conspicuous round black dot (sometimes more), and sometimes

there is an additional red stripe towards the base. The hind-wings are generally suffused with rosy.

There are also a great number of Indian Moths allied to *Miltochrista*, which are generally of a yellowish colour, or else stained with reddish, with black lines and markings on the fore-wings, generally transverse, zig-zag, or interlacing.

Among the largest and handsomest Moths of the whole Family we may reckon the species of the exclusively Indian genus *Macrobrochis*, Herrich-Schäffer. Their bodies are rather stout, and longer than the hind-wings. The head, front, and sides of thorax and anal tuft are orange; the abdomen is bluish-green, with transverse white bands. The fore-wings expand upwards of three inches, and are very long and rather pointed, with the hind-margin rather oblique; the hind-wings are much longer than broad, though broader than the fore-wings, and are likewise produced into a distinct point at the tip. The fore-wings are dark brown, with green and purplish reflections, and usually with numerous long white spots, arranged in two or three irregular and incomplete transverse rows; the hind-wings are white towards the base, and more or less broadly black or brown towards the hind-margin. They expand about three inches.

There are several American *Lithosiidæ* which are very like *Crambidæ* in shape and appearance, but are much larger. They are white, and in some species the fore-wings are traversed by a broad silvery streak. They belong to the genera *Macrocrambus*, Kirby, *Crambomorpha*, pt. Felder and Rogenhofer; *Crambidia*, Packard, &c.

Argina, Hübner, is a genus found in India and Africa, the species of which were formerly included in *Utetheisa*. They are of about the same size, but the fore-wings are rather broader and more rounded than in *Utetheisa*, and are deep orange, with pale yellow transverse bands, spotted with black on the

fore-wings, and an orange body and hind-wings, spotted with black. One or two of the Indian species are red instead of yellow.

Towards the end of the Family, there are several aberrant genera of small species, allied to *Nycteola* and *Nola*, which were originally described as *Tortrices*, &c.

FAMILY XVI. HYPSIDÆ.

Egg.—Not described.

Larva.—With several long slender hairs, hardly agglomerated into tufts, springing from each segment. They feed on different species of *Ficus*.

Pupa.—With the posterior segments rather short and slender; enclosed in a cocoon.

Imago.—Rather stout, the abdomen extending a little beyond the hind-wings. Antennæ simple, or slightly pectinated; proboscis rather long. Wings long and broad, the fore-wings rather longer than the hind-wings, with the costa curved towards the extremity, the apex more or less rounded off, and the hind-margin not very oblique. Hind-wings generally longer than broad, the hind-margin gradually curved; sub-costal nervure connected with the costal by a short cross-nervule about the middle of the cell. All the species provided with a stridulating apparatus.

This small Family is very characteristic of the Indo- and Austro-Malayan Regions, although represented by several species in Africa and its adjacent islands. The typical species have all much resemblance to one another, and can generally be referred to this Family at a glance. The body, and often more or less of the wings, which average about three inches in expanse, are of varying shades between yellow and orange, and spotted with black; more or less of the basal area, of the fore-wings especially, is often thus marked. The fore-wings are

usually light brown, longitudinally lined or streaked with white, and the hind-wings are white or yellow, spotted with black, and frequently bordered with black.

They have been divided into several genera; but all bear a strong family likeness to each other. They have been discussed by various authors, some of whom have regarded them as only a Sub-family of the *Lithosiidæ*; but they are usually treated as an independent Family.

GENUS HYPSA.

Hypsa, Hübner, Verz. bek. Schmett. p. 172 (1822 ?); Walker, List Lepid. Ins. Brit. Mus. ii. p. 444 (1854); Butler, Trans. Ent. Soc. Lond. 1875, p. 315; Meyrick, Proc. Linn. Soc. N. S. Wales (2) i. p. 766 (1886); Snellen, Tijdschr. Ent. xxxi. pp. 116, 122 (1888).

In this genus the antennæ are slightly pectinated in the male, and set with short bristles in the female. The third joint of the palpi is shorter than the second. The fore-wings are rather narrow, and somewhat obtuse at the tips, and usually mouse-coloured, with a white stripe running from the base, which is orange, spotted with black and white. The hind-wings are white, with a brown border, and the body is orange, spotted with black. This type is *H. silvandra* (Cramer) from the coast of Coromandel. I have figured an allied species, which was mistaken for the true *H. silvandra* by Walker.

HYPSA CLAVATA.

(*Plate LXXXIX. Fig.* 1.)

Hypsa silvandra (pt.), Walker (nec Cramer), List Lepid. Ins. Brit. Mus. ii. p. 450, no. 7 (1854).

Hypsa clavata, Butler, Trans. Ent. Soc. Lond. 1875, p. 317.

This species measures about 2¾ inches across the wings. The body is orange, spotted with black. The antennæ are

black, and the legs whitish. The fore-wings are mouse-colour, the base orange, spotted with black and white, and there is a broad white streak running from the base, widened externally, and the veins of the basal half of the wing are white. The hind-wings are white, with a broad mouse-coloured border, undulated on its inner edge; a large black spot at the end of the discoidal cell, and sometimes a small spot near the border opposite the cell, and an oblique dash towards the anal angle.

This is a widely distributed Moth, and is recorded from such distant localities as Hong Kong, Silhet, and Borneo.

GENUS CARYATIS.

Caryatis, Hübner, Verz. bek. Schmett. p. 171 (1822?); Walker, List Lepid. Ins. Brit. Mus. ii. p. 460 (1854).

Antennæ slender, setaceous. Proboscis rather long. Fore-wings rather long, narrow, and pointed at the tip; hind-wings rounded, hardly longer than broad, and not broader than the fore-wings. Body moderately stout, the abdomen extending a little beyond the hind-wings.

This is a small African genus, the type of which is here figured. It has been hitherto regarded as allied to the *Hypsidæ*, which it considerably resembles in general coloration, though the wings are longer and narrower; and Walker regarded it as a connecting link between the *Hypsidæ* and the *Lithosiidæ*. Dr. Jordan, however ("Novitates Zoologicæ," iii. p. 59), refers it to the *Arctiidæ* on account of the absence of the cross-nervule between the costal and sub-costal nervures of the hind-wings. Instead of this, the costal nervure is connected with the sub-costal at its base, and is thrown off from it at two-fifths of the length of the cell.

CARYATIS PHILETA.

(*Plate LXXXIX. Fig* 4.)

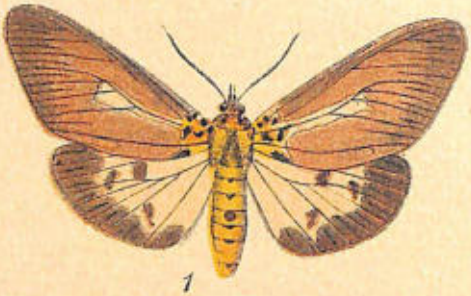
Noctua phileta, Drury, Ill. Ex. Ent. iii. pl 22, fig. 5 (1780).

Callimorpha phileta, Westwood, in Jardine's Nat. Library, Exot. Moths, p. 190, pl. 23, fig. 3 (1841).

This is a West African insect. It expands 2½ inches. Antennæ black; head and thorax deep red, the latter with several black spots and streaks. The fore-wings are black with a white band passing from beyond the middle of the costa to the hinder angle. The hind-wings are yellow, with a broad black band on the hind margin, narrowing towards the hinder angle, to which it does not extend. The abdomen is yellow, like the hind-wings, with black streaks. The legs are black, marked with white.

FAMILY XVII. CALLIDULIDÆ.

This is a small Family, of which the transformations have not yet been discovered, which is exclusively confined to the Indo- and Austro-Malayan Regions, only touching the Palæarctic Region in the debatable ground of Amurland and Japan. They are Moths of rather small size, seldom much exceeding an inch and a half in expanse, and have short slender bodies, and short and very broad fore-wings, frequently truncated at the end, and sometimes excavated on the hind margin. The hind-wings form an oval from the base, and have a separate costal and two sub-median nervures; the cell is open on the hind-wings. The antennæ are short and simple. The usual colour of the wings is brown, more or less tinged with reddish or yellowish, and with a pale transverse band, white, yellow, or red, on the fore-wings. The under side is yellowish, irrorated with black, and more or less varied with other colours. There is a patch of raised scales on the hind-wings of the male. The flight is diurnal, and the Moths have considerable resemblance to *Lemoniinæ*; and they were, in fact, generally regarded either as Butterflies or as *Geometræ*



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1. *Hypsa clavata.*
2. *Cyllopoda vesperlina.*
3. *Callidula petavia.*
4. *Caryatis phileta.*

by the older authors. Later writers have regarded them as *Castniidæ*, *Agaristidæ*, *Lithosiidæ*, or as forming a Family allied to the *Hypsidæ*, but Sir George Hampson places them between the *Hepialidæ* and the *Drepanulidæ*, with which latter Family he believes them to have some affinity. The Family has recently been monographed and well illustrated by Dr. Pagenstecher of Wiesbaden.

GENUS CALLIDULA

Callidula, Hübner, Verz. bek. Schmett. p. 66 (1816?); Pagenstecher, Jahrb. Nassau. Ver. xl. p. 229 (1887).

Datanga, Moore, Descr. Ind. Lep. Atkinson, p. 21 (1879); Pagenstecher, Jahrb. Nassau. Ver. xl. p. 235 (1887).

The genus *Callidula* includes a number of the smaller species of the Family, expanding an inch or a little over, with the fore-wings hardly longer than the hind-wings, the costa strongly arched at the base, and the tip and hind margin nearly rectangular; the hind margin is slightly convex, and the hind-wings are rounded, and hardly longer than broad. The wings are brown above, with an oblique yellow band on the fore-wings.

CALLIDULA PETAVIA.

(*Plate LXXXIX. Fig.* 3.)

Papilio petavius, Cramer, Pap. Exot. iv. pl. 365, figs. C, D (1782).

Polyommatus petavius, Godart, Encycl. Méth. ix. p. 676 (1823).

Callidula petavia, Pagenstecher, Jahrb. Nassau. Ver. xl. p. 230, pl. 3, figs. 3-6 (neuration) (1887).

There are several closely-allied forms found in the Eastern Islands, differing chiefly in the form and colour of the transverse band on the fore-wings, and in the mottling of the

under side. In the specimens from Amboina and Ceram, which agree best with Cramer's figure, there is only one white dot near the middle of the hind-wings beneath.

FAMILY XVIII. CYLLOPODIDÆ.

This is an exclusively American Family of rather small slender-bodied Moths, usually expanding under 1½ inch. They have long wings, and are generally black and yellow in varying proportions; or black with a red longitudinal stripe traversing each wing, as in *Josia*, Hübner, and its allies.

They were formerly classed as *Lithosiidæ*, or as forming part of a Family called *Chrysaugidæ*, the typical members of which are now removed to the *Pyrales*, while others formed part of an ill-defined Family called *Melameridæ*, some of which have now been ascertained, by the discovery of their metamorphoses, to be *Geometræ*. The antennæ are simple, or slightly pectinated in the males. These Moths fly by day.

GENUS CYLLOPODA.

Cyllopoda, Dalman, Anal. Ent. p. 102 (1823).

Chrysauge, Group 2, *Flavinia*, Walker, List Lepid. Ins. Brit Mus. ii. p. 369 (1854).

Chrysauge, Group 3, *Scaptia*, Walker, List Lepid. Ins. Brit. Mus. ii. p. 376 (1854).

These are slender-bodied black and yellow Moths, with long wings, and pectinated antennæ in the males. They greatly resemble Butterflies of the genus *Chamælimnas*, Felder, belonging to the *Lemoniidæ*, which are found in the same countries.

CYLLOPODA VESPERTINA.

(*Plate LXXXIX. Fig.* 2.)

Phalcidona vespertina, Walker, List Lepid. Ins. Brit. Mus. xxxi. p. 135 (1864).

Xanthyris osera, Boisduval, Lépid. Guat. p. 93 (1870).

This Moth comes from New Grenada. The expanse of the wings is 1½ inch, and the length of the body a little over half an inch.

"Male.—Black, slender. Palpi smooth, porrect, hardly extending beyond the head; third joint conical, not more than one-fourth of the length of the second. Antennæ very slightly pectinated. Thorax with a luteous mark on each side at the base of the fore-wing. Pectus luteous in front. Abdomen beneath and legs cinereous. Fore-wings with a broad luteous streak, which is near and parallel to the inferior border, and is very convex in front; a shorter and narrow oblique luteous streak, which is opposite to the inferior angle. Hind-wings with a broad luteous stripe, which extends along the inferior border and thence to the disk, and is much excavated in front." (*Walker.*)

FAMILY XIX. DIOPTIDÆ.

This is another Family entirely confined, like the last, to Tropical America. The species have generally a slender body and pectinated antennæ, at least in the male, and the wings are long, rather narrow, and rounded at the extremity, and they are usually more or less transparent, with opaque borders, and are deceptively similar in general appearance to various species of *Ithomiinæ*, among which they fly by day. These insects are specially interesting, because it was from Bates' observations of their habits, and their association with the *Ithomiinæ*, that he was led to propound the great theory of

Mimicry, which, though often misunderstood and exaggerated, has thrown a flood of light on many phenomena that sorely needed such an explanation. In brief, Bates observed that certain Butterflies were never molested by birds, and that other insects, either Moths or Butterflies belonging to other genera, and usually to other Families, which closely resembled these in colour, markings, and habits, apparently shared in their immunity from attack. He therefore concluded that in the course of generations (we do not say ages, for in the case of insects, which are probably more plastic, and also much more short-lived than higher animals, a very long period might not be required) the colours of the unprotected insects have gradually become assimilated to those of the protected ones, by the constant weeding out of those which did not sufficiently resemble them. This may be taken as a brief outline of the theory of mimicry as applied to the resemblance of an unprotected to a protected insect; but there are probably many instances of pseudo-mimicry in which neither species gains any direct advantage from its resemblance to another. In such cases the resemblance may be due solely to the influence of similar surrounding conditions or of habits.

The transformations of the *Dioptidæ* are at present unknown.

GENUS LAURON.

Dioptis, Group 11, *Lauron*, Walker, List Lepid. Ins. Brit. Mus. ii. p. 333 (1854).

Laurona, Walker, List Lepid. Ins. Brit. Mus. xxxi. p. 148 (1864).

In this genus the antennæ are pectinated, the legs slender, and the abdomen moderately long and slender. The Moths resemble small *Ithomiinæ*, and the wings are generally more or less transparent.

LAURON RUFILINEA.

(*Plate XC. Fig.* 1.)

Laurona rufilinea, Walker, List Lepid. Ins. Brit. Mus. xxxi. p. 148 (1864).

The species which we have figured comes from Ega, in the Upper Amazon district.

The expanse of the wings is about two inches.

"**Female.**—Black. Head whitish about the eyes. Palpi smooth, slender, porrect, extending somewhat beyond the head; third joint lanceolate, about half the length of the second. Antennæ serrated. Pectus whitish, ochraceous on each side. Abdomen extending rather beyond the hind-wings; upper side whitish, with a brown stripe. Legs whitish beneath. Fore-wings with a sub-marginal ochreous line, which extends along the costa, and along the interior border, and is sometimes nearly obsolete along the costa, and sometimes represented by some speckles along the exterior border; a broad oblique white streak in the disk beyond the interior angle." (*Walker.*)

FAMILY XX. NYCTEMERIDÆ.

Eggs.—Not described.

Larva.—Rather long and cylindrical, with tufts of fine hair.

Pupa.—Enclosed in a slight cocoon.

Imago.—With pectinated antennæ in the males, and rather short and broad fore-wings, with one sub-median nervure, and the discoidal cell not divided.

This is another Tropical Family, usually with pectinated antennæ in the males, moderately slender bodies, and large wings. They expand two or three inches, and the fore-wings are not much longer than the hind-wings. On the fore-wings, there is

a long pre-discoidal cell, formed by a cross-nervule between the second and third branches of the sub-median nervure; and on the hind-wings the costal nervure is united with the sub-costal for a short distance from the base. The Moths fly by day, and are numerous in the Indo- and Austro-Malayan regions, and in Africa, and are also represented in Tropical America.

GENUS ALETIS.

Aletis, Hübner, Verz. bek. Schmett. p. 179 (1822?); Walker, List Lepid. Ins. Brit. Mus. ii. p. 353 (1854).

The body is linear, cylindrical, rather long, moderately thick and spotted with white. The palpi are three-jointed, and shorter than the head, the second and third joints being nearly equal in length. The antennæ, which are simple in both sexes, are set with minute bristles on the under surface. The abdomen does not extend beyond the hind-wings. Legs very slender; hind tibia with two small apical spurs. Wings long, rather broad, with white spots on the borders.

There are several closely-allied handsome species of this genus in different parts of Africa. In their general style of colouring they resemble various other African Butterflies and Moths, belonging to the genera *Euphædra*, Hübner, *Xanthospilopteryx*, Wallengren, &c.

ALETIS DRURYI.

(*Plate XC. Fig.* 2.)

Noctua helcita, Drury (nec Clerck), Ill. Exot. Ent. iii. pl. 29, fig. 4 (1780).

Callimorpha helcita, Westwood, in Jardine's Nat. Libr. Exot. Moths, p. 189, pl. 23, fig. 2 (1841).

Aletis druryi, Butler, Proc. Zool. Soc. Lond. 1878, p. 386.

This species is a common West African Moth, and is closely allied to *A. helcita*, Clerck, the type of the genus.

The head is black. The thorax and abdomen are black, with three rows of white spots, one on the back and one on each side. The fore-wings are of a beautiful deep red, the whole of the posterior part beyond the middle black, with a curved row of white spots, which are largest near the costa and smallest towards the hinder angle. The hind-wings are of the same colour as the fore-wings, with a broad black border containing eight oval white spots. The antennæ are black, and the palpi yellow.

The Moth expands about 3½ inches. Like most other African insects, it used to be extremely rare in collections. Drury obtained his specimen from Mr. Smeathman, who supplied him with many insects from Sierra Leone, and likewise with much information on their habits. He states that *A. druryi* is found in the savannahs, and is a sluggish insect, easily taken.

GENUS NYCTEMERA.

Nyctemera, Hübner, Verz. bek. Schmett. p. 178 (1822?); Walker, List Lepid. Ins. Brit. Mus. ii. p. 391 (1854); Meyrick, Proc. Linn. Soc. N. S. W. (2) i. p. 759 (1886).

Leptosoma, Boisduval, Voy. Astrolabe, Lépid. p. 197 (1832).

The typical species of *Nyctemera* and its allies are nearly all very similar, being white, variously spotted or bordered with brown. They measure about two inches in expanse, and are confined to the tropics of the Old World. Though very numerous, most of the species have a strong family likeness, and can easily be recognised as belonging to this group.

NYCTEMERA CRESCENS.

(*Plate XC. Fig.* 3.)

Nyctemera crescens, Walker, List Lepid. Ins. Brit. Mus. xxxi. p. 204 (1864); Meyrick, Proc. Linn. Soc. N. S. Wales (2) i. p. 761 (1886).

This species is found in Queensland. It expands one inch. "Male.—Blackish-brown. Head luteous about the eyes and beneath. Palpi luteous towards the base. Antennæ moderately pectinated. Thorax with the four tegulæ and the scutellum whitish-bordered. Pectus luteous, with some black spots. Abdomen with a white band on the hind border of each segment; a white stripe on each side of the first segment; bands of the sixth and seventh segments and apical tuft, luteous; underside luteous, with four rows of blackish-brown spots, which successively decrease in size towards the tip. Femora pale luteous beneath. Fore-wings with the veins white towards the base, and with a securiform white streak which extends from the base, and at its tip occupies the whole space between the median vein and the sub-median vein; a broad irregular exterior white band, which is slightly abbreviated at each end, and is much notched on its inner side; interior border white for nearly two-thirds of its length from the base. Hind-wings white, with a broad brown border, which is undulating on its inner side." (*Walker.*)

FAMILY XXI. PTEROTHYSANIDÆ.

Sir George Hampson has established this Family ("Moths of India," i. p. 431) for the genus *Pterothysanus*, Walker, which includes a few very remarkable East Indian species. They agree with the *Nyctemeridæ* in their slender bodies and large wings, the fore-wings being hardly longer than the hind-wings. The antennæ are simple, the abdomen is tufted at the extremity,

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1. *Lauron rufilinea.*
2. *Aletis druryi.*
3. *Nyctemera crescens.*

and the flight is diurnal. There is no prediscoidal cell on the fore-wings, the cross-nervure so characteristic of the *Nyctemeridæ* being absent, and on the hind-wings, the costal nervure is completely detached from the sub-costal, though closely approximating to it. But what distinguishes this genus from almost all others is the immensely long fringe of hair on the hind-wings, all along the inner margin, and the lower half of the hind margin, almost as long as the breadth of the wing at its narrowest part, and filling up the whole space between the wing and the abdomen. The type, *Pterothysanus laticilia*, Walker, is not uncommon in Northern India, and measures from 2½ to 3 inches across the wings. The head and collar are bright red, the thorax black, the abdomen yellowish, with black spots, the fore-wings black, with several irregular rows of large white spots, and the hind-wings white, with two transverse bands, and most of the hind margin black.

