A Morphological and Phylogenetic Study on the Pupae of Geometridae (Insecta: Lepidoptera) from Japan

Masanao NAKAMURA

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Introduction

The classification of insects has hitherto been made ordinarily on the basis of adults and studies on the immature stages have been supplementary to the survey of insect pests. Still more, the survey of pupae has been subordinated to that of larvae throughout the world. A comprehensive study of lepidopterous pupae was made previously by Mosher (1916), but thereafter a few investigators merely tried to describe pupae of a limited number of families, groups or species. In Japan, only Dr A. Kawada and the author had studied the pupae of some lepidopterous families or groups, viz. Hesperiidae (Kawada, 1932a), Saturniidae (Kawada, 1934), Drepanidae (Kawada, 1937), Pieridae (Kawada, 1939), Sphingidae (Kawada, 1935; Nakamura, 1977a), Thyrididae (Nakamura, 1974b), Lymantriidae (Nakamura, 1976a), Thyatiridae (Nakamura, 1980b), Agaristidae (Nakamura, 1980a), Pantheinae of Noctuidae (Nakamura, 1987a), Plusiinae of Noctuidae (Nakamura, 1974a, 1987b) and Lasiocampidae (Nakamura & Yamamoto, 1990). In addition, the author (Nakamura, 1981) proposed a key to the pupae of Japanese lepidopterous families.

Other investigators published papers on the following: Psychidae (Yano, 1958), Pterophoridae (Yano, 1963), Glyphipterigidae and Choreutidae (Arita, 1981), a part of Tortricidae (Homma, 1970), a part of Olethreutinae (Komai, 1999), Yponomeutidae (Moriuti, 1977), Nymphulinae of Pyralidae (Yoshiyasu, 1985), Dreparidae (Nakajima, 1970, 1972), Papilionidae (Makibayashi, 1980; Igarashi, 1984) and a part of Geometridae (Sato, 1984; Nakajima, 1988).


However, most of these papers excepting those of the author were devoted merely to the description or discrimination of these pupae with no attempt made for classification. This is partly because the pupal chaetotaxy has not been considered. In this paper, the pupae of 203 genera belonging to all subfamilies of Japanese Geometridae were described and a phylogenetic classification was tried on them with the practical use of chaetotaxy. Besides, higher classification linking subfamilies and genera were discussed. The author is confident that the genus of an uncertain pupa can be determined easily by utilization of these results.

Material and Methods

The pupae used in the survey of this paper were reared from eggs or larvae collected in the field and their scientific names were identified by examining the emerged adults. When the available materials were highly limited in number, one or a few pupae were used, or the exuvia was examined if a single pupa was available and their features were observed under a binocular microscope. The necessary parts were measured and drawn as accurately as possible. The specimens were preserved as dried specimens or immersed in alcohol.

History of the investigation of geometrid pupae

In her first important study of lepidopterous pupae, Mosher (1916) recorded 22 genera of North American geometrid pupae and divided them into four groups irrespective of subfamily. The following year, she added 12 genera and proposed a key for the distinction of these genera (Mosher, 1917).

Toxonomic studies on the pupae of Japanese Lepidoptera-Heterocera XII.
Forbes (1945) described the pupae of 75 genera from various parts of the world including four Japanese species, prepared a key for them, and experimented with grouping of them based on certain features. He described concise characteristics of the tribes of subfamilies and made a key for four tribes of Sterrhinae and 44 genera of North American Ennominae (Forbes, 1948).

Dugdale (1961) paid attention to a new outlook of several features and applied it to New Zealand ennomine pupae. McGuffin (1972–81) described the pupae of many Canadian species and Patočka (1980–1992) described several pupae of European species belonging to Larentiinae and Ennominae. He (1994) discussed the tribal relationship between adult and pupa. Giehslers (1975–1979) recorded the shape of various pupal cremasters. Khotoko (1977) published a taxonomic key for the pupae of Geometridae, but this key cannot be used for the phylogenetic classification. Nakamura (1987c) presented a phylogenetic key for subfamilies and Japanese Archiearinae based on the pupal characteristics of this family. He also studied the pupae of Japanese Oenochrominae and Sterrhinae (Nakamura, 1994a). Recently, Sato (1984) and Nakajima (1998) described some pupae in their studies of Geometridae. However, the taxonomic keys proposed by all the investigators excepting that of Nakamura (1987c) do not conform to the phylogenetic classification.

**Pupating habit of Geometridae and its influence on agriculture and forestry**

Geometrid moths are substantially insect pests to agriculture and forestry inclusive of crops, flowers, fruit trees, garden trees and forest trees, etc. Damage by larvae is rather easy to detect at sight. However, damage done by the pupae of harmful lepidoptera, especially those of subterranean species pupating in the soil, is extremely difficult to assess. Insects cause damages to various extent depending on their habits and it is important to determine the scientific name and habit of the insect in question.

At the time of pupating, a large full-fed larva moves 10 metre or more away from the plant. At a suitable place, it spins silken cocoon amongst leaves, foliage or twigs. Some geometrine species cut peculiarly shaped holes in two leaves and pupate between them (Plate 2, figs 22–26). In the case of a subterranean pupa, a larva enters the soil to a certain depth and makes an earthy cocoon. The depth ranges from 1 to 10 cm. (Minamikawa (1951) pointed out that the depth is 3 to 6 cm in the case of *Jankowskia fuscaria* Leech).

Two kinds of pupae can be discriminated easily from each other on the basis of the features of cremaster seta, one having a hooked or falcate seta and the other with bifurcate seta. The form of cremaster seta has presumably evolved in the order from hooked, falcate, to bifurcate, and this suggests that the subterranean pupation is apomorphic.

The pupal period is about seven days generally, but it will extend to several months in the case of hibernation. Subterranean pupae, however, are known to exist over an extremely long period of time if the condition is adequate. The author observed a pupa of *Odontopera arida* Butler existing for three years and Tutt (1900) reported on the case of a certain moth which emerged seven years after of pupation in England. This indicates that subterranean pupae show strong resistance to environmental changes. However, what condition induce the emergence is not clear at the present time.

The subterranean Geometrid pupa is affected to dryness of ground and the survival rate of pupa is low in wetting ground. For instance, the outbreak of *Xerodes rufescensitaria* Motschulsky in Akita Pref. in 1912 was derived by the soil dryness of pine forests which were languished by mining pollution. Baba (1937) recognized that hymenopterous and dipterous parasites of a hanging pupa, *Cystidia stratonice* Stoll, oviposit always on their larva.

**Pupal morphology applied to the classification**

The terminology and homology of pupal features were pointed out by Poulton (1890–91), Chapman (1893), Packard (1895), Tutt (1900), Mosher (1916) and Forbes (1948) but were not
reconsidered thereafter. Nakamura (1987d) corrected some errors in their views and, in this paper, his new concepts are introduced to the pupal classification of this family.

A number of important terms are commented briefly below.

*Pilifer* (Fig. 1) - Mosher's pilifer is really a mandible. The true pilifer of the pupa exists inside the body and is not visible from outside.

*Epicranial suture* (Fig. 2) - The suture referred to as epicranial suture (=frontal suture) is really a part of the adfrONTAL suture. The frontal suture is invisible in pupae.

*Eye-piece* - This is made up of a part of the compound eye of the adult. The pupal compound eye differs from the larval ocelli. In the course of pupation, the ocelli together with the antennae turn 180 degrees reversing their arrangement and thereafter they converge to a point and vanish. The pupal antenna, however, is positioned between ocellus 4 and 5 as in the larva.

*Glazed eye-piece* (Fig. 3) - During the pupation, the vertex of the head collapses as a result of the vanishing of the mandibular muscle which occupies a greater part of the gnathocephalon of head capsule. This transformation presumably pushes the antenna up to the procephalon with a 180 degree turn and produces a crescent crack in the eye-piece. The repaired part of this crack seems to be the glazed eye-piece.

*Antenna* (Fig. 3) - As a result of the above-cited transformation, the pupal antenna moves to the vicinity of the vertex. The 1st segment of larval antenna changes into the scape of pupal antenna and 2nd and 3rd segments into flagella.

*Maxillary palpus* - This organ is generally recognized as a small triangular piece on the caudal margin of eye-piece. This is the very extremity of the maxillary palpus which has elongated going around the backside of eye-piece inside the body. This organ is not recognized in the pupae of Geometridae.

*Thorax* (Fig. 6) - The pupal thorax corresponds to the dorsal half of the larval thorax and hence the prothorax is equivalent to the larval thoracic shield.

*Prothoracic femur* (Fig. 11) - This is the part appearing between the prothoracic leg and the maxilla. It was designated as trochanter by Mosher (1916) and later amended to coxa by Kawada (1932b). However, it is a part of femur and is neither trochanter nor coxa.

*Thoracic legs* (Fig. 11) - Of the prothoracic and mesothoracic legs only tibia and tarsus are exposed. From the standpoint of classification, it is important to see which proximal end of the two appears more cephalad. In the case where the ratio in length of the femur of prothoraxic leg to that of mesothoracic leg in the adult is 0.7 or less, the mesothoracic leg appears more cephalad than the prothoracic leg in the pupa.

*Trachea of the wing* (Fig. 10) - Nakamura (1984) pointed out that eleven types of patterns are recognized in pupal tracheation. In the Geometridae, Sterrhinae and Geometrinae are A- or C-type, Larentiinae is A-, B-, F- or G-type and Ennominae is A- or C-type.

*Thoracic spiracle* (Figs. 4 and 5) - Two opinions have been offered until now regarding the pupal thoracic spiracle, one by Tutt (1900) claiming as prothoracic and the other by Mosher (1916) as mesothoracic, but what they claimed is no doubt prothoracic spiracle. The true spiracle, however, exists in the membranous saccate "pretrarium" inside the body and opens through the "prespipracular slit" to be described under the following item.

*Spiracular callosity* - This is equivalent to the spiracle of Forbes (1948). It is a filter bearing micro-setae or micro-spines for the air flowing through the slit between prothorax and mesothorax or the "prespipracular slit". In reality, the "spiracular callosity" often shows as a knob-like protuberance on the cephalic margin of mesothorax.
Pupal chaetotaxy

**Wing** – The wing of the pupa is smaller than that of the adult. The adult wing is folded complicated in the wing sack. The position of the hindwing hidden under the forewing is useful for the pupal classification. Nitsu (2001) pointed out the mechanism of female wing degeneration in the pupal body of winter geometrid, *Nyssodes lefuarius* Ersoff.

**Notaulix** – This is an indistinct short slit on the latero-dorsum of the mesothorax and was formerly designated as “alar furrow”. The slit, however, corresponds to notaulix in view of its position.

**Flanged plate** – This is a sclerotized movable abdominal conjunctiva and this conjunctiva often has a rising edge.

**Abdominal spiracle** – The spiracle on the 1st segment of this family is hidden under the wing, the one on the 8th (and on the 7th or on the 6th and 7th in some specialized genera) is vestigial and the one on the 9th is not exist.

**Spiracular furrow** (Fig. 7) – A puncture or a crinkle on the pupal cuticle has apparently transformed and developed into this organ, but its function is unknown. As this organ is often found in subterranean pupae, Edmunds (1974) presumed in certain beetle that its possible function may be to remove soil grains etc.

**Caudal dehiscence** (Fig. 8) – It is not correct to call this organ “anal opening”. The real anal opening of the pupa exists inside the body and the author (1987d) gave the name of “caudal dehiscence” to the cleft designated as “anal opening” by Mosher (1916).

**Lateral and dorsal grooves** (Fig. 9) – The lateral groove is scar of a boundary between anal leg and anal shield. The dorsal groove is a depressed intersegmental line between the 9th abdominal segment and the anal shield of the larva. Scallop or notches on the edge may be a kind of filter as micro-setae grow on top and bottom edges.

**Scar of anal leg** (Fig. 9) – In many cases, the scar appears as a weak protuberance on both sides of the caudal dehiscence. The anal leg of the larva falls down in the caudal direction and becomes smaller and finally vestigial at the time of pupating. The groove restricting the dorsal side of this position is the lateral groove.

**Cremaster** (Fig. 8) – This is a scar of the larval anal shield. The spine like or hooked setae on the cremaster there correspond to the setae on the larval anal shield (the number of setae in the pupa completely agrees with that in the larva). The bifurcate cremaster recognized in the ennomine pupae is formed by the transformation of D1+D2 seta and a “side spinule” often possessed by this type of cremaster is the scar of SD2 seta.

**Basal mass** (Fig. 8) – It is a pair of wen-like protuberances present at the base of cremaster and is mostly observed in ennomine pupae of this family. It is unknown from what feature of the larva this part is derived (it may be hypoprocts, Nakamura, 1993a).

**Pupal chaetotaxy (Taxonomic importance of the chaetotaxy)**

Generally, the chaetotaxy of pupae is identical with that of larvae (Schierbeck, 1917), but some of the setae of the larva lack in the pupa. This variation of the chaetotaxy is very important for the classification of lepidopterous pupae, especially in those of this family (Nakamura, 1970). However, it should be noted that the most pupal tactile setae are same length, inspite of Hinton (1946) pointed out that the relative length of tactile setae on the larvae are important indicator for their homology. The setal homology between larva and pupa has been suggested on Culicidae by Okada (1950). The category of Tribe is fairly small and the mutual affinity is indefinite. In this paper, the author has a trial of establishment two informal taxa, Division and Subdivision, between Subfamily and Tribe based on the chaetotaxy. The phylogenetic relationship between tribes or genera of Ennomidae does make distinctly by this method. In the pupae, the setae of the
head are recognized only in the frontal piece. The setae on the thorax and 1st to 3rd abdominal segments are restricted to those on the dorsal half and the setae on the 4th to 9th segments are all recognizable. Many investigators have hitherto proposed different systems of chaetotaxy to the head, thorax, abdomen, anal shield and anal leg of the lepidopterous larvae. Hinton (1946) made a comprehensive study on the larval chaetotaxy, but his opinions were revised to some extent by Gerasimov (1952), Mutuura (1956) and the author (1992). In this paper, the author's system was adopted. A difference worthy of note after the revision is that Hinton's L3 and L4 setae (coxal setae) were amended to SL1 and SL2 setae (subcoxal setae). SL2 seta is characteristic of two superfamilies, Geometroidea and Drepanoidea. Nakamura (1970) predicted usefulness of his chaetotaxy for classification by applying it to some pupae of Geometrinae and Ennominae as an example. The fundamental chaetotaxy of geometrid pupae is as follows. Setae on the head are always F1, A1 and A2. Thoracic setae are D1 and SD1. Abdominal setae are D1, SD1, scar of SD2, L1 and L2 and some setae are hidden under the wing on the 1st to 4th segments. In general, the reduction in number of pupal setae is viewed as an apomorphic and this tendency is shown remarkably by Desmobathrinae and Ennominae. The chaetotaxy of these subfamilies is the most stable.

Hypothetical relationship among the subfamilies of Geometridae on the basis of pupal chaetotactic diagnoses was shown in Plate 38, fig. 650. In Serrhinae, additional setae are often observed on the thorax which bears D1, D2 and SD1 setae. SL setae are observed in the abdomen on 5th and/or the 7th and 8th segments. The greatest modification shows in Geometrinae and Larentiinae. Among the three thoraces of Geometrinae only the prothorax varies. There are only three setal types in the prothorax, viz. D1 and SD1, D2 and SD1, and SD1. Both SL and SV setae frequently coexist on abdominal segments.

Larentiinae (Fig. 11) bears a maximum of five setae on the prothorax. They are XD1, XD2, D1, D2 and SD1 (Nakamura, 1994b), but this varies from group to group, namely, XD1, D1, D2 and SD1; D1, D2 and SD1 (or XD1, D1 and SD1); and D1 and SD1 (or D2 and SD1). The mesothorax and metathorax bear D1, D2 and SD1 or D1 and SD1. D, SD1, L1 and L2 setae and additionally SV and/or SL setae are always present on the abdomen and there are two types for D setae, viz. D1 only or D1 and D2. On the other hand, the thoracic setae of Ennominae are always D1 and SD1. In this subfamily, three types of D setae, viz. D1 only, D2 only and D1 and D2 are recognized on the abdomen and the pupae belonging to the 2nd type and those belonging to a part of the 1st type lack SV and/or SL setae. Only in Abraxas, SD1 seta is present on 4th abdominal segment.

The author (Nakamura, 1970, 1981, 1984a and 1987c) made clear that the chaetotaxy plays an important role in the classification of lepidopterous pupae. The following key to the subfamilies has been prepared by using only the chaetotaxy.

The position of Geometridae among the superfamilies

**Geometroidea and Drepanoidea from pupal point of view**

Japanese six families belonging to superfamilies Geometroidea and Drepanoidea are Geometridae, Epiplemidae, Cyclidiidae, Drepanidae, Thyatiridae and Epicopeiidae. The pupae of these families are distinguished as follows:

1. SD2 seta present on abdomen, if covered by secondary setae, then hindwing exposed on ventro-meson .............................................................. 2
   - SD2 seta absent on abdomen, if covered by secondary setae, then hindwing never exposed on ventro-meson .............................................................. 5
2. XD1 seta present on prothorax, if absent, then L2 seta absent on abdomen; if covered by secondary setae, then maxilla reaching tip of antenna, and suture between pro- and mesothorax attached to antenna at the level far cephalad of proximal end of suture between maxilla and prothoracic leg .............................................................. 3
Key to the subfamilies of Geometridae

Roman numbers in parentheses just following subfamily names indicate Division in a subfamily, which will be defined in following parts of this paper.

1. First abdominal segment bearing one seta ........................................... 3
   - First abdominal segment never bearing seta, otherwise with setae in two pairs ...... 2
2. F seta present ............................................. Sterrhinae (I)
   - F seta absent ............................................. Sterrhinae (II)
3. Fifth–7th abdominal segments bearing one D seta each, if two setae then L1 seta present on 2nd–3rd segments ......................................................... 4
   - Fifth–7th abdominal segments bearing two D setae each ................................ 11
4. Ninth abdominal segment bearing D seta .............................................. Larentiinae (I)
   - Ninth abdominal segment never bearing D seta ......................................... 5
5. Second–3rd abdominal segments bearing D2 seta each ................................. Ennominae (I)
   - Second–3rd abdominal segments bearing D1 seta each ................................ 6
6. SV seta absent on abdominal segments .................................................... 7
   - SV seta present on abdominal segments ................................................... 10
7. F and Af setae absent ............................................. Ennominae (II)
   - F and Af setae present ............................................. Ennominae (III)
8. SL seta present on abdominal segments, if absent, then L1 and L2 setae on 5th segment situated obliquely each other ........................................... Ennominae (III)
   - SL seta absent on abdominal segments, if present, then L1 and L2 setae on 5th segment situated vertically each other ................................... 9
9. Eighth abdominal segment bearing D seta .............................................. Desmobathrinae
   - Eighth abdominal segment never bearing D seta ...................................... Geometrinae (I)
10. Prothorax with one seta ............................................. Geometrinae (II)
   - Prothorax with two setae ............................................. Geometrinae (III)
11. First–4th abdominal segments bearing two D setae each ............................ Oenochrominae
   - First–4th abdominal segments bearing one D seta each ................................ 12
12. SV seta present on abdominal segments .................................................. 13
   - SV seta absent on abdominal segments ................................................... 14
13. Prothorax bearing two setae ............................................. Geometrinae (I)
   - Prothorax bearing three or more setae .................................................... Larentiinae (IV)
14. Fourth abdominal segment bearing SL1 seta; 1st abdominal segment bearing two setae .................................................. Archiearinae
Key to the subfamilies

- Fourth abdominal segment never bearing SL1 seta, otherwise 1st abdominal segment bearing one seta .................................................................15

15. First abdominal segment bearing one seta, if two pairs, then pro-, meso- and metathorax bearing 3–3–3 setae each ............................................ Ennominae (IV)
- First abdominal segment bearing two setae; pro-, meso- and metathorax bearing 2–2–2 pairs of setae each .................................................... Larentiinae (II)

As was shown in the key above, the subfamilies of Geometridae cannot be discriminated and a discrimination is possible only among Divisions of each subfamily. This means that these Divisions are in the affinity stage. For example, the pupae of Division I or Division II of Larentiinae and Ennominae resemble one another in appearance, chaetotaxy and other features. From this fact, it seems likely that these subfamilies have made parallel evolution. In the following descriptions, the chaetotaxy only gives an account of the important setae for the classification.
ARCHIEARINAE

Only one genus Archiearis Hübner is recorded from Japan and the pupa of this genus was examined.
As already pointed out, the pupa is unique for Geometridae in the presence of somewhat prolonged noctuid-type labial palpus but easily distinguishable from Noctuidae by the thoracic chaetotaxy: the number of setae on pro-, meso- and metathorax are 2–3–3 respectively in Archiearis, while 2–2–2, 3–3–3 or 5–3–3 in Noctuidae.