FAMILY XXII. LIPARIDÆ.

Eggs.—Generally laid in batches, and covered with down from the body of the female.

Larva.—Usually with projecting tufts of short and stiff, or long and soft, hair; feeding, as a rule, on trees.

Pupa.—Enclosed in a cocoon.

Imago.—Usually with strongly pectinated antennæ, at least in the males; body sometimes slender in the males, but generally short, stout, and tufted at the extremity in the females; wings ample; flight diurnal in the males of many species; females sometimes apterous. Many species which fly at dusk or at night may be found resting on the trunks of trees in the daytime. The proboscis is short or obsolete, but the frenulum is well marked, as is usually the case in strongly-

flying Moths. The discoidal cells are closed, and the hind-wings are provided with two sub-median nervures, while the costal and sub-costal nervures are frequently connected by a short cross-nervule near the base.

This is a very numerous Family, most of the species being either white or yellow, with black markings. Or they may be brown, and occasionally they are marked with red. To this Family belong several of our commonest and best-known Moths, such as the Vapourer Moth, the Brown- and Gold-Tail Moths, &c., and many of them are very destructive to the plants on which they feed. Some of the exotic genera, such as the American genus *Eloria* of Walker, and the African genus *Cypra*, Boisduval, have extremely delicate, gauzy, and sometimes almost transparent, wings. Apart from the genera with apterous females, the dissimilarity of the sexes, both in form, colour, and habits, is very great in some genera, while in others the sexes differ comparatively little, but the female is nearly always a much stouter-bodied insect than the male of the same species.

GENUS EUPROCTIS.

Euproctis, Hübner, Verz. bek. Schmett. p. 159 (1822?); Butler, Ill. Lepid. Heter. Brit. Mus. v. p. 50 (1880); Moore, Lepid. Ceylon, ii. p. 89 (1883).

This genus may be taken as typical of a very extensive series of Moths (most numerous in the Old World), of comparatively small size and white colour (more or less smoky on the under surface), with one or two conspicuous black spots or markings. The antennæ are strongly pectinated in the males, and the females have a large tuft of wool at the end of the abdomen. The Brown-Tail Moth (*E. chrysorrhœa*) and a still more abundant allied species, the Gold-Tail Moth, *Leucoma similis* (Fuessly), may often be seen at dusk, resting in the

hedges, which their larvæ have half stripped of their leaves. Our other white *Liparidæ* are larger and less common.

THE BROWN-TAIL MOTH. EUPROCTIS CHRYSORRHŒA.

Bombyx chrysorrhœa, Linn. Syst. Nat. (ed. x.), i. p. 502, no. 28 (1758); id. Faun. Suec. p. 299 (1761); Hübner, Eur. Schmett. iii. figs. 67, 248, 249 (1800 ?); Godart, Lépid. France, iv. p. 273, pl. 27, fig. 3 (1822).

Bombyx auriflua, Esper, Schmett. iii. p. 207, Taf. 39, fig. 6 (1785).

Bombyx phæorrhœa, Donovan, Brit. Ins. x. pl. 555 (1801).

Liparis chrysorrhœa, Ochsenheimer, Schmett. Eur. iii. p. 202 (1810).

Porthesia auriflua, Stephens, Ill. Brit. Ent. Haust. ii. p. 66 (1828).

The Brown-Tail Moth.

Porthesia chrysorrhœa, Kirby, Eur. Butterflies and Moths, p. 111, pl. 25, fig. 4 (1879); Buckler, Larvæ of Brit. Lepid. iii. pl. 40, fig. 1 (1889); Barrett, Lepid. Brit. Isl. ii. p. 292, pl. 78, fig. 2, 2*a*–*c* (1894).

Euproctis chrysorrhœa, Kirby, Cat. Lepid. Heter. i. p. 442 (1892).

The Brown-Tail Moth is found throughout Europe, North Africa, and Asia Minor. It expands from 1¼ to 1½ inch. It is white, sometimes with a dark spot near the hinder angle of the fore-wings in the male. The abdomen ends in a tuft of

long hairs, brownish in the male, rust-coloured in the female. These the female uses as a covering for her eggs, which are laid in a cluster.

The larvæ hibernate in companies in a common grey web, but disperse after the first moults. The full-grown larva is greyish black, with light brown hairs and two reddish-brown lines on the back. On the fifth and terminal segments is a black wart-like elevation, and on both sides of the back is a white stripe. It feeds on various kinds of fruit trees as well as on oak, blackthorn, &c.

GENUS OCNERIA.

Ocneria, Hübner, Verz. bek. Schmett. p. 158 (1822?); Walker, List Lepid. Ins. Brit. Mus. iv. p. 789 (1855).

This is a South European genus, the type of which is easily distinguished from any of the British *Liparidæ* by its pale reddish colours. The antennæ are strongly pectinated in the male, in which, too, the body is much less stout than in the female; the legs are very slender, and not tufted, as in most of the other *Liparidæ*, and the wings are rather narrow, more of the shape that we observe in some of the smaller *Lasiocampidæ*.

OCNERIA RUBEA.

(*Plate XCI. Fig.* 1.)

Bombyx rubea, Fabricius, Mant. Ins. ii. p. 117, no. 107 (1787); Hübner, Beitr. Schmett. ii. (2) p. 50, Taf. 32 (1790); id. Eur. Schmett. ii. figs. 60, 61, 240 (1800?); Esper, Schmett. iii. (2) p. 53, Taf. 89, fig. 3 (1807).

Liparis rubea, Ochsenheimer, Schmett. Eur. iii. p. 190 (1810).

Ocneria rubea, Herrich-Schäffer, Schmett. Eur. ii. p. 136, fig. 89 (1844); Kirby, Eur. Butterflies and Moths, p. 119 (1879).

This rather scarce species expands an inch or a little more. The fore-wings are reddish-grey with a double dark transverse line near the base, and a whitish central spot, edged with darker. The hind-wings are dull rosy-red with a blackish central shade, bordered externally by an interrupted black line. In the female the scaling is less dense, the markings less distinct, and the colour redder.

The larva hibernates when half-grown, and is fully grown in May. It is yellow, suffused with brown on the back, and has two irregular blackish stripes on the sides of the back, containing a distinct black dot at the commencement of each segment. There are, moreover, twelve rows of tubercles on the body, set with grey and blackish hair. The head is reddish-brown.

It feeds on low oaks (*Quercus robur* and *Q. ilex*), remaining hidden under the fallen leaves by day, and emerging only at night to take food.

The pupa is light brown, with tufts of yellow hair.

This species has been reputed British, but without any reliable authority, and as it is a South European insect, it is not at all likely to occur with us. Many of the older English writers appear to have indicated species as British in the most careless and haphazard manner. Most of these, however, were practically eliminated by Stephens, though since his time, entomologists have erred in the opposite direction, and struck out many species of the occurrence of which in England there is little reasonable doubt. Indeed, several of them have since been reinstated in our lists.

GENUS PORTHETRIA.

Liparis, Ochsenheimer, Schmett. Eur. iii. p. 186 (1810).
Porthetria, Hübner, Verz. bek. Schmett. p. 160 (1822 ?).
Hypogymna, Stephens, Ill. Brit. Ent. Haust. ii. p. 55 (1828).

Antennæ strongly pectinated in the male, which is slender-bodied, and flies by day; slightly pectinated in the female, which is much larger and stouter than the male, and has a large tuft at the extremity of the abdomen; it rests on hedges or tree-trunks by day. The basal joint of the palpi is small, and the third joint obtuse.

There is but one European species; but several allied species are found in India, Japan, &c.

THE GIPSY MOTH. PORTHETRIA DISPAR.

Bombyx dispar, Linnæus, Syst. Nat. (ed. x.) i. p. 501, no 27 (1758); Esper, Schmett. iii. p. 197, Taf. 38 (1785); Hübner, Eur. Schmett. iii. figs. 75, 76, 263 (1800?); Godart, Lépid. France, iv. p. 256, pl. 25, figs. 1, 2 (1822).

Liparis dispar, Ochsenheimer, Schmett. Eur. iii. p. 195 (1810).

Hypogymna dispar, Stephens, Ill. Brit. Ent. Haust. ii. p. 56 (1828); Buckler, Larvæ of Brit. Lepid. iii. pl. 37, fig. 6 (1889); Barrett, Lepid. Brit. Isl. ii. p. 303, pl. 79, figs. 2, 2*a-e* (1894).

Ocneria dispar, Kirby, Eur. Butterflies and Moths, p. 110, pl. 25, fig. 2, *a-c* (1879).

Porthetria dispar, Kirby, Cat. Lepid. Heter. i. p. 475 (1892).

The Gipsy Moth has a wide range, extending throughout Europe as well as Northern and Western Asia. It expands from 1½ to 2½ inches, the male being much smaller than the female.

The male is generally dark brown or smoky-black, though the colour varies considerably and light greyish-brown specimens may sometimes be met with. The hind-wings are somewhat lighter than the fore-wings, with a dark margin. The female is greyish-white with black antennæ. In both sexes the fore-wings are crossed by dark zig-zag transverse lines, and

have a dusky black lunule and costal spots. The hind-wings of the female have a faint sub-marginal line.

The larva is brown or ashy-grey with three fine yellow lines or a broad dark brown stripe on the back. The anterior segments are blue, and the red tubercles thickly covered with hair. The head is very large and yellowish-grey, with two

Gipsy Moth ♂.

Gipsy Moth ♀.

brown spots. It feeds on various fruit trees, as well as on poplar, willow, oak, rose, &c.

The pupa is dark brown with yellowish tufts of hair, and is placed in a web between leaves or in the chinks of bark.

The eggs are deposited on tree-trunks, palings, &c., and are covered with down from the abdomen of the female.

This species is most abundant and destructive on the Continent, the males flying everywhere about bushes and hedges, in

the manner of *Notolophus antiquus*, and the females are almost equally abundant and conspicuous at rest. It has also lately been introduced into North America, where it has proved quite as destructive. Very fine and large specimens used to be common in the fens of Cambridgeshire and Huntingdonshire before they were drained; but otherwise the Moth seems to have always been rare in England. Some of the writers of the last century say that it was introduced into the orchards at Chiswick, where, however, it soon seems to have died out; Stephens says that it has occasionally been taken at Coombe Wood; and Stainton mentions Halton in Buckinghamshire, and Stowmarket as localities. It is now considered to be almost, if not quite, extinct as a British insect, though a degenerate breed derived from an original British stock is, or was till recently, kept up among entomologists. It is curious that two British species, both named *dispar* from the dissimilarity of the sexes, one a Butterfly and the other a Moth, should both have become practically extinct in England through the draining of the fens.

GENUS LYMANTRIA.

Lymantria, Hübner, Verz. bek. Schmett. p. 160 (1822?); Walker, List Lepid. Ins. Brit. Mus. iv. p. 870 (1855); Moore, Lepid. Ceylon, ii. p. 99 (1883).

Psilura, Stephens, Ill. Brit. Ent. Haust. ii. p. 57 (1828); Rambur, Cat. Lépid. de l'Andalusie, p. 276 (1866).

This genus is very similar to the last, but the first joint of the palpi is nearly half as long as the second, and the third is acute. The sexes are nearly similar, and the male does not fly by day. The female has a pointed abdomen, and a short but conspicuous ovipositor.

There are several Indian species of this genus closely resembling *L. monacha*, some of which have the wings spotted

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1. *Ocneria rubea*.
2. *Lymantria monacha* ♂
3. " " ♀
4. *Dasychira netrix*.
5. " " larva.
6. *Heterogynis paradoxa*.

and suffused with red or orange, and the body red, with black spots. Some of these are of considerable size, expanding four or five inches across the wings.

THE BLACK ARCHES. LYMANTRIA MONACHA.

(*Plate XCI. Fig.* 2 (*male*), 3 (*female*).)

Bombyx monacha, Linnæus, Syst. Nat. (ed. x.) i. p. 501, no. 26 (1758); id. Faun. Suec. p. 300 (1761); Esper, Schmett. iii. p. 192, Taf. 37, figs. 1–6 (1785); Hübner, Eur. Schmett. iii. fig. 74 (1800 ?); Godart, Lépid. France, iv. p. 259, pl. 25, figs. 3, 4 (1822).

Liparis monacha, Ochsenheimer, Schmett. Eur. iii. p. 192 (1810).

Psilura monacha, Stephens, Ill. Brit. Ent. Haust. ii. p. 57 (1828); Buckler, Larvæ of Brit. Lepid. iii. pl. 37, fig 5 (1889); Barrett, Lepid. Brit. Isl. ii. p. 309, pl. 80 (1894).

Ocneria monacha, Kirby, Eur. Butterflies and Moths, p. 110, pl. 25, fig. 3 (1879).

Lymantria monacha, Kirby, Cat. Lepid. Heter. i. p. 477 (1892).

The Black Arches is found in most parts of Europe. The male generally expands from 1¼ to 1½ inch, and the female about two inches. Both sexes vary considerably, but the following description will apply to the majority of specimens:—Fore-wings greyish-white, with numerous black spots, and four confused zig-zag transverse lines of the same colour. The hind-wings are brownish-grey, sometimes white towards the hind margin; the fringe always white spotted at regular intervals with black. The thorax is white with black spots, and the abdomen is rose-red behind, with the incisions and series of spots black, that of the female ending in a yellow ovipositor.

The larva is brownish-green, or a mixture of light grey and black, and occasionally quite black. It has a number of tubercles,

bearing blue and red hairs, and on the third segment is a velvety-black spot, concave in front, and edged with bluish behind, and white on the sides. The three terminal segments are spotted with black, and the sides are of a lighter colour. The head is large, light brown, with two projecting black tufts of hair. It feeds on fir, oak, apple, &c., and is often very destructive on the Continent, though it is far from generally abundant in England. In Germany, where it is one of the worst pests in the pine-forests, the Moth is often called the Nun, the translation of the Latin name of the insect.

GENUS DASYCHIRA.

Dasychira, Hübner, Tentamen, p. 1 (1810?); Stephens, Ill. Brit. Ent. Haust. ii. p. 58 (1828); Walker, List Lepid. Ins. Brit. Mus. iv. p. 861 (1855).

In this genus, the type of which is one of our largest *Liparidæ*, the body is stout, and the antennæ strongly pectinated in the male, and the wings long, the hind-wings being oval, with the lower part of the hind margin waved. The wings are grey, or whitish; with darker markings, and the sexes are less dissimilar than in many species of this Family.

THE PALE TUSSOCK. DASYCHIRA PUDIBUNDA.

Bombyx pudibunda, Linnæus, Syst. Nat. (ed. x.) i. p. 503, no. 35 (1758); id. Faun. Suec. p. 396 (1761); Esper, Schmett. iii. p. 271, Taf. 54 (1785); Godart, Lépid. France, iv. p. 239, pl. 22, figs. 2, 3 (1822).

Geometra scopularia, Linnæus, Syst. Nat. (ed. x) i. p. 521, no. 144 (1758); Clerck, Icones, pl. 5, fig. 8 (1759).

Bombyx juglandis, Hübner, Eur. Schmett. iii. figs 84, 85 (1800?).

Orgyia pudibunda, Ochsenheimer, Schmett. Eur. iii p. 209 (1810).

Dasychira pudibunda, Stephens, Ill. Brit. Ent. Haust. ii. p. 59 (1828); Kirby, Eur. Butterflies and Moths, p. 109, pl. 24, figs. 5, *a–c* (1879); Buckler, Larvæ of Brit. Lepid. iii. pl. 38, fig. 2 (1889); Barrett, Lepid. Brit. Isl. ii. p. 316, pl. 81, figs. 2, 2*a–e* (1894).

The Pale Tussock is common in most parts of Europe. It expands from 1¾ to 2¾ inches.

The antennæ are brownish-yellow, finely dentated in the female. The fore-wings are whitish-grey, lightly dusted with blackish, and shaded with a dark brown central lunule and three waved transverse lines of the same colour. The hind-wings are whitish, with an indistinct dark grey central spot and a similar spot at the anal angle.

The Pale Tussock.

The female is larger than the male, with paler fore-wings, fewer markings, and not so heavily dusted with darker colour. The hind-wings are whiter, with the spots less distinct.

The larva is hairy, greenish yellow, with velvety-black incisions, and four yellow tufts of hair on the back, and a single rose-coloured one on the last segment.

The colour of the hair varies from rosy to reddish-brown.

It feeds on oak, beech, hazel, birch, lime, willow, poplar, walnut, and all kinds of fruit-trees. In hop-gardens it is called the Hop-Dog.

The cocoon is yellowish, and is mixed with the hairs of the larva. The pupa is dark brown, reddish-brown behind, with yellow tufts of hair. The insect passes the winter in the pupa, and the Moth emerges in the following spring.

DASYCHIRA (?) NETRIX.

(*Plate XCI. Fig.* 4 (*imago*), 5 (*larva*).)

Bombyx netrix, Cramer, Pap. Exot. iv. pl. 307, fig. B (1780); Stoll, Suppl. Cram. pl. 24, figs. 2, 2*c*, *d* (transf.) (1790).

This Moth is a native of Surinam, and measures about two inches in expanse. The body is orange-tawny, and the antennæ are short and pectinated. The wings are broad, rounded at the extremities, and not very long; the fore-wings are white, with four transverse orange-tawny bands, the last marginal, with a short streak of the same colour at the end of the cell between the first and second bands. Hind-wings white, with two narrow orange-tawny stripes about the middle.

The larva is yellow, with longitudinal black lines, and tufts of long black hairs, knobbed at the extremity, of which there are two pairs near the head, and one pair near the tail. The other hairs are long and simple, and there is a row of white silky brushes of hair on the back. It feeds on the pine-apple. The cocoon is white, and the silk is drawn out into a point at both ends.

GENUS DEMAS.

Colocasia, Ochsenheimer, Schmett. Eur. iv. p. 63 (1816); Hübner, Verz. bek. Schmett. p. 201 (1822 ?); Walker, List Lepid. Ins. Brit. Mus. v. p. 1059 (1855).

Demas, Stephens, Ill. Brit. Ent. Haust. ii. p. 59 (1828).

The type of this genus has short hairy palpi, long and slightly bipectinated antennæ, and a crested thorax, the abdomen tufted and crested, and the legs very pilose. One or two North

American species are also included in this genus, which is of somewhat doubtful position, having been referred by different authors to the *Notodontidæ*, *Lasiocampidæ*, or *Noctuæ*, as well as to the *Liparidæ*. The name *Colocasia* is properly rejected by Stephens on account of its having been previously used in Botany.

THE NUT-TREE TUSSOCK. DEMAS CORYLI.

Bombyx coryli, Linnæus, Syst. Nat. (ed. x.) i. p. 503, no. 33 (1758); id. Faun. Suec. p. 333 (1761); Esper, Schmett. iii. p. 252, Taf. 50, figs. 1–5 (1785).

Noctua coryli, Hübner, Eur. Schmett. iv. figs. 17, 18 (1799); Duponchel, Lépid. France, vi. p. 180, pl. 84, fig. 6 (1826).

The Nut-Tree Tussock.

Demas coryli, Stephens, Ill. Brit. Ent. Haust. ii. p. 60 (1828); Kirby, Eur. Butterflies and Moths, p. 147 (1880); Buckler, Larvæ of Brit. Lepid. iii. pl. 38, fig. 3 (1889); Barrett, Lepid. Brit. Isl. ii. p. 323, pl. 82, figs. 2, 2*a–d* (1895).

Orgyia coryli, Treitschke, Schmett. Eur. x. (i) p. 178 (1834).

The Nut-Tree Tussock is found throughout the greater part of Europe. It expands from 1¼ to 1½ inch. It is a reddish-brown Moth, with the outer half of the fore-wings ashy-grey. There are several black zig-zag transverse lines, an orbicular stigma enclosed in a black ring, and a reniform stigma, which is bounded with black towards the base. The hind-wings are pale brown without any markings.

The full-grown larva is light reddish-brown or pale flesh-

colour, with a black-edged spot on the back of the second segment, and a dark brown dorsal line, often more or less broken. The whole of the body is covered with fine hairs, and there are long tufts on the back of the fifth and sixth segments, on each side of the head, and on the last segment.

It feeds on hazel, lime, beech, and oak, but is not one of our commonest species, though it is not exactly rare.

GENUS NOTOLOPHUS.

Orgyia (pt.), Ochsenheimer, Schmett. Eur. iii. p. 208 (1810); Stephens, Ill. Brit. Ent. Haust. ii. p. 60 (1828); Walker, List Lepid. Ins. Brit. Mus. iii. p. 780 (1855).