Archiearis Hübner (Plate 2, figs 13–17)
Cylindrical. Head smooth or densely punctate; F seta present or absent; two A1 setae situated longitudinally each other; adfrontal suture invisible; large labial palpus appearing frequently; maxilla reaching eight ninths length to caudal margin of wing; cephalic margin strongly sigmoid; antennae reaching caudal margin of wing, meet on meson in caudal part; eye-piece relatively small; more or less punctate; thorax more or less punctate; suture between pro- and mesothorax attached to antenna at a medium point of sutures restricting proximal margins of pro- and mesothoracic legs; spiracular callosity absent; hindwing hidden under forewing near apex of wing; prothoracic leg extending four sevenths of the distance to apex of wing, femur concealed; mesothoracic legs ending just before tip of maxilla or far beyond it and meet at meson; metathoracic leg concealed; abdomen smooth or slightly punctate; 2nd and 3rd abdominal spiracles half hidden under wing; 8th spiracle vestigial; lateral and dorsal grooves barely traceable; cremaster minute with a pair of spinous setae, consisting two segments.
D1 and SD1 setae on prothorax, D1, D2 and SD1 setae on meso- and metathorax. D1 and D2 setae on 1st–7th abdominal segments but D1 on 8th segment; L1 seta on 4th–7th segments; SL1 seta on 5th–7th segments.
Pupating in a minute hole of the same size as the larva which is bored in rotten wood.

Key to the species
1. F seta present; maxilla extending just beyond tip of mesothoracic leg, then distal portion of mesothoracic legs never meet at meson; head and prothorax coarsely punctate and mesothorax smooth (prothorax punctate more coarsely than in the next species); scar of larval prolegs absent on 5th and 6th segments; SL1 seta on 7th segment situated caudal; cremaster seta extendin latero-caudal direction; 12 mm, blackish brown but reddish in abdomen with a black dorsal line

....................... parthenias Linnaeus (Yunomaru Pass, Gunma. 22 vi 1974)
- F seta absent; maxilla never extending tip of mesothoracic leg; distal portion of mesothoracic legs meet at meson; head, prothorax and cephalic half of mesothorax densely punctate; scar of larval prolegs present on 5th and 6th abdominal segments; SL1 seta on 7th segment situated cephalad; cremaster seta extending sideways and somewhat dorsal direction; 12 mm, same colour with preceding species

....................... notha Hübner (Siwa, Iwate. 27 v 1976, K. Satake leg.)

OENOCHROMINAE

In this subfamily, Alsophilila, Alsophiloides and Inurois are allied to ennomine members in both pupal features and pupating habit, then these are transferred to Ennominae in this paper. The pupa of Xyridacma veronica Prout from New Zealand (Plate 1, fig. 12), the true member of Oenochrominiae is no fundamental difference from Larentiiniae.

Naxa Walker (Plate 2, figs 18–19)
Body smooth but frons somewhat striated; labial palpus concealed; maxilla hidden under
prothoracic leg at half the length to apex of wing and appearing minute again between tips of pro- and mesothoracic legs, proximal margin gently oblique; antenna ending medium point between tips of pro- and mesothoracic legs; glazed and sculptured eye-piece distinguishable; prothorax relatively small, slightly incised at cephalo-meson; mesothorax with heavily protruded spiracular callosity which bears many spines at top; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; prothoracic legs reaching nine tenths the length to caudal margin of wing, meet on meson in distal portion, femur appearing largely; mesothoracic legs reaching medium point between tip of prothoracic leg and caudal margin of wing, meet on meson in distal portion; metathorax leg appeared relatively large; hindwing hidden under forewing at the middle of 4th abdominal segment; abdomen slightly swollen dorsad between 1st-3rd segments; 2nd-3rd abdominal spiracles appearing completely; 8th spiracle vestigial; lateral and dorsal grooves invisible; cremaster relatively large, with four pairs of setae which are bifid or trifid and more or less curled at tip.

Pro-, meso- and metathorax with D1 and SD1 setae; D1 and D2 setae on 1st–8th segments and D1 seta on 9th segment; SL1 seta on 4th–8th segments; SL2, SV1, SV2 and SV3 setae on 5th–7th segments and two excess SV setae on 6th and one excess seta on 7th segment; 9th segment with D1, SD1 and L1 setae.

 seriaria  Motschulsky (Mt Takao, Tokyo, 20 v 1968). 14 mm, White with orange marks under spiracles on 4th–8th abdominal segments and black markings scattered on head, thorax and abdomen. Pupa hanging on a silken-net of larval nest among twists (Yano, 1926).

DESMOBATHRINAE

This subfamily includes extraneous genera each other and the author examined only a genus Ozola  Walker and is not sure that the following is a complete description of the characteristics of this subfamily.

Ozola  Walker (Plate 2, figs 20–21)

Cylindrical, somewhat feeble. Head smooth; adfrontal suture present but coronal suture invisible; labial palpus minute; maxilla reaching just before caudal margin of wing, proximal margin steeply oblique; antennae slender but conspicuously swollen at pedicel, proximal part sharply curved ventrad, reaching caudal margin of wing and meeting on meson at extremity, proximal margin steeply oblique; eye-piece large, suture between glazed and sculptured pieces indistinct; thorax smooth; prothorax small; spiracular callosity large, oval and raised; prothoracic leg reaching slightly before caudal margin of wing, femur appearing but slender; mesothoracic leg extending to just before caudal margin of wing; metathoracic leg concealed; forewing acute toward apex; hindwing hidden under forewing on cephalic margin of 4th abdominal segment; abdomen smooth but bearing micro punctures scattered along cephalic margin of 4th–7th segments; 2nd abdominal spiracle never hidden under wing; 8th spiracle vestigial; 5th spiracle situated slightly more dorsad than the other segments; lateral groove concealed and dorsal groove with an acute incision at dorso-meson which is heavily sclerotized; cremaster knob-like and trigonal in ventral view, striated in ridges, with two pairs of falcate setae.

F and Af setae present on head; pro-, meso- and metathorax with D1 and SD1 setae; D1 seta on 1st–8th abdominal segments; SL and SV setae absent; 8th segment with D1, SD1 and L1 setae; 9th segment without seta.

Pupating in the parchment-like cocoon on the leaf.

defectata  Inoue (Gusichan, Okinawa, 1 xii 1998, S.Tominaga leg.). 12 mm, yellowish brown but abdomen pale brown, spiracular callosity and cremaster blackish brown.
GEOMETRINAE

At the present time, Japanese Geometrinae contain 30 genera and the pupae of 24 genera are described in this paper. Based on the pupal characters, Japanese Geometrinae are classified into four “Divisions” and each Division is further divided into two “Subdivisions”. The author’s Subdivisions are roughly identical with Inoue’s Tribes (1961). The relationship among the genera is as in the chart below (Text-fig. A):

The phylogenetic classification based on the pupa of this subfamily is nearly identical with that of the adult excepting Jodis combines with Hemistola. The most of the pupae of this subfamily are characterized as follows: greenish tint with many black spots or stripes, the micro-spinules densely scattered, caudal end of suture defining eye-piece touched to prothoracic leg and hindwing protruded at hind angle of forewing. The prothorax bears only one seta in Subdivisions I–II and II–I.

Adfrontal suture between proximal ends of antennae disappearing; labial palpus minute; maxilla reaching to or just before apex of wing in many genera but ending at four fifths the length to that of wing in Aracima and at three fourths in Pachista, however ending at tip of prothoracic leg in Comibaena and Thetidia; antenna reaching apex of wing excepting in Aracima and Thetidia. Prothorax relatively small in Aracima, Ochrognedia and Geometra; prespiracular slit small but distinct, spiracular callosity heavily protruded in the genera of

Textfig. A.  Phylogenetic relationship of genera in Geometrinae
Division IV; hindwing hidden under forewing on 4th abdominal segment and slightly protruded on hind angle of forewing; prothoracic femur concealed in many genera; mesothoracic legs reaching just before apex of wing, never meeting on meson except for Pachista, Comibaena and Thetidia; 7th abdominal segment conspicuously narrower than 5th and 6th segments in Jodis, Hemistola, Chlorissa, Culpinia and Idioclorida; spiracular furrow in which SD1 and/or L2 setae exist in Subdivision I–I; 8th abdominal spiracle but in Dindica 7th–8th spiracles vestigial; 6th spiracle situated more ventrad than those of other segments in Pachista, Agathia, Neohipparchus, Pelagodes, Maxates, Hemistola and the genera of Division IV; dorsal furrow indistinct but distinct in Dindica, Pingasa, Agathia, Pelagodes and Maxates; scar of larval anal leg recognized as protruded labia on which many spineous setae are present in Jodis but absent in Hemistola and Comibaena; cremaster developed, with four or more pairs of hooked setae in most genera but very small with short spineous setae in Pachista and Dindica.

F and Af setae always present on head; 1st abdominal segment bearing always D1 setae and 9th segment never bearing seta. Pro-, meso- and metathorax with D1 and SD1 setae but prothorax with only SD1 seta in Subdivisions I–II and II–I. Abdomen with D1 seta but D1 and D2 setae on 2nd–8th segments in Subdivision IV–II. SD1 seta present on 2nd–8th segments, L1 seta on 4th–8th segments and L2 seta on 5th–8th segments but on 4th–8th segments in Tanaorhinus and Mixochloria of Subdivision II–I. The genera of Division I without SV seta, Geometra with SV2 and SV3 setae, Tanaorhinus, Aracima, Thetidia and Comibaena with SV1, SV2 and SV3 setae. Pupating between leaves (Plate 2, figs 22–26) but the pupa of Dindica is subterranean.

Tribe tribes are characterized as in the chart below (Text–fig. B):

![Relationship of Division and Subdivision of Geometrinae](image)

Textfig. B. Relationship of Division and Subdivision of Geometrinae.
1. SV seta is present (●) or absent (○) on abdominal segments.
2. Mesothoracic leg appears from the level of mesothorax (s) or metathorax (t).
3. Prothorax with one (●) or two setae (○).
4. Two L setae on 5th abdominal segment are situated vertically (●) or obliquely (○).
5. D1 seta (1) or D2 seta (2) is present on prothorax.
6. D2 seta is absent on 5th–8th (●) or 1st–8th (○) abdominal segments.
7. L2 seta on 4th abdominal segment is present (●) or absent (○).
8. Cremaster setae are in four (●) or five or more pairs (○).
9. Ninth abdominal segment with one (●) or two SV setae (○).
Key to the genera

1. SV seta absent on abdomen .................................................. (Division I) 2
   - SV seta present on abdomen .............................................. 5

2. Prothorax with one seta; abdominal L setae situated vertically to each other on 5th–8th segments .............................................. (Subdivision I–II) Pingasa Moore
   - Prothorax with two setae; abdominal L setae situated obliquely to each other on 5th–8th segments .............................................. (Subdivision I–I) 3

3. Spiracular furrow present; cremaster small with some minute spinous setae .......... 4
   - Spiracular furrow absent but shallow pores present on metathorax to 8th abdominal segment; cremaster large with four pairs of hooked setae; excess seta of L group present on 4th–7th abdominal segments .............................................. Agathia Guenée

4. One seta (L2) present in spiracular furrow; an excess seta bearing between D1 and SD1 on 1st–8th abdominal segments; 7th and 8th abdominal spiracles vestigial; cremaster with a pair of spinous setae .............................................. Dindica Moore
   - Two setae (SD1 and L2) present in spiracular furrow; an excess seta never bearing between D1 and SD1 on 1st–8th abdominal segments; 8th abdominal spiracle vestigial; cremaster with four pairs of spinous setae ......................................... Pachista Prout

5. Prothoracic spiracle elevated; proximal end of mesothoracic leg appearing from the level of metathorax .............................................. (Division IV) 22
   - Prothoracic spiracle not elevated; proximal end of mesothoracic leg appearing from the level of mesothorax; antenna slender .............................................. 6

6. Prothorax with one or two setae; two L setae situated vertically to each other on 5th abdominal segment, if obliquely to each other then prothoracic seta one
   - Prothorax with two setae; two L setae situated obliquely to each other on 5th abdominal segment .............................................. (Division II) 7

7. Prothorax with one seta .................................................. (Subdivision II–I) 8
   - Prothorax with two setae .............................................. (Subdivision II–II) 12

8. Sculptured eye-piece scabrous; antenna never reaching caudal margin of wing; 6th abdominal spiracle situated more ventrad than those of other segments; L2 seta absent on 4th abdominal segment; abdomen bearing scatteringly prickles .............................................. Aracima Butler
   - Sculptured eye-piece smooth; antenna reaching caudal margin of wing; 6th abdominal spiracle situated at normal position; 4th abdominal segment bearing L2 seta; abdomen smooth or bearing minute punctures scatteringly .............................................. 9

9. Prothoracic femur never exposed; one or three SV setae present on 5th abdominal segment .............................................. 10
   - Prothoracic femur exposed; two SV setae present on 5th abdominal segment ........ 11

10. Head roughened; maxilla and mesothoracic leg never reaching caudal margin of wing; D seta present on 8th abdominal segment; one SV setae present on 5th abdominal segment .............................................. Geometra Linnaeus
    - Head smooth; maxilla and mesothoracic leg reaching just before caudal margin of wing; D seta absent on 8th abdominal segment; three SV setae present on 5th abdominal segment .............................................. Tanaorhinus Butler

11. Maxilla and antenna reaching caudal margin of wing; suture between pro- and mesothorax touching antenna at caudal point of suture restricting proximal margin of prothoracic leg; D seta absent on 8th abdominal segment; two L setae situated vertically to each other on 4th, 5th and 8th abdominal segments .............................................. Megalochoflora Meyrick
    - Maxilla and antenna reaching just beyond caudal margin of wing; suture between pro- and mesothorax touching antenna at a point of suture restricting proximal margin of prothoracic leg; D seta present on 8th abdominal segment; two L setae situated obliquely to each other on 4th, 5th and 8th abdominal segments .............................................. Mixochlora Warren

12. Maxilla extending just cephalad tip of mesothoracic leg; abdominal segments bearing
prickles scattering; SD1 seta present on 4th abdominal segment. *Eucyclodes* Warren
- Maxilla reaching tip of mesothoracic leg; abdominal segments smooth; SD1 seta absent on 4th abdominal segment .................. Neohipparchus Inoue
13. Head without protuberance; D1 and SD1 setae present on prothorax; Af setae situated near antennae .................................. (Subdivision III-I) 14
- Head with a pair of protuberances; D2 and SD1 setae present on prothorax; Af setae situated away from antennae .................. (Subdivision III-II) 18
14. Scar of larval anal legs invisible; scabrous furrow of cremaster deep; cremaster with hooked setae in four pairs ..................................... 15
- Scar of larval anal legs visible; scabrous furrow of cremaster shallow; cremaster with hooked setae in five or more pairs ........................................ 16
15. Maxilla extending just beyond tip of mesothoracic leg; metathoracic leg concealed; cremaster relatively slender .................................. Pelagodes Holloway
- Maxilla extending to or just before tip of mesothoracic leg; metathoracic leg appearing; cremaster relatively broad .......................... Maxates Moore
16. Basal part of antenna swelling; prothoracic femur appearing small; 6th abdominal spiracle located at normal position; one SV seta present on 5th abdominal segment; scar of larval anal leg conspicuously protruded, with many spineous setae .... Jodis Hübner
- Basal part of antenna never swelling; prothoracic femur concealed; 6th abdominal spiracle located ventrad; two SV setae present on 5th abdominal segment; scar of larval anal leg slightly protruded, without seta .................. 17
17. Cremaster with nine pairs of hooked setae .................. Hemistola Warren
- Cremaster with four pairs of hooked setae ................................................. Unnamed genus related to *Hemistola* Warren
18. Basal part of antenna swelling; hindwing hidden under forewing at spiracle level of 4th abdominal segment; two SV setae present on 5th abdominal segment .......... 19
- Basal part of antenna never swelling; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; one SV seta present on 5th abdominal segment .......................... Rhomborista Warren
19. Antenna reaching caudal margin of wing; mesothoracic legs never meet on meson at distal portion; tip of prothoracic leg lanceolate ........................................ 20
- Antenna ending slightly before caudal margin of wing; mesothoracic legs meeting on meson at distal portion; tip of prothoracic leg subliformis .................. 21
20. Mesothoracic leg ending just before caudal margin of wing; dorsal area of mesothorax verrucous .................. Hemitherea Duponchel
- Mesothoracic leg reaching caudal margin of wing; dorsal area of mesothorax smooth ................................................. Idiochiora Warren
21. Thoracic dorsad relatively straight; antenna reaching tip of mesothoracic leg; hindwing concealed at apex ................................ Culpinia Prout
- Thoracic dorsad slightly curved; antenna ending beyond tip of mesothoracic leg; hindwing visible at apex .......................... Chlorissa Stephens
22. Mesothoracic legs meeting on meson; one D seta present each of 1st–4th abdominal segments but two D setae on 5th–7th segments; three SV setae present on 5th abdominal segment; L2 seta present on 4th segment .................................. 23
- Mesothoracic legs never meeting on meson; one D seta present each of 1st–7th abdominal segments; two SV setae present on 5th abdominal segment; L2 seta absent on 4th segment .................................. Comostola Meyrick
23. Prespiracular slit opening large and conspicuously raised; SV setae present on 5th abdominal segment .................................. Comibaena Hübner
- Prespiracular slit elevated; SV setae present on 5th–8th abdominal segment ................................................. Thetidia Boisduval
Description of the genera

Division I

Subdivision I-1

*Pachista* Prout (Plate 3, figs 31, 40; Plate 6, fig. 66) (Read *Pachista* for *Pachiodes* in Text-fig. A on p. 14)

Fusiform. Head prominent, ruged with minute tubercles; frons wrinkly; maxilla extending four fifths the distance to apex of wing; antenna ending just before tip of mesothoracic leg; thorax smooth but slightly ruged on dorsal area; suture between pro- and mesothorax attached to antenna at slightly cephalic point of suture restricting proximal margin of mesothoracic leg; spiracular callosity obviously; prothoracic leg reaching two thirds the length to caudal margin of wing, femur appearing very slender; mesothoracic legs extending nine tenths the length to caudal margin of wing, meeting on meson at apical portion; metathoracic leg appearing relatively large; hindwing hidden under forewing at caudal portion of 4th abdominal spiracle and appearing again very slender between forewing and metathoracic legs; abdomen smooth but slightly ruged on 5th–9th segments, heavily striated around 5th spiracle; spiracular furrow excavated large, with a protuberance on which SD1 and L2 setae are present; cremaster small, ruged and rugous with four pairs of small spines. Thoracic setae two (D1 and SD1) each; abdominal D1 seta present, L1 situated ventro-caudad spiracle on 6th–8th segments but directly caudad on 4th–5th segments; SV seta absent.

*superans* Butler (Mt Takao, Tokyo, 7 v 1970). 31 mm, fresh green, frons and abdominal ventrum whity; edge of spiracular furrow reddish brown; spiracle and cremaster brown.

*Dindica* Moore (Plate 3, fig. 32; Plate 6, fig. 67)

Slightly prolonged; body with scattered micro spinules; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna reaching caudal margin of wing; suture between pro- and mesothorax attached to antenna at slightly caudal point of suture restricting proximal margin of prothoracic leg; spiracular callosity semi-disk shape; prothoracic leg extending five ninths the length to caudal margin of wing, femur concealed; mesothoracic leg ending slightly before tip of maxilla; metathoracic leg invisible; hindwing hidden under forewing in slightly caudal portion of 4th abdominal spiracle; scar of larval proleg slightly raised on 6th segment; spiracular furrow consisting of a deep lenticular pore in which L2 seta is present; dorsal groove simple but slightly incised at dorso-meson; lateral groove short; cremaster small, pointed bearing micro spines densely scattered, minute protrusion in the middle of ventral surface, with one pair of large spines. Thoracic setae two (D1 and SD1) each; abdominal D1 seta present; excess seta of D group present between D1 and SD1 on each of 1st–8th segments; L1 seta situated ventro-caudad spiracle on 4th–8th segments; SV seta absent.

*virescens* Butler (Hakone, Kanagawa, 7 vii 1968). 18 mm, dusty chestnut brown, frosting.

*Agathia* Guenée (Plate 2, figs 27–30)

Fusiform. Head slightly striated; maxilla extending just before caudal margin of wing, proximal margin steeply oblique; antenna ending at caudal margin of wing; thorax and wing wrinkled; suture between pro- and mesothorax attached to antenna at slightly caudal point of suture restricting proximal margin of prothoracic leg; spiracular callosity reniform, covered by micro setae; prothoracic leg reaching three fourths the length to caudal margin of wing, femur appearing small; mesothoracic leg ending tip of maxilla; metathoracic leg appeared
small; hindwing hidden under forewing at the level of 4th abdominal spiracle; abdomen with small and shallow punctures coarsely scattered; spiracular furrow absent; 6th abdominal spiracle situated more ventrad than those of other segments; small horseshoe-shaped depression on laterad of 5th–7th abdominal segments and on subdorsum of metathorax to 8th abdominal segment; dorsal groove simple, slightly incised brace-like on dorso-meson; lateral groove normal; cremaster wrinkly on ventro-meson, with four pairs of hooked setae. Thoracic setae two (D1 and SD1) each; abdominal D seta one, L1 seta situated ventro-caudal spiracle on 5th–8th segments; excess seta of L group present on each 5th–7th segments; SV seta absent.

Key to the species

1. A pair of slight protuberances present on frons; spiracular callosity curved more sharply than the following species; abdomen with densely scattered punctures; shallow depression present at the base of D1 seta; 16 mm, dusty dark brown, legs and interveins of wing, spiracular callosity blackish brown ....... visenda Butler (Mt Takao, Tokyo, 3 viii 1970)
- Such protuberances absent on frons; spiracular callosity curved more gently than the preceding species; abdomen scattered more or less sparcely punctures; shallow depression never present at the base of D1 seta; 15 mm, light green with many pale brown spots on abdomen ................. carissima Butler (Atsumi, Aichi, 23 viii 1991)

Subdivision I–II

Pingasa Moore (Plate 3, fig. 33; Plate 6, fig. 71; Plate 38, figs 648–649)

Appearance similar to Pachista Prout but not so tapered towards cephalic end, wing area slightly swelled on 4th abdominal segment. Labial palpus minute; maxilla ending at caudal margin of wing, cephalic margin steeply oblique; antenna reaching tip of maxilla; suture between pro- and mesothorax attached to antenna just at a cephalic point of suture restricting proximal margin of mesothoracic leg; prothorax slightly wrinkled; spiracular callosity reniform and roughened; prothoracic leg reaching two thirds the length to caudal margin of wing; mesothoracic leg ending just before tip of maxilla; hindwing hidden under forewing in slightly caudal portion of 4th abdominal spiracle; abdomen with micro setae densely scattered; spiracular furrow absent; lateral groove very short and dorsal groove with 22–24 teeth; cremaster large, wrinkled, with four pairs of hooked setae. Prothorax with SD1 seta only but meso- and metathorax with each of D1 and SD1 setae; D1 seta present and SV seta absent on 1st–9th abdominal segments, L1 seta situated ventro-caudal spiracle and just below L2 seta on 5th–8th segments, SV seta absent.

Key to the species

1. A pair of small tubercules present on frons; lateral groove disappearing; cremaster squared at tip, setae slightly short; 20 mm, ashy grey, with many dark brown patches or shades; spiracular callosity black; cremaster milky white, setae vermilion ................. ruginaria Guenée (Kochinda, Okinawa, 10 x 2002, S. Tominaga leg.)
- Such tubercules absent on frons; lateral groove appearing; cremaster taper off, setae somewhat long; 16 mm, colour variable, deep green but in some individuals suffused with creamy white or pinkish tint, with or without blackish spots; spiracular callosity black; cremaster pale reddish yellow, setae vermilion ................. pseudoterpnaria Guenée (Mt Mitake, Tokyo, 15 ix 1968)
Division II

Subdivision II-1

*Mixochlora* Warren (Plate 2, fig. 26; Plate 3, fig. 38; Plate 6, fig. 76)

Appearance similar to *Megalochlora* Meyrick. Head and thorax slightly rugged; labial palpus minute; maxilla reaching just beyond apex of wing, cephalic margin steeply oblique; antenna slender, extending to tip of maxilla; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity semi-ellipsoidal, covered by white micro setae; prothoracic leg ending at two thirds the length to apex of wing, femur small and slender; mesothoracic leg reaching just before tip of maxilla; forewing extending to caudal margin of 4th abdominal segment, tapered towards apex; hindwing hidden under forewing at 4th abdominal spiracle level; abdomen with granules scattered densely on 1st–4th segments and micro spinules scattered on 5th–9th segments; 6th abdominal spiracle located ventrad than those of the other segments; spiracular furrow absent; cremaster warhead-shaped, wrinkled, with four pairs of hooked setae. 

Setae often abnormally shaped. Prothorax with SD1 seta only but meso- and metathorax each with D1 and SD1 setae; abdominal D1 seta present on 1st–8th segments; L1 seta situated ventro-caudal spiracle on 6th and 8th segments and just below spiracle on 4th, 5th and 7th segments, L2 seta present on 4th segment, SV1 and SV2 setae present on 5th segment.

*vittata* Moore (Mt Takao, Tokyo, 26 viii 1970). 16 mm, creamy white with many small black spots.

*Geometra* Linnaeus (Plate 2, fig. 22; Plate 3, fig. 36)

Fusiform. Head rounded, roughened with small tubercles; labial palpus minute; maxilla ending at four fifths the length to caudal margin of wing, tapered gradually towards extremity, proximal margin steeply oblique; antenna slender, extending to caudal margin of wing; prothorax roughened with small tubercles; spiracular callosity indistinct; suture between pro- and mesothorax attached to antenna at slightly caudal point of suture restricted proximal margin of prothoracic leg; prothoracic leg ending at seven tenths the length to caudal margin of wing, femur concealed; mesothoracic leg ending just before caudal margin of wing; metathoracic leg appearing large; hindwing hidden under forewing at 4th abdominal spiracle level; abdomen smooth but with micro punctures densely scattered at cephalic margin of 5th–7th segments; 6th abdominal spiracle situated at normal position; dorsal groove absent; cremaster large, trigonal and wrinkled, with three pairs of hooked setae. 

Prothorax with SD1 seta only but meso- and metathorax with each of D1 and SD1 setae; 1st–8th abdominal segments with D1 seta, L1 seta situated ventro-caudal spiracle on 4th–8th segments and just below L2 on 5th and 7th–8th segments; L2 seta absent on 4th segment, SV2 seta present on 5th segment.


*Megalochnora* Meyrick (Based on the pupal characteristics, *Megalochlora* was designated as separate genus in this paper) (Plate 3, figs 34, 35; Plate 6, figs 68, 72, 79)

Fusiform. Head slightly angular in lateral view. Smooth but head striated. Labial palpus minute; maxilla ending at or just before caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to caudal margin of wing, spiracular callosity reniform; prothoracic leg reaching seven tenths the length to caudal margin of wing, femur visible but minute; mesothoracic leg ending just before caudal margin of wing; metathoracic leg visible or concealed; hindwing hidden under forewing at 4th abdominal spiracle level; 6th abdominal spiracle situated ventrad than that of the other segments; cremaster large, pentagonal and
wrinkly, with four pairs of hooked setae.
Prothorax with SD1 seta, meso- and metathorax each with D1 and SD1 setae; abdomen with D1 seta; L1 seta situated ventro-caudal spiral on 4th–8th segments and just below L2 on 4th, 5th and 8th segments; L2 seta present on 4th segment; SV1 and SV2 setae present on 5th segment.

Key to the species

1. Suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; prothoracic femur very slender but appearing fully; cremaster with two pairs of stout hooked setae and two pairs of weakly short hooked setae; 23 mm, pale green with many blackish brown spots. ........................................... valida Felder & Rogenhofer (Mt Takao, Tokyo, 28 vi 1970)
   - Suture between pro- and mesothorax attached to antenna at cephalic point of suture restricting proximal margin of mesothoracic leg; prothoracic femur barely recognized
2. Cremaster with four pairs of same hooked setae; 18 mm, pale green with many blackish brown spots ........................................... dieckmanni Graeser (Kunitachi, Tokyo, 10 v 1973)
   - Cremaster with two pairs of stout hooked setae and two pairs of weakly short hooked setae; 20 mm, pale green with many blackish brown spots ........................................... sponsaria Bremer (Mt Zinba, Tokyo, 12 v 1968)

Tanaorhinus Butler (Plate 3, fig. 37; Plate 6, fig. 80)
Fusiform but somewhat slimmer, head slightly angular in lateral view. Head and thorax rugged; sculptured eye-piece rugged; labial palpus minute; maxilla wrinkled, reaching just before caudal margin of wing, cephalic margin gently oblique; antenna ending at tip of maxilla; suture between pro- and mesothorax attached to antenna at just cephalic point of suture restricting proximal margin of mesothoracic leg; spiracular callosity small, semi-elliptical; hindwing hidden under forewing at spiral on level of 4th abdominal segment; prothoracic leg extending two thirds the length to caudal margin of wing, femur concealed; mesothoracic leg reaching just before tip of maxilla; metathoracic leg appeared small; abdomen with granules scattered on 1st–4th segments and micro spinules on 5th–9th segments; 6th abdominal spiral situated at normal position; dorsal groove absent; cremaster relatively large, with four pairs of hooked setae.
Prothorax with SD1 seta but meso- and metathorax with each of D1 and SD1 setae; 1st–8th abdominal segments with D1 seta; L1 seta situated ventro-caudal to spiral on 4th–8th segments but just below L2 seta on 4th, 5th and 8th segments, SV1, SV2 and SV3 setae present on 5th segment.
reciprocata Walker (Kunitachi, Tokyo, 10 v 1973). 24 mm, whitish yellow, abdomen green; base of seta black spotted.

Aracina Butler (Plate 3, fig. 39; Plate 6, fig. 82)
Fusiform. Head, thorax and wing heavily rugged; labial palpus minute; maxilla ending at eight ninths the length to caudal margin of wing, cephalic margin gently oblique; antennae extending slightly beyond tip of maxilla, meeting on meson at extremity; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity absent; prothoracic leg reaching three fourths its distance to caudal margin of wing, femur concealed; mesothoracic legs ending between tips of maxilla and antenna, meeting on meson at tips; metathoracic leg concealed; hindwing hidden under forewing at level of 4th abdominal spiral; abdomen with micro spinules scattered densely; 6th abdominal spiral situated more ventrad than those of the other segments; scar of larval proleg appearing as small tubercle on 6th abdominal segment; dorsal groove absent; 10th segment roughened with vertical ridges; cremaster relatively large and
thin, with four pairs of hooked setae.
Prothorax with SD1 setae only; 1st–8th abdominal segments with D1 seta; L1 seta situated
ventro-caudal spiracle on 4th–8th segments and just below L2 seta on 5th and 8th segments,
L2 seta absent on 4th segment, SV1, SV2 and SV3 setae on 5th segment.

*muscosa* Butler (Karuizawa, Nagano, 8 vi 1969). 16 mm, chestnut brown.

Subdivision II–II

**Eucyclodes** Warren (Plate 3, fig. 41; Plate 4, fig. 43, Plate 6, fig. 73)

Fusiform. Body rugged with irregular tubercles and ridges, moreover thorax with micro-
spines densely scattered; labial palpus minute; maxilla ending slightly before caudal margin
of wing, cephalic margin steeply oblique; sculptured eye-piece scabrous; antenna reaching
caudal margin of wing; suture between pro- and mesothorax attached to antenna at a point
of suture restricting proximal margin of mesothoracic leg; spiracular callosity acutely raised;
prothoracic leg extending four or five sevenths the length to caudal margin of wing, femur
concealed; mesothoracic leg ending midway between tips of antenna and maxilla; metathor-
acic leg visible; hindwing hidden under forewing at spiracle level of 4th abdominal segment;
6th abdominal spiracle situated more ventrad than those of the other segments; 8th spiracle
vestigial; lateral groove shallow and dorsal groove indistinct; cremaster relatively large, thin,
wrinkled by vertical slits, with four pairs of hooked setae.
Prothorax with D1 and SD1 setae; 1st–8th abdominal segments with D1 seta; L1 seta
situated ventro-caudal spiracle on 4th–8th segments and just below L2 seta on 5th, 7th and
8th segments, L2 seta absent on 4th segment; SV1 and SV2 setae present on 5th segment.

**Key to the species**

1. Prothoracic leg reaching four sevenths the length to caudal margin of wing; 16 mm.
   yellowish brown but dorsal area pale green; cremaster blackish brown
   .................. *infracta* Wileman (Mt Takao, Tokyo, 20 v 1968)
   - Prothoracic leg reaching five sevenths the length to caudal margin of wing; 18 mm, pale
     green, cremaster blackish brown. ........ *difficita* Walker (Mt Zinba, Tokyo, 12 v 1968)

**Neohipparchus** Inoue (Plate 2, fig. 24; Plate 5, fig. 55; Plate 6, fig. 69)

Apparently similar to *Tanaorhinus* Butler. Whole surface rugged and roughened with
irregular granules; labial palpus minute; maxilla ending slightly before caudal margin of
wing, cephalic margin gently oblique; antenna extending to caudal margin of wing; suture
between pro- and mesothorax attached to antenna at a point of suture restricting proximal
margin of mesothoracic leg; spiracular callosity never raised; prothoracic leg reaching two
thirds the distance to caudal margin of wing, femur very slender; mesothoracic leg ending at
tip of maxilla; metathoracic leg visible; hindwing hidden under forewing in slightly caudal
portion of 4th abdominal spiracle; 6th abdominal spiracle situated more ventrad than those
of the other segments; 8th spiracle vestigial; lateral groove relatively short and dorsal groove
irregularly incised at caudal edge; cremaster relatively small, with four pairs of hooked setae.
Prothorax with D1 and SD1 setae; 1st–8th abdominal segments with D1 seta; L1 seta
situated ventro-caudal spiracle on 4th–8th segments and just below L2 seta on 5th and 8th
segments, L2 seta absent on 4th segment, SV seta absent.

*vallata* Butler (Mt Takao, 10 vi 1969). 17 mm, pale green, whitish on frons; spiracle brown;
cremaster brown.
Division III

Subdivision III-1

Pelagodes Holloway (Plate 5, fig. 58; Plate 6, figs 77–78)

Fusiform. Smooth but more or less roughened on head; labial palpus minute; maxilla reaching caudal margin of wing; cephalic margin steeply oblique; antenna slender, ending just beyond caudal margin of wing, a row of minute tubercles possessed; glazed and sculptured eye-piece never separated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity slightly raised; prothoracic leg reaching two thirds the length to caudal margin of wing, femur concealed; mesothoracic leg ending slightly before tip of maxilla; metathoracic leg concealed; hindwing hidden under forewing at spiracle level of 4th abdominal segment; 6th abdominal spiracle situated more ventrad than those of the other segments; slight two transverse ridges present on caudal margin of 4th segment; lateral groove relatively short; dorsal groove shallow and simple; cremaster prolonged, dorsal side flattened and almost smooth, ventral side rugous, carinated ridge running at boundary of both sides, with four pairs of hooked setae.

Prothorax with D1 and SD1 setae; 1st–8th abdominal segments with D1 seta; L1 seta situated ventro-caudad spiracle but obliquely L2 seta on 5th–8th segments, L2 seta absent on 4th segment; 5th segment with SV1 and SV2 setae.

Key to the species

1. Basal mass rounded; cremaster with vertical striae on whole surface of ventrad; cremaster setae relatively short; 16 mm, green, head, thorax and its appendices dull grey
   subquadrata Inoue (Yuto, Shizuoka, 28 vii 1969)
2. Basal mass prolonged; cremaster with vertical striae on apical portion of ventrad; cremaster setae relatively long; 15 mm, pale reddish yellow
   inmissaria Walker (Kochinda, Okinawa, 9 ii 2000, S. Tominaga leg.)

Maxates Moore (Plate 4, figs 47–49; Plate 6, figs 70, 83–84)

Fusiform. Smooth. Labial palpus minute; maxilla reaching just before caudal margin of wing, cephalic margin gently oblique; antenna extending to caudal margin of wing; suture between pro- and mesothorax attached to antenna at a point of or just caudal point of suture restricting proximal margin of prothoracic leg; spiracular callosity semi-circular, slightly protruded; prothoracic leg extending two thirds the length to caudal margin of wing, femur concealed; mesothoracic leg ending at tip of maxilla; metathoracic leg appearing small; hindwing hidden under forewing at spiracle level of 4th abdominal segment; 6th abdominal spiracle situated more ventrad than those of the other segments; lateral groove long and dorsal groove simple and more or less sinuous; 9th abdominal segment very narrow; cremaster warhead-shaped, smooth but wrinkled on medio-ventral area, with four pairs of hooked setae.