Notolophus, Germar, Syst. Gloss. Prodr. p. 35 (1812).

Gynæphora (partim), Hübner, Verz. bek. Schmett. p. 161 (1822?).

Micropterogyna, Rambur, Cat. Lépid. de l'Andalusie, p. 281, note (1866).

This genus differs from the majority of the Family by the rudimentary wings of the stout-bodied females. The males are brown or orange, with short, pectinated antennæ, and broad wings, the fore-wings being almost triangular. They fly about in the daytime, and the larvæ feed on trees. They are numerous in South Europe; in Britain we have only two very similar and rather dull-coloured species.

THE VAPOURER MOTH. NOTOLOPHUS ANTIQUUS.

Bombyx antiqua, Linnæus, Syst. Nat. (ed. x.) i. p. 503, no. 37 (1758); id. Faun. Suec. p. 297 (1761); Esper, Schmett. iii. p. 278, Taf. 56, figs. 1–5 (1786); Godart, Lépid. France, iv. p. 253, pl. 24, figs. 1, 2 (1822).

Orgyia antiqua, Ochsenheimer, Schmett. Eur. iii. p. 221 (1810); Stephens, Ill. Brit. Ent. Haust. ii. p. 61 (1828);

Kirby, Eur. Butterflies and Moths, p. 108, pl. 24, figs. 2, *a–c* (1879); Buckler, Larvæ of Brit. Lepid. iii. p. 11, pl. 39, fig. 1 (1889); Barrett, Lepid. Brit. Isl. ii. p. 329, pl. 83, figs. 2, *2a–f* (1895).

Orgyia nova, Fitch, Rep. Ins. New York, viii. p. 193 (1865).

Orgyia badia, H. Edwards, Proc. California Acad. v. p. 188 (1874).

Notolophus antiquus, Kirby, Cat. Lepid. Heter. i. p. 493 (1892).

The Vapourer Moth has a very wide range, being not only found in Europe and North and West Asia, but also in North America. It is abundant even in London, and may often be seen flying in the streets wherever there are any trees near.

The Vapourer Moth ♂ and ♀

It expands from ¾ to 1½ inch. This is one of those interesting Moths in which the females are wingless, and is the best known example of this peculiarity occurring in Britain.

The male is bright chestnut-brown, with a white crescentric spot in front of the hinder angle of the fore-wings, and a few dark transverse markings. The hind-wings are without markings. The female has a stout body covered with down, and has only small projections, representing rudiments of wings.

The larva is ashy-grey, with fine reddish-yellow and white longitudinal lines, and tubercles covered with yellowish hair; behind the head are reddish-yellow spots arranged in a transverse row, and two black tufts of hair. There is also a tuft on

each side of the fifth segment, and another erect tuft on the last. On the back are four pairs of yellow tufts, shorter than the others. It feeds on most trees and shrubs growing in woods and gardens, even on the poisonous Cherry Laurel (or laurel, as it is generally called in England), which very few insects will touch. The cocoon is egg-shaped and yellowish-grey, and the pupa is yellow with dark brown wing-cases and brownish hairs.

When the female emerges she crawls about on the cocoon, but never travels farther, laying her eggs upon it. Newman says: "It is a very curious thing, and I believe hitherto unobserved, and therefore unpublished, that these eggs do not hatch all together like those of Moths in general, but come out a few at a time, over a period of ten weeks, so that the caterpillar, chrysalis, and Moths are all found together throughout the summer and autumn."

FAMILY XXIII. HETEROGYNIDÆ.

Eggs.—Deposited in the pupa-case.

Larva.—Short, slightly pubescent, onisciform.

Pupa.—Enclosed in a loose cocoon.

Imago.—Of small size, the male diurnal, with long sub-triangular fore-wings, rounded off at the edges; the hind-wings are oval, with the hind-margin rounded. The antennæ are pectinated; the proboscis is short, and the body is hairy. Ocelli absent; frenulum present. Female smooth, vermiform. There is but one genus, which resembles the *Adscitinæ* in shape, and the *Psychidæ* in appearance and habits.

GENUS HETEROGYNIS.

Heterogynis, Rambur, Ann. Soc. Ent. France, v. p. 584 (1836); id. Cat. Lépid. de l'Andalusie, p. 316 (1866).

This genus includes only a few South European species. The males are of dull uniform colours, and are clothed with fine down, or hair-like scales, which leave the wings slightly transparent. The female is apterous, and much resembles the larva; she quits the case to pair, but returns to it afterwards to deposit her eggs.

HETEROGYNIS PARADOXA.

(*Plate XCI. Fig.* 6.)

Bombyx paradoxa, Hübner, Eur. Schmett. iii. fig. 99 (1800?).
Tinea penella, Hübner, Eur. Schmett. viii. fig. 447 (1818).
Heterogynis hispana, Rambur, Ann. Soc. Ent. France, v. p. 586 (1836).
Heterogynis pennella, Duponchel, Lépid. France, Suppl. iv. p. 75, pl. 50. fig. 14 (1842).
Heterogynis erotica, Graslin, Ann. Soc. Ent. France (2) viii. p. 396, pl. 10, figs. 4–7 (1850).
Heterogynis penella, Bruand, Mon. Psych. p. 29, no. 11, pl. 1, fig. 11 (1852).
Heterogynis padella, Chenu, Encycl. Pap. i. p. 244, figs. 420–423 (1857).
Heterogynis dubia, Schmidt, Verh. zool.-bot. Ges. Wien. x. p. 659 (1860).
Heterogynis paradoxa, Kirby, Eur. Butterflies and Moths, p. 116 (1879).

This plain little South European Moth expands nearly an inch. The male has a brownish-black body, and unicolorous, slightly transparent, smoky-black wings. The antennæ have the pectinations becoming shorter towards the extremity.

The female, which is wingless, bears some resemblance to a larva. It is pale greenish-yellow with a black band. It holds its body turned up like an S. The head is black and horny, and the legs are also black, and rudimentary.

each side of the fifth segment, and another erect tuft on the last. On the back are four pairs of yellow tufts, shorter than the others. It feeds on most trees and shrubs growing in woods and gardens, even on the poisonous Cherry Laurel (or laurel, as it is generally called in England), which very few insects will touch. The cocoon is egg-shaped and yellowish-grey, and the pupa is yellow with dark brown wing-cases and brownish hairs.

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Heterogynis penella, Bruand, Mon. Psych. p. 29, no. 11, pl. 1, fig. 11 (1852).
Heterogynis padella, Chenu, Encycl. Pap. i. p. 244, figs. 420–423 (1857).
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The female, which is wingless, bears some resemblance to a larva. It is pale greenish-yellow with a black band. It holds its body turned up like an S. The head is black and horny, and the legs are also black, and rudimentary.

The larva is cylindrical, slightly tapering towards the extremities. It is of a greyish sulphur-yellow, with the second and last segments whitish-grey, with a dorsal band. The head is small and black, and is often hidden by the first segment. It feeds on various species of broom.

The cocoon is pale yellow, and the pupa shining dark brown, pointed behind.

FAMILY XXIV. PSYCHIDÆ.

Eggs.—Small and rounded.

Larva and Pupa.—Enclosed in variously formed cases resembling those of *Trichoptera* (Caddis-flies).

Imago.—Male generally of small size and dull uniform coloration; usually white, grey, brown, or black, with pectinated antennæ, and short rounded wings, with long fringes. Female apterous, and in some genera destitute even of legs and antennæ; in the latter condition, she is, of course, incapable of even quitting her case.

The males of the European species fly about among the grass, like the *Adscitinæ*, *Pyraustidæ*, and other small day-flying Moths which they resemble in their habits. They have representatives in all parts of the world, but are perhaps most numerous in Europe, India, and Australia. By some authors they are regarded as a section of the *Tineæ*.

The European species are all very similar in shape and size, and the largest scarcely measures an inch across the wings, the majority being much smaller. The foreign species are, however, more varied in some respects, though always of very dull colours. Two foreign species, one American, and one Australian, are figured on the accompanying page (p. 211)

1, 2, 3, 4, 5. Metamorphoses of Oiketicus Kirbyi.
6. Cryptothelea Macleayi.

GENUS ŒCETICUS.

Oiketicus, Guilding, Trans. Linn. Soc. Lond. xv. p. 375 (1837); Westwood, Proc. Zool. Soc. Lond. 1854, p. 219; Walker, List Lepid. Ins. Brit. Mus. iv. p. 961 (1855).

Male pilose, the mouth-parts rudimentary; antennæ strongly pectinated, serrated towards the tips. Wings long and narrow, but rounded at the tips; fore-wings twice as long as the hind-wings. Abdomen moderately stout, and very long, extending for almost its whole length beyond the hind-wings. Female apterous, ovipositing in its case.

This genus includes a few closely-allied species, and is met with from the Southern United States to Uruguay. The generic name is sometimes applied to species occurring in the Old World, but these are now usually referred to separate genera.

ŒCETICUS KIRBII

(*Page* 211, *Figs.* 1-5.)

Oiketicus kirbii, Guilding, Trans. Linn. Soc. Lond. xv. p. 375, pls. 6, 7 (1837); Westwood, Proc. Zool. Soc. Lond. 1854, p. 221, pl. 134, fig. 2.

Oiketicus poeyi, Lucas, in Ramon de la Sagra, Hist. Nat. Cuba, Anim. Art. p. 724 (1857).

Oiketicus fulgerator, Herrich-Schäffer, Aussereurop. Schmett. i. fig. 520 (1856).

Psyche (*Oiketicus*) *gigantea*, Zeller, Stett. Ent. Zeitung, xxxii. pp. 49, 80, pl. 2 (1871).

This species is abundant in Central America and the West Indies, and a closely-allied insect occurring in the Argentine Republic and Uruguay was formerly considered to be identical, but has recently been separated under the name of *O. platensis*, Berg. This insect was first brought to the notice of naturalists by the Rev. Lansdown Guilding, who visited the West Indies

in 1817, and found it abundant on various trees, being particularly injurious to fruit trees in gardens. Mr. Guilding reared the larvæ in abundance, during several years' residence, but he was much puzzled at breeding males only, for he did not think of searching in the pupa-cases for the females, but imagined that the female pupa had not been fully developed owing to the attacks of parasites. At last, however, a specimen was uncased after the rupture of the thoracic carina, and the mystery was solved. When the female has come to sexual maturity, she opens the carina by the motion of her head, and prepares to receive the winged male. Afterwards the female packs the bottom of her pupa-case with eggs, covered with down from her own body, and then dies within the case, or squeezes her shrivelled body through the opening and dies outside.

The eggs are small, round, yellow, and very numerous, and, as soon as they are hatched, the larvæ quit the pupa-case, spread themselves over the trees, and at once begin to form their cylindrical cases of scraps of wood and leaves, held together by threads, and open at both ends. In these cases they move about, like the larvæ of caddis-flies. When young, they hold the tail erect, but afterwards it is weighed down by the pressure of the case. The larva is thick and fleshy, with sixteen legs, the thoracic legs being unusually thick and strong. The body is clothed with a few scattered hairs, and the head and three thoracic segments are yellowish, varied with brown, the rest of the body being of a dull livid colour. When the larva is alarmed, it very rapidly closes the purse-like aperture of its dwelling by means of its mandibles and fore-legs, and thus remains in security, suspended only by a few threads. Fig. 1 shows a female larva in its case; and Fig. 2 represents the same larva without its case. When it has reached its full growth, it attaches one end of its case firmly to a branch by strong silken threads, and having thus suspended it, the larva

changes to a pupa within the case. Fig. 3 represents the suspended case of a male. The pupa of the male is brown, and rather long, with a rust-coloured ring on the abdominal segments, the front somewhat carinated, and each segment furnished with a double series of dorsal prickles. The pupa of the female is of the same colour, but much thicker.

The wings of the male measure about 1¾ inch in expanse; and the body is 1⅛ inch in length. The wings are black, slightly glossed with purple, the fore-wings rather long and narrow, the hind-wings shorter, and slightly produced at the anal angle. The abdomen is long and extensile, the tarsi reddish, and the front of the head pale; the antennæ are strongly pectinated from the base to the middle, and serrated beyond (Fig. 4).

The female more resembles a pupa than a perfect insect, being enclosed in a tough envelope without even the three principal divisions of the body being clearly defined. Not only the mouth-parts but even the antennæ are absent, and the legs are very short and rudimentary, and destitute of claws. The body is brownish, clothed with woolly hair towards each extremity, and the eyes are reddish (Fig. 5).

GENUS CRYPTOTHELEA.

Cryptothelea, Duncan, in Jardine's Nat. Libr. Exot. Moths, p. 115 (1841).

Lansdownia, Heylaerts, Ann. Soc. Ent. Belg. xxv. p. 65 (1881).

The male has the antennæ pectinated throughout, the pectinations gradually diminishing in length towards the extremity; wings broad, rounded; body slender, not longer than the hind-wings; the legs slender. Female apterous, pubescent, not leaving the case.

A considerable number of Indian, African, and Australian species are referred to this genus, besides the typical species, which we have figured.

CRYPTOTHELEA MACLEAYI.

(*Page* 211, *Fig.* 6.)

Oiketicus macleayi, Guilding, Trans. Linn. Soc. Lond. xv. p. 375, pl. 8 (1827); Westwood, Proc. Zool. Soc. Lond. 1854, p. 222, pl. 34, fig. 3.

Cryptothelea macleayi, Duncan, in Jardine's Nat. Libr. Exot. Moths, p. 115, pl. 9, fig. 6 (1841).

Psyche macleayi, Walker, List Lepid. Ins. Brit. Mus. iv. p. 955, no. 14 (1855).

The male is dark brown or blackish, and expands rather more than half an inch. The female is yellowish, with a band of yellow woolly hair on each segment. In the larva, the head and the three thoracic segments are yellow with brown markings; the rest of the body is brownish, with scattered pale warts. It always carries its tail erect, and lives among the branches and trunks of old trees, frequently forming its case of the lichens with which they are covered. In other respects its habits are said to resemble those of *Œceticus*.

FAMILY XXV. LIMACODIDÆ.

Eggs.—(Of *Heterogenea cruciata*) laid in an agglomerated mass, pale, shining, translucent.

Larva.—Depressed, limaciform, with imperfectly developed or retractile legs, smooth or fasciculate, and often furnished with a formidable stinging apparatus.

Pupa.—Enclosed in a large cocoon provided with a lid.

Imago.—Of small or moderate size, usually with the body short and stout, the legs stout, and the wings short and oval, the fore-wings with two sub-median nervures (the lowermost forked at the base) and the hind-wings with three. Frenulum present; proboscis often rudimentary.

This is a Family of considerable extent, and chiefly remarkable for the form and structure of the larva. It is well represented in most parts of the world, but there are only two European species, both of which are found in England. The European larvæ are not known to sting.

The Moths have some resemblance to the *Tortrices* in shape, and were regarded as belonging to them by several of the older writers.

GENUS DORATIFERA.

Doratifera, Westwood, in Jardine's Nat. Libr. Exot. Moths, p. 181 (1841); Walker, List Lepid. Ins. Brit. Mus. v. p. 1115 (1855).

Doratiophora, Scott, Austral. Lepid. p. 17 (1864).

Lamprolepis, Felder, Reise d. Novara, Lepid. iv. pl. 82, fig. 13 (1874).

This genus includes a few Australian species, with very stout, pubescent, and rather short bodies, the abdomen not extending beyond the hind-wings. The palpi are very short and pilose, the wings are rather short and broad, and the antennæ of the male are pectinated to the middle, and serrated beyond; those of the female are simple. The abdomen of the female is clothed with woolly hair beneath and on the sides.

DORATIFERA VULNERANS.

(*Plate XCII. Fig.* 3 (*imago*), 4, 5 (*larva*), 6 (*cocoon*).)

Bombyx vulnerans, Lewin, Prodr. Ent. p. 5, pl. 4 (1805).

Doratifera vulnerans, Westwood, in Jardine's Nat. Libr. Exot. Moths, p. 181, pl. 22, figs. 3, 4, 5 (1841); Walker, List Lepid. Ins. Brit. Mus. v. p. 1116, no. 1 (1855).

This little Australian Moth expands about 1 inch to 1⅛ inch, the male being rather smaller than the female, though

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1. *Parasa media*.
2. *Scopelodes unicolor*.
3. *Doratifera vulnerans*.
4. 6. „ „ *larva*.
5. „ „ *cocoon*.

in colouring the sexes are very much alike. The fore-wings are ferruginous, with a silvery margin, and with numerous transverse lines formed of little tufts of a chestnut colour, changeable in different lights. The hind-wings are dull whitish, the thorax and abdomen brown and bushy.

The larva is very remarkable, broad, thick, and massive, with four reddish protuberances on the anterior part of the body and four behind. These knobs it is able to open at will and dart out eight rays or bunches of stings of a yellow colour. The colour of the body is grey, with numerous black spots and streaks, the back being marked with a large yellow spot marked with several black crescents. There are also two reddish tufts on the head and two similar ones at the hinder extremity. The sides have a row of white spines directed backwards. It feeds on the leaves of the stringy bark tree, a species of *Eucalyptus*, and passes into the pupa-state in the beginning of February, fastening itself to the stem of a leaf, and spinning a dense oval brown cocoon. The Moth emerges in about three weeks.

The wound inflicted by the little fascicles of stings is described by Lewin as very painful and venomous, and it darts them forth whenever it is alarmed by the motion of anything approaching. They must prove a very powerful defence against birds and many other enemies.

GENUS PHOBETRUM.

Phobetron, Hübner, Verz. bek. Schmett. p. 398 (1827 ?).
Ecnomidea, Westwood, in Jardine's Nat. Libr. Exot. Moths, p. 183 (1841).
Phobetrum, Packard, Proc. Ent. Soc. Philad. iii. p. 340 (1864).

In its general characters this genus agrees with *Euclea* (*vide*

infrà, p. 222), but the body is much stouter, the fore-wings are longer and narrower, with the hind margin obliquely curved, and the hind-wings are very short and rounded. The larva is a very extraordinary creature; very broad, with three long processes, curving backwards, on each side.

PHOBETRUM PITHECIUM.

(*Plate XCIII. Fig.* 1 (*imago*), 2 (*larva*).)

Phalæna pithecium, Abbot & Smith, Lepid. Georg. ii. pl. 74 (1797).

Phobetron abbotana, Hübner, Verz. bek. Schmett. p. 398, no 3853 (1827 ?).

Ecnomidea pithecium, Westwood, in Jardine's Nat. Libr. Exot. Moths, p. 183, pl. 21, fig. 4 (1841).

Phobetrum pithecium, Lintner, Rep. Inj. Ins. v. pp. 183–192 (1889).

This pretty little Moth is a native of Georgia. The female expands 1¼ inch, and the male rather less.

The fore-wings are bluish, with waved yellowish-brown transverse bands, more or less clouded with dusky. The hind-wings are uniform brown, with a narrow yellow line within the fringes. The female has the body rather thick, the thorax bluish with brown sides, and the abdomen bluish with brown rings. The male has the body light brown clouded with darker, and a tuft at the end of the abdomen.

The larva is uniform brown with a yellow head, and it is its peculiar and uncouth aspect which has suggested the name *Pithecium* (little ape) for the insect. It feeds on persimmon and various kinds of oak. Abbot's specimen spun up on the 10th of July, and the Moth emerged on the 31st. The cocoon is almost globular.

GENUS SCOPELODES.

Scopelodes, Westwood, in Jardine's Nat. Libr. Exot. Moths, p. 222 (1841); Walker, List Lepid. Ins. Brit. Mus. v. p. 1104 (1855).

This genus is confined to India, China, and the Indo-Malayan Islands. The antennæ are pectinated on the basal half in the male, and simple in the female, and the palpi are very long, pilose, and tufted at the extremity. The body is pilose, and very stout, as are also the legs, and the wings are long and rather broad, and much rounded at the extremity.

The species of this curious genus are among the largest belonging to the Family.

SCOPELODES UNICOLOR.

(*Plate XCII. Fig.* 2.)

Scopelodes unicolor, Westwood, in Jardine's Nat. Libr. Exot Moths, p. 222, pl. 28, fig. 2 (1841).

Scopelodes unicolor et *S. palpalis*, Walker, List Lepid. Ins. Brit Mus. v. p. 1104, nos. 1 & 2 (1855).