D1 and SD1 setae on pro-, mso- and metathorax; abdomen with D1 seta; L1 seta situated just below ventral corner of spiracle and obliquely to L2 seta on 8th segment; L2 seta absent on 4th segment; 5th segment with SV1 and SV2 setae.

Key to the species

1. Extremity of cremaster acute; dorsal groove largely curved caudad at dorso-meson. .2
   - Extremity of cremaster angular chevron-like; dorsal groove not so curved at dorso-meson; 13 mm, pale reddish green with deep green dorsal band
2. Hindwing hidden under forewing at spiracular level of 4th abdominal segment; proximal part of cremaster slightly projected laterally; 16 mm, pale reddish brown with darker dorsal band ..................illitutara Walker (Sagami-hakusan, Kanagawa, 6 ix 1970)
- Hindwing hidden under forewing near cephalic margin of 4th abdominal segment; proximal part of cremaster not so projected; 17 mm, pale reddish brown with darker dorsal band ..................grandificata Graeser (Mt Takao, Tokyo, 28 vi 1970)

Jodis Hübner (Plate 4, figs 45-46; Plate 6, figs 90-92)
Fusiform but very slimmer. Head slightly rugous; labial palpus minute; maxilla ending slightly before caudal margin of wing, cephalic margin gently oblique; suture between glazed and sculptured eye-piece invisible; antenna reaching caudal margin of wing; thorax and abdomen smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity small, reniform; prothoracic leg reaching two thirds the length to caudal margin of wing, femur appearing very slender; mesothoracic leg ending slightly before caudal margin of wing; metathoracic leg appearing small; hindwing hidden under forewing at level of or slightly cephalic portion of 4th abdominal spiracle; 6th abdominal spiracle situated at normal position; 8th spiracle vestigial; scar of larval anal leg conspicuously protuberant as labia in which many spineous setae are present; cremaster very long, with four to seven pairs of small hooked setae.
Thorax with D1 and SD1 setae each; abdomen with D1 seta; L2 seta absent on 4th segment; SV1 and SV2 setae present on 5th segment.

Key to the species
1. Body narrowed to cephalic end, somewhat slimmer; scar of larval anal leg expanded laterally; cremaster with hooked seta in four or five pairs ..................2
   - Body not so narrowed to cephalic end, somewhat swollen on wing area; scar of larval anal leg expanded laterally; cremaster with hooked setae in seven pairs; deep green but light green laterad, reddish dorsal line and grayish brown lateral band; caudal area vermillion; 11.5 mm ..................argutaria Walker (Mt Takao, Tokyo, 29 iv 1966)
2. Cremaster with hooked setae in five pairs; deep green; 9.5 mm ..................lactearia Linnaeus (Mt Takao, Tokyo, 7 v 1970)
   - Cremaster with hooked setae in four pairs; head brown, body deep green, caudal area reddish brown; 10 mm ..................urosticta Prout (Mt Takao, Tokyo, 27 iv 1969)

Hemistola Warren (Plate 2, fig. 25; Plate 5, fig. 56; Plate 6, figs 87-88)
Fusiform but slender, frons slightly projected ventrad. Head slightly wrinkled; labial palpus minute; maxilla ending before caudal margin of wing, cephalic margin gently oblique; antenna extending to or slightly before caudal margin of wing; suture between glazed and sculptured eye-piece invisible; thorax and wing slightly rugous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity slightly raised; prothoracic leg reaching various position by the species, acuted at extremity, femur appearing; mesothoracic leg extending to or just before tip of antenna; metathoracic leg appearing; hindwing hidden under forewing at ventral position of 4th abdominal segment spiracle; abdomen smooth; 6th abdominal spiracle situated more ventrad than those of the other segments; lateral groove indistinct; dorsal groove with some shallow notches; cremaster trigonal, dorsal side flattened and smooth, ventral side smooth, basal mass possessed, with some pairs of hooked setae.
Pro-, meso, and metathorax with D1 and SD1 setae; 1st-8th abdominal segments with D1 seta; L1 seta situated ventro-caudad spiracle on 6th-8th segments; SL1 and SL2 seta present on 5th segment and SL1 seta on 6th segment.
Key to the species

1. Antenna reaching slightly before caudal margin of wing; maxilla ending tip of mesothoracic leg; mesothoracic legs never meet on meson; cremaster hooked setae four pairs; 15 mm, fresh green with a crimson stripe at dorso-meson of abdominal segments; proximal end of antenna blackish brown; cremaster blackish vermilion

--- venata Butler (Mt Takao, Tokyo, 30 vii 1977) ---

2. Antenna reaching caudal margin of wing; maxilla ending just beyond tip of prothoracic leg; mesothoracic legs meet on meson in apical portion; cremaster hooked setae eight pairs; 13 mm, fresh green, proximal end of antenna blackish brown.

--- dijuncta Walker (Oyama, Shizuoka, 3 vi 1979, H. Nakajima leg.) ---

Unnamed genus related to Hemistola Warren (Plate 4, fig. 44; Plate 6, fig. 89)

Closely allied to Hemistola Warren but only differs in the following points: frons never projected ventrad; suture between pro- and mesothorax attached to antenna at just caudal point of suture restricting proximal margin of prothoracic leg; prothoracic leg reaching four fifths the length to caudal margin of wing, never acuted at extremity, femur disappearing; hindwing hidden under forewing at spiralare level of 4th abdominal segment; lateral groove short, dorsal groove shallow; cremaster long, running a ventro-mesal vertical groove, without basal mass, with twelve pairs of hooked setae.

Chaetotaxy same as Hemistola Warren excepting SL1 seta absent on 6th abdominal segment.

tenulinnea Alphéraky (Hinoharu, Yamanashi, 26 v 1969). 12 mm, fresh green with small crimson marks at dorso-caudal corner of abdominal segments; cremaster pale vermilion

Subdivision III-II

Rhomborista Warren (Plate 3, fig. 42; Plate 5, fig. 57)

Fusiform. Head rugged; labial palpus minute; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna extending to slightly before caudal margin of wing; eye-piece smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; thorax rugous; spiracular callosity invisible; prothoracic leg reaching three fifths the length to caudal margin of wing, femur concealed; mesothoracic leg ending just before tip of antenna; metathoracic leg appearing small; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; 6th abdominal spiralare situated slightly ventrad than those the other segments; 8th spiracle vestigial; lateral groove short; dorsal groove with many vague notches; cremaster pentagonal, wrinkled on dorsal and ventral sides, with four pairs of hooked setae.

Prothorax with D2 and SD1 setae, meso- and metathorax with D1 and SD1 setae each; abdominal D1 seta on 1st-8th segments; L1 seta situated slightly ventrad spiralare on 6th-7th segments; L2 seta absent on 4th segment; SV1 seta present on 5th segment.

megaspilaria Guenée (Gushikami, Okinawa, 19 x 1999, S. Tominaga leg.). 14 mm, deep green, cremaster reddish white.

Hemithea Duponchel (Plate 4, figs 51-52; Plate 6, figs 74-75)

Fusiform but slender; smooth. Head rugous, with a pair of conical protuberances inside of proximal end of antennae and an excavation behind the protuberances; labial palpus minute; maxilla reaching caudal margin of wing, cephalic margin gently oblique; antenna extending to tip of maxilla; suture between glazed and sculptured eye-piece invisible; suture between pro- and mesothorax attached to antenna at just caudal point of suture restricting proximal margin of prothoracic leg; thorax rugous; spiracular callosity small; prothoracic leg ending
at three fifths the length to caudal margin of wing, femur concealed; mesothoracic leg reaching slightly before tip of maxilla; metathoracic leg concealed; hindwing hidden under forewing at spiracle level of 4th abdominal segment; 6th abdominal spiracle situated slightly more ventrad than those of the other segments; lateral groove very short but distinct; dorsal groove concealed; cremaster warhead-like, wrinkled on ventral and dorsal sides, with four pairs of hooked setae.

Prothorax with D2 and SD1 setae, and meso- and metathorax with D1 and SD1 setae each; 1st–8th abdominal segments with D1 seta; L1 seta situated just below ventral corner of spiracle on 4th–8th segments; L2 seta absent on 4th segment; SV1 and SV2 setae present on 5th segment.

**Key to the species**

1. Slender than the following species; frontal protuberances relatively small; metathoracic leg concealed; 12 mm, greenish brown, abdomen creamy white in dark brown shade; spiracle with black circumference; cremaster vermilion

   ----------------------------- *marina* Butler (Yuto, Shizuoka, 12 vii 1980)

   - Slightly swelled on wing area; frontal protuberances larger than the preceding species; metathoracic leg appearing small; 18 mm, green, abdomen whitish green with dark medio-dorsal stripe; reddish brown shade in basal part of antenna; spiracle without black circumference; cremaster brown

   ----------------------------- *aestivaria* Hübner (Kunitachi, Tokyo, 10 v 1973)

**Idiochlorella** Warren (Plate 4, fig. 50; Plate 6, fig. 81)

Allied to *Hemithoe* Duponchel but only differs from it as follows: maxilla extending just before caudal margin of wing, cephalic margin gently oblique; antenna reaching caudal margin of wing; suture between glazed and sculptured eye-piece scarcely visible; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; prothoracic leg ending at three fifths the length to caudal margin of wing, distal portion lanceolate, femur concealed; mesothoracic leg reaching tip of antenna; lateral groove indistinct.

SV1 and SV2 setae on 5th abdominal segment but often vestigial.

**ussuriaria** Bremer (Meguro, Tokyo, 28 v 1950). 10 mm, dusty brown, with blackish brown dorsal line from metathorax to 9th abdominal segment; dark brown subventral band from 4th segment to cremaster; dark brown shade along veins of wing; slightly darker irregular subdorsal and supraspiracular lines; spiracle with black circumference.

**Chlorissa** Stephens (Plate 4, fig. 53; Plate 6, fig. 85; Plate 37, figs 644–645)

Similar to *Hemistola* Warren in appearance but a pair of triangular protruded at proximal end of antenna. Head rugged; labial palpus minute; maxilla reaching or slightly before caudal margin of wing, cephalic margin gently oblique; antenna more or less broad, extending to or slightly before caudal margin of wing; suture between glazed and sculptured eye-piece invisible; thorax wrinkled; suture between pro- and mesothorax attached to antenna at just cephalic point of suture restricting proximal margin of prothoracic leg; spiracular callosity small, semi-circular, not so protruded; prothoracic leg reaching two or four fifths the length to caudal margin of wing, femur concealed; mesothoracic leg ending at or slightly beyond tip of maxilla; metathoracic leg appearing; hindwing hidden under forewing at spiracle level of 4th abdominal segment; abdomen smooth; 6th abdominal spiracle situated slightly more ventrad than those of the other segments; dorsal groove simple; lateral groove invisible; cremaster long, rugous, with four pairs of hooked setae.

Af seta situated near dorso-meson; prothorax with D2 and SD1 setae, meso- and metathorax with D1 and SD1 setae each; abdominal D seta one; L1 seta situated just below spiracle on
7th segment and ventro-caudal spiracle on 5th–6th and 8th segments; SV1 and SV2 setae on 5th segment.

**Key to the species**

1. Slender; frontal protuberance remarkable; prothoracic leg reaching four fifths the length to caudal margin of wing; mesothoracic leg ending slightly beyond tip of maxilla; cremaster trigonal, with basal mass; 11 mm, pale green; head, thorax and its appendices amber; dark brownish dorsal line from prothorax to mesothorax and concolorous subdorsal line on mesothorax; blackish brown dorsal line from metathorax to 7th abdominal segment; many vertical shades along veins of wing; spiracle brown
   - Somewhat burly; frontal protuberance not so remarkable; prothoracic leg reaching two fifths the length to caudal margin of wing; mesothoracic leg ending tip of maxilla; cremaster rather oblong trigonal, without basal mass; 11 mm, head and thorax pale dusty black, abdomen greyish brown with four pale dusty black irregular striae, cremaster yellow. ......... *inornata* Matsumura (Kumagaya, Saitama, 30 ix 2001, K. Kudo leg.)

**Culpinia** Prout (Plate 4, fig. 54, Plate 6, fig. 86)

Apparently similar to *Idiochlora* Warren. Head rugged; labial palpus minute; maxilla extending eight ninths the length to caudal margin of wing, cephalic margin gently oblique; antenna ending midway between tip of maxilla and caudal margin of wing; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; pro- and mesothorax rugged; spiracular callosity small, semi-circular, never protruded; prothoracic leg extending two thirds the distance to caudal margin of wing, distal portion subulated, femur concealed; mesothoracic leg reaching tip of antenna; metathoracic leg appearing slightly beyond caudal margin of wing; forewing more or less tapered towards apex; hindwing hidden under forewing at spiracle level of 4th abdominal segment; abdomen smooth; 6th abdominal spiracle situated slightly more ventrad than those of the other segments; dorsal groove shallow with some small notches; lateral groove very short; cremaster large, dorsal side flattened, rugged, with four pairs of hooked setae.

Af seta shifted near dorso-meson; prothorax with D2 and SD1 setae, meso- and metathorax with D1 and SD1 setae; abdominal D seta one; L1 seta situated just below spiracle on 7th segment and ventro-caudal spiracle on 4th–6th and 8th segments; SV1 and SV2 setae present on 5th segment.

**diffusa** Walker (Kunitachi, Tokyo, 10 v 1973). 11 mm, pale green; head, prothorax and cremaster amber; dark brown dorsal line from prothorax to mesothorax and concolorous subdorsal shade on mesothorax; blackish brown dorsal line from metathorax to 10th abdominal segment; spiracle with black circumference; cremaster setae chestnut brown.

Division IV

Subdivision IV–I

**Comastola** Meyrick (Plate 5, fig. 63; Plate 6, figs 93–94)

Fusiform. Head slightly rugose, labial palpus minute, prolonged; maxilla extending to slightly before caudal margin of wing, cephalic margin gently oblique; suture between glazed and sculptured eye-piece invisible; antenna more or less broad but tapered abruptly at extremity; thorax and abdomen smooth; suture between pro- and mesothorax attached to antenna at far cephalic point of suture restricting proximal margin of prothoracic leg; prespiracular slit opening large and conspicuously raised; prothoracic leg reaching three
fourths the length to caudal margin of wing, femur concealed; mesothoracic leg appearing from more caudal portion than that of ordinary pupa, ending at tip of maxilla; metathoracic leg appeared; hindwing hidden under forewing at spiracle level of 4th abdominal segment; 2nd and 3rd abdominal spiracles appearing completely; 6th spiracle situated more ventrad than those of the other segments; dorsal and lateral grooves invisible; cremaster broad, dorsal side slightly wrinkled and ventral side rugous, with four pairs of hooked setae. Setae very short. Thorax with D1 and SD1 setae each; 1st–7th abdominal segments with D1 seta each; L1 seta situated ventro-caudad spiracle on 4th, 5th and 8th segments and just below on 6th–7th segments; SV2 and SV3 setae on 5th segment and SV1 seta on 6th–8th segments; 8th segment with SD1, L1 and L2 setae.

Key to the species

1. Cremaster triangulatus ................. subtiliaria Bremer (Mt Maya, Hyogo, 4 viii 1972)
   - Cremaster ovatus
     ............... rubripunctata Warren (Mitushima, Tushima, 28 viii 1977, H. Nakajima leg.)

Both species are 8 mm long, fresh green, cephalic area dark brown; grayish brown dorsal line from mesothorax to 7th abdominal segment; cremaster reddish brown.

Subdivision IV–II

Comibaena Hübner (Plate 5, figs 64–65; Plate 6, figs. 95–98)

Fusiform. Head, thorax and its appendices crimped but never as heavily as the next genus; labial palpus minute; maxilla varying in length but never reaching caudal margin of wing, cephalic margin gently oblique; antenna broad, ending just or slightly before caudal margin of wing; glazed eye-piece scarcely separable from sculptured piece; suture between pro- and mesothorax attached to antenna at just or far cephalic point of suture restricting proximal margin of prothoracic leg; prespiracular slit opening large and conspicuously raised; prothoracic legs reaching seven tenths the length to caudal margin of wing, meeting or never meeting on meson in apical portion, femur visible or concealed; mesothoracic legs appearing from more caudad than that of ordinary pupa, ending at or slightly before tip of antenna, meeting on meson in apical portion; metathoracic leg appearing; hindwing hidden under forewing at spiracle level of 4th abdominal segment; abdomen with micro-spines scattered densely; 6th abdominal spiracle situated more ventrad than those of the other segments; lateral and dorsal grooves indistinct; cremaster broad, dorsal side flattened and microspines scattered, ventral side rugous, with four pairs of hooked setae. Pro-, meso- and metathorax with D1 and SD1 setae; abdominal D1 seta on 1st–4th segments but D1 or D1 and D2 setae on 5th–7th segments; L1 seta situated just below spiracle on 5th–7th segments and ventro-caudad spiracle on 8th segment; L2 seta present on 4th segment; SV1, SV2 and SV3 setae on 5th segment.

Key to the species

1. Maxilla never reaching tip of prothoracic leg; antenna extending to tip of mesothoracic leg; prothoracic femur appearing; abdominal D1 seta on 1st–8th segments; 13 mm, deep green with dull reddish brown irregular stripes, cremaster vermillion
   .......................................................... argentataria Leech (Hakone, Kanagawa, 21 vii 1968)
   - Maxilla reaching beyond tip of prothoracic leg; antenna extending slightly beyond tip of mesothoracic leg; prothoracic femur concealed; abdominal D1 seta on 1st–4th segments and D1 and D2 setae on 5th–7th segments ........................................ 2

2. Suture between pro- and mesothorax attached to antenna at just cephalic point of suture restricting proximal margin of prothoracic leg; wing extending just cephalad of caudal
margin of 4th abdominal segment; 3rd abdominal spiracle never hidden under wing; 12 mm, pale cinnamon with dark brownish shades, cremaster cinnabar

- Suture between pro- and mesothorax attached to antenna at far cephalic point of suture restricting proximal margin of prothoracic leg; wing extending just caudal of cephalic margin of 5th abdominal segment; 3rd abdominal spiracle partially hidden under wing; 10 mm, dark yellowish brown with blackish brown shades

- **amoenaria** Oberthür (Mt Hoto, Saitama, 21 ix 1969)

**Thetidia** Boisduval (Plate 5, figs 61–62; Plate 6, figs 99–100)

Fusiform. Head, thorax and its appendices heavily crimped; labial palpus minute or concealed; maxilla ending at half the length to caudal margin of wing, cephalic margin gently oblique; antenna broad in basal half, reaching at or slightly before tip of mesothoracic leg but never extending to caudal margin of wing; suture between pro- and mesothorax attached to antenna at cephalic point or slightly cephalic point of suture restricting proximal margin of prothoracic leg; prespiracular slit elevated; prothoracic legs reaching five sixths the distance to caudal margin of wing, meeting on meson in apical one thirds, femur concealed; mesothoracic legs appearing from more caudal position than that of ordinary pupa, ending slightly before caudal margin of wing, meeting on meson at apical portion; metathoracic leg appearing beyond caudal margin of wing; hindwing hidden under forewing at spiracle level of 4th abdominal segment; abdomen with micro spines densely scattered; 2nd and 3rd abdominal spiracles never hidden under wing; 6th spiracle situated more ventrad than those of the other segments; 9th segment very narrow and incised cephalad on dorso-meson; lateral and dorsal grooves indistinct; cremaster broad, ventral side rugous, dorsal side flattened and micro spines scattered, with four pairs of hooked setae.

Pro-, meso- and metathorax with D1 and SD1 setae; abdominal D1 setae on 1st–4th and 8th segments and D1 and D2 setae on 5th–7th segments; L1 and L2 setae situated vertically to each other on 7th segment; L2 seta present on 4th segment; SL1 and SL2 setae on 5th segment; SV1 and SV2 setae on 5th and 6th segments and SV2 and SV3 setae on 7th segment.

**Key to the species**

1. Labial palpus appearing minute; antenna ending at tip of mesothoracic leg; suture between pro- and mesothoracic leg attached to antenna at caudal point of suture restricting proximal margin of prothoracic leg; abdominal spiracle protruded; 13 mm, light brown with numerous small blackish brown marking scattered densely

- **albocostaria** Bremer (Lake Shikotu, Hokkaido, 17 ix 1980)

- Labial palpus concealed; antenna ending slightly before tip of mesothoracic leg; suture between pro- and mesothorax attached to antenna at slightly cephalic point of suture restricting proximal margin of prothoracic leg; abdominal spiracles not so protruded as the preceding species; 15 mm, green

- **smaragdaria** Fabricius (Hinoharu, Yamanashi, 26 v 1968)
STERRHINAE

Seventeen genera are included in Japanese fauna and the pupae of 12 genera among them described in this paper. These genera are divided into four Tribes, Cosymbiini, Sterrhini, Scopulini and Rhodostrophini (Inoue, 1956). The tribes are constituted from the Divisions and Subdivisions as shown in the chart below (Text-fig. C), based on the pupal characteristics.

The classification based on the pupa is completely identical with that of the adult. The sterrhine pupa can be generally diagnosed with the 1st and 9th abdominal segments without seta (except for Timandra), the mesothoracic leg never tapering as its extremity, and the proximal end of prothoracic leg appearing further caudal to those in ordinary geometrid pupae.

Fusiform but somewhat cylindrical in Cosymbiini; brown or green, but whitish with black to brown ill-defined sparse patches; F seta one or none; Af seta two; fronto-clypeal suture distinct or at least visible; clyppo-labral suture obscure; labial palpus appearing minute or concealed; maxilla extending to apex of wing but ending six sevenths the distance to that of the wing in Timandra and Organopoda; antenna ending at or just before tip of mesothoracic leg (just beyond that of mesothoracic leg in Timandra) with one or two rows of minute tubercles in Cosymbiini; prothorax relatively small, suture between pro- and mesothorax touching to antenna at the level of proximal end of suture between maxilla and prothoracic leg, but touching at far caudal level in Scopulini; spiracular callosity more or less large and pubescent, but heavily protruded in Cyclophora; hindwing hidden under forewing at various levels; proximal end of prothoracic leg appearing more cephalad than those of ordinary geometrid pupae; prothoracic femur always exposed; mesothoracic legs reaching to or just before apex of wing, never tapering at extremity, and meeting on meson in distal portion in Organopoda and Timandra; abdomen smooth or slightly punctate; 3rd abdominal spiracle concealed in Cyclophora, 8th spiracle vestigial; spiracular furrow lacking; dorsal and lateral grooves developed but obscure in Cosymbiini; scar of larval prolegs and anal leg indistinct; cremaster rather small, with three or four pairs of setae; in Cosymbiini and Sterrhini, bounded by ride line between proximal end of cremaster and other part of 10th segment (= tergite).

Chaetotaxy: among the Japanese Sterrhinae, Somatina, Antitrygodes and Problepsis show the most simple and fundamental chaetotaxy. Pylargosceles is substantially the same but adds an extra D seta. Abdominal D seta of this subfamily is one pair except Timandra,
Traminda and Perixera; Cosymbiini is unique with the 9th segment having setae. There are some peculiarities in the pupating habits of this subfamily: Cyclophora and Perixera have a cingulate pupa; Timandra and Traminda have a hanging pupa; other genera are subterranean.

The Tribes are characterized as in the chart below (Text-fig. D).

Text-fig. D. Relationship of Division, Subdivision and Tribe of Sterrhinae

1. Setae on 9th abdominal segment are present (○) or absent (●).
2. D seta on 4th–7th abdominal segments is D1 (○) or D2 (●).
3. Eighth abdominal segment with four (○) or three or five setae (●).

In the following key, the chaetotaxy of each genus is shown. Among the various characteristics, the chaetotaxy is the most useful for the grouping of the Sterrhine genera

Key to the Genera

1. Fusiform; F seta present; setae never present on 9th abdominal segment; dorsal and lateral grooves present ........................................ (Division I) 2
   - Cylindrical or elongate; F seta absent; setae present on 9th abdominal segment; cremaster setae four pairs; dorsal and lateral grooves present or absent ........................................ (Division II) (Cosymbiini) 9
2. Cremaster with three pairs of hooked setae; D2 seta on 4th–7th abdominal segment ........................................ (Subdivision I) (Sterrhini) Idaea Treitschke
   - Cremaster with two or three pairs of hooked setae; D1 seta on 4th–7th abdominal segments ........................................ (Subdivision II) 3
3. 8th abdominal setae three or five pairs; hindwing hidden under forewing on 2nd or 3rd abdominal segment, if hidden on 4th segment, then 8th abdominal setae three pairs ........................................ (Rhodostrophini) 4
   - 8th abdominal setae four pairs; hindwing hidden under forewing on 4th abdominal segment ........................................ (Scopulinii) 6
4. Maxilla ending just beyond prothoracic leg, then distal portion of mesothoracic legs meeting on meson; suture between pro- and mesothorax touching to antenna at the level of proximal end of suture between maxilla and prothoracic leg; lateral groove moderate; extra D seta absent; SL seta present ........................................ 5
   - Maxilla ending far beyond prothoracic leg, then mesothoracic legs never meeting on meson; suture between pro- and mesothorax touching to antenna at the caudal level of proximal end of suture between maxilla and prothoracic leg; hindwing hidden under forewing on 3rd abdominal segment; lateral groove weak; extra D seta present; SL seta absent ........................................ Pylargosceles Prout
5. Hindwing hidden under forewing at slightly caudad of 2nd abdominal segment; 2nd–4th segments without a series of punctures; 5th–7th segments punctate only on cephalic half; D seta present on 8th segment; one pair of SL setae present on 8th segment ........................................ Dithecodes Warren
   - Hindwing hidden under forewing at 4th abdominal segment; a series of punctures along cephalic margin of 2nd–4th abdominal segments; 5th–7th segments punctate on whole surface; D seta never present on 8th segment; SL seta absent on 8th segment
6. SL1 seta absent; seta long; spiracular callosity prominent ........................................7
   - SL1 seta present on 5th–8th abdominal segments; seta short; cremaster setae four pairs; spiracular callosity never prominent. .................................................. Scopula Schrank
7. Second–7th abdominal segments punctate; cremaster setae three pairs ........................................Somatina Guenée
   - First–8th abdominal segments punctate; cremaster setae one pair .................................8
8. Suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity large; metathoracic leg disappearing .................................................. Antitrygodes Warren
   - Suture between pro- and mesothorax attached to antenna at the level between proximal margins of pro- and mesothoracic legs; spiracular callosity not so large; metathoracic leg appearing ...........................................Prolepsis Lederer
9. Frons bearing a pair of acute protuberances which is fused each other, with many micro hooked setae at tip; mesothorax without tubercle; hindwing hidden under forewing on 1st or 4th abdominal segment; lateral and dorsal grooves absent; abdominal D setae two..................................................10
   - Frons never bearing such protuberances; mesothorax with a pair of tubercles at cephalo-lateral corners; hindwing hidden under forewing on 4th abdominal segment; lateral and dorsal grooves present but indistinct; abdominal D seta one .................................11
10. Hindwing hidden under forewing on 1st abdominal segment; prothoracic leg ending far before tip of maxilla; femur of prothoracic leg appearing; 7th abdominal spiracle normal; SL1 seta present on 5th abdominal segment; prothorax with three setae .......................................................... Cyclophora Hübner
    - Hindwing hidden under forewing on 4th abdominal segment; prothoracic leg reaching just before tip of maxilla; femur of prothoracic leg disappearing; 7th abdominal spiracle vestigial; SL1 setae present on 5th and 6th abdominal segments; prothorax with two setae ............................... Perixera Meyrick
11. Frons protuberances fused to extremity each other; distal portion of mesothoracic legs never meeting on meson; cremaster with hooked setae at tip; meso- and metathorax each with two setae; 9th abdominal segment with one seta ............................................................. Traminda Saalmüller
    - Frons protuberances separated at extremity each other; distal portion of mesothoracic legs meeting on meson; cremaster hooked setae bearing at independent points from each other; meso- and metathorax each with three setae; 9th abdominal segment with five setae .................................................. Timandra Duponchel

Description of the genera

Division 1

Subdivision I–I (Sterrhini)

Idaea Treitschke (Plate 8, fig. 119)

Fusiform but slim. Head slightly wrinkled, thorax and abdomen smooth; labial palpus concealing; maxilla ending the middle between tip of prothoracic leg and apex of wing, cephalic margin gently oblique; antenna extending just before apex of wing; suture between pro- and mesothorax touching to antenna at the level slightly cephalad of proximal end of suture between maxilla and prothoracic leg; spiracular callosity slightly raised; prothoracic leg reaching 11/13 the length to apex of wing; mesothoracic leg reaching apex of wing, more or less narrower at tip; metathoracic leg appearing; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; abdominal spiracle small, 2nd–3rd ones appearing completely, position of 6th–8th spiracles situated more ventrad than those of 2nd–5th
ones; dorsal groove distinct but simple, lateral groove wide; cremaster semi-circular, smooth, with three pairs of hooked setae.
Setae varied bristly; pro-, meso- and metathorax each with D1 and SD1 setae; abdominal D1 seta on 2nd–3rd and D2 seta on 4th–8th segments; L1 seta situated just below or slightly ventro-caudal spiracle and obliquely to L2 seta on 4th–8th segments; SL1 seta on 5th segment and SL1 and SL2 setae on 7th segment; SV1 seta on 5th segment; 1st and 9th segments without seta.

*muricata* Hufnagel (Machida, Tokyo, 7 vi 1983). 8 mm, yellowish brown, with some blackish brown stripes on wing.

Subdivision I–II (Rhodostrophiiini)

**Dithecodes** Warren (Plate 7, fig. 112; Plate 8, fig. 121)

Fusiform. Head and thorax smooth; F seta somewhat bristly; labial palpus concealing; maxilla reaching 11/13 the length to apex of wing, cephalic margin gently oblique; antenna slender, ending at or just before apex of wing; suture between pro- and mesothorax touching to antenna at the level of proximal end of suture between maxilla and prothoracic leg; spiracular callosity distinct, ellipsoidal and slightly raised; prothoracic leg extending before tip of maxilla; mesothoracic legs reaching near apex of wing, meeting on meson in distal portion; metathoracic leg appearing; hindwing hidden under forewing just before caudal margin of 2nd abdominal segment; 2nd–7th segments scattered shallow micro punctures, but 5th–7th segments only on cephalic half; dorsal and lateral grooves possessing micro setae; cremaster small and roughened, with one pair of large falcate setae and two pairs of hooked setae.
Pro-, meso- and metathorax with D1 and SD1 setae each; abdominal D1 seta on 2nd–8th segments; L1 seta situated ventro-caudal spiracle on 4th–8th segments and vertically to L2 seta on 8th segment; SL1 and SL2 setae present on 7th segment and SL1 seta on 8th segment; SV seta absent; 1st and 9th segments without seta.

*erasa* Warren (Mt Takao, Tokyo, 29 iv 1968). 9.5 mm, brown, spiracle black.

**Organopoda** Hampson (Plate 7, fig. 111; Plate 8, fig. 118)

Fusiform. Closely allied to *Dithecodes* Warren. Seta slightly bristly; maxilla ending before apex of wing, proximal margin gently oblique; antenna reaching apex of wing; prothoracic leg reaching 8/11 the distance to apex of wing; mesothoracic legs never meeting on meson; hindwing appearing very slender to 4th abdominal segment; 2nd–8th segments punctate on whole surface; a series of deep punctures (4 pairs on 2nd, 8 pairs on 3rd and 10–11 pairs on 4th segments) along cephalic margin of 2nd–4th segments.
Pro-, meso- and metathorax with D1 and SD1 setae; D1 seta on 2nd–7th abdominal segments; SD1 seta on 2nd–8th segments; L1 seta on 4th–8th segments and L2 seta on 5th–8th segments; SL1 and SL2 setae on 7th segment.

*carnearia* Warren (Sagami-hakusan, Kanagawa, 6 ix 1980). 12 mm, dull green, abdomen suffused with reddish brown, spiracle black.

**Pylargosceles** Prout (Plate 7, fig. 110; Plate 8, fig. 120)

Fusiform. Allied to preceding genus but F seta normal; labial palpus appearing minute; proximal margin of maxilla slightly oblique; hindwing hidden under forewing at spiracular level of 3rd abdominal segment; a series of punctures on 2nd–4th segments lacking; dorsal groove very short.
Abdomen with an excess seta between D and SD setae on 2nd–8th segments, L1 seta oblique.
to L2 seta on 8th segment; SL and SV setae lacking.

*steganioides* Butler (Meguro, Tokyo, 10 v 1955). 8 mm, yellowish brown, abdomen brown, wing suffused green.

(Scopulini)

**Antitrygodes** Warren (Plate 32, figs 500–501)

Fusiform. Head small, slightly striated; labial palpus minute; maxilla extending caudal margin of wing, cephalic margin steeply oblique; antenna ending tip of maxilla, broad on basal part; thorax rugous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity large, protruded; prothoracic leg ending nine eleventh the length to caudal margin of wing, femur appaerio large; mesothoracic leg reaching caudal margin of wing; metathoracic leg disappearing; hindwing hidden under forewing at spiracular level of 4th abdominal segment; 1st–8th abdominal segments shallow punctate; 8th abdominal spiracle vestigial; lateral groove somewhat large; dorsal groove with three notches; cremaster cleaved in two on apical portion, with a pair of large falcate setae. Setae relatively long; pro-, meso- and metathorax each with D1 and SD1 setae; abdominal D1 seta on 2nd–8th segments; L1 seta situated slightly ventro-caudad spiracle on 4th, 6th and 8th segments and directly below spiracle on 5th and 7th ones; SL and SV setae lacking; 1st and 9th segments without seta.

*divisaria* Walker (Mt Nago, Okinawa, 13 ii 1999, S. Tominaga leg.). 14 mm, reddish brown.

**Somatina** Guenée (Plate 8, fig. 116)

Fusiform. Head, thorax and there appendices roughened with many striae; labial palpus concealing; maxilla ending slightly before apex of wing, cephalic margin slightly steeply oblique; antenna ending just before tip of mesothoracic leg; suture between pro- and mesothorax touching to antenna at the level just cephalad of proximal end of suture between pro- and mesothoracic legs; spiracular callosity elliptical and slightly raised; prothoracic leg reaching four fifths the distance to apex of wing; mesothoracic leg extending to apex of wing; metathoracic leg appearing; hindwing hidden under forewing at spiracular level of 4th abdominal segment; abdomen punctate on 2nd–7th segments; 7th abdominal spiracle locating slightly ventrad than those of the other segments; dorsal groove with seven deep incision; lateral groove without microsetae; cremaster somewhat quadrate and almost smooth, with one pair of large falcate and two pairs of hooked setae. Chaetotaxy same as in *Antitrygodes* Warren but L1 seta situated directly below spiracle on 8th abdominal segment only.

*indicataria* Walker (Ogi, Sado, Niigata, 5 viii 1976, R. Sato leg.). 12 mm, dark brown.

**Problepsis** Lederer (Plate 8, fig. 115)

Closely allied to *Somatina* Guenée and only distinguishable by spiracular callosity rectangular; 1st–7th abdominal segments scattered densely deep punctures and 8th segment scattered sparcely on dorsal area only; cremaster conical but bifurcate at tip, on which a pair of relatively long and stout hooked setae bearing, almost smooth. Chaetotaxy same as preceding genus.

*albidior* Warren (Mt Kakuta, Niigata, 15 v 1975, R. Sato leg.). 13 mm, dark brown.

**Scopula** Lederer (Plqte 7, figs 107–109, Plate 8, figs 122–124)

Fusiform or somewhat slimmer. Head and thorax smooth; labial palpus concealing;
maxilla reaching to or just before apex of wing; antenna reaching to or just before apex of wing; suture between pro- and mesothorax touching to antenna at the level of proximal end of suture between pro- and mesothoracic legs; spiracular callosity elliptical, not so prominent; prothoracic leg extending five sixths the distance to apex of wing; mesothoracic leg extending to or just before apex of wing; hindwing hidden under forewing at or slightly cephalad spiracular level of 4th abdominal segment; abdomen punctate on 2nd–8th segments; dorsal groove incised deeply, lateral groove without micro setae; cremaster small, relatively smooth, with one pair of large falcate and three pairs of hooked setae. Pro-, meso- and metathorax each with D1 and SD1 setae; abdominal D1 seta on 2nd–8th segments; L1 seta situated ventro-caudal spiracle on 4th, 6th and 8th segments and just below spiracle on 5th and 7th segments, L1 seta on 8th segment located vertically to L2 seta, SL1 setae on 5th–6th segments and SL1 and SL2 setae on 7th segment; SV seta absent; 1st and 9th segments without seta.

**Key to the species**

1. Slightly elongated; maxilla ending slightly before apex of wing; metathoracic leg visible
   - Not so elongated; maxilla reaching apex of wing; metathoracic leg concealed or minute; 12 mm, brown, caudal portion dark brown.
   
   
   *ignobilis* Inoue (Mt Takao, Tokyo, 16 v 1970)

2. Antenna reaching apex of wing; hindwing hidden under forewing at spiracular level of 4th abdominal segment; lateral groove long; 11 mm, pale greenish brown, ventrum yellowish brown.
   - Antenna ending slightly before apex of wing; hindwing hidden under forewing at slightly cephalad spiracular level of 4th abdominal segment; lateral groove short

3. Cremaster somewhat slender; 10 mm, pale brown, wing suffused pale green
   - Cremaster thick than that of preceding species; 8 mm, pale brown.

   *confusa* Butler (Hakone, Kanagawa, 31 v 1968)

   *emma* Prout (Kochinda, Okinawa, 20 xi 1998, S. Tominaga leg.)