This dull-coloured Moth is a native of India, Java, and Borneo. The expanse of the wings is 2¾ inches. We give Westwood's original description, which is as follows:—"The head is rather small, but the eyes are large; the palpi are very long, forming a thick clavate brush of hairs; the maxillæ are almost rudimental, forming a very short flat tongue; the antennæ are short and slender; the wings are short and broadly ovate, the anterior rather acute at the apex, from which point to the base the hind margin of the wing forms a regular curve. The post-costal vein is at a considerable distance from the mediastinal one, and anteriorly emits three branches, the third of which is furcate, the apical

point of the wing being included between the fork; the medial vein emits three branches, and there are two longitudinal veins (extending from the vein which connects the post-costal and medial veins) between the last branch of the medial vein and the main or fourth branch of the post-costal vein. There appears to be no bridle to hook the wings together. The thorax is short and thick, as is also the abdomen. The legs are of nearly equal length, and very woolly, the spurs of the hind-wings being almost concealed. The tarsi are long and thick and very woolly, the tarsal unguis and large flat pulvilli being concealed by curved black hairs. When at rest the wings are deflexed at the sides of the body like the roof of a house. The colour of the entire Moth is buff, the wings having a silky gloss, and the palpi have a pale ring near the apex; the back of the abdomen is rather more fulvous, and marked with short black bands."

GENUS PARASA.

Neæra, Herrich-Schäffer, Aussereurop. Schmett. i. figs. 176, 177 (1854); Walker, List Lepid. Ins. Brit. Mus. v. p. 1138 (1855); *nom præocc.*

Parasa, Moore, Cat. Lepid. Mus. E. I. House, ii. p. 413 (1859); id. Lepid. Ceylon, ii. p. 196 (1883).

In this genus the antennæ of the male are pectinated towards the base; the palpi are pilose, extending a little beyond the head, and the hind tibiæ are armed with one pair of spurs. The body is stout and pilose, and extends as far as the hind-wings. The wings are broad, oval, rounded at the extremity, and very densely scaled.

The genus is the most extensive in the Family, upwards of fifty species being now referred to it; but the great majority of these are found in Africa and the Indo-Malayan Region. Most of the species are grass-green, with brown or fawn-

coloured borders. Larvæ with fascicles of stings. I have figured a representative species.

PARASA MEDIA.

(*Plate XCII. Fig.* 1.)

Neæra media, Walker, List Lepid. Ins. Brit. Mus. v. p. 1140, no. 2 (1855).

Parasa media, Moore, Cat. Lepid. Mus. E. I. House, ii. p. 414, no. 940, pl. xxi. figs. 4, 4*a* (transf.) (1859).

This Moth, which measures from 1 to 1½ inch across the wings, is found in Java. The body is brown, with the sides of the head and thorax broadly grass-green. The fore-wings are fawn-colour, with a very broad grass-green band, occupying the greater part of the costal area, and more than the basal half of the inner margin. The green band is sinuated on the outside. The base and nervures are brown, and the outer side of the green band is bordered with brown. On the under side the fore-wings are grass-green, with the costa and hind margin bordered with fawn-colour. The hind-wings are pale testaceous, bordered with brownish. The female, which I have figured, is larger than the male, and the green colour of the under side of the fore-wings is paler.

The larva, which feeds on a species of *Eugenia*, called "Juet Jambu" in Java, is marked with alternate stripes of green and yellow, with a blue stripe on the back. It is armed with fascicles of stings, which are tipped with red at each extremity of the body and on the sides. The cocoon opens with a round lid, like that of a Dipterous pupa.

PARASA LEPIDA.

Noctua lepida, Cramer, Pap. Exot. ii. pl. 130, fig. E (1779?).

Limacodes graciosa, Westwood, Cab. Orient. Ent. p. 50, pl. 24, fig. 4 (1848).

Neœra graciosa, Walker, List Lepid. Ins. Brit. Mus. v. p. 1139, no. 1 (1855).

Parasa lepida, Moore, Cat. Lepid. Ins. E. I. House, ii. p. 413, no. 939, pl. 21, figs 3, 3*a-d* (transf.) (1859); id. Lepid. Ceylon, ii. p. 127, pl. 128, figs. 2, 2*a*, *b* (1893); Snellen, Tijdschr. Ent. xx. p. 18 (1877).

This species, which inhabits India and Ceylon, is the type of the genus *Parasa*. It much resembles *P. media*, but is larger, and the green portion of the fore-wings is not indented, but gradually rounded on the outer side.

The larva feeds on *Ficus*, mango, and other trees. It is like that of the last species, but shorter and broader, and only two of the fascicles at each end are tipped with red. Mr. Moore quotes the following accounts of its habits:—"The mask which conceals the head when at rest is curious. It is prehensile, and clasps the edge of the leaf while the head underneath is eating its way along. Instead of pro-legs it has eight pairs of soft flexible protuberances, which, by a peristaltic kind of motion, are made to serve as pro-legs, and by means of them the animal clings particularly strongly against the surface even of glass" (*Sclater*). "The caterpillar stings with such horrible pain that I sat in the room almost sick with it, and unable to keep the tears from running down my cheeks for more than two hours, applying ammonia all the time" (*Templeton*).

GENUS EUCLEA.

Euclea, Hübner, Verz. bek. Schmett. p. 149 (1822?); Walker, List Lepid. Ins. Brit. Mus. v. p. 1143 (1855); Packard, Proc. Ent. Soc. Philad. iii. p. 336 (1864).

Euclea includes a series of rather small American moths, with somewhat stout bodies, not extending much beyond the

hind-wings; the antennæ are moderately pectinated in the male, and the wings are short and broad, with rounded hind margins; the legs are stout and pilose, the hind tibiæ being armed with four short spurs.

The larva is a curious boat-shaped creature, and is armed above with a double row of long and very thick spikes. Dr Packard detected in it a resemblance to the famous war-ship "Monitor."

EUCLEA QUERCETI.

(*Plate XCIII. Fig.* 3 (*imago*), 4 (*larva*).)

Phalæna cippus, Abbot & Smith (*nec* Cramer), Lepid. Georg. ii. pl. 13 (1797).

Limacodes cippus, Duncan, in Jardine's Nat. Libr. Exot. Moths, p. 177, pl. 21, fig. 2 (1841).

Limacodes querceti, Herrich-Schäffer, Aussereurop, Schmett. i. fig. 174 (1854).

Euclea cippus, Walker, List Lepid. Ins. Brit. Mus. v. p. 1143, no. 1 (1855).

Euclea monitor, Packard, Proc. Ent. Soc. Philad. iii. p. 337 (1864); id. Guide Ins. pp. 288, 289 (1869).

This elegant little species is a native of the United States. It expands about an inch. The fore-wings are brown with something of a reddish tinge. They have a dark brown band near the hind margin, a few dark marks nearer the base and two rather large green spots, each of which is divided externally by a white and black border from a red spot.

The hind-wings are light brown without spots.

The head and thorax are of the same colour as the ground-colour of the fore-wings, and the abdomen is like the hind-wings.

The larva inclines to purple on the sides, with three longitudinal yellow stripes margined below with black

The middle of the back is dark and the pointed projection brownish-red. It feeds on the dog-weed (*Cornus florida*), oak, and other trees. It was observed by Abbot to make its cocoon on the 14th of September, and the Moth appeared on the 22nd of July.

GENUS APODA.

Apoda, Haworth, Lepid. Brit. ii. p. 137 (1809).
Cochlidion, Hübner, Tentamen, p. 2 (1810?).
Limacodes, Latreille, Fam. Nat. p. 474 (1825); Stephens, Ill. Brit. Ent. Haust. ii. p. 85 (1829); Walker, List Lepid. Ins. Brit. Mus. v. p. 1145 (1855).

In this genus the antennæ are stout and serrated in the male, and simple in the female. The palpi are densely clothed with scales and short hairs, and extend a little beyond the head, and the legs and abdomen are rather stout. The femora and tibiæ are fringed with hair. The fore-wings are oblong, with transverse lines. The larva is stout, naked, and gibbous above, and the pupa is robust, obtuse, narrowed behind and enclosed in a dense ovate cocoon. Several species from different parts of the world are referred to this genus. The single European species flies by day.

THE FESTOON MOTH. APODA AVELLANA.

Tortrix avellana, Linnæus, Syst. Nat. (ed. x.) i. p. 531, no. 210 (1758); id. Faun. Suec. p. 344 (1761).
Bombyx limacodes, Hufnagel, Berl. Mag. iii. p. 402, no. 78 (1776); Esper, Schmett. iii. p. 140, Taf. 26, figs. 3–9 (1784).
Bombyx sulphurea, Fabricius, Gen. Ins. p. 279 (1777).
Phalæna limax, Borkhausen, Eur. Schmett. iii. p. 449 (1780).
Bombyx testudo, Fabricius, Mant. Ins. ii. p. 121, no. 116 (1787).
Bombyx bufo, Fabricius, Mant. Ins. ii. p. 121, no. 118 (1787).

Phalæna funalis, Donovan, Brit. Ins. iii. pl. 76 (1794).
Bombyx asella, Esper, Schmett. iii. p. 36, Taf. 85, fig. 4 (1801).
Tortrix testudinana, Hübner, Eur. Schmett. vii. figs. 164, 165 (1803 ?); Treitschke, Schmett. Eur. viii. p. 14 (1830).
Limacodes testudo, Godart, Lépid. France, iv. p. 279, pl. 28, figs. 1, 2 (1822); Stephens, Ill. Brit. Ent. Haust. ii. p. 86 (1829); Kirby, Eur. Butterflies and Moths, p. 114, pl. 26, fig. 3 (1879); Buckler, Larvæ of Brit. Lepid. iii. pl. 53, fig. 8 (1889); Barrett, Lepid. Brit. Isl. ii. p. 166, pl. 64, figs. 22, *a*, *b* (1894).
Apoda avellana, Kirby, Cat. Lepid. Heter. i. p. 552 (1892).

The Festoon Moth is found in most parts of Europe and Asia Minor. The expanse of the wings is about one inch, the male being smaller than the female.

The fore-wings are usually dark ochre-yellow in the male, with two dark-brown transverse lines commencing near together

Male. Female.

The Festoon Moth.

on the costa, but widely diverging towards the inner margin, and enclosing a dark triangular area, in which may be observed in the middle of the wing a round spot, and near the inner margin an elongated one, both of the ground-colour. The hind-wings are dark brown, yellowish towards the base. The fringes are varied with yellowish.

The abdomen ends in a pale tuft.

The female has pale ochre-yellow fore-wings, with the same markings as the male, but paler and more distinct, the spots in

the central area being sometimes almost white. The fringes are rusty brown. The hind-wings are ochre-yellow, suffused with brown.

The larva is slug-shaped, with an arched back and flat sides. It is light green, without hairs, and covered with small shining tubercles. On the back are two whitish longitudinal lines, bounded by reddish-yellow, and on the sides is a yellow line. When at rest the head is retracted under the second segment.

It feeds on oak and beech.

The transformation takes place in an oval cocoon between leaves, in which the larva spends the winter, before passing into the pupa-state. The pupa is soft and yellow, and has the parts of the Moth outlined, as is the case in beetles.

This insect is fairly common in woods in England.

GENUS HETEROGENEA.

Heterogenea, Knoch, Beitr. Insect. iii. p. 60 (1793); Stephens, Ill. Brit. Ent. Haust. ii. p. 84 (1829); Treitschke, Schmett. Eur. viii. p. 13 (1830).

This genus somewhat resembles the last, but the antennæ, palpi, legs, and abdomen are all much more slender and less pilose; and the wings are unicolorous. The fore-wings are trigonate, and somewhat truncate at the extremity; the hind-wings are rounded. The larva is ovate, naked, and depressed.

THE TRIANGLE MOTH. HETEROGENEA CRUCIATA.

Heterogenea cruciata, Knoch, Beitr. Insect. iii. pl. 3, figs. 1–10 (1783).

Bombyx asella, Fabricius, Mant. Ins. ii. p. 121, no. 117 (1787).

Tortrix asellana, Hübner, Eur. Schmett, vii. figs. 166, 167 (1803?).

Bombyx asellus, Godart, Lépid. France, iv. p 282, pl. 228, fig. 3 (1822).

Heterogenea asella, Stephens, Ill. Brit. Ent. Haust. ii. p. 85, pl. 17, fig. 2 (1829); Barrett, Lepid. Brit. Isl. ii. p. 172 pl. 64. figs. 3, 3*a*, *b* (1894).

Heterogenea asellana, Treitschke, Schmett. Eur. viii. p. 18 (1830).

Heterogenea asellus, Kirby, Eur. Butterflies and Moths, p. 114 (1879); Buckler, Larvæ of Brit. Lepid. iii p. 73, pl. 53, fig. 8 (1889).

The Triangle Moth is found throughout the greater part of Europe.

It expands about ¾ inch.

The body and fore-wings are yellowish-brown in the male, more or less tinged with darker, and the hind-wings are blackish, with yellowish borders.

The female, which is often distinctly larger than the male, is ochre-yellow.

Male. Female.

The Triangle Moth.

The Moth rests with the wings partly arched, and the abdomen raised.

The larva is short and stout, with the back flat and the sides somewhat depressed. It has a very small head. The whole of the upper surface of the body is rough like shagreen, and of a delicate green colour, with a broad olive-brown dorsal mark commencing on the third segment, narrowing somewhat on the fifth, becoming very wide on the seventh and eighth, and narrowing again till the end of the body is reached.

It usually remains upon one leaf, and does not leave it until it is quite consumed. When feeding, it retracts the head under the second segment, so that it is concealed.

It draws a leaf together with fine threads, and forms a short, elliptical brown cocoon.

The pupa is shining, transparent whitish-brown.

The New Forest is the chief locality for this Moth in England.

FAMILY XXVI. NOTODONTIDÆ.

Egg.—Circular or button-shaped, flattened beneath, and sometimes depressed above.

Larva.—Naked, more or less gibbous before and behind, and with the anal claspers often modified into short or long slender appendages.

Pupa.—Enclosed in a cocoon, either between leaves, or attached to the bark of trees.

Imago.—With the wings considerably longer than broad, and usually of plain colours, rarely dentated, but frequently with a very conspicuous tooth on the inner margin of the fore-wings. Body stout, pubescent, sometimes tufted, and generally longer than the hind-wings; antennæ frequently more or less strongly pectinated in the male.

Proboscis and ocelli present or absent; fore-wing with one sub-median nervure, and sometimes with a prediscoidal cell; hind-wings with the costal nervure distinct from the sub-costal, but often approximating, and sometimes connected with it by a cross-nervule; two sub-median nervules.

Flight nocturnal.

This is a Family of considerable extent, which has relationships with the *Sphingidæ*, *Noctuæ*, and, in the larval state only, with the *Drepanulidæ*. The forms assumed by the larvæ are often very curious, and several are here figured. The *Notodontidæ* are well represented in Europe.

GENUS STAUROPUS.

Stauropus, Germar, Syst. Gloss. p. 45 (1812); Stephens, Ill. Brit. Ent. Haust. ii. p. 21 (1828); Walker, List Lepid. Ins. Brit. Mus. v. p. 1019 (1855).

Terasion, Hübner, Verz. bek. Schmett. p. 147 (1822?).

The wings are long, the fore-wings being much longer than the hind-wings, with the costa much arched, but the tip not very pointed; the antennæ are strongly pectinated in the male for half their length; the body is stout, tufted, and extends considerably beyond the hind-wings; the legs are hairy, and the hind tibiæ are armed with two long apical spurs. There are several patches of raised scales on the fore-wings.

This genus is numerously represented in India, China, and Japan; we have one species in Europe.

THE LOBSTER MOTH. STAUROPUS FAGI.

Noctua fagi, Linnæus, Syst. Nat. (ed. x.) i. p. 508, no. 60 (1758).

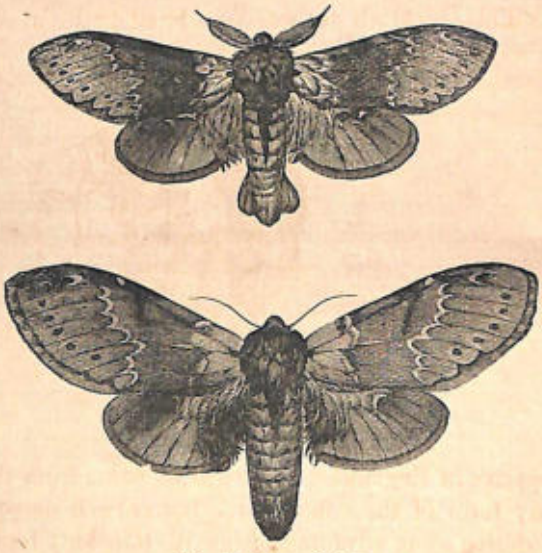
Bombyx fagi, Linnæus, Faun. Suec. p. 295 (1761); Knoch, Beitr. Schmett. ii. p. 58, Taf. 3, fig. 5 (1782); Esper, Schmett. iii. p. 105, pl. 20 (1784); Hübner, Eur. Schmett. iii. fig. 31 (1800?); Godart, Lépid. France, iv. p. 173, pl. 15, fig. 1 (1822).

Harpyia fagi, Ochsenheimer, Schmett. Eur. iii. p. 39 (1810).

Stauropus fagi, Stephens, Ill. Brit. Ent. Haust. ii. p. 21 (1828); Kirby, Eur. Butterflies and Moths, p. 137, pl. 30, figs. 8, *a–c* (1880); Buckler, Larvæ of Brit. Lepid. ii. p. 63, pl. 33, fig. 1 (1887); Barrett, Lepid. Brit. Isl. iii. p. 99, pl. 103 (1895).

The Lobster Moth is found throughout Europe and Western Asia. It has an expanse of about 2¾ inches. It is varied with brown and grey. The fore-wings are paler at the base and

before the hind-margin, with the inner margin suffused with reddish-brown in the central area. There are two zig-zag yellowish transverse lines, and small black spots in front of the



The Lobster Moth.

hind margin, bounded by whitish on the inner side. The hind-wings are reddish-grey, darker on the costa, with traces of a dentated transverse line.

The larva is chestnut-brown, stouter behind, with a pale dorsal line edged with blackish. On each of the segments, from the fifth to the tenth, is a pair of humps, the first of these being the largest. The last segment, which is broad, ends in two short, erect, somewhat clubbed horns. The six thoracic legs are very long and two-jointed. When at rest, the larva keeps the head and tail raised.

It feeds on oak, birch, hazel, beech, lime, plum, and other trees. It weaves a white silky cocoon between leaves. The pupa is shining reddish-brown, with four curved and pointed hooklets at the extremity.

The Lobster Moth is not considered to be a very com-

Larva of Lobster Moth.

mon species in England. It derives its name from the extraordinary form of the caterpillar. It has been suggested that it may derive some advantage from its (fancied) resemblance to a spider; but, on the other hand, it has been pointed out that spiders are peculiarly defenceless creatures, and extremely subject to the attacks of birds and wasps, so that a caterpillar would probably in no way benefit by any such resemblance.

GENUS BRACHIONYCHA.

Brachionycha, Hübner, Verz. bek. Schmett. p. 144 (1822?); Walker, List Lepid. Ins. Brit. Mus. v. p. 1035 (1855).

Petasia, Stephens, Ill. Brit. Ent. Haust. ii. p. 31 (1828).

Asteroscopus, Boisduval, Ind. Meth. p. 59 (1829); id. Gen. Ind. Meth. p. 85 (1840).

In this genus the antennæ are long, and pectinated to the tips; the legs are stout, and the hind tibiæ armed with four long spurs; the body stout, hairy, extending a little beyond the hind-wings; the wings long, the fore-wings rather longer than the hind-wings, with the costa nearly straight, and no projection on the inner margin. We have figured the commonest of the two British species. The other, *B. nubeculosa* (Esper), is larger and darker, and is found at Rannoch in Perthshire.

THE SPRAWLER. BRACHIONYCHA SPHINX.

Noctua sphinx, Hufnagel, Berl. Mag. iii. p. 400, no. 75 (1767); Von Rottenburg, Naturf. ix. p. 133 (1776).

Bombyx sphinx, Esper, Schmett. iii. p. 249, Taf. 49, figs. 1–3 (1785).

Bombyx cassinea, Fabricius, Mant. Ins. ii. p. 126, no. 148 (1787); Hübner, Eur. Schmett. iii. figs. 5, 6 (1800).

Xylina cassinea, Treitschke, Schmett. Eur. v. (3) p. 53 (1826).

Noctua cassinea, Duponchel, Lépid. France, vii. (1) p. 116, pl. 114, fig. 2 (1827).

Petasia cassinea, Stephens, Ill. Brit. Ent. Haust. ii. p. 32 (1828); Buckler, Larvæ of Brit. Lepid. iii. pl. 36, fig. 2 (1889); Barrett, Lepid. Brit. Isl. iii. p. 155, pl. 112, figs. 2, 2*a*, *b* (1895).

Asteroscopus sphinx, Kirby, Eur. Butterflies and Moths, p. 170, pl. 33, fig. 7 (1880).

The Sprawler is common in most parts of Europe. It has an expanse of about 1½ inch.