**Division II (Cosymbiini)**

**Timandra** Duponchel (Plate 7, figs 103–104, Plate 8, figs 126–129)

Somewhat prolonged, head tapering; frons with a bifurcated protrusion on which many micro hooked setae possessed at top; spinoeous projection having at base of forewing. Head and thorax smooth; labial palpus minute; maxilla reaching four fifths the length to apex of wing, cephalic margin gently oblique; antenna slender, reachin apex of wing; suture between pro- and mesothorax touching to antenna at the level slightly cephalad of proximal end of suture between maxilla and prothoracic leg; prespiracular slit disappearing; spiracular callosity reniform, slightly raised; prothoracic leg ending seven tenths the length to apex of wing; mesothoracic legs ending slightly before apex of wing, meeting on meson in apical portion from tip of maxilla; metathoracic leg appearing; hindwing hidden under forewing at slightly cephalad 4th abdominal spiracular level; abdomen smooth but weakly striated; dorsal groove disappearing; cremaster quadrigonal, smooth, with four pairs of short hooked setae. Prothorax with D1 and SD1 setae, meso- and metathorax with D1, D2 and SD1 setae each; abdomen with D1 and D2 setae on 1st–9th segments, L2 seta wanting on 4th segment; SL1 and SL2 setae on 5th and 7th segments and SL1 seta on 8th one; SV1 and SV2 setae on 5th–6th segments and SV1 seta on 7th–8th ones (on 7th segment situated directly ventral L2 seta but on 8th segment directly ventral L1 seta). Setae always varied short bristles which is not pointed at tip.

All examined species are yellowish white with brownish patches, frontal protrusion suffused
vermilion; 13 mm.

**Key to the species**

1. Cremaster narrow ................................................................. 2
   - Cremaster wide ................................................................. 3

2. Cremaster setae bearing close together and near apical portion.
   ................................................................. apicrosea Prout (Yuto, Shizuoka, 15 viii 1968)
   - Cremaster setae bearing apart from each other and not so restricted apical portion
     ................................................................. amata Linnaeus (Mt Takao, Tokyo, 23 viii 1966)

3. Cremaster setae bearing close together (especially between D2 and SD1) and termen incised deeper. ............ comptaria Walker (Mt Takao, Tokyo, 10 viii 1969)
   - Cremaster setae bearing apart from each other (especially between D2 and SD1) and termen incised shallower. ........ dichela Prout (Sagami-hakusan, Kanagawa, 6 ix 1980)

*Traminda* Saalmüller (Plate 7, fig. 101, Plate 8, fig. 114)

Appearance somewhat resembling that of *Pieris brassicae* Linnaeus. Head tapering; frons with two bifurcated protrusions fused together completely each other on which many micro hooked setae are present at top; middle of wing raised. Head and thorax smooth, protruded part of frons wrinkled; labial palpus minute; maxilla extending just before apex of wing, cephalic margin gently oblique; antenna reaching just before apex of wing; suture between pro- and mesothorax touching antenna at the level just caudal of proximal end of suture between maxilla and prothoracic leg; spiracular callosity absent; prothoracic leg reaching three fourths the length to apex of wing; mesothoracic leg extending to tip of maxilla; metathoracic leg appearing small; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; shallow crepe-like wrinkles on 5th abdominal conjunctiva; lateral and dorsal grooves concealed; cremaster warhead-shaped, rugous, similar to *Cyclophora* Hübner, with four pairs of short hooked setae at extremity.

Pro-, meso- and metathorax each with D1 and SD1 setae; abdomen with D1 and D2 setae on 2nd–7th segments but D1 seta on 8th–9th segments; SL1, SL2, SV1 and SV2 setae on 5th segment; 1st segment without seta. Abdominal setae put on a minute verruca.

*aeviari*a Guenée (Kotinda, Okinawa, 12 vii 1999, S. Tominaga leg.). 13 mm, head, thorax and its appendices and abdomen ventrad chestnut brown, other area pale brown.

*Cyclophora* Hübner (Plate 7, figs 105–106, Plate 8, fig. 117)

Somewhat prolonged; head truncate; frons flattened; large tubercle at just below spiracular callosity of mesothorax. Head and thorax smooth; labial palpus concealing; maxilla extending slightly before apex of wing, cephalic margin gently oblique; antenna reaching apex of wing; suture between pro- and mesothorax touching to antenna at the level far cephalad of proximal end of suture between maxilla and prothoracic leg; spiracular callosity rigid ellipsoidal, scarcely raised; prothoracic leg ending two thirds the length to apex of wing, heavily pointed towards apex, femur appearing; mesothoracic leg reaching apex of wing; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; abdomen slightly rugous on 1st–3rd segments and punctate on 4th–8th segments; dorsal groove appearing at dorso-meson, cuneiform, shallow; cremaster war-head shape, dorsal side smooth, ventral side rugous, with four pairs of short hooked setae at extremity.

Prothorax with D1, D2 and SD1 setae; meso- and metathorax with D1 and SD1 setae; abdomen with D1 seta on 2nd–9th segments; L1 seta on 4th–9th segments and L2 seta on 5th–8th segments; SL1 seta on 5th segment; 1st segment without seta.

*albipunctata* Hufnagel (Spa Manza, Nagano, 29 vii 1965). 13 mm, milky white with pale black patches.
Perixera Meyrick (Plate 7, fig. 113, Plate 8, fig. 125; Plate 37, figs 627–629)

Somewhat allied to Cyclophora Hübner but tubercle on mesothorax (spiracular callosity) thorn-like; thorax striated; prothoracic leg ending two thirds the length to caudal margin of wing, femur appearing; hindwing hidden under forewing on 4th abdominal segment; 1st–7th abdominal segments punctate; 8th abdominal spiracle vestigial; lateral groove indistinct; dorsal groove with small seven notches; cremaster war-head shape, with four pairs of hooked setae.

Prothorax with D1, D2 and SD1 setae; meso- and metathorax with D1 and SD1 setae; abdomen with D1 seta on 2nd–8th segments; SL1 seta on 5th–6th segments.

Key to the species

1. Spiracular callosity acuted upwards; cremaster conical, hooked setae relatively apart from each other, terminal one somewhat large; 12 mm, yellowish brown or green.

   ..........minorata Warren (Gushikami, Okinawa, 17 vi 1999, S. Tominaga leg.)

- Spiracular callosity acuted rather sideways; cremaster trigonal, hooked setae bearing close together at apical end, all setae same size; 7 mm, flesh green with or without a white stripe on laterad

   ..........obrinaria Guenée (Gushikami, Okinawa, 23 v 2001, S. Tominaga leg.)
LARENTIINAE

Larentiinae is a large subfamily of Geometridae and about 100 genera has been recorded in Japan. In this paper, the pupae of 43 genera are investigated and divided into three Divisions each of which is further divided into two or three Subdivisions. No study is known on the tribes of Japanese Larentiinae. Forbes (1948) made a study on the North American species and recently Leraut (1980 and 1997) published his searches on French moths. Compared with Leraut's result, the pupal classification is practically the same in the division of the tribe (only Trichopterygini is placed near Xanthorhoini, Asthenini near Hydriomenini, Cidariini near Eupitheciini and Chesiadiini).

From above mentioned point of view, the conspicuous differences between adult and pupa classifications are the following items:

1. Chesiadiini (Division III) is in a directly opposite position to Trichopterygini (Division I).
2. Trichopterygini (Division I) constituted a same group with Xanthorhoini.
3. Melanthis is transferred from the last position to near Rheumapterini.
4. Rheumapterini is not a member of Division II and rather placed near Eupitheciini or Asthenini of Division III.

There is little study dividing Japanese Larentiinae into tribes. Forbes (1948) has been tried it based on the North American species and recently Herbulot (1962–63) and Leraut (1980 and 1997) did on the French fauna. These results conform well to one another, but differ conspicuously from that of this paper in the treatment of Rheumapterini.

The affinity among the tribes, however, is substantially different from one another as Forbes stated “no clear seriation of primitive and specialized”.

The most larentiine pupae are fusiform and tinted brownish, but in some genera, especially Subdivision III–II, the pupae are prolonged and often decorated with various irregular black markings. The prothoracic femur is exposed; the spiracular furrow is never present except for Subdivision III–I; and the cremaster bears hooked setae (except for Operophterini and Subdivision III–III).

Head moderate; adfrontal suture present between proximal ends of antennae; labial palpus concealed but appearing minute in some genera; maxilla reaching to or just before caudal margin of wing except for Operophtera and Aplocera; antenna reaching to or just before caudal margin of wing but far beyond that of wing in Aplocera; suture between pro- and mesothorax attached to antenna at caudal point of suture restricting proximal margin of prothoracic leg; prothoracic legs ending at various positions, meeting on meson in Operophtera, femur appearing but disappearing in Otopecta, Episteira, Sauris and Oporinia; hindwing hidden under forewing on 4th abdominal segment but on 3rd segment in Sauris, Episteira, Trichopteryx, Idioteuria and Asthena, and on 2nd segment in Aplocera; abdomen frosted or punctate; 2nd and/or 3rd spiracles often concealed; 8th spiracle vestigial in many genera but 7th–8th in Trichopterigia, Otopecta, Episteia, Sauris and Hydrelia, and 6th–8th in Anticollinix, Trichodezia and Trichobaptoria; spiracular furrow absent except for Pseudostegania, Philerema and cognate genera; cremaster distinct but small in Operophtera and related genera, cremaster setae hooked or spiny (Subdivision II–I) and in two to four pairs, the number often varying even in allied genera.

F and Af setae present on head excepting for Operophterini; pro-, meso- and metathorax bearing D1 and SD1 setae in many genera with the following variation in Division III, viz. D1, D2 and SD1 setae on pro-, meso- and metathorax in III–I (XD1, D1 and SD1 in only Hydrelia), XD1, D1, D2 and SD1 on prothorax and D1, D2 and SD1 on meso- and metathorax in III–II and XD1, XD2, D1, D2 and SD1 on prothorax and D1, D2 and SD1 on meso- and metathorax in III–III. Abdomen only D1 seta present on each of 1st–8th segments in Divisions I and II but D1 and D2 setae in Division III (9th segment with D1 seta only in all genera); SD and L setae normal; SL seta and sometimes SV seta present on abdominal segments in all the genera of this subfamily with the number varying from genus...
Textfig. E. Phylogenetic relationship of genera in Larentiinae
to genus.
The genera of this subfamily excepting for *Operophtera* Hübner and *Aplocera* Stephens both of which are subterranean, pupate in roughly spun cocoons on or just below the surface of the soil, between the leaves, amongst the twigs, in the bunch of young leaves and so on. These Tribes are characteristic as in the chart below (Text-fig. F):

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**Text-fig. F.** Relationship of Division, Subdivision and Tribe of Larentiinae.

1. Mesothorax with two (○) or three setae (●).
2. First-3rd abdominal segments with one (○) or two D setae (●).
3. Fourth-7th abdominal segments with one (○) or two D setae (●).
4. Eighth abdominal segment with four or less (○) or six setae (●).
5. Prothorax with three or four (○) or five setae (●).
6. Adfrontal suture is present (○) or absent (●).
7. Eighth abdominal segment with two or three (○) or four setae (●).
8. SL1 seta on 4th abdominal segment is present (○) or absent (●).
9. Cremaster with (○) or without (●) hooked setae.
10. Setae on 9th abdominal segment are present (○) or absent (●).
11. Ninth abdominal segment with two (○) or five setae (●).

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**Key to the Genera**

1. Two pairs of setae on mesothorax, if three pairs, then prothoracic femur disappearing .......................................................... 2
   - Three pairs of setae on mesothorax; prothoracic femur appearing ...................................... (Division III) 21
2. One D seta on each of 1st-3rd abdominal segments .................................................. (Division I) 3
   - Two D setae on each of 1st-3rd abdominal segments .................................................. (Division II) 13
3. One D seta on each of 4th-7th abdominal segments .............................................. (Subdivision I-II) 4
   - Two D setae on 4th-7th abdominal segments; prothoracic femur exposed ................................. (Subdivision I-I) 10
4. Prothoracic femur concealed; hindwing hidden under forewing on 2nd or 3rd abdominal segment; 7th-8th abdominal spiracles vestigial; SL1 seta present on 4th abdominal segment .......................................................... 5
- Prothoracic femur exposed; hindwing hidden under forewing on 4th abdominal segment.

5. Fusiform; labial palpus concealed; adfrontal suture between proximal ends of antennae absent; D seta absent on 8th abdominal segment. .................. _Otoplecta_ Warren
- Slimmer; labial palpus appearing small; adfrontal suture between proximal ends of antennae present; D seta present on 8th abdominal segment. .................. 6

6. Mesothoracic leg reaching tip of maxilla; dorsal groove indistinct; two setae present on 9th abdominal segment. .......................... _Sauris_ Walker
- Mesothoracic leg reaching beyond tip of maxilla; dorsal groove distinct; seta absent on 9th abdominal segment. .................. _Episteira_ Warren

7. SL1 seta present on 4th abdominal segment; seta absent on 9th segment; cremaster setae in two or three pairs .................................. _Xanthorhoe_ Hübner
- SL1 seta absent on 4th abdominal segment; one seta present on 9th segment; cremaster setae in four pairs .................................. 8

8. Somewhat prolonged; 3rd abdominal spiracle hidden under wing; 8th abdominal spiracle vestigial; terminal setae of cremaster hooked ........ _Lobogonodes_ Bastelberger
- Fusiform; 3rd abdominal spiracle appearing; 7th–8th abdominal spiracles vestigial; terminal setae of cremaster falcate .................. 9

9. Femur of prothoracic leg appearing; metathoracic leg visible; 6th–8th abdominal spiracles vestigial ........................................ _Anticollis_ Prout
- Femur of prothoracic leg concealed; metathoracic leg invisible; 7th–8th abdominal spiracles vestigial ........................... _Colix_ Guenée

10. Third abdominal spiracle appeared partly; 8th spiracle vestigial; cremaster with two pairs of hooked setae; 8th abdominal segment with two or three setae
- Third abdominal spiracle hidden under wing; 7th–8th spiracles vestigial; 8th abdominal segment with four setae .................. _Tyloptera_ Christoph

11. Labial palpus concealed; cremaster with one pair of hooked setae or without seta. 12
- Labial palpus appearing; cremaster with two pairs of hooked setae ........................................................................... _Trichopterigia_ Hampson

12. A pair of hooked setae present on cremaster ................................... _Trichopteryx_ Hübner
- Hooked setae absent on cremaster ........................................... _Esakiopteryx_ Inoue

13. Eighth abdominal segment with four or less setae; one seta present or absent on 9th segment ........................................ (Subdivision II–I) 14
- Eighth abdominal segment with six setae; three or four setae present on 9th segment ........................................ (Subdivision II–II) 18

14. Prothoracic femur concealed; 3rd abdominal spiracle hidden under wing; cremaster with hooked setae .................................. 15
- Prothoracic femur exposed; 3rd abdominal spiracle appearing; cremaster without hooked setae .................................. 16

15. Cremaster with one pair of straight setae and three pairs of hooked setae.
- Cremaster with three pairs of hooked setae ................................ _Idiotephria_ Inoue

16. Maxilla ending at half the length to caudal margin of wing ................ _Oneropithera_ Hübner
- Maxilla reaching just before caudal margin of wing .................. 17

17. Suture between pro- and mesothorax attached to antenna at slightly cephalic point of suture restricting proximal margin of mesothoracic leg; mesothoracic legs never meeting on meson; 3rd and 4th abdominal spiracles hidden under wing. .... _Epirrita_ Hübner
- Suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; mesothoracic legs meeting on meson at distal end; 4th abdominal spiracle appeared .................. _Nothoporia_ Inoue

18. Eighth abdominal spiracle vestigial; two SL setae present on 6th–7th abdominal segments and one on 5th and 8th segments; 9th abdominal segment with five setae .... 19
- Sixth–8th abdominal spiracles vestigial; one SL seta present on 6th–7th abdominal segments ................................................. 20
19. Eighth abdominal segment punctate; terminal setae of cremaster falcate; two SL setae present on 6th–7th segments. ......................... Pseudostegania Butler
- Eighth abdominal segment never punctate; terminal setae of cremaster hooked; one SL seta present on 6th–7th abdominal segments .......... Lacinioides Warren
20. Hindwing hidden under forewing on 2nd abdominal segment; cremaster setae in four pairs; three setae present on 9th segment. ........ Trichodezia Warren
- Hindwing hidden under forewing on 4th abdominal segment; cremaster setae in three pairs; four setae present on 9th abdominal segment. .......... Trichobaptia Prout
21. Prothorax with five setae; maxilla and antenna extending far beyond caudal margin of wing; cremaster bifurcated; SV1 and SV2 setae present on 5th–6th abdominal segments and SV1 seta on 7th segment. .................. (Subdivision III–III) Aplocera Stephens
- Prothorax with three or four setae; maxilla and antenna never extending so very beyond caudal margin of wing; cremaster with hooked setae ......................... 22
22. Adfrontal suture between proximal ends of antennae concealed; 9th abdominal segment with three or less setae, or without seta. ........ (Subdivision III–I) 23
- Adfrontal suture between proximal ends of antennae appearing .......................................................... (Subdivision III–II) 30
23. SL1 seta absent on 4th abdominal segment. ...................................................... 24
- SL1 seta present on 4th abdominal segment .................................................. 28
24. Prothorax with three setae; one seta present on 1st abdominal segment; one or three SV setae present on 6th segment. ....................... 25
- Prothorax with four setae; two setae present on 1st abdominal segment; two SV setae present on 6th segment. ............................... 26
25. Two SV setae present on 5th abdominal segment and one SV seta on 6th segment .......................................................... Sibatania Inoue
- One SV seta present on 5th abdominal segment and three SV setae on 6th segment .................................................. Eucosmabraxas Prout
26. Metathoracic leg concealed; 5th–6th abdominal conjunctiva with many irregularly ridged furrow ..................................... Eulithis Hübner
- Metathoracic leg appearing; 5th–6th abdominal conjunctiva without such furrows as the preceding ............................................. 27
27. Antenna ending at tip of mesothoracic leg .................................................. Eciptopera Warren
- Antenna ending just before tip of mesothoracic leg ................................ Eveciptopera Inoue
28. SV1 seta present on 5th abdominal segment. .................................................. Eschatarchia Warren
- SV1 and SV2 setae present on 5th abdominal segment ........................................ 29
29. Prothorax with four setae; two setae present on 1st abdominal segment; 5th segment with two SV setae. ................................... Gandartitis Moore
- Prothorax with three setae; one seta present on 1st abdominal segment; 6th segment with three SV setae. ................................... Calleulype Warren
30. Setae present on 9th abdominal segment. .................................................. 31
- Setae absent on 9th abdominal segment. .................................................. 38
31. SL1 seta present on 4th abdominal segment .................................................. 32
- SL1 seta absent on 4th abdominal segment. .................................................. 34
32. Metathorax with three setae; V seta absent on 6th–8th abdominal segments .......... 33
- Metathorax with four setae; V seta present on 6th–8th abdominal segments .................................................. Dysstroma Hübner
33. Slender; tibia of prothoracic leg never swelling; SV setae present on 5th–7th abdominal segments .................................................. Heterothera Inoue
- Thick; tibia of prothoracic leg swelling; SV setae absent on 5th–7th abdominal segments .................................................. Eolis Hübner
34. One D seta (D1) present on abdominal segments .................................................. 35
Two D setae (D1 and D2) present on abdominal segments ........................................36
35. First–7th abdominal segments punctate; dorsal groove with three notches

- Metathorax and abdominal segments punctate; dorsal groove with one notch

- Chloroclystis Hübner

- Gymnoscelis Mabille

36. Five setae present on 9th abdominal segment. .................................................. Eupithecia Curtis

- Two setae present on 9th abdominal segment. ..................................................37

37. Eighth abdominal spiracle vestigial; two setae present on 9th segment

- Seventh–8th abdominal spiracle vestigial; one seta present on 9th segment.

- Asthena Hübner

- Hydrelia Hübner

38. Spiracular furrow present. .................................................................39

- Spiracular furrow never present. ...............................................................42

39. Second–3rd abdominal segments without D2 seta. ........................................40

- Second–3rd abdominal segments with D2 seta. ............................................41

40. Fourth abdominal segment with D1 seta; SL1 seta present on 4th, 5th, 6th and 7th segments; 2nd–3rd segments smooth. .................................................. Philerena Hübner

- Fourth abdominal segment with D1 and D2 setae; SL1 seta present on 4th, 5th and 7th segments; 2nd–3rd segments punctate ......................... Rheumaptera Hübner

41. Fourth abdominal segment with L1 seta; hindwing appearing near apex of wing; SV1 seta present on 5th segment ........................................... Triphosa Stephens

- Fourth abdominal segment without L1 seta; hindwing hidden under forewing on 4th segment; SV1 seta absent on 5th segment .................... Telenomeuta Warren

42. Eighth abdominal segment with four setae ............................................ Melanthia Duponchel

- Eighth abdominal segment with three setae .............................................. Photoscotosia Warren

Description of the genera

Division I

Subdivision I–I

Tyloptera Christoph (Plate 8, figs 137–138)

Fusiform. Head slightly striated; labial palpus concealed; maxilla reaching just before caudal margin of wing, cephalic margin gently oblique; antenna comparatively broad but narrowed in distal portion, extending to tip of maxilla; glazed and sculptured eye-piece never separable; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; prothorax rugged but meso- and metathorax rumpled; medio-dorsal ridge from prothorax to mesothorax; prespiracular slit indistinct; spiracular callosity never recognized; prothoracic leg ending at four fifths the distance to caudal margin of wing, femur appearing; msothoracic leg extending to tip of maxilla; metathoracic leg appearing minute; forewing slightly ridged along veins; hindwing appearing slender along forewing to near apex; abdomen punctated; 2nd and 3rd abdominal spiracles completely appearing; 6th spiracle situated slightly more ventrad than those of the other segments; 8th spiracle vestigial; dorsal groove with many obscure incisions on lower margin; lateral groove very short; cremaster trigonal, with a bifurcated thick process at extremity and a pair of fine falcate setae and two pairs of hooked setae at sides.

Pro-, meso- and metathorax each with D1 and SD1 setae; abdominal D1 seta on 1st–3rd and 8th segments and D1 and D2 setae on 4th–7th segments; L1 seta situated ventro-caudad of spiracle on 5th–7th segments; SL1 seta and SV1 seta present on 5th segment; 8th segment with D1, SD1, L1 and L2 setae; 9th segment without seta.
bella Butler (Mt. Mitake, Tokyo, 17 vii 1967). 10 mm, brown but ventrum reddish brown.

**Trichopteryx** Hübner (Plate 8, figs 131–132)

Fusiform but prolonged. Head striated; labial palpus concealed; maxilla extending to just before caudal margin of wing, cephalic margin steeply oblique; antenna reaching caudal margin of wing; glazed and sculptured eye-piece separable fully; thorax slightly striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity never recognized; prothoracic leg ending at or to eight ninths the length to caudal margin of wing, femur very narrow; mesothoracic leg reaching caudal margin of wing, never tapered to extremity; metathoracic leg appearing minute; forewing ridged along veins; hindwing hidden under forewing at caudal margin of 3rd abdominal segment; abdomen roughly punctate; spiracles small and protruded; 3rd abdominal spiracle hidden under wing; 6th spiracle situated more slightly ventrad than those of the other segments; 7th and 8th spiracles vestigial; lateral and dorsal grooves disappearing; cremaster small, slightly striated, with one pair of large falcate setae at extremity and one pair of weakly hooked setae at side.

Pro-, meso- and metathorax with D1 and SD1 setae each; abdominal D1 seta on 1st–4th segments, D1 and D2 setae on 6th–8th segments but no seta on 9th segment; SL1 seta situated ventrad of L2 seta on 5th–7th segments; SV1 seta situated ventrad of L seta on 5th segment.

**microloba** Inoue (Mt. Takao, Tokyo, 20 v 1968). 8 mm, brown.

**Esakiopteryx** Inoue (Plate 8, fig. 130)

Only differing from the preceding genus in the absence of hooked setae of bifurcated cremaster.

**volitans** Butler (Mt. Zinba, Tokyo, 12 v 1969). 8 mm, brown.

**Trichopterigia** Hampson (Plate 8, figs 133–134; Plate 32, fig. 506)

Fusiform but somewhat swollen. Head, thorax and its appendices rugged; labial palpus appearing; maxilla reaching just before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to caudal margin of wing; glazed and sculptures eye-piece not separated; suture between pro- and mesothorax attached to antenna at slightly cephalic point of suture restricting proximal margin of mesothoracic leg; prothoracic leg ending at eight nineths the length to caudal margin of wing, femur narrow; mesothoracic leg extending to caudal margin of wing; metathoracic leg appearing minute; forewing ridged along veins; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; abdomen punctate and slightly rugose; 3rd abdominal spiracle hidden under wing, 6th and 7th spiracles situated more ventrad than those of the other segments; 7th and 8th spiracles vestigial; lateral groove short and dorsal groove deep with a medio-dorsal incision and a pair of lateral indistinct incisions; 9th and 10th segments dorsal striated vertically; cremaster trigonal, slightly ruged dorsal and smooth ventrad, with terminal bifid spinous setae and one or two pairs of fine hooked setae at side.

Pro-, meso- and metathorax each with D1 and SD1 setae; D1 seta one on 1st–4th and 8th abdominal segments and D1 and D2 setae on 5th–7th segments; L1 seta situated just under L2 seta on 5th–6th segments; SL2 seta on 5th–6th segments; SV1 and SV2 setae on 5th segment; 8th segment with D1 and SD1 setae; 9th segment without seta.

**Key to the species**

1. cremaster with one pair of fine hooked setae; 13 mm, dark brown
   
   ---------------------------------- costipunctaria Leech (Siki, Saitama, 2 v 1966)
   
   - cremaster with two pairs of fine hooked setae; 8 mm, brown
Subdivision I–II

**Otoplecta** Warren (Plate 8, figs 135–136)

Fusiform but somewhat shortened. Head weakly striated; adfrontal suture between proximal ends of antennae absent; labial palpus concealed; maxilla extending to just before caudal margin of wing; cephalic margin gently oblique; suture between glazed and sculptured eye-piece invisible; antenna reaching caudal margin of wing; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity lacking; prothoracic leg reaching three fourths the length to caudal margin of wing; femur concealed; mesothoracic leg reaching caudal margin of wing; metathoracic leg appearing small; hindwing hidden under forewing at level of 4th abdominal spiracle; forewing ridged along veins; abdomen punctate; abdominal spiracles small, 6th spiracle situated slightly more ventrad than those of the other segments; 7th and 8th spiracles vestigial; lateral groove minute; dorsal groove with vague notches; cremaster small, almost smooth, with one pair of robust falcate setae at extremity and three pairs of hooked setae.

**frigida** Butler (Siki, Saitama, 2 v 1966). 7.5 mm, brown.

**Episteira** Walker (Plate 9, figs 140–141, 149–150; Plate 33, figs 518–519)

Prolonged. Head faintly rugous; adfrontal suture between proximal ends of antennae present; labial palpus minute; maxilla extending nine tenths the length to caudal margin of wing, cephalic margin steeply oblique; antenna slender, reaching before caudal margin of wing; glazed and sculptured eye-piece never separated; thorax faintly rugous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; prespiracular slit raised; prothoracic leg reaching four fifths the length to caudal margin of wing, femur concealed; mesothoracic leg extending to caudal margin of wing, extremity never acute; metathoracic leg appearing; forewing faintly rugous; hindwing hidden under forewing on 3rd abdominal segment; 6th abdominal spiracle situated slightly more ventrad than the other segments; 7th and 8th spiracles vestigial; lateral groove present; dorsal groove with many slits; cremaster warhead shaped, smooth, with one pair of anchor like setae and three pairs of hooked setae.

**frigida** Butler (Siki, Saitama, 2 v 1966). 7.5 mm, brown.

**Key to the species**

1. Adfrontal suture between antennae and coronal suture distinct; antenna somewhat angular at base, ending just before tip of maxilla; area surrounding prespiracular slit conspicuously raised; abdomen not punctured; 2nd and 3rd abdominal spiracles half hidden under wing; lateral groove slightly incised; **nigrilinearia** Leech (Yuto, Shizuoka, 28 vi 1980)

   - Adfrontal suture between antennae and coronal suture scarcely visible; antenna not angular at base, ending just beyond tip of maxilla; area surrounding prespiracular slit slightly raised; 5th–8th abdominal segments bearing shallow punctures scatteringly, 9th segment with faintly vertical striae; 2nd and 3rd abdominal spiracles completely appear-
ing; lateral groove incised; SV seta situated caudal of SL seta on 5th abdominal segment; 13 mm, light green, cremaster amber

\[ \text{eupena} \text{ Prout (Yuto, Shizuoka, 24 vii 1980)} \]

**Sauris** Walker (Plate 9, figs 139, 148; Plate 33, fig. 520)

Prolonged; Head faintly wrinkled; adfrontal suture between proximal ends of antennae present; labial palpus minute; maxilla reaching just before caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to tip of prothoracic leg; glazed and sculptured eye-piece not separated; thorax wrinkled; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity slender; prothoracic leg reaching just before tip of mesothoracic leg, femur concealed; mesothoracic leg extending to caudal margin of wing; metathoracic leg appearing; hindwing hidden under forewing on 3rd abdominal segment; abdomen shallowly punctate; 6th abdominal spiracle situated slightly more ventrad than those of the other segments; 8th spiracle vestigial; lateral groove incised full and dorsal groove with seven notches; cremaster warhead shaped, shallowly wrinkled; with one pair of anchor like setae and three pairs of hooked setae.

Pro-, meso- and metathorax with D1, D2 and SD1 setae; D1 seta on abdomen; SL1 seta on 5th–8th segments and SV1 seta on 5th segment; 9th segment with D1 and SD1 setae.

**nanaria** Leech (Kochinda, Okinawa, 2 ii 1996, S. Tominaga leg.). 12 mm, light green, with some black spots on abdominal segments, 10th segment and cremaster chestnut brown.

**Xanthorhoe** Hübner (Plate 9, figs 143–144, 154–155; Plate 33, figs 521–522)

Fusiform. Head slightly striated; labial palpus appearing; maxilla reaching at or just before caudal margin of wing, cephalic margin steeply oblique; antenna reaching just beyond tip of maxilla; suture between glazed and sculptured eye-piece invisible; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity rigid; prothoracic leg ending at three fourths the length to caudal margin of wing, femur appearing; mesothoracic leg extending to just before caudal margin of wing; metathoracic leg appearing or disappearing; forewing slightly striated; hindwing hidden under forewing at spiracle level of 4th abdominal segment; abdomen punctate; 6th abdominal spiracle situated slightly ventrad than those of the other segments; scar of larval proleg on 6th segment recognized; lateral and dorsal groves present; cremaster small, with one pair of robust falcate setae at extremity and one or two pairs of hooked setae.

Pro-, meso- and metathorax with D1 and SD1 setae each; D seta on 1st–7th abdominal segments; SD1 seta situated cephalad of dorsal corner of spiracle on 7th and 8th segments; 8th segment without L1 seta; 5th–6th segments with SL1 and SL2 setae and 4th, 7th and 8th segments with SL1 seta; 9th segment without seta.

**Key to the species**

1. Antenna broader than in *saturata* Guéné; prothoracic femur appearing slender; metathoracic leg appearing small; scar of larval proleg on 6th abdominal segment conspicuously raised; lateral groove long incised; cremaster hooked setae two pairs; 9 mm, brown ……………… *muscicapata* Christoph (Hakone, Kanagawa, 31 v 1968)

- Antenna slender; prothoracic femur relatively large; metathoracic leg concealed; scar of larval proleg on 6th abdominal segment never raised; lateral groove short incised; cremaster hooked setae one pair; 8 mm, brown ……………… *saturata* Guéné (Mt. Takao, Tokyo, 20 v 1968)
Lobogonodes Bastelberger (Plate 10, fig. 176)

Fusiform. Head faintly striated; labial palpus minute; eye-piece smooth; maxilla reaching slightly before caudal margin of wing; cephalic margin steeply oblique; antenna slender, extending to caudal margin of wing; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; forewing smooth; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at two thirds the length to caudal margin of wing, femur exposed; mesothoracic leg extending to tip of maxilla; metathoracic leg appearing small; 1st–7th abdominal segments with deep punctures densely scattered, 8th–9th segments smooth; abdominal spiracles small, never hidden under wing, 2nd–4th spiracles raised, 6th–8th spiracles vestigial; lateral groove short incised, dorsal groove with a medio-dorsal notch and some vague small notches; cremaster conical, smooth and slightly concave in medium area of ventral side, crinkled on dorsal side, with four pairs of hooked setae.

Pro-, meso- and metathorax with two setae; 1st–9th abdominal segments with D1 seta; L1 seta situated just caudad of spiracle; 5th–7th segments with SL1 seta.

erectaria Leech (Mt Takao, Tokyo, 28 vi 1970). 7.5 mm, brown.

Anticollix Prout (Plate 9, fig. 152)

Fusiform. Head smooth; labial palpus minute; eye-piece smooth; maxilla reaching slightly before caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to caudal margin of wing; thorax slightly crinkled; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity absent; forewing smooth; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at two thirds the length to caudal margin of wing, femur exposed; mesothoracic leg extending to tip of maxilla; metathoracic leg appearing small; 1st–7th abdominal segments with deep punctures densely scattered, 8th–9th segments smooth; abdominal spiracles small, never hidden under wing, 2nd–4th spiracles raised, 6th–8th spiracles vestigial; lateral groove short incised, dorsal groove with a medio-dorsal notch and some vague small notches; cremaster conical, smooth, with a pair of terminal long and robust falcate setae and three pairs of hooked setae.

Pro-, meso- and metathorax with D1 and SD1 setae; abdominal D1 seta on 1st–9th segments; L1 seta situated caudad of ventral corner of spiracle; SL1 seta on 5th–6th segments.

sparasta Treitschke (Tunan, Niigata, 21 vii 1975, R. Sato leg.). 9 mm, brown.

Collix Guenée (Plate 9, figs 142, 151)

Allied to Anticollix Prout but differing from the following point. Head and thorax slightly crinkled; maxilla reaching to caudal margin of wing; femur of prothoracic leg concealed; mesothoracic leg ending just before tip of maxilla; metathoracic leg concealed; 1st–7th abdominal segments with shallow punctures scattered; 6th abdominal spiracle situated slightly ventral than that of the other segments; 8th spiracle vestigial; lateral groove only notched; dorsal groove with five notches. SL1 seta on 4th–6th segments.

ghoshia Guenée (Kochinda, Okinawa, 20 xi 1999, S. Tominaga leg.). 9 mm, yellowish brown; abdomen brown.
Division II

Subdivision II-1

**Idiotephria** Inoue (Plate 9, figs 146, 153)

Fusiform. Head slightly striated but frons smooth; labial palpus minute, pentagonal; maxilla reaching just before caudal margin of wing, cephalic margin steeply oblique; sculptured eye-piece crinkled; antenna slender, extending to caudal margin of wing; thorax rugous but wing smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity raised, spinous; hindwing hidden under forewing at caudal margin of 3rd abdominal segment; prothoracic leg ending five sevenths the length to caudal margin of wing, femur slender; mesothoracic leg reaching tip of maxilla; metathoracic leg appearing; abdomen with many small and shallow punctures scattered excepting 8th-10th segments; 6th abdominal spiracle situated at normal position; 8th spiracle vestigial; lateral groove notched fully, dorsal groove with some incisions; cremaster warhead like, dorsal side rugged, ventral side almost smooth with some weak ridges, with a pair of falcate and thickened processes at extremity and three pairs of short hooked setae.

Pro-, meso- and metathorax with D1 and SD1 setae; abdominal D1 seta present on 1st–3rd and 8th segments and D1 and D2 setae on 4th–7th segments; L1 and L2 setae situated obliquely to each other; SL1 and SL2 setae present on 5th–7th segments; 8th segment with D1, D2, SD1 and L1 setae; 9th segment with D1 seta.

*amelia* Butler (Mt Takao, Tokyo, 20 v 1968). 12 mm, brown.

**Hydrionema** Hübner (Plate 9, fig. 157)

Fusiform. Head slightly striated; labial palpus minute; maxilla reaching just before caudal margin of wing, cephalic margin steeply oblique; suture between glazed and sculptured eye-piece indistinct; thorax almost smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity absent; prothoracic leg ending at seven ninths the distance to caudal margin of wing, femur appearing small; mesothoracic leg reaching just before tip of maxilla; metathoracic leg minute; hindwing hidden under forewing at spiracle level of 4th abdominal segment; 3rd–7th abdominal segments shallowly punctate on cephalic half; 2nd–3rd abdominal spiracles appearing completely; lateral groove scarcely recognized as roughly trigonal depression; dorsal groove with eight notches; cremaster trigonal, dorsal side smooth and ventral side roughened, with terminal bifid falcate processes and a pair of straight setae and three pairs of hooked setae.

Pro-, meso- and metathorax with D1 and SD1; abdominal segments with D1 seta; L1 and L2 setae situated obliquely to each other; SL1 and SL2 setae present on 5th–7th segments; 8th segment with D1, SD1 and L2 setae; 9th segment with D1 seta.

*furcata* Thunberg (Yunomaru Pass, Gunma, 3 ix 1983). 13 mm, dark reddish brown.

**Operophthera** Hübner (Plate 10, figs 159–160, 168 A–C, 169–170)

Fusiform in male but more or less ovoid in female. Head smooth; F and Af setae absent; labial palpus concealed; maxilla never reaching caudal margin of wing, cephalic margin steeply oblique; antenna broad especially in female, extending to caudal margin of wing; eye-piece relatively small, sculptured piece striated; thorax slightly striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity disappearing; notaulix distinct; hindwing hidden under forewing at intermediate point between apex of forewing and 4th abdominal spiracle;
prothoracic leg appearing from more cephalad than those of ordinary pupae, reaching slightly before caudal margin of wing, femur concealed; mesothoracic leg ending midway between tips of prothoracic leg and caudal margin of wing; metathoracic leg appearing small; 1st, 2nd, 8th and 9th abdominal segments smooth but other segments punctate (sparsely on 3rd–4th segments and densely on 5th–7th segments); 2nd abdominal spiracle appearing completely and 3rd spiracle often concealed; 6th spiracle situated more ventrad than those of the other segments; 8th spiracle vestigial; dorsal groove with some notches; lateral groove recognized as shallow fine oblique furrow; cremaster smooth with a forked process at extremity and sometimes with a pair of spinous setae in proximal portion.

Pro-, meso- and metathorax with D1 and SD1 setae; abdomen with D1 seta on 1st–3rd and 8th segments and D1 and D2 setae on 4th–7th segments; SL1 setae on 4th and 7th segments and SL1 and SL2 setae on 5th–6th segments; 8th segments with D1, SD1, L1 and L2 setae; 9th segment without seta.