The ground colour of the fore-wings is usually ashy-grey, but dark brown or dark grey specimens may occasionally be met with, especially in the female. There are numerous brown and blackish longitudinal streaks. From the base, in the middle of the wing, is a stout black streak. The fringes are ashy-grey, streaked with white. The hind-wings are white, suf-

1. *Phobetrum pithecium*.
2. ,, ,, *larva*.
3. *Euclea querceti*.
4. ,, ,, *larva*.

fused with brown, especially in the female, with a large, indistinct central spot, the fringes with brown crescents.

The larva is shining green, but becomes yellower after the first moult, and finally white. On the back are three clear

The Sprawler.

white lines, and on each side a sulphur-yellow one. It is very delicate, and, especially after the third moult, becomes semi-transparent. It feeds on lime, willow, oak, cherry-tree, beech, &c.

This Moth is not very uncommon in England, and Stephens remarks that the larvæ assume, when at rest, the attitude of

Larva of the Sprawler.

those of the *Sphingidæ*, and, in addition, stretch out their anterior legs to the utmost, whence the name *Sprawler*, which has been applied to the insect.

GENUS DRYMONIA.

Drymonia, Hübner, Verz. bek. Schmett, p. 144 (1822 ?); Curtis, Brit. Ent. xvi. pl. 755 (1839); Walker, List Lepid. Ins Brit. Mus. v. p. 1011 (1855).

Chaonia, Stephens, Ill. Brit. Ent. Haust. ii. p. 29 (1828).

The Moths belonging to this genus have stout pubescent bodies not extending far behind the hind-wings; antennæ pectinated to the tips in the male; wings long and rather narrow, with the hind margin rounded, and with no distinct tooth on the inner margin; the thorax slightly crested, and the hind tibiæ with four spurs. The larva is naked, with anal claspers, but without humps on the back. Several species of this genus are found in Europe and Japan; and one is recorded from Chili. We have two species in Britain, but neither of them is very abundant.

THE LUNAR MARBLED BROWN. DRYMONIA RUFICORNIS.

Bombyx ruficornis, Hufnagel, Berl. Mag. ii. p. 424, no. 43 (1766).

Phalæna confusa, Hufnagel, Berl. Mag. iii. p. 414, no. 94 (1767).

Noctua roboris, Fabricius, Gen. Ins. p. 283 (1777).

Bombyx roboris, Esper, Schmett. iii. p. 243, Taf. 46, figs. 4–7 (1785).

Bombyx chaonia, Hübner, Eur. Schmett, iii. figs. 10, 11 (1800 ?); Godart, Lépid. France, iv. p. 218, pl. 20, fig. 6 (1822).

Notodonta chaonia, Ochsenheimer, Schmett. Eur. iii. p. 82 (1810).

Chaonia roboris, Stephens, Ill. Brit. Ent. Haust. ii. p. 30 (1828).

Drymonia chaonia, Kirby, Eur. Butterflies and Moths, p. 141, pl. 31, fig. 7 (1880); Buckler, Larvæ of Brit. Lepid. ii. p. 157, pl. 34, fig. 3 (1887); Barrett, Lepid. Brit. Isl. iii. p. 130, pl. 108, figs. 2, 2*a*–*g* (1895).

Drymonia ruficornis, Kirby, Cat. Lepid. Heter. i. p. 570 (1892).

This species is confined to Europe. It expands from 1½ to nearly 1¾ inch.

The fore-wings are blackish-grey with whitish markings and transverse lines, and a black central lunule. The anterior transverse line is nearly straight, and the sub-marginal line is indistinct. The fringes are scarcely lighter than the ground-colour, and are bordered by a dark marginal line. The hind-

The Lunar Marbled Brown.

wings are whitish in the male, with a grey transverse line, pale grey in the female, with a light central line. The abdomen is reddish-grey.

The larva is elongated, smooth and shining, pale green, darker on the sides, with two yellow dorsal lines and a similar one above the legs.

It feeds on the oak (*Quercus robur*), and forms an earthen cocoon for the pupa, which is dark brown.

THE MARBLED BROWN. DRYMONIA TRIMACULA.

Bombyx trimacula, Esper, Schmett. iii. p. 242, Taf. 46, figs. 1–3 (1785).

Bombyx ilicis, Fabricius, Ent. Syst. iii. (1) p. 434, no. 84 (1793).
Bombyx dodonæa, Hübner, Eur. Schmett. iii. fig. 8 (1800?); Godart, Lépid. France, iv. p. 216, pl. 20, fig. 5 (1822).
Notodonta dodonæa, Ochsenheimer, Schmett. Eur. iii. p. 80 (1810).
Chaonia dodonea, Stephens, Ill. Brit. Ent. Haust. ii. p. 30 (1828).
Drymonia dodonæa, Curtis, Brit. Ent. xvi. pl. 755 (1839); Kirby, Eur. Butterflies and Moths, p. 142 (1880); Buckler, Larvæ of Brit. Lepid. ii. p. 158, pl. 34, fig. 4 (1887); Barrett, Lepid. Brit. Isl. iii. p. 133, pl. 109, figs. 1, 1*a–g* (1895).
Drymonia trimacula, Kirby, Cat. Lepid. Heter. i. p. 571 (1892).

The Marbled Brown is common in most parts of Europe. It measures from 1½ to nearly 1¾ inch across the wings. The fore-wings are brownish-grey, with the anterior transverse line filled in with yellowish-grey, and the hinder one filled with white. The wings are suffused more or less with white towards the base, especially on the nervures. There is no central

The Marbled Brown.

lunule and the sub-marginal line is indistinct. The basal and marginal areas are also often more or less dusted with whitish, the latter as far as a spot on the costa. The fringes are whitish-grey spotted with dusky. The hind-wings are brownish-grey with a light central streak. The abdomen is ochre-yellow, and

this character serves to distinguish the Moth, which is otherwise very variable.

The larva is green, with a golden-yellow spiracular line, which is sometimes spotted with red. It feeds on oak (*Quercus robur*).

The cocoon is formed of tough silk, covered with fine earth, and the pupa is mahogany-brown, and glossy.

GENUS PHALERA.

Pygæra (pt.), Ochsenheimer, Schmett. Eur. iii. p. 214 (1810); Stephens, Ill. Brit. Ent. Haust. ii. p. 11 (1828).
Phalera, Hübner, Verz. bek. Schmett. p. 147 (1822 ?); Walker, List Lepid. Ins. Brit. Mus. v. p. 1049 (1855).
Acrosema, Meigen, Eur. Schmett. iii. p. 24 (1832).
Hammatophora, Westwood, British Moths, i. p. 63 (1851).

In this genus the antennæ of the male are slightly pectinated. The Moths have a stout tufted abdomen, extending beyond the hind-wings, and long and rather broad fore-wings, with the hind margin denticulated, but no tooth on the inner margin; the hind-wings are broad and rounded, and the legs are stout and pilose, and the hind tibiæ are armed with four long spurs. The genus is well represented in Asia, and there are two very similar European species, one of which is common in England.

THE BUFF-TIP. PHALERA BUCEPHALA.

(*Plate XCIV. Fig.* 3.)

Noctua bucephala, Linnæus, Syst. Nat. (ed. x.), i. p. 508, no. 61 (1785).
Bombyx bucephala, Linnæus, Faun. Suec. p. 295 (1761); Esper, Schmett. iii. p. 111, Taf. 22, figs. 1–4 (1785); Hübner, Eur. Schmett. iii. figs. 194, 195 (1804?); Godart, Lépid. France, iv. p. 206, pl. 22. fig. 1 (1822).

Pygæra bucephala, Ochsenheimer, Schmett. Eur. iii. p. 235 (1810); Stephens, Ill. Brit. Ent. Haust. ii. p. 11 (1828); Duponchel, Lépid. France, Suppl. iii. p. 111, pl. 11, fig. 4 (1836); Buckler, Larvæ of Brit. Lepid. iii. pl. 37, fig. 4 (1889); Barrett, Lepid. Brit. Isl. iii. p. 161, pl. 113 (1895).

Phalera bucephala, Kirby, Eur. Butterflies and Moths, p. 153 pl. 31, fig. 1 (1880).

The Buff-tip is common throughout Europe, as well as in Northern and Western Asia. It expands 2½ inches. The fore-wings are light brown, interspersed with numerous silvery scales, especially towards the base, with a large rounded yellow spot at the tip, slightly suffused with ochreous externally, and bounded on the inner side by two rust-coloured undulating

The Buff-tip.

transverse lines, which are continued to the inner-margin. From this large yellow spot is derived the popular name by which the Moth is known. There are one or two other rusty transverse lines, in addition to those mentioned above. The fringe is yellowish, varied with rusty-red and bounded by a series of small crescentic spots of the same colour internally. The hind-wings are uniform yellowish-white. The thorax is

ochreous, with two rust-coloured lines on each side, and the abdomen is coloured like the hind-wings.

The larva, which is pilose and not humped, is at first ackish; but when full-grown it is dark brown with numerous ellow longitudinal stripes, interrupted at the incisions by a yellow transverse band. The head is black, as well as the outer side of the legs. It is a gregarious larva, and consumes the leaves of the elm (especially the wych elm), oak, lime, and willow. By thus feeding in company they often strip a tree of a large portion of its foliage in a very short time. When freshly emerged, the larvæ arrange themselves side by side, in considerable detachments, and commencing at one end of a leaf, eat their way to the other, consuming the parenchyma or pulpy substance only half-way through. When they have attained their full growth, which is usually by September, they drop to the ground, into which they burrow, and change into a dark brown pupa.

GENUS ANAPHE.

Anaphe, Walker, List Lepid. Ins. Brit. Mus. iv. p. 856 (1855); Walsingham, Trans. Linn. Soc. Lond. (2) ii. p. 421 (1885).

Arctiomorpha, Herrich-Schäffer, Aussereurop, Schmett. i. p. 11 (1855).

Henosis, Wallengren, K. Vet. Akad. Handl. Stockh. (2) v. (4) p. 51 (1865).

This genus is confined to Africa, and its position is somewhat uncertain, as it has been referred by different authors to the *Arctiidæ*, *Liparidæ* or *Notodontidæ*. The antennæ are pectinated in the male; body is stout, pubescent, and tufted, and extends a little beyond the hind-wings, and the wings are rather long, broad, and rounded at the extremities. The moths are of a creamy-white, with a narrow reddish-brown stripe

extending all round the fore-wings, which are usually marked with oblique stripes and longitudinal bands of the same colour. The legs are rather stout, and the hind tibiæ are armed with apical spurs.

The Moths are remarkable for the gregarious habits of the larvæ, which feed on trees, and form large nests several inches broad and long, in which they assume the pupa state, each nest containing from 80 to 300 pupæ.

The larvæ are very abundant, frequently stripping the trees on which they feed of their leaves, but they are exposed to the attacks of a variety of parasites, belonging to different orders of insects. The larvæ are provided with barbed hairs, like those of the Processionary Caterpillars of Europe, which are likewise gregarious, though they do not form nests like *Anaphe*, and are clothed with hairs which are irritating in the highest degree.

ANAPHE VENATA.

(*Plate XCV. Fig.* 3.)

Anaphe venata, Butler, Ann. Nat. Hist. (5) ii. p. 459 (1878).

The species which we have figured is a native of Old Calabar, and has an expanse of 2¼ inches.

"Wings cream-coloured; primaries with the veins, margins, and a central belt bright chocolate-colour; secondaries with an apical fringe slightly brownish, and with bright chocolate dots at the ends of the veins; head, inner fringe of tegulæ and thorax red-brown, collar and outer border of tegulæ cream-coloured; abdomen pale red-brown, the segments whitish in front; antennæ black; under surface with the markings less distinct than above." (*Butler.*)

GENUS HETEROMORPHA.

Heteromorpha, Hübner, Tentamen, p. 1 (1810).

Episema, Ochsenheimer, Schmett. Eur. iv. p. 65 (1816);

Treitschke, Schmett. Eur. v. (1) p. 111 (1825); Stephens, Ill. Brit. Ent. Haust. ii. p. 14 (1828); Walker, List Lepid. Ins. Brit. Mus. v. p. 1081 (1855).

Euphragis, Hübner, Verz. bek. Schmett. p. 194 (1822).

Diloba, Boisduval, Gen. Ind. Meth. p. 88 (1840).

This is a small genus of rather doubtful position, being placed by some entomologists with the *Noctuæ*. The body is stout, with the thorax slightly crested, with lateral fasciæ, and the abdomen, which extends a little beyond the hind-wings, is tufted at the extremity. The antennæ are pectinated to the tips in the male, and the legs and palpi are very hairy; the hind tibiæ are armed with four spurs. Wings long and rather narrow, with the hind margin rounded.

THE FIGURE OF EIGHT MOTH. HETEROMORPHA CÆRULEOCEPHALA.

Bombyx cæruleocephala, Linnæus, Syst. Nat. (ed. x.) i. p. 504, no. 38 (1758); id. Faun. Suec. p. 296 (1761); Esper, Schmett. iii. p. 288, Taf. 58, figs. 1–4 (1786); Hübner, Eur. Schmett. iii. fig. 196 (1800 ?).

Episema cæruleocephala, Treitschke, Schmett. Eur. v. (1) p. 112 (1825); Stephens, Ill. Brit. Ent. Haust. ii. p. 15 (1828).

Noctua cæruleocephala, Godart, Lépid. France, vi. p. 187, pl. 85, fig. 1 (1826).

Diloba cæruleocephala, Kirby, Eur. Butterflies and Moths, p. 146 (1880); Buckler, Larvæ of Brit. Lepid. iii. p. 1, pl. 36, fig. 1 (1889); Barrett, Lepid. Brit. Isl. iii. p. 175, pl. 115, figs. 2, 2*a–d* (1895).

Heteromorpha cæruleocephala, Kirby, Cat. Lepid. Heter. i. p. 585 (1892).

This pretty species is an inhabitant of Europe and Western

Asia, and is a common British species. It expands 1½ inch or a little less.

The fore-wings are bluish-grey, with two zig-zag lines running across the middle, and diverging above. Between these is a conspicuous greenish-white spot, composed of three connected parts. In addition to the lines already mentioned there is a faint lunule above, edged with brown, and a black sagitt ate streak below. The hind-wings are generally whitish in the male. In the female the nervures are more heavily dusted, and there is a larger lunule. At the anal angle there is a black spot. The fringes of the fore-wings are light brown, edged with darker, and those of the hind-wings silvery-grey, edged with darker. The thorax is grey, and the abdomen brown, slender, with a long anal tuft in the male; stout with woolly hair in the female.

The Figure of Eight Moth.

The larva is yellowish-green with black tubercles, each bearing a single hair. On the back is a broad pale yellow stripe, and on each side a narrower one of the same colour. The head is bluish, with two round black spots. When young the larva is paler, and when it is approaching full growth it becomes bluish.

It feeds on almond tree, white-thorn, black-thorn, and various fruit-trees. It is generally solitary, but sometimes appears in such large numbers on the Continent as to cause considerable damage.

When about to pupate it forms a firm, narrow cocoon, with fragments of bark, splinters, or moss. It is oval, and the threads are white.

The pupa is reddish-brown, and very small in comparison to the larva.

GENUS CERURA.

Cerura, Schrank, Fauna Boica, ii. (2) p. 155 (1802); Latreille, Gen. Crust. Ins. iv. p. 219 (1809); Stephens, Ill. Brit. Ent. Haust. ii. p. 15 (1828); Walker, List Lepid. Ins. Brit. Mus. v. p. 982 (1855).

Andria, Hübner, Tentamen, p. 1 (1810?).

Harpyia, Ochsenheimer, Schmett. Eur. iii. p. 19 (1810); Hübner, Verz. bek. Schmett. p. 148 (1822?); Moore, Lepid. Ceyl. ii. p. 108 (1883).

Pania, Dalman, Anal. Ent. p. 92 (1823).

Dicranura, Boisduval, Ind. Meth. p. 54 (1829).

Cerura includes several species with white, rather thinly-scaled, wings, with dark transverse or zig-zag markings, stout woolly bodies, extending beyond the hind-wings, antennæ pectinated in both sexes, and two small terminal spurs on the hind tibiæ. The largest, and also the commonest, of our British species is called the "Puss-Moth," and the smaller species are known as the "Kittens." The larvæ are green, varied with purplish-brown, truncate in front, with an elevation on the third segment, and the anal claspers modified into long processes enclosing retractile filaments. The pupa is enclosed in a hard cocoon. The species are rather numerous in the Northern Hemisphere.

THE ALDER KITTEN. CERURA BICUSPIS.

Bombyx bicuspis, Borkhausen, Eur. Schmett. iii. p. 380, no. 141 (1790); Hübner, Eur. Schmett. iii. fig. 36 (1800); Freyer, Neu. Beitr. iv. p. 131, Taf. 363 (1841).

Harpyia bicuspis, Ochsenheimer, Schmett. Eur. iii. p. 26 (1810); Duponchel, Lépid. France, p. 128, pl. 12, fig. 3 (1836).

Cerura bicuspis, Kirby, Eur. Butterflies and Moths, p. 136 (1880); Buckler, Larvæ of Brit. Lepid. ii. pp. 62, 137, pl. 32, fig. 1 (1887); Barrett, Lepid. Brit. Isl. iii. p. 83, pl. 100, figs. 3, 3*a–c*, pl. 101, fig. 1 (1895).

The Alder Kitten is found in most parts of Europe. It measures rather less than 1¾ inch across the wings.

It is white, the fore-wings with a dark grey band before the middle, irregularly concave on both sides. This has to be distinguished from two other very similar British species, namely,

The Alder Kitten.

C. hermelina, Goeze (The Poplar Kitten) and *C. furcula* (The Sallow Kitten). All have a dark grey thorax, with a whitish-grey collar, and orange transverse streaks or spots, and light or dark grey borders to the lighter abdomen. On the fore-wings is a whitish basal area, with a transverse row of black dots, a dark grey band bordered first with black and then with orange, reaching to the middle of the wing, and between this and the hind margin two or three deeply dentated dark transverse lines, the last of which is dusted with orange. The hind-wings are white in the male, pale grey in the female, with a faint band in front of the hind margin.

In *C. bicuspis*, the white of the ground-colour is clearer than

in the others, the dark band is concave on both sides, and much attenuated in the middle. It is pure blackish-grey, not dusted with orange, and the black border is only slightly marked.

The larva is pale green, with a yellowish-brown head. On the second segment commences a large reddish-brown spot, bordered with white on the sides, and shaped like a pyramid or triangle, with the sides longer than the base. On the third segment it ends in a small button-like elevation. The dorsal line commences on the fifth segment, and is not joined to the triangular mark already mentioned. It is also reddish-brown, and is pointed in front, expanding gradually till the eighth segment, where it widens out so much as to extend laterally down to the spiracle. It then narrows again till the twelfth segment, where it slightly expands, and terminates between the caudal processes, which are long and spiny, in a shining black plate. This dorsal line is bordered with a white line, broken on the eighth segment, and is spotted with yellowish on the sides of the sixth and eighth segments. It feeds on birch and alder.

Larva of Alder Kitten.

The pupa is brown, and is contained in a hard, firm cocoon.

This species is widely distributed in England, but is scarce in collections, owing rather to the difficulty of finding it than to its actual rarity. Its cocoons are almost invisible, from their

resemblance to the surrounding bark, till after the Moth has emerged; this is usually the case in *Cerura* and allied genera of *Notodontidæ*.

THE SALLOW KITTEN. CERURA FURCULA.

Bombyx furcula, Clerck, Icones, pl. 9, fig. 9 (1759); Linnæus, Faun. Suec. p. 298 (1761); Esper, Schmett. iii. p. 102, Taf. 19, figs. 3, 4 (1784); Hübner, Eur. Schmett. iii. fig. 39 (1800); Godart, Lépid. France, iv. p. 136, pl. 16, fig. 2 (1822).

Harpyia furcula, Ochsenheimer, Schmett. Eur. iii. p. 32 (1810).

Cerura furcula, Stephens, Ill. Brit. Ent. Haust. ii. p. 17 (1828); Kirby, Eur. Butterflies and Moths, p. 136 (1880); Buckler, Larvæ of Brit. Lepid. ii. p. 137, pl. 32, fig. 2 (1887); Barrett, Lepid. Brit. Isl. iii. p. 86, pl. 101, figs. 2, 2*a–d* (1895).

Dicranura furcula, Duponchel, Lépid. France, Suppl. iii. p. 128, pl. 12, fig. 4 (1836).

This species, like *C. bicuspis*, is found only in Europe. It expands from 1¼ to 1½ inch.

The Sallow Kitten.

It is light grey with a dark grey transverse band on the fore-wings, suffused with orange, straight on the inner side, and irregularly excavated on the outer sides.

The larva is yellowish-green, dotted here and there with reddish and dark green. The cervical and dorsal spots are connected, and are usually violet, spotted with red and yellow. The former is pyramidal, ending in a blunt cone, and margined with yellow. The dorsal spot is very variable, and is sometimes of a rich rosy red. It has a darker central line, and is shaded with darker, especially on the sides of the seventh and

Larva of Sallow Kitten.

eighth segments, where it is excavated, and the yellow margin is interrupted. A few small black spots may be seen in front of it on the seventh and eleventh segments. The caudal filaments are ringed with yellow and brown. It feeds on sallow.

The pupa is light brown with greenish wing-cases, and the cocoon is made with chips of wood.

This is a much commoner species in England than the last, which it greatly resembles.

THE POPLAR KITTEN. CERURA HERMELINA.

Noctua hermelina, Goeze, Beytr. Ins. iii. (3) p. 227, no. 25 (1781).

Bombyx furcula, Esper, Schmett. iii. p. 104, Taf. 19, figs. 5–7 (1784).

Bombyx bifida, Brahm in Fuessly, Neues Mag. iii. p. 161 (1786); Borkhausen, Eur. Schmett. iii. p. 374, no. 139 (1788); Hübner, Eur. Schmett. iii, fig. 38 (1800).

Harpyia bifida, Ochsenheimer, Schmett. Eur. iii. p. 29 (1810).
Cerura bifida, Stephens, Ill. Brit. Ent. Haust. ii. p. 19, pl. 15, fig. 2 (1828); Kirby, Eur. Butterflies and Moths, p. 136, pl. 30, fig. 6 (1880); Buckler, Larvæ of Brit. Lepid. ii. p. 141, pl. 32, fig. 3 (1887); Barrett, Lepid. Brit. Isl. iii. p. 90, pl. 101, figs. 3, 3*a*, *b* (1895).
Dicranura furcula (*nec* Clerck), Boisduval, Icones, pl. 70, fig. 2 (1834 ?).

This species has a somewhat wider range than the last, extending beyond Europe into Northern Asia.

It expands about 1¾ inch.

It is white or greyish-white, with a dark grey transverse band on the fore-wings, with a straight inner and concave outer border. It is usually not so white as *C. bicuspis*, but is dusted with grey, especially in the female.

The larva is bright green, with a shining reddish-grey, retractile, head. On the neck is a spot having the shape of a truncated pyramid, of a violet colour with a waved border, first

The Poplar Kitten.

reddish-brown, and then yellow. It extends to the end of the third segment, and is divided by a whitish longitudinal line, near which stand several whitish dots. The dorsal spot begins at the end of the fourth segment, and is not connected with that on the neck. It is violet-brown, spotted with yellow on the sides, especially on the eighth segment, and defined by

1

2

3

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1. *Cerura vinula.*
2. *" " larva.*
3. *Phalera bucephala.*

a line which is first dark reddish-brown, and afterwards yellow. Along the middle passes a line, and on both sides of this are dots darker than the ground-colour. On the last segment are two whitish crescentic spots with the convexity outwards. The whole of the body is covered with delicate

Larva of Poplar Kitten.

yellow spots ringed with violet, and the spiracles are also yellow with a dark reddish-brown ring. The filaments are light green tipped with red, and between them are two stiff black spines. It feeds on poplar. The pupa is light brown, with a case formed of chips of wood held together with silk.

THE PUSS-MOTH. CERURA VINULA.

(*Plate XCIV. Fig.* 1 (*imago*), 2 (*larva*).)

Bombyx vinula, Linnæus, Syst. Nat. (ed. x.) i. p. 499, no. 16 (1758); id. Faun. Suec. p. 294 (1761); Esper, Schmett. iii. p. 95, Taf. 18, figs. 1–7 (1784); Hübner, Eur. Schmett. iii. figs. 34, 34° (1800–1841); Godart, Lépid. France, iv. p. 160, pl. 15, fig. 23 (1822).

Bombyx gnoma, Fabricius, Gen. Ins. p. 279 (1777).

Cerura vinula, Stephens, Ill. Brit. Ent. Haust. ii. p. 19 (1828); Kirby, Eur. Butterflies and Moths, p. 136, pl. 30, figs. 4, *a–c* (1880); Buckler, Larvæ of Brit. Lepid. ii. p. 143, pl. 32, fig. 4 (1887); Barrett, Lepid. Brit. Isl. iii. p. 93, pl. 102 " (1895).

The Puss-Moth is common throughout Europe and Northern

and Western Asia. The female expands about three inches, the male somewhat less.

It is light grey with numerous blackish transverse lines, fewest towards the base, most marked and zig-zag towards the hind margin. The hind-wings are almost white in the male, grey in the female. The thorax has two pairs of large black spots; it is slightly tinged with greenish. The abdomen is grey with two black dorsal longitudinal lines. The tarsi are black, ringed with white.

The larva of this insect is one of the most curious found in this country, and its form and attitudes are so grotesque that it rarely fails to attract the notice even of the most indifferent

The Puss-Moth (Male).

observers. When at rest it holds its large and singular-looking head somewhat raised and drawn back upon the front segments of the body like the larva of a *Sphinx*, and the tail is held erect at the same time. Its threatening aspect has sometimes inspired most ludicrous notions of its powers of doing mischief, as in the instance quoted by Dr. Shaw from a country newspaper, where it is described as a monster with a head like a lion, jaws like a shark, a horn like an unicorn, and two tremendous stings in its tail. Isaac Walton in the "Angler," chap. v., gives following quaint account of this larva:—

"The very colours of caterpillars, as one has observed, are elegant and beautiful. I shall, for a taste of the rest, describe one of them; which I will, some time the next month, show you feeding on a willow-tree; and you shall find him punctually to answer this very description: his lips and mouth somewhat yellow; his eyes black as jet; his forehead purple; his feet and hinder parts green; his tail two-forked and black; the whole body stained with a kind of red spots, which run along the neck and shoulder-blade, not unlike the form of St. Andrew's Cross, or the letter X made thus crosswise ×, and a white line drawn down his back to his tail; all which add much beauty to his body. And it is to me observable, that at a fixed age, this caterpillar gives over to eat, and towards winter comes to be covered over with a strange shell or crust called an *aurelia*; and so lives a kind of dead life, without eating all the winter. And as others of several kinds turn to be several kinds of flies and vermin the spring following, so this caterpillar then turns to be a painted butterfly."

The two-forked tail alluded to, which is peculiar to the Puss-Moth larva and two or three others, is thus described by Kirby and Spence (Introduction to Entomology, iii. p. 150):—

"This horn-like appendage is composed of two distinct cylindrical diverging branches, each about four lines long, not united at the base. Each of these is hollow, and includes a smaller cylindrical piece, which can be protruded at pleasure, and withdrawn again, as a pencil within its case; or, rather, as the horns of a snail. The two outer horns are tolerably firm, movable at their base, and beset with black spines; the interior tentacula are fleshy, movable in every direction, and in full-grown larvæ of a rose-colour. The animal seldom protrudes them, unless in some way disturbed; and frequently it approximates the outer cases so closely that they resemble a single horn. It appears to use these inner horns, when protruded,

as a kind of whip to drive away the flies, especially the Ichneumons, that alight upon its body. When touched in any place, it will unsheath one of them, and sometimes both, and with them strike the place where it is incommoded."

The cocoon is very strong, being composed of bits of wood, united by an adhesive kind of gummy material.

There is an European species, very similar to this, but whiter, and with fewer markings, which has sometimes been stated to have been found in England. This is *C. erminea*, Esper; but it is doubtful whether the supposed British specimens may not have been mere varieties of *C. vinula*.

GENUS THAUMATOPŒA.

Thaumatopœa, Hübner, Verz. bek. Schmett. p. 185 (1822?).
Cnethocampa, Stephens, Ill. Brit. Ent. Haust. ii. p. 46 (1828); Walker, List Lepid. Ins. Brit. Mus. v. p. 1039 (1855).
Thaumatocampa, Wallengren, Skand. Heter. ii. p. 158 (1871).

Thaumatopœa, which is referred by some authors to the *Notodontidæ*, and by others to the *Lasiocampidæ*, has rather short antennæ, bipectinated to the tip in the males, the body stout and pilose, tufted at the extremity, and not extending much beyond the hind-wings; wings rather short, broad, rounded at the extremities, and rather thinly scaled; the fore-wings not much longer than the hind-wings; legs pilose; hind tibiæ with two small apical spurs.

This genus includes several European species, two of which have been erroneously reputed British. The larvæ are remarkable for their gregarious habits; they are cylindrical and hairy, and form large nests on trees, from which they march out in regular order in search of food, whence they are called Processionary Caterpillars. They are also remarkable for the terribly urticating properties of their hairs, which,

becoming detached, are blown about by the wind, and are said to render it dangerous to approach their nests.

"The larvæ, when first hatched, construct a temporary nest for themselves on the branches of the oak, and change their situation from time to time, until they are about two-thirds grown, when the entire brood unite in forming a general nest on the trunk; this nest, when completed, is about eighteen inches long, six broad, and composed of grey silk, resembling the surface of the tree; but the most curious fact in their history is the extraordinary regularity with which the larvæ proceed, towards sunset, in search of food; at their head is a chief, by whose movements their procession appears regulated; he is followed by three or four in a single line, the head of the second touching the tail of the first, &c.; then comes an equal series of pairs, next of threes, and so on as far as fifteen or twenty, forming a band several feet in length; sometimes the order is rather different, the leader being followed by two, then three, four, and so on; but at all times the procession moves on at an even pace, each file treading upon the steps of those that precede it, through all the sinuosities made by the chief. They do not invariably return to their nest before morning, but may sometimes be found during the day assembled in irregular masses, heaped upon each other." (*Stephens.*)

The Moths themselves are rather small and obscurely coloured; we append an account of the commonest and best-known species.

THE PROCESSIONARY MOTH. THAUMATOPŒA PROCESSIONEA.

Bombyx processionea, Linnæus, Syst. Nat. (ed. x.) i. p. 500, no. 21 (1758); i. (2) p. 819, no. 37 (1767); Esper, Schmett. iii. p. 150, Taf. 29, figs. 1–5 (1785); Hübner, Eur. Schmett. iii. figs. 159, 160 (1880?); Godart, Lépid. France, iv. p. 126, pl. 12, figs. 5, 6 (1822).

Gastropacha processionea, Ochsenheimer, Schmett. Eur. iii. p. 280 (1810).

Cnethocampa processionea, Stephens, Ill. Brit. Ent. Haust. ii. p. 47, note (1828); Kirby, Eur. Butterflies and Moths, p. 133, pl. 24, figs. 7, 7*a*–*b* (1880).

This species is common in many parts of Europe, but is not found in the British Isles. It expands from 1 to 1¼ inch.

It has light brown antennæ, an ashy-grey head and thorax, and a brownish abdomen with a blackish-brown anal tuft. The fore-wings are ashy-grey, clouded with darker. At the base is a blackish-grey waved transverse line, then comes another nearly straight, and a third, which is somewhat waved, approaches the second at the inner margin. Between these two lines is often a blackish spot. The hind-wings are whitish with a faint blackish-grey transverse stripe, which is sometimes broader at the anal angle. The fringes are chequered with dark and light grey.

The eggs are yellowish-white, with a blackish central dot, and are covered by the female with the anal hairs.

The larva is covered with whitish-grey hair, bluish-black on the back and whitish on the sides, with two tubercles on each segment, bearing reddish-yellow or pale grey hairs. It feeds on oak from May till the beginning of July.

The pupa is ochre-yellow, with two short terminal points, and is enclosed in a firm reddish-brown cocoon, in which the hairs of the larva are interwoven.

The Moth usually emerges in about four or five weeks, but may remain in pupa till the following year.

GENUS GLUPHISIA.

Gluphisia, Boisduval, Ind. Meth. p. 56 (1829); id. Gen. Ind. Meth. p. 88 (1840); Walker, List Lepid. Ins. Brit. Mus. v. p. 1037 (1855).

In *Gluphisia*, the antennæ of the male are pectinated to the tip, the body is moderately stout and hairy, and does not extend beyond the hind-wings, the wings are long, and the costa of the fore-wings is nearly straight, the apex moderately pointed, and the hind margin obliquely rounded; the legs are pilose, and the hind tibiæ are armed with a pair of short apical spurs; the larva is smooth, without protuberances.

The only European species is very rare in England. Several species of this genus are recorded as occurring in the United States.

THE DUSKY MARBLED BROWN. GLUPHISIA CRENATA.

Bombyx crenata, Esper, Schmett. iii. p. 245, Taf. 47, figs. 3, 4 (1785); Godart, Lépid. France, iv. p. 214, pl. 20, fig. 4 (1822).

Bombyx rurea, Fabricius, Mant. Ins. ii. p. 164, no. 67 (1787).

Bombyx crenosa, Hübner, Eur. Schmett. iii. fig. 12 (1800).

Notodonta crenosa, Ochsenheimer, Schmett. Eur. iii. p. 79 (1810); Herrich-Schäffer, Eur. Schmett. ii. p. 117, no. 7, fig. 124 (1846).

Gluphisia crenata, Kirby, Eur. Butterflies and Moths, p. 140 (1880); Buckler, Larvæ of Brit. Lepid. ii. p. 80, pl. 34, fig. 6 (1887); Barrett, Lepid. Brit. Isl. iii. p. 152, pl. 112, figs. 1, 1*a*, *b* (1895).

This Moth is found in many parts of Europe.

It expands about 1¼ inch.

The fore-wings are broad, and scarcely dentated on the inner margin; they are ashy-grey varied with white and yellowish-brown. Two blackish transverse lines, edged with whitish on the sides remote from one another, bound the paler central area, in which is a faint yellowish lunule. Between the outer of these and the hind margin runs a third line, edged with white on the inner side. The space between these lines is dark ashy-grey.

The hind-wings are pale ashy-grey, shaded with blackish-brown on the hind margin, with a faint dark mark at the anal angle, divided by a small whitish streak. All the fringes are ashy-grey chequered with whitish.

The Dusky Marbled Brown.

The larva is smooth, green, with a pale dorsal line and yellow lateral lines. On the back are several pairs of rusty red marks.

It feeds on poplar (*Populus nigra*).

The pupa is shining brownish-black, and is enclosed in a dull yellow cocoon between leaves.

GENUS HOPLITIS.

Hoplitis, Hübner, Verz. bek. Schmett. p. 147 (1822 ?); Walker, List Lepid. Ins. Brit. Mus. v. p. 989 (1855).

Hybocampa, Lederer, Verh. zool.-bot. Ges. Wien, ii. p. 78 (1853).

The type of this genus is a very conspicuous European Moth, which does not occur in England.

The body is stout, very pilose, and longer than the hind-wings; the antennæ are pectinated nearly to the tips in the

male, and there are large lateral crests on the thorax, and lateral and terminal tufts at the extremity of the abdomen. The wings are long and narrow, the costa and hind margin of the fore-wings converging, and rounding off the apex of the wing. The legs are pilose, and armed with small apical spurs. The cocoon resembles that of *Cerura*.

HOPLITIS MILHAUSERI.

Bombyx milhauseri, Fabricius, Syst. Ent. p. 577, no. 70 (1775); Esper, Schmett. iii. p. 108, Taf. 21 (1784).
Bombyx vidua, Knoch, Beitr. Ins. i. p. 48, no. 9, Taf. 3, fig. 3 (1781).
Bombyx terrifica, Borkhausen, Eur. Schmett. iii. p. 387, no. 144 (1790); Hübner, Eur. Schmett. iii. figs. 32, 33 (1800); Godart, Lépid. France, iv. p. 176, pl. 16, fig. 4 (1822).
Harpyia milhauseri, Ochsenheimer, Schmett. Eur. iii. p. 41 (1810).
Hybocampa milhauseri, Kirby, Eur. Butterflies and Moths, p. 137, pl. 30, fig. 7, *a*, *b* (1880).
Hoplitis milhauseri, Kirby, Cat. Lepid. Heter. i. p. 595 (1892).

This species is found in many parts of Europe.

It expands about 1½ inch.

The fore-wings are whitish-grey with blackish nervures, and are shaded with dark grey on the hind margin. The inner margin is [illegible]dly, and the costa before the middle and tip more narrowly, blackish. The central shade and the posterior transverse line are indicated. The space between these is pale yellow and divides the blackish inner margin. The hind-wings are white, with a black spot towards the anal angle.

The larva is green, when full grown, roughly shagreened and mottled with yellow. It has a red head. On each of the

middle segments is a pointed red elevation, the first of which is forked.

The last segment, which is held erect, consists of a quadrilateral, somewhat convex plate, and has in the middle a brownish-yellow spot margined with deep yellow.

Larva of *Hoplitis milhauseri*.

The anal claspers are replaced by two short spines. On each side of the middle segments is an oblique elongated flesh-coloured spot.

If feeds on oak, elm, birch, poplar, &c.

The cocoon is placed in the crevices of the bark, and resembles it so much, being made with fragments of lichen, that it is almost impossible to find it before the Moth has emerged.

The pupa is dark brown, with the back and wing-cases black.

GENUS PTEROSTOMA.

Pterostoma, Germar, Syst. Gloss. Prodr. ii. p. 42 (1812); Walker, List Lepid. Ins. Brit. Mus. v. p. 1005 (1855).
Ptilodontis, Stephens, Ill. Brit. Ent. Haust. ii. p. 28 (1828).
Orthorinia, Boisduval, Ind. Meth. p. 56 (1829).

This is one of the most distinct genera in the whole family; the antennæ are very broadly pectinated to the tip in the male, less broadly in the female; the palpi are very long, projecting, and obliquely curved upwards; the body is moderately stout, very long, and tufted at the extremity, the tuft bifid in the

male; the wings are long and rather broad, the fore-wings with the hind margin denticulated, and the inner margin furnished with two reversed tufts of long scales, the basal one the longest; the hind tibiæ are armed with four long spurs. The larva is naked without protuberances, but with a very pointed head; the pupa is subterranean.

THE PALE PROMINENT. PTEROSTOMA PALPINUM.

Bombyx palpina, Clerck, Icones, pl. 9, fig. 8 (1759); Linnæus, Faun. Suec. p. 305 (1761); Roemer, Gen. Ins. pl. 36, fig. 21 (1785); Esper, Schmett. iii. p. 315, Taf. 63, figs. 1–4 (1786); Hübner, Eur. Schmett. iii. fig. 16 (1800); Godart, Lépid. France, iv. p. 203, pl. 19, figs. 3, 4 (1822).

Notodonta palpina, Ochsenheimer, Schmett. Eur. iii. p. 69 (1810).

Ptilodontis palpina, Stephens, Ill. Brit. Ent. Haust. ii. p. 28 (1828).

Pterostoma palpina, Kirby, Eur. Butterflies and Moths, p. 138, pl. 31, fig. 2 (1880); Buckler, Larvæ of Brit. Lepid. ii. p. 154, pl. 34, fig. 1 (1887); Barrett, Lepid. Brit. Isl. iii. p. 145, pl. 111, figs. 1, 1*a–c* (1895).

This European species measures from 1¾ to 2 inches across the wings.

The palpi are long and prominent. The antennæ have a whitish shaft with dark brown branches, and are strongly pectinated in the male. The body is yellowish-grey, with a divided anal tuft in the male.

The fore-wings are broad, dentated and yellowish, varied with whitish-grey, with darker sinuous streaks and yellowish dots on the nervures. The hind-wings are brownish-grey in the male, lighter in the female, with a yellowish zig-zag transverse band.

The larva is slender, bluish-green, with a few paler longitudinal

lines and a yellow lateral line, generally dotted with red, which runs above the legs. The head is flattened, and is kept extended when the creature is at rest. It feeds on willows,

The Pale Prominent.

poplars, lime (*Tilia europæa*), &c. The pupa is reddish-brown, and the cocoon is formed of loose earth and greyish silk.

The Moth is not very scarce in England.

GENUS PTILOPHORA.

Ptilophora, Stephens, Ill. Brit. Ent. Haust. ii. p. 29 (1828); Walker, List Lepid. Ins. Brit. Mus. v. p. 1097 (1855).

This is another very distinct genus, though with but little resemblance to the last, except in the very broadly pectinated antennæ of the male; those of the female are simple. The body is pilose, and slightly tufted at the extremity in the male; the abdomen extends somewhat beyond the hind-wings. The fore-wings are long, broad, and rather pointed at the tips; and the hind margin is slightly denticulated. The wings are slightly transparent; the legs are short and downy, and the hind tibiæ are armed with two small apical spurs. The greatest contrast which this genus present to *Pterostoma* is in its palpi. In *Pterostoma* these organs are of quite unusual length for one of the *Notodontidæ*, in which Family they are

frequently very small; but in *Ptilophora* they are extremely minute, and concealed by the surrounding hairs.

THE FEATHERED PROMINENT. PTILOPHORA PLUMIGERA.

Bombyx plumigera, Esper, Schmett. iii. p. 254, Taf. 50, figs. 6, 7 (1785); Hübner, Eur. Schmett. iii. figs. 13, 250 (1800); Godart, Lépid. France, iv. p. 205 (1822).

Bombyx variegata, De Villers, Linn. Ent. ii. p. 60, no. 85 (1789).

Geometra contiguaria, Esper, Schmett. v. p. 267, Taf. 47, figs. 1, 2 (1794).

Notodonta plumigera, Ochsenheimer, Schmett. Eur. iii. p. 71 (1810).

Ptilophora variegata, Stephens, Ill. Brit. Ent. Haust. ii. p. 29 pl. 14, fig. 1 (1828).

Ptilophora plumigera, Kirby, Eur. Butterflies and Moths, p. 138, pl. 30, fig. 9 (1880); Buckler, Larvæ of Brit. Lepid. ii. pp. 73, 156, pl. 34, fig. 2 (1887); Barrett, Lepid. Brit. Isl. iii. p. 149, pl. 111, figs. 2, 2*a–e* (1895).

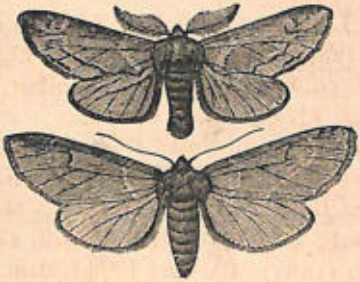
This species is found in most parts of Europe, but is a rarity in Britain. It expands about 1½ inch.

The antennæ are very strongly pectinated in the male, but hardly at all in the female. The head and body are thickly covered with rust-coloured hair. The wings are thinly scaled, ochre-yellow, shaded with brown, or reddish-brown varied with grey, with a light yellow curved line and blackish nervures. The whole of the inner margin is thickly hairy. The female is darker, sometimes ashy-grey, with less distinct markings and narrower wings. The hind-wings are light or dark brownish-grey, and somewhat transparent.

Variations in the ground-colour and in the intensity of the markings are of frequent occurrence.

The larva has a rather large, shining, yellowish-green head,

bifid above. Its body is yellowish-green, darker on the sides, with a bluish dorsal line and three fine whitish lateral ones, the two lowest being above the legs, and close together.



The Feathered Prominent.

It feeds on maple, beech, and sallow.

The pupa is dark brown, and is enclosed in an oval earthen cocoon.

GENUS NOTODONTA.

Notodonta, Ochsenheimer, Schmett. Eur. iii. p. 45 (1810); Hübner, Verz. bek. Schmett. p. 146 (1822?); Stephens, Ill. Brit. Ent. Haust. ii. p. 22 (1828); Curtis, Brit. Ent. xiv. pl. 739 (1839); Walker, List Lepid. Ins. Brit. Mus. v. p. 995 (1855).

Peridea, Stephens, Ill. Brit. Ent. Haust. ii. p. 32 (1828).

In *Notodonta* the antennæ are slightly pectinated to the tips. In the males, the body is stout, pubescent, and rather long, extending beyond the hind-wings; the fore-wings are long, moderately broad, with the hind margin oblique and rounded, and a very conspicuous tooth on the inner margin. The hind tibiæ are armed with four long spurs. The larva is naked, with humps on the back, and the pupa is subterranean. There

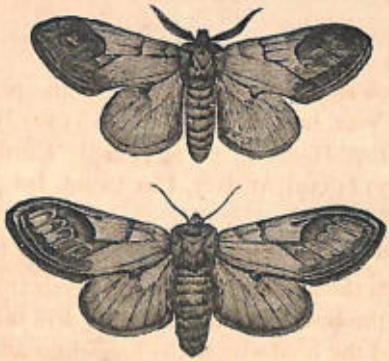
are several European species, some of which occur in England.

THE PEBBLE PROMINENT. NOTODONTA ZICZAC.

Bombyx ziczac, Linnæus, Syst. Nat. (ed. x.) i. p. 504, no. 39 (1758); id. Faun. Suec. p. 296 (1761); Esper, Schmett. iii. p. 293, Taf. 59, figs. 1–4 (1786); Godart, Lépid. France, iv. p. 182, pl. 17, figs. 3, 4 (1822?).

Notodonta ziczac, Ochsenheimer, Schmett. Eur. iii. p. 48 (1810); Stephens, Ill. Brit. Ent. Haust. ii. p. 23 (1828); Kirby, Eur. Butterflies and Moths, p. 143, pl. 31, fig. 9, *a–d* (1880); Buckler, Larvæ of Brit. Lepid. ii. p. 152, pl. 33, fig. 4 (1887); Barrett, Lepid. Brit. Isl. iii. p. 111, pl. 105 (1895).

The Pebble Prominent is a common European Moth. It expands from 1½ to 1¾ inch.



The Pebble Prominent.

The colour is pale yellowish-brown; the fore-wings with the costa reddish-white, especially broad and light in the cen-

tral area, and with a very large dark rusty-brown central lunule. Near the apex is a rusty-brown longitudinal streak. The transverse lines are indistinct on the inner margin. The sub-marginal line is close to the hind margin, and parallel to it, and is dentate on the inner side on the nervures, and suffused with rusty-brown. The hind-wings are pale reddish-grey, lighter in the male, with a dark central lunule and anal angle, and a light transverse curved line.

The larva has the anterior segments slender, becoming stouter behind. The head is heart-shaped. On both the sixth and seventh segments is a large rounded hump, tipped with reddish-brown, and on the eighth a smaller one, often hardly

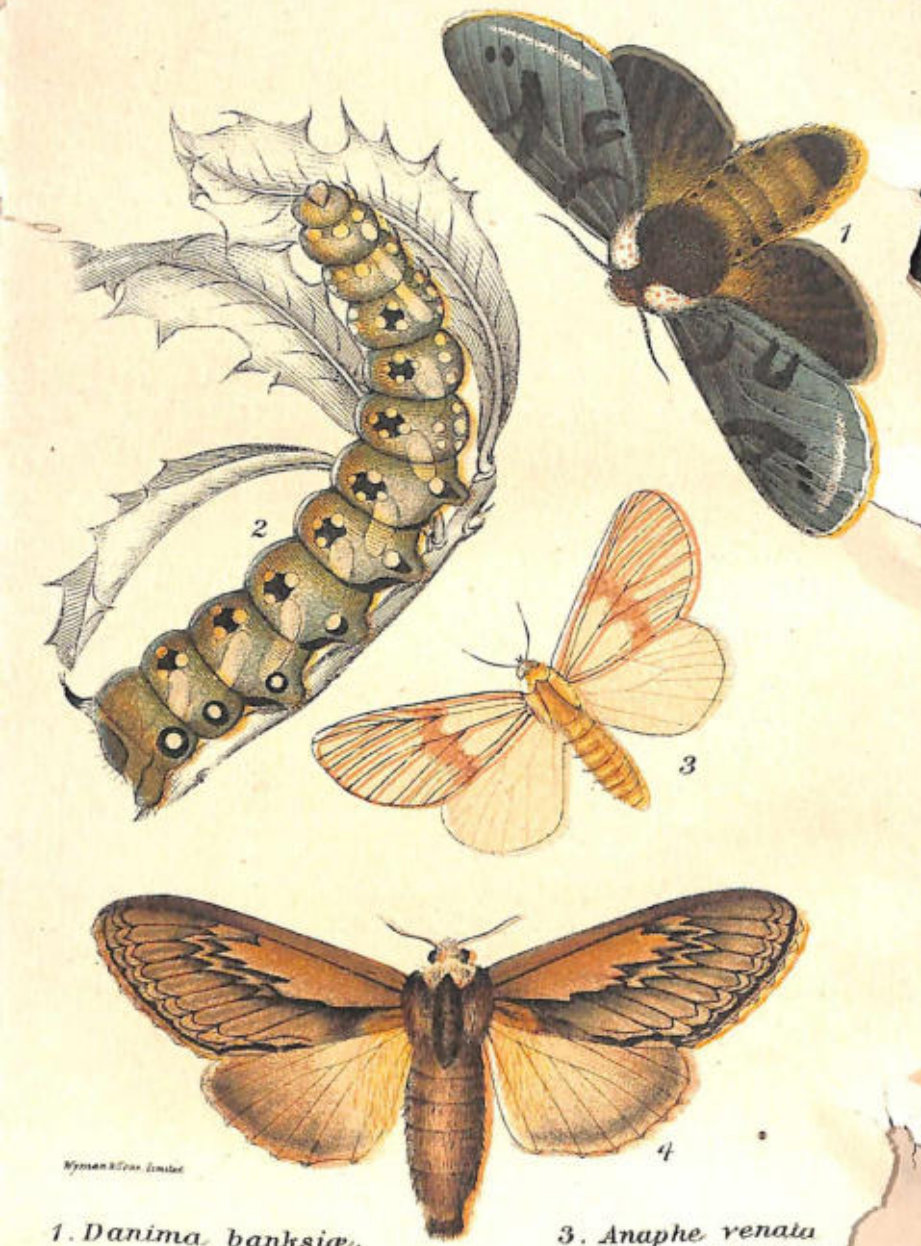
Larva of the Pebble Prominent.

perceptible. The ground-colour is reddish violet, reddish-brown, or rose-coloured, varied with whitish. Between the head and the first hump is a brownish-red median line. The two last segments have a rounded elevation, and are spotted with reddish-yellow.

The pupa is reddish-brown, with two terminal spines, and is placed in a strong cocoon, between leaves or on the ground.

THE GREAT PROMINENT. NOTODONTA ANCEPS.

Noctua anceps, Goeze, Beytr. Ins. iii. (3) p. 207, no. 66 (1781).
Bombyx trepida, Esper, Schmett. iii. p. 284, Taf. 57 (1786).



1. *Danima banksiæ.*
2. *" " larva.*
3. *Anaphe venata*
4. *Braura lignicla*

Bombyx serrata, Thunberg, Diss. Ins. Suec. iii. p. 60 (1792).

Bombyx tremula, Hübner, Eur. Schmett. iii. fig. 30 (1800); Godart, Lépid. France, iv. p. 222, pl. 21, fig. 2 (1822).

Notodonta trepida, Ochsenheimer, Schmett. Eur. iii. p. 86 (1810); Barrett, Lepid. Brit. Isl. iii. p. 118, pl. 106, figs. 2, 2*a*, *b* (1895).

Peridea serrata, Stephens, Ill. Brit. Ent. Haust. ii. p. 33 (1828).

Notodonta tremula, Treitschke, Schmett. Eur. x. (1) p. 156 (1834).

Peridea trepida, Kirby, Eur. Butterflies and Moths, p. 142 (1880); Buckler, Larvæ of Brit. Lepid. iii. p. 9, pl. 36, fig. 4 (1889).

This species is found in most parts of Europe. It expands from 2 to 2½ inches.

The fore-wings are yellowish, varied with grey, with three rusty-brown zig-zag transverse stripes, the outer of which is hardly perceptible in the middle. In front of the hind margin is a curved series of rusty-brown elongated spots bordered with yellow, and in front of the fringes a similarly coloured stripe. In the middle of the wing is a rusty-brown lunule bordered with yellow. The hind-wings are yellowish-white, margined with dark brown, and suffused with ashy-grey on the costa.

The full-grown larva is smooth, yellowish-green, with two white dorsal lines and an oblique red lateral stripe on each segment edged with yellow. It feeds on oak (*Quercus robur* and *Q. ilex*).

It forms a cocoon of earth bound together with silk, and changes into a blackish pupa with lighter incisions.

This is a widely-distributed species in the British Islands, but is seldom common with us.

THE THREE-HUMPED PROMINENT. NOTODONTA TRITOPHUS.

Bombyx tritophus, Esper, Schmett. iii. p. 299, Taf. 60, figs. 1, 2 (1786); Hübner, Eur. Schmett. iii. fig. 29 (1800).

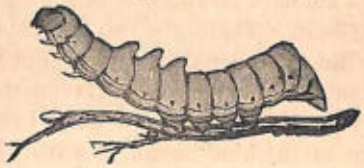
Bombyx dodonæa, Scriba, Beitr. Ins. ii. p. 77, Taf. 7, figs. 6, 7 (1791).

Bombyx torva, Hübner, Eur. Schmett. iii. Text, p. 108 (1800); Godart, Lépid. France, iv. p. 185, pl. 17, fig. 5 (1822).

Notodonta tritophus, Kirby, Eur. Butterflies and Moths, p. 142, pl. 31, fig. 8 (1880); Buckler, Larvæ of Brit. Lepid. ii. p. 72, pl. 33, fig. 3 (1887); Barrett, Lepid. Brit. Isl. iii. p. 115, pl. 106, figs. 1, 1*a*, *b* (1895).

The Three-Humped Prominent.

This species is found throughout the greater part of Europe and Northern Asia. It expands about 1¾ inch.



Larva of the Three-humped Prominent.

The fore-wings are yellowish-brown, with two waved transverse lines, and a yellowish spot between them, centred with rust-colour; parallel to the hind margin is a rust-coloured band

bordered with grey on the outer side. The hind-wings are whitish.

The larva is green, with a brown head. It has a very small hump on the fifth, and large ones on the sixth, seventh, eighth, and twelfth segments. It feeds on poplar, birch, and aspen.

This is a very rare Moth in England.

THE IRON PROMINENT. NOTODONTA DROMEDARIUS.

Bombyx dromedarius, Linnæus, Syst. Nat. (ed. xii.) i. (2) p. 827, no. 62 (1767); Esper, Schmett. iii. p. 297, Taf. 59, figs. 5–9 (1786); Hübner, Eur. Schmett. iii. fig. 28 (1800); Godart, Lépid. France, iv. p. 87, pl. 17, fig. 5 (1822).

Notodonta dromedarius, Ochsenheimer, Schmett. Eur. iii. p. 53 (1810); Stephens, Ill. Brit. Ent. Haust. ii. p. 22 (1828); Curtis, Brit. Ent. xiv. pl. 739 (1839); Kirby, Eur. Butterflies and Moths, p. 142 (1880); Buckler, Larvæ of Brit. Lepid. ii. p. 150, pl. 33, fig. 2 (1887); Barrett, Lepid. Brit. Isl. iii. p. 123, pl. 107, figs. 2, *2a–e* (1895).

The Iron Prominent is common in many parts of Europe. It expands from 1¾ to 2 inches.

The fore-wings are dark greyish-brown, spotted with whitish or yellow at the base. There are two blackish-brown undulating transverse lines, bordered with whitish or yellow on the sides remote from one another, and between these near the costa is a small rusty-brown streak enclosed in white or yellowish. In front of the hind margin is a rusty-brown stripe, extending as far as the hinder angle, where it joins the second transverse line to form a yellow or whitish-grey spot. The hind-wings are brownish-grey, with a faint whitish transverse band, and a dark brown dash at the anal angle.

The larva is yellow, with a dorsal hump on the fifth to the

seventh segments inclusive. On the back is a broad purplish stripe, running from the second to the eighth segment, and including the humps. On the twelfth segment is also a hump.

The Iron Prominent.

It feeds on birch, alder, and hazel.

The cocoon is formed of tough yellowish-brown silk and particles of earth. The pupa is reddish-brown, and cylindrical, with a rounded extremity.

GENUS HIEROPHANTA.

Microdonta, Duponchel, Cat. Lépid. Eur. p. 92 (1844).
Hierophanta, Meyrick, Handbook Brit. Lepid. p. 310 (1895).

The only species of this genus may easily be distinguished from its allies by its shorter and broader wings, which are white, with black and orange markings on the fore-wings. The body is also rather short and thick. It is very rare as a British insect, though it has been taken at Killarney, as well as in Staffordshire and Devon.

The name *Microdonta* is preoccupied in *Coleoptera*.

THE WHITE PROMINENT. HIEROPHANTA BICOLORIA.

Bombyx bicoloria, Denis & Schiffermüller, Syst. Verz. Schmett. Wien. p. 49, no. 3 (1776); Esper, Schmett. iii. p. 217, Taf. 41, fig. 7 (1783).

Bombyx bicolora, Fabricius, Mant. Ins. ii. p. 126, no. 146 (1787); Hübner, Eur. Schmett. iii. fig. 18 (1800); Godart, Lépid. France, iv. p. 207, pl. 20, fig. 1 (1822).

Notodonta bicolora, Ochsenheimer, Schmett. Eur. iii. p. 73 (1810); Barrett, Lepid. Brit. Isl. iii. p. 127, pl. 103, figs. 1, 1*a* (1895).

Microdonta bicolora, Kirby, Eur. Butterflies and Moths, p. 140, pl. 31, fig. 5 (1880); Buckler, Larvæ of Brit. Lepid. ii. p. 76, pl. 34, fig. 5 (1887).

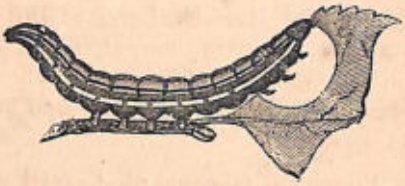
Hierophanta bicoloria, Meyrick, Handbook Brit. Lepid. p. 310 (1895).

This species is generally distributed in Europe. It expands from 1¼ to 1½ inch.

The White Prominent.

The insect is white, with an orange transverse streak on the fore-wings, edged with black on the inner side. From the inner margin, and separated from the first streak by a small black dash, runs a second orange stripe extending almost to the hinder angle. The hind-wings are without markings.

The larva is green, with the back greenish-white. On the sides is a bright yellow line enclosing the spiracles, which are



Larva of the White Prominent.

black ringed with white. The legs are nearly black, and the claspers green.

It feeds on birch.

The pupa is shining brownish-black, and is enclosed in a rather thin greenish-grey cocoon.

GENUS ODONTOSIA.

Odontosia, Hübner, Verz. bek. Schmett. p. 145 (1822?).

This is another small genus, formerly included with *Notodonta*, but distinguished by its more strongly denticulated and uniformly-coloured wings; the body, too, is rather stouter and shorter. The thorax has a slight crest. The typical species is widely distributed in England, but not common, though it is not of such extreme rarity as many of our British *Notodontidæ*.

THE SCARCE PROMINENT. ODONTOSIA CARMELITA.

Bombyx carmelita, Esper, Schmett. iii. Cont. p. 65, Taf. 91, fig. 1 (1790?); Godart, Lépid. France, iv. p. 194, pl. 18, fig. 6 (1822).

Bombyx capucina, Hübner, Vögel u. Schmett. pl. 81 (1793); id. Eur. Schmett. iii. fig. 21 (1800).

Notodonta carmelita, Ochsenheimer, Schmett. Eur. iii. p. 61 (1810).

Lophopteryx carmelita, Stephens, Ill. Brit. Ent. Haust. ii. p. 27, pl. 14, fig. 3 (1828); Buckler, Larvæ of Brit. Lepid. ii. p. 165, pl. 35, fig. 5 (1887); Barrett, Lepid. Brit. Isl. iii. p. 136, pl. 109, figs. 2, 2*a*, *b* (1895).

Odontosia carmelita, Kirby, Eur. Butterflies and Moths, p. 139, pl. 31, fig. 4 (1880).

The Scarce Prominent is found in Central and Eastern Europe. It expands about 1¾ inch.

The fore-wings are rusty-brown on the costa, with a large and a small white spot, the latter being sometimes wanting. The hind and inner margins are bluish-grey, with the nervures

The Scarce Prominent.

dotted with black and white, and a black line on the hind margin, which runs out into the white fringes, giving them a chequered appearance. The hind-wings are paler than the fore-wings, with a faint whitish band and a bluish cloud at the anal angle.

The larva is green, with a yellow spiracular line. The spiracles are black, ringed with white. It feeds on birch.

The pupa is shining, and of a deep mahogany colour, with a rounded extremity. The cocoon is made of dirty grey silk, plastered over with earth

GENUS LOPHOPTERYX.

Lophopteryx, Stephens, Ill. Brit. Ent. Haust. ii. p. 26 (1828); Walker, List Lepid. Ins. Brit. Mus. v. p. 1007 (1855).

In this genus the wings are more or less dentated, as in *Odontosia*, with which it is often united, but the thorax has a double crest in the middle above.

THE COXCOMB PROMINENT. LOPHOPTERYX CAPUCINA.

Bombyx capucina, Linnæus, Syst. Nat. (ed. x.) i. p. 507, no. 55 (1758); id. Faun. Suec. p. 304 (1761).

Bombyx camelina, Linnæus, Syst. Nat. (ed. x.) i. p. 507, no. 56 (1758); id. Faun. Suec. p. 305 (1761); Esper, Schmett. iii. p. 360, Taf. 70 (1786); Hübner, Eur. Schmett. iii. fig. 19 (1800); Godart, Lépid. France, iv. p. 192, pl. 18, figs. 4, 5 (1822).

Notodonta camelina, Ochsenheimer, Schmett. Eur. iii. p. 58 (1810).

Lophopteryx camelina, Stephens, Ill. Brit. Ent. Haust. ii. p. 26 (1828); Kirby, Eur. Butterflies and Moths, p. 139, pl. 31, figs. 3, *a*, *b* (1880); Buckler, Larvæ of Brit. Lepid. ii. p. 162, pl. 35, fig. 3 (1887); Barrett, Lepid. Brit. Isl. iii. p. 139, pl. 110, figs. 1, *a–g* (1895).

The Coxcomb Prominent.

The Coxcomb Prominent has a range extending through Europe into Northern Asia. It expands from 1½ to 1¾ inch. The fore-wings, which are deeply dentated on the hind

margin, are rusty-brown, clouded with ochre-yellow, with two dark brown oblique zig-zag lines running obliquely from the costa to the inner margin, and blackish nervures, dotted on the hind margin with white or yellow. The hind-wings are yellow, with a dark hind margin, and occasionally a lighter transverse band, and a blue-black dash at the anal angle divided by a pale yellow streak.

Larva of the Coxcomb Prominent.

The larva is green, or sometimes reddish, with the back whitish, and a yellow spiracular line, edged above with violet. The spiracles are black, and there is a red spot behind each. When at rest it keeps the head and second segment thrown back, and the tail erect also.

The pupa is dark reddish-brown, tapering to the extremity, which ends in a straight spine. It is enclosed in a cocoon made of fine earth.

This is a common species in England; the next is a rarity with us.

THE MAPLE PROMINENT. LOPHOPTERYX CUCULLINA.

Bombyx cucullina, Denis & Schiffermüller, Syst. Verz. Schmett. Wien. p. 311, no. 8 (1776); Hübner, Eur. Schmett. iii. fig. 20 (1800?); Godart, Lépid. France, iv. p. 190, pl. 18, fig. 3 (1822).

Bombyx cuculla, Esper, Schmett. iii. p. 364, Taf. 71, fig. 1 (1786).

Notodontâ cucullina, Ochsenheimer, Schmett. Eur. iii. p. 55 (1810).

Lophopteryx cuculla, Stephens, Ill. Brit. Ent. Haust. ii. p. 27 (1828).

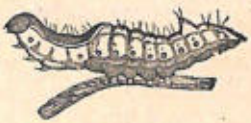
Lophopteryx cucullina, Kirby, Eur. Butterflies and Moths, p. 139 (1880); Buckler, Larvæ of Brit. Lepid. ii. p. 164, pl. 35, fig. 4 (1887); Barrett, Lepid. Brit. Isl. iii. p 142, pl. 110, figs. 2, 2*a*, *b* (1895).

The Maple Prominent.

This European species expands about 1½ inch.

The fore-wings are rusty-brown, with the costa pale ochre-yellow, and the hind margin whitish. There are several fine dark zig-zag lines. The lower part of the hind margin is white, divided by a dark brown nervure. The fringes are white, chequered with rusty-brown.

The hind-wings are yellowish-brown with an indistinct band, a rusty-brown spot at the anal angle divided by a yellowish line, and light grey fringes faintly chequered with darker.



Larva of the Maple Prominent.

The young larva is green, and slightly hairy, with a rounded reddish hump on the twelfth segment, bifid at the top. When full grown it is green or pale reddish, with a heart-shaped green

or dark brown spot behind the head, and two slightly raised truncated humps on each of the segments from the sixth to the eleventh, between which passes a dark green, or in the reddish varieties, a deep-red longitudinal line. The caudal hump is tipped with red.

It feeds on hornbeam, sycamore, service-tree, &c.

GENUS PHEOSIA.

Pheosia, Hübner, Verz. bek. Schmett. p. 145 (1822 ?); Walker, List Lepid. Ins. Brit. Mus. v. p. 1001 (1855).

Leiocampa, Stephens, Ill. Brit. Ent. Haust. ii. p. 24 (1828).

This genus differs from *Notodonta* in having the antennæ slightly pectinated in the female as well as in the male; the abdomen is stout, and considerably longer than the hind-wings, and the fore-wings are long and rather pointed, with the hind margin denticulated. There is a slight projection on the inner margin. The larvæ are smooth, with sixteen legs, and the cocoon is formed of bits of wood bound together with silk.

There are two common European species, both of which are found in England.

THE SWALLOW PROMINENT. PHEOSIA TREMULA.

Bombyx tremula, Clerck, Icones, pl. 9, fig. 13 (1759); Linnæus, Faun. Suec. p. 298 (1761).

Bombyx porcellana, Hufnagel, Berl. Mag. ii. (3) p. 420, no. 38 (1766).

Bombyx dictæa, Esper (*nec* Linn.), Schmett. iii. p. 290, Taf. 58, fig. 5 (1786); id. Forts. p. 27, Taf. 84, fig. 2 (1789); Hübner, Eur. Schmett. iii. fig. 22 (1800); Godart, Lépid. France, iv. p. 196, pl. 19, fig. 1 (1822).

Bombyx trepida, Donovan, Brit. Ins. vii. p. 63, pl. 239, fig. 1 (1798).

Notodonta dictæa, Ochsenheimer, Schmett. Eur. iii. p. 63 (1810); Barrett, Lepid. Brit. Isl. iii. p. 105, pl. 104, figs. 1, 1*a–e* (1895).

Leiocampa dictæa, Stephens, Ill. Brit. Ent. Haust. ii. p. 25 (1828); Kirby, Eur. Butterflies and Moths, p. 140, pl. 31, fig. 6 (1880); Buckler, Larvæ of Brit. Lepid. ii. p. 158, pl. 35, fig. 1 (1887).

Pheosia tremula, Kirby, Cat. Lepid. Heter. i. p. 607 (1892).

This species occurs in most parts of Europe. It expands from 2 to over 2¼ inches.

The fore-wings are greyish-brown, with a longitudinal white area in the centre, and a black oblong costal spot divided by

The Swallow Prominent.

the nervures and ending in a point at the apex. The base is yellow towards the inner margin, along which runs a black band, on which are five white dashes. There is a brown marginal line edged with white on the inner side. The hind-wings are dirty white with the inner margin yellowish-grey and the anal angle marked by a black dash. The body is grey, with the first two segments of the abdomen reddish. The antennæ are yellowish.

The larva is smooth, shining, reddish-brown, often passing into violet, with a pyramidal hump on the last segment, which

is only slightly marked when young. There is sometimes a yellow line above the legs.

It feeds on poplars, willow, and birch.

The pupa is cylindrical, chestnut-brown, with two points at the extremity. It rests in a large cocoon of grey silk covered with loose earth.

THE LESSER SWALLOW PROMINENT. PHEOSIA GNOMA.

Bombyx gnoma, Fabricius, Spec. Ins. ii. p. 190, no. 89 (1781).
Bombyx dictæoides, Esper, Schmett. iii. Forts. p. 27, Taf. 84, fig. 3 (1789); Hübner, Eur. Schmett. iii. figs. 23, 24 (1800); Godart, Lépid. France, iv. p. 190, pl. 19, fig. 1 (1822).
Notodonta dictæoides, Ochsenheimer, Schmett. Eur. iii. p. 66 (1810); Barrett, Lepid. Brit. Isl. iii. p. 108, pl. 104, figs. 2, 2*a–d* (1895).
Leiocampa dictæoides, Stephens, Ill. Brit. Ent. Haust. ii. p. 25 (1828); Kirby, Eur. Butterflies and Moths, p. 141 (1880); Buckler, Larvæ Brit. Lepid. ii. p. 160, pl. 35, fig. 2 (1887).

This is a common species in most parts of Europe. The male expands about 2 inches, and the female from 2 to 2¼ inches.

It is distinguished from *P. tremula* by the following points: The fore-wings are more darkly suffused, which brings out more prominently the whitish-grey colouring. The shade is broader and extends at the hind margin into the apex. The three apical stripes are dark blackish-brown, and form the posterior boundary of a white costal spot. At the hinder angle is an elongated white sagittate spot, the point of which is directed inwards. The blackish-brown marginal line extends on to the fringes, giving them a somewhat chequered appearance. The hind-wings are dirty white in the male, shaded with brown on

the costa and hind margin, and dark brown in the female, varied with whitish-grey only in the middle of the wing.

The larva is a very handsome one. It is lilac varied with olive, and with a reddish tinge on the sides. On the back of the twelfth segment is a black hump. There is a bright yellow line above the legs, on which the spiracles stand out black in white rings. The head is brownish.

It feeds on birch and sycamore.

The cocoon and pupa are like those of *P. tremula*, but smaller.

PHEOSIA DICTÆA.

Bombyx dictæa, Linnæus, Syst. Nat. (ed. xii.) i. (2) p. 826, no. 60 (1767).

I reject this name for *P. tremula*, Clerck, not only because it is later in date, but because neither the description nor locality agree with that species, and they will, I anticipate, be found to apply to some species which has been lost sight of since the time of Linnæus. Herewith I append his description.

P. Bombyx elinguis, *alis deflexis exustis plaga albida, inferioribus albis.*

Habitat in Barbaria, rarius in Europa.

Media. Corpus *testaceum uti Antennæ.* Alæ superiores *supra exustæ; plaga media longitudinali albida et puncto lineaque nivea juxta thoracem.* Inferiores *albæ, ad angulum ani fuscescentes.*

GENUS MELALOPHA.

Melalopha, Hübner, Tentamen, p. 1 (1810?).

Pygæra, Ochsenheimer, Schmett. Eur. iii. p. 224 (1810).

Ichthyura, Hübner, Verz. bek. Schmett. p. 162 (1822?); Walker, List Lepid. Ins. Brit. Mus. v. p. 1054 (1855).

Clostera, Stephens, Ill. Brit. Ent. Haust. ii. p. 12 (1828).

The species of this genus are of small size, with the antennæ

pectinated to the tips, especially in the males; and the thorax strongly crested. The wings are short and broad, the body rather long, stout and tufted; and the hind tibiæ are armed with two small apical spurs. The larva is slightly pilose, with a tubercle on the fourth and terminal segments. There are several species in Europe, and two of the three British species are fairly common.

THE CHOCOLATE TIP. MELALOPHA CURTULA.

Bombyx curtula, Linnæus, Syst. Nat. (ed. x.) i. p. 503, no. 34 (1758); id. Faun. Suec. p. 299 (1761); Hübner, Eur. Schmett. iii. fig. 89 (1800); Godart, Lépid. France, iv. p. 233, pl. 21, fig. 5 (1822).

Bombyx anachoreta, Esper, Schmett. iii. p. 260, Taf. 51, fig. 5 (1785); id. Forts. p. 44, Taf. 86, figs. 6–8 (1789).

Pygæra curtula, Ochsenheimer, Schmett. Eur. iii. p. 232 (1810); Kirby, Eur. Butterflies and Moths, p. 135 (1880).

Clostera curtula, Stephens, Ill. Brit. Ent. Haust. ii. p. 12 (1828); Buckler, Larvæ of Brit. Lepid. iii. pl. 37, fig. 3 (1889); Barrett, Lepid. Brit. Isl. iii. p. 166, pl. 114, figs. 1, 1*a–e* (1895).

Melalopha curtula, Kirby, Cat. Lepid. Heter. i. p. 609 (1892).

The Chocolate-Tip has a range extending through Europe

The Chocolate-Tip.

and Western Asia. It expands about 1¼ inch or a little more.

The fore-wings are reddish-grey, with three white transverse lines, the outer of which bounds a large reddish-brown spot, which becomes faint towards the apex, and crossed by a blackish line. The hind-wings are light brownish-grey, darker towards the hind-margin. The thorax is coloured like the fore-wings. A longitudinal mark on the thorax and the extremity of the abdomen are rusty-brown.

The larva is thinly covered with hair, brownish-grey, yellowish-green, or flesh-coloured. On the fifth segment is a large velvety-black warty elevation, and on the last segment a similar one, but smaller. The first variety mentioned has a reddish dorsal line and red dots on the sides; the yellowish-green variety is dusted with blackish points on the sides, and has four rows of pale yellow warts; whilst the flesh-coloured specimens have a fine blackish dorsal line and deep yellow warts.

It feeds on aspen (*Populus tremula*), and other species of poplar.

The larva is dark brown, with a rounded extremity.

THE SMALL CHOCOLATE-TIP. MELALOPHA PIGRA.

Phalæna anastomosis, Scopoli (*nec* Linn.), Ent. Carn. p. 201, no. 502 (1763); Donovan, Brit. Ins. iv. pp. 43, 56, pls. 124, 129 (1795).

Phalæna pigra, Hufnagel, Berl. Mag. ii. (4) p. 426, no. 46 (1766).

Bombyx reclusa, Esper, Schmett. iii. p. 260, Taf. 51, figs. 6, 7 (1785); Fabricius, Mant. Ins. ii. p. 120, no. 113 (1787); Hübner, Eur. Schmett. iii. fig. 90 (1800); Godart, Lépid. France, iv. p. 230, pl. 21, fig. 4 (1822).

Pygæra reclusa, Ochsenheimer, Schmett. Eur. iii. p. 228 (1810).

Clostera reclusa, Stephens, Ill. Brit. Ent. Haust. ii. p. 13 (1828); Buckler, Larvæ of Brit. Lepid. iii. pl. 37, fig. 1 (1889); Barrett, Lepid. Brit. Isl. iii. p. 172, pl. 114, figs. 1, 1*a–e* (1895).

Pygæra pigra, Kirby, Eur. Butterflies and Moths, p. 135 (1880).

This species is common in most parts of Europe. It expands about an inch.

The fore-wings are bluish-grey with two whitish transverse lines towards the base, edged with brown, and blending at both ends. Next comes a dark brown shade, bounded internally by a whitish line, which does not reach the costa, but ends in a hook.

The Small Chocolate-Tip.

Externally there is a whitish transverse line running from the inner margin, where it is connected with another line, obliquely to the costa, and ending in a small white spot. On its outer side is a reddish-brown spot. The hind margin is bluish-grey with a curved and sometimes interrupted black transverse line. The hind-wings are brownish-grey.

The body is reddish-grey.

The larva is blackish-grey, with the back yellow, pale ashy-grey, or greenish-grey; on each side are yellow spots, and on each incision a small blackish spot. There are tubercles

bearing black hair on the fifth and twelfth segments, and above the legs runs a double chain of yellow spots.

It feeds principally on aspen (*Populus tremula*). The pupa is reddish-brown with black wing-cases.

THE SCARCE CHOCOLATE-TIP. MELALOPHA ANACHORETA.

Bombyx curtula, Hufnagel (*nec* Linn.), Berl. Mag. ii. (4) p. 408, no. 20 (1766); Fabricius, Syst. Ent. p. 574, no. 81 (1775); Esper, Schmett. iii. p. 256, Taf. 51, figs. 1–4 (1875).

Bombyx anachoreta, Fabricius, Mant. Ins. ii. p. 120, no. 114 (1787); Hübner, Eur. Schmett. iii. fig. 88 (1800); Godart, Lépid. France, iv. p. 230, pl. 21, fig. 6 (1822).

Pygæra anachoreta, Ochsenheimer, Schmett. Eur. iii. p. 230 (1810); Kirby, Eur. Butterflies and Moths, p. 135, pl. 24, fig. 8 (1880).

Clostera anachoreta, Stephens, Ill. Brit. Ent. Haust. ii. p. 13 (1828); Buckler, Larvæ of Brit. Lepid. pl. 37, fig. 2 (1889); Barrett, Lepid. Brit. Isl. iii. p. 169, pl. 114, figs. 2, 2*a–d* (1895).

The Scarce Chocolate-Tip has a wide range, extending through Europe into Northern and Western Asia. It expands about 1¼ inch.

The fore-wings are bluish-grey, with whitish transverse lines. Near the tip is a large spot of a greyish-brown colour, varied with rusty-brown. Through this runs a white sub-marginal line, and near the hind margin is a row of blackish-brown dots, which may be connected, forming a line. On the inner margin are two black spots of unequal size, placed one above the other. The hind-wings and under side are ashy-grey, as is also the body.

The larva is yellowish-grey, flesh-coloured or grey on the back, with interrupted blackish longitudinal lines, and alternate black

and yellow spots below them. On the fifth segment is a large reddish-yellow wart-like elevation, and on the twelfth segment another smaller one. That on the fifth segment has a white spot on each side of it. There are reddish-yellow spots on the spiracles.

It feeds on various species of poplar and willow.

The pupa is brown.

The Scarce Chocolate-Tip.

This Moth was inserted in the British list by the earlier writers, but was lost sight of, and was consequently omitted from our lists until a colony was discovered at Folkestone by Dr. Knaggs in 1859. Subsequently the species was almost exterminated in that locality by a great storm; but the insect has been met with in one or two other localities on the coast of Kent and Sussex, though very rarely.

GENUS DANIMA.

Danima, Walker, List Lepid. Ins. Brit. Mus. v. p. 1052 (1855).

This is a very stout-bodied genus; the abdomen extends far beyond the hind-wings; the antennæ are pectinated for half their length in the male; the wings are rather long and narrow, and the tibiæ are armed with two long apical spurs. The larva resembles that of a *Sphinx*, and the genus evidently forms a connecting link between the *Notodontidæ* and the true *Sphingidæ*. It is by no means improbable that it actually belongs to the latter Family.

DANIMA BANKSIÆ.

(*Plate XCV. Fig.* 1 (*imago*), 2 (*larva*).)

Bombyx banksiæ, Lewin, Prodr. Ent. pl. 9 (1805).
Harpyia banksiæ, Duncan in Jardine's Nat. Libr. Ent. Moths, p. 164, pl. 17, fig. 2 (1841).
Danima banksiæ, Walker, List Lepid. Ins. Brit. Mus. v. p. 1053, no. 1 (1855).

This Moth is found in Australia and Tasmania. The male expands upwards of two inches and the female about 3¼ inches.

In the female the fore-wings are of a leaden colour, glossed with purple, with a few black marks, and freckled here and there with white and orange-coloured dots, and also several clouds and dashes of the same colour. The fringes are brown. The hind-wings are uniform glossy-brown with lighter fringes. The thorax is black, with two white patches spotted with orange towards the front. The abdomen is orange-coloured, with three black spots on the sides, and a black tip.

The male is lighter in colour, with whitish and silvery hind-wings, and brown antennæ, pectinated at the base.

The larva is a handsome one, and bears a considerable resemblance to that of a *Sphinx*, both in form and markings. It is yellowish, with the head and upper part of the last segment yellowish-brown, the latter with a small black horn and a grey spot behind. On the back of the middle segments is a white stripe, and on the sides of the second and third segments are round white spots; on those following they are arranged around a triangular or quadrilateral figure, and lower down on each segment is an oblique, somewhat oval white streak; below this, again, on the seventh and succeeding segments, is a white spot ringed with black.

It feeds on *Banksia ilicifolia*, var. *integrifolia*, and when

near its transformation is, to use Lewin's words, of considerable bulk, very showy, and in general a great devourer. He found it to pupate in February, spinning on the surface of the ground a slight cocoon, and collecting about it fragments of earth and leaves in order to disguise it. It emerged in March, after being in the dormant state for thirty-six days.

GENUS BRAURA.

Braura, Walker, List Lepid. Ins. Brit. Mus. xxxii. p. 464 (1865).

This genus is not unlike the last. The antennæ are short, stout, and serrated. The body is very stout and woolly, and the head is tufted in front. The proboscis is obsolete, and the stout hairy palpi extend a little beyond the head. The wings are long, with the fore-wings rather pointed. The legs are short and stout, and are very thickly clothed with hair; the abdomen is woolly, and extends considerably beyond the hind-wings.

BRAURA LIGNICLUSA.

(*Plate XCV. Fig.* 4.)

Braura lignicluſa, Walker, List Lepid. Ins. Brit. Mus. xxxii. p. 464 (1865).

This Moth is found in Natal, and measures about 3½ inches across the wings.

"*Male.*—Reddish-brown. Thorax with a black stripe and with two oblique black streaks: pale fawn-colour in front. Abdomen reddish. Pectus, abdomen beneath, and legs, blackish. Fore-wings tinged with cinereous on the hinder part; a broad fawn-coloured sub-costal stripe, which extends from the base to two-thirds of the length, has a very long and acute notch on its hind side, and is tridentate at its tip; a cinereous black-bordered line of the same hue; marginal line cinereous, bordered with black on both sides; fringe fawn

colour, ferruginous at the base. Hind-wings reddish cinereous, cinereous-brown along the exterior border." (*Walker.*)

Some of the Moths referred to the *Notodontidæ* are very large insects, four inches and upwards in expanse, with long pointed wings, generally of a brown or wood-colour, and with long narrow pointed bodies, like *Sphingidæ*. Others are smaller, and have much resemblance to *Noctuæ;* and there are many genera which some authors have regarded as *Notodontidæ*, and others as *Noctuæ*. At one time Dr. Butler proposed a very large extension of the *Notodontidæ*, including in the group whole families of *Noctuæ*, such as the *Calpidæ* and *Cucullidæ*, &c.; but he has recently adopted other views, and has decided to include most of these in the *Noctuæ* again.

Our next volume will begin with the true *Sphingidæ*, and will also complete our survey of all the Families of *Bombyces* not included in the present volume.

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