**Key to the species**

1. Maxilla reaching five sixths the length to caudal margin of wing; mesothoracic legs meeting on meson at extremity; cremaster never bearing a pair of spinous setae in proximal portion ........................................2
   - Maxilla reaching half the length to caudal margin of wing; mesothoracic legs never meeting on meson; cremaster bearing a pair of spinous setae in proximal portion; 8 mm, green, abdomen brownish.

   .............................................. **rectipostmediana** Inoue (Mt Zinba, Tokyo, 12 v 1968)

2. Abdomen with shallow micro–pores scattered coarsely; forked process of cremaster short; 7 mm, green, abdomen brownish . **brumata** Linnaeus (Kunitachi, Tokyo, 10 v 1963)
   - Abdomen with small pores scattered; forked process of cremaster long ...............3

3. Abdomen with small pores scattered more densely than the following species; forked process of cremaster thick; 7 mm, green

   .............................................. **japonaria** Leech (Mt Takao, Tokyo, 20 v 1968)
   - Abdomen with small pores scattered slightly coarsened than the preceding species; forked process of cremaster slender; 7 mm, green

   .............................................. **relegata** Prout (Mt Takao, Tokyo, 20 v 1968)

**Epirrita** Hübner (Plate 10, figs 161, 174)

Closely allied to the preceding genus, and only differing in the following points: maxilla reaching just before caudal margin of wing and ending at tip of mesothoracic leg, cephalic margin gently oblique; prothoracic leg extending eight ninths the length to caudal margin of wing; mesothoracic leg ending tip of maxilla; notaulix visible; abdomen smooth; 3rd and 4th abdominal spiracles often concealed; dorsal groove ill-defined but with two or four pairs of upward spines; lateral groove concealed.

**viridipurpurescens** Prout (Machida, Tokyo, 23 iv 1983). 10 mm, yellowish brown.

**Nothoporinia** Inoue (Pl. 10, figs. 162, 173)

Allied to *Operophtera* Hübner and *Epirrita* Hübner, and only differing in the following points: maxilla ending just before tip of mesothoracic leg then tips of mesothoracic legs meeting on meson at distal end, cephalic margin steeply oblique; notaulix invisible; 1st–8th abdominal segments punctate (densely on 5th–7th segments); 3rd abdominal spiracle concealed but 4th spiracle appearing; lateral groove recognized as small and shallow notch; dorsal groove without upward spines.

SL1 seta on 4th and 7th abdominal segments and SL1 and SL2 setae on 5th segment; SV1 seta present on 5th segment.
mediolineata Prout (Mt Mitake, Tokyo, 13 v 1970). 9 mm, yellowish brown, spiracle black.

Subdivision II–II

Pseudostegania Butler (Plate 9, figs 145, 156)

Fusiform. Head striated; labial palpus appearing minute; maxilla reaching slightly before caudal margin of wing; cephalic margin gently oblique; antenna slender, extending to caudal margin of wing; sculptured eye-piece with some striae; pro- and mesothorax striated and metathorax punctate; spiracular callosity distinct; prothoracic leg ending at three fourths the length to caudal margin of wing, femur appearing; mesothoracic leg extending to just before caudal margin of wing; metathoracic leg appearing small; abdomen distinctly punctate but 9th segment smooth; 2nd–3rd abdominal spiracle appearing completely, 6th spiracle situated slightly ventrad than those of the other segments, scar of larval leg on 6th segment swelled; 8th spiracle vestigial; lateral groove short, dorsal groove with four pairs of slight notches; cremaster conical, smooth, with a pair of terminal long falcate processes and three pairs of hooked setae. Pro-, meso- and metathorax with D1 and SD1 setae; abdomen with D1 and D2 setae; SL1 seta on 5th and 8th segments and SL1 and SL2 setae on 6th–7th segments; 9th segment without seta.

defectata Christoph (Asahi, Niigata, 29 ix 1973, R. Sato leg.). 11 mm, reddish brown.

Laciniodes Warren (Plate 9, figs 147, 158)

Fusiform. Head striated; labial palpus concealed; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to tip of maxilla; suture between glazed and sculptured eye-piece invisible; thorax almost smooth; suture between pro- and mesothorax attached to antenna at medium point of suture restricting proximal margins of pro- and mesothoracic legs; prespiracular slit opening large; hindwing hidden under forewing on spiracle level of 4th abdominal segment; prothoracic leg reaching three fourths the length to caudal margin of wing, femur exposed; mesothoracic leg extending to caudal margin of wing; metathoracic leg concealed; abdomen punctate but 8th–9th segments smooth; 2nd–3rd abdominal spiracles never hidden under wing; 8th spiracle vestigial; lateral groove moderately long, dorsal groove with eleven notches; cremaster conical, rigid, excavated on ventral side, with one pair of longer setae and three pairs of shorter hooked setae. Pro-, meso- and metathorax with D1 and SD1 setae; abdomen with D1 and D2 setae; SL1 seta on 5th–8th segments; 9th segment with D1, D2, SD1, L1 and SL1 setae.

unistripes Butler (Kitayuzawa, Hokkaido, 21 ix 1980). 11 mm, reddish brown with blackish brown markings.

Trichodezia Warren (Plate 10, fig. 163)

Somewhat prolonged. Head slightly striated but frons smooth; labial palpus concealed; maxilla extending just before caudal margin of wing, cephalic margin steeply oblique; antenna slender, reaching caudal margin of wing; eye-piece smooth; thorax wrinkled; suture between pro- and mesothorax attached to antenna at intermediate point of suture restricting proximal margin of mesothoracic leg; spiracular callosity slightly rugous; hindwing hidden under forewing on 2nd abdominal segment; prothoracic leg ending at three fourths the length to caudal margin of wing, femur exposed; mesothoracic leg reaching just before tip of maxilla; metathoracic leg appearing small; abdomen with shallow punctures scattered; abdominal spiracles small, 2nd–3rd spiracles appearing completely; 6th–8th spiracles vestigial; lateral groove rounded and dorsal groove with many notches; cremaster conical, smooth but a few shallow ridges at base, with two pairs of long and robust setae and two pairs of
short and feeble hooked setae.
Pro-, meso- and metathorax with D1 and SD1 setae; abdomen with D1 and D2 setae; SL1 seta present on 5th–8th segments; 9th segment with D1, D2 and L1 setae.

*kindermannii* Bremer (Asakawa, Tokyo, 28 vi 1970). 11 mm, brown.

*Trichobaptria* Prout (Plate 10, figs 164, 175)

Fusiform. Head slightly striated; labial palpus minute; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to caudal margin of wing; sculptured eye-piece roughened; prothorax roughened, mesothorax striated and metathorax crinkled; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; prespiracular slit distinct but spiracular callosity not remarkable; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at five sixths the distance to caudal margin of wing, femur exposed; mesothoracic leg extending to slightly before caudal margin of wing; metathoracic leg concealed; abdomen with micro punctures scattered shallow but 8th–9th segments smooth; abdominal spiracles small, 2nd–3rd spiracles appearing completely and ridged dorsum, 6th spiracle situated more ventrad than those of the other segments; 6th–8th spiracles vestigial; lateral groove shallowly incised, dorsal groove with a distinct medio-dorsal notch and some vague notches at side; cremaster conical, smooth but roughened on dorsal side, with two pairs of long and robust hooked setae and one pair of short and feeble falcate setae. Pro-, meso- and metathorax with D1 and SD1 setae; abdomen with D1 and D2 setae; SL1 seta on 6th–8th segments and SL1 and SL2 setae on 5th segment; 9th segment with D1, D2, SD1 and L1 setae.

*executa* Felder and Rogenhofer (Mt Takao, Tokyo, 26 vi 1969). 10 mm, pale reddish brown, head and appendices of thorax green.

Division III

Subdivision III–I

*Gandaritis* Moore (Plate 1, fig. 11; Plate 11, fig. 190)

Fusiform but somewhat prolonged. Head rugged; labial palpus appearing small; maxilla extending to caudal margin of wing, cephalic margin steeply oblique; antenna slender, reaching slightly before tip of maxilla; sculptured eye-piece rugged with some minute warts; prothorax roughened and meso- and metathorax crinkled; suture between pro- and mesothorax attached to a slightly caudal point of suture restricting proximal margin of mesothoracic leg; spiracular callosity raised semi-elliptically; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching five sixths the length to caudal margin of wing, femur appearing; mesothoracic leg ending midway between tips of maxilla and antenna; metathoracic leg concealed; 1st–3rd abdominal segments carinulated, 4th segment dotted with small warts, 5th–7th segments with small denticules scattered and 8th–9th segments smooth; 2nd–3rd abdominal spiracles appearing completely; dorsal groove with eight notches; lateral groove incised deep and relatively wide; cremaster large, shell-shaped, rugged, with a pair of short and thickened hooked terminal processes and three pairs of hooked setae beared near extremity. Prothorax with MD1, D1, D2 and SD1 setae, meso- and metathorax with D1, D2 and SD1 setae; abdomen with D1 and D2 setae; SL1 seta present on 4th–5th and 7th–8th segments; SL2 seta on 5th–7th segments; SV1 and SV2 setae on 5th–6th segments and SV2 seta on 7th–8th segments; 9th segment with D1, D2, SD1 and L1 setae. Setae on 5th–9th abdominal segments bristle-like.
agnes Butler (Mt Takao, Tokyo, 8 v 1965). 28 mm, cinnabar brown with many black spots on thorax and abdomen dorsad.

Calceulype Warren (Plate 12, figs 204, 210)
Fusiform and prolonged. Head rugged; adfrontal suture between proximal ends of antennae concealed; labial palpus minute; maxilla extending to just before caudal margin of wing, cephalic margin steeply oblique; antenna slender, reaching tip of maxilla; sculptured eye-piece rugged; thorax roughened; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; prothorax swelling dorsad; spiracular callosity slightly raised; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg extending four fifths the length to caudal margin of wing, femur appearing; mesothoracic leg reaching caudal margin of wing; metathoracic leg appearing; abdomen scabrous and with small scratches scattered; dorsal groove with six or seven notches; lateral groove incised fully; cremaster large, halberd-like, rugous, with thickened falcate terminal process and three pairs of hooked setae. Prothorax with XD1, D1, D2 and SD1 or D1, D2 and SD1 setae. Meso- and metathorax with D1, D2 and SD1 setae; abdomen with D1 and D2 setae: SL1 seta on 4th–8th segments and SL2 seta on 5th–7th segments; SV1, SV2 and SV3 setae on 5th segment, SV1 and SV2 setae on 6th segment and SV1 seta on 4th and 8th segments; 9th segment with D1, D2, SD1, L1 and/or SL1 setae. Setae on 5th–9th abdominal segments bristle-like.

whitelyi Butler (Mt Takao, Tokyo, 8 v 1965). 17 mm, pale brown, head slightly reddish and abdomen yellowish white, with blackish brown blots and dots densely scattered.

Sibatania Inoue (Plate 12, fig. 208)
Prolonged. Head small, striated; adfrontal suture between ends of antennae concealed; labial palpus minute; maxilla reaching slightly before caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending at caudal margin of wing; sculptured eye-piece rugous; prothorax smooth, meso- and metathorax crinkled; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity with dark slender edge; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending five sixths the distance to caudal margin of wing, femur exposed; mesothoracic leg reaching tip of antenna; metathoracic leg appearing; 1st–3rd abdominal segments crinkled, 4th–7th segments with shallow punctures scattered and 8th–9th segments smooth; 6th abdominal spiracle situated more ventrad than those of the other segments; 8th spiracle vestigial; 5th–6th abdominal conjunctiva with many irregular furrows; 8th abdominal spiracle vestigial; lateral groove broad but shallow; dorsal groove shallow with indistinct dentate edges; cremaster large, halberd-like, rugous, with a pair of robust falcate terminal setae and three pairs of hooked setae. Pro-, meso- and metathorax with three setae; abdominal D setae two; L1 seta situated ventro-caudal of spiracle on 4th–6th segments and just caudal of spiracle on 7th–8th segments; SL1 seta present on 5th–8th segments; SL2 seta on 5th–7th segments; SV1 and SV2 setae on 5th–6th segments; 9th segment with four setae. Setae on 5th–9th abdominal segments bristle-like.

maactata Felder and Rogenhofer (Okutama, Tokyo, 17 vii 1971). 15 mm, pale green, caudal area suffused with whitish vermilion.

Eucosmabraxas Prout (Plate 12, figs 205, 211)
Allied to Sibatania Inoue but only differing as follows: 2nd–9th abdominal segments with small punctures densely scattered; 6th abdominal spiracle situated at normal position; lateral
groove long; dorsal groove with five notches.
Chaetotaxy same as in *Sibatania* Inoue but SV1 seta present on 5th abdominal segment and SV1, SV2 and SV3 setae on 6th segment.

**Key to the species**

1. Head rounded; 15 mm, pale yellowish white with numerous blackish brown patches
   - Head slightly angular; 20 mm, yellowish white with irregular dark reddish brown striae on head and thorax; dorsal, subdorsal, lateral and subventral bands blackish brown
   - *evanescent* Butler (Yuto, Shizuoka, 2 x 1992)
   - *placida* Butler (Mt Takao, Tokyo, 10 viii 1969)

**Eulithis** Hübner (Plate 12, figs 206, 212)

Fusiform but somewhat slender. Head slightly striated; adfrontal suture between proximal ends of antennae present; labial palpus small; maxilla ending at just before caudal margin of wing, cephalic margin steeply oblique; antenna slender, reaching just beyond tip of maxilla; suture between glazed and sculptured eye-piece invisible; pro- and mesothorax slightly striate and metathorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity indistinct; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; prothoracic leg reaching five sixths the length to caudal margin of wing, femur exposed; mesothoracic leg reaching tip of maxilla; metathoracic leg disappearing, abdomen almost smooth; 2nd-3rd abdominal spiracles half hidden under wing; 6th spiracle situated normal position; lateral groove shallow and broad; dorsal groove with indistinct dentate edges; cremaster large, halbert-like, rugous, with terminal thickened falcate setae and three pairs of hooked setae. Prothorax with D1, D2, SD1 and XD1 setae, meso- and metathorax with D1, D2 and SD1 setae; abdomen with D1 and D2 setae, SL1 seta on 5th-8th segments and SL2 seta on 5th-7th segments, SV1 and SV2 setae on 5th and 6th segments, 9th segment with D1, D2, SD1 and L1 setae. Setae on 5th-9th abdominal segments bristle-like.

*convergenata* Bremer (Unazuki, Toyama, 19 ix 1967). 15 mm, pale green but caudal area suffused with whitish vermilion.

**Evecliptopera** Inoue (Plate 12, figs 207, 213)

Fusiform. Head striated; adfrontal suture between proximal ends of antennae concealed; labial palpus minute; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to tip of mesothoracic leg; suture between glazed and sculptured eye-piece scarcely visible; prothorax roughened, meso- and metathorax rugous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity crescent, velvety; hindwing hidden under forewing near spiracle level of 4th abdominal segment; prothoracic leg reaching four fifths the distance to caudal margin of wing, femur exposed small; mesothoracic leg reaching to or just beyond tip of maxilla; metathoracic leg appearing; abdomen with micro punctures scattered coarsely on 1st-3rd segments and densely on 4th-8th segments, and smooth on 9th segment; 5th-6th abdominal conjunctiva without furrows; 2nd-3rd abdominal spiracles appearing completely; 6th spiracle situated slightly ventrad than those of the other segments; lateral groove incised relatively short; dorsal groove indistinct; cremaster halbert-like, almost smooth, with a pair of terminal processes situated closely to each other and three pairs of hooked setae. Chaetotaxy same as in *Eulithis* Hübner.

*decurrens* Moore (Sagamihakusan, Kanagawa, 6 ix 1980). 11 mm, pale green without markings.
**Ecliptoperia** Warren (Plate 12, figs 203, 209; Plate 32, fig. 504)

Closely allied to the preceding genus and only differing in the following points: labial palpus minute or concealed; antenna ending tip of mesothoracic leg; femur of prothoracic leg appearing more or less large; lateral groove incised long; ventral side of cremaster wrinkled. Chaetotaxy same as in *Eulithis* Hübner.

**Key to the species**

1. Labial palpus minute; lateral groove narrow and incised shallowly; terminal processes of cremaster situated closely to each other; 14 mm, pale green with many irregular brown markings ........................................... *umbrosaria* Motschulsky (Yutó, Shizuoka, 23 x 1992)
   - Labial palpus concealed; lateral groove broad and incised deep; terminal processes of cremaster situated away from each other; 12 mm, pale green with many irregular brown markings ........................................... *capitata* Herrich-Schäffer (Mt Akagi, Gunma, 27 viii 1976, H. Nakajima leg.)

**Eschatarchia** Warren (Plate 13, figs 218, 220)

Fusiform but somewhat shortened, shoulder angular. Head almost smooth; adfrontal suture between proximal ends of antennae concealed; labial palpus concealed; maxilla extending to just before caudal margin of wing, cephalic margin gently oblique; antenna slender, reaching caudal margin of wing; eye-piece roughened, suture between glazed and sculptured eye-piece invisible; prothorax roughened, mesothorax striated and metathorax punctate; thorax with dorsal and subdorsal ridges; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity black ridged; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg reaching three fourths the length to caudal margin of wing, femur exposed; mesothoracic leg extending to just before tip of antenna; metathoracic leg appearing; abdomen with punctures more or less coarsely scattered but smooth on 9th segment; abdominal spiracle small; 2nd-3rd sialiæ appearing completely; 6th spiracle situated ventrad than those of the other segments; lateral groove short; dorsal groove with some vague notches; cremaster small, trigonal, smooth, with terminal falcate processes and two pairs of hooked setae.

Prothorax with D1, D2, SD1 and MD1 setae, meso- and metathorax with D1, D2 and SD1 setae; abdomen with D1 and D2 setae; SL1 setae present on 4th-8th segments; SL2 seta on 5th and 7th segments; SV1 seta on 5th segment; 9th segment without seta.

*lineata* Warren (Ogi, Sado, Niigata, 19 vi 1975, R. Sato leg.). 10 mm, brown.

**Subdivision III-II**

**Melanthia** Dupechel (Plate 11, fig. 192; Plate 32, fig. 503)

Fusiform. Head rugous; labial palpus minute; maxilla reaching just beyond caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to caudal margin of wing; pro- and mesothorax slightly striated, metathorax punctate; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity black, raised semi-elliptical disk whose surface is pubescent; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg ending at three fourths the length to caudal margin of wing, femur exposed; mesothoracic leg reaching just before tip of antenna; metathoracic leg concealed; abdomen with small punctures densely scattered but 9th segment smooth; 2nd and 3rd abdominal spiracles appearing completely; 6th spiracle situated slightly ventrad than those of the other segments;
spiracular furrow comprising many small cavities occupied on dorsal half of cephalic margin; lateral groove short and shallow; dorsal groove with five notches; cremaster trigonal, almost smooth, with one pair of long falcate terminal setae and three pairs of short hooked setae. Pro-, meso- and metathorax with D1, D2 and SD1 setae; abdomen with D1 and D2 setae but without on 8th–9th segments; SL1 seta present on 4th, 5th and 8th segments; SL2 seta on 5th–7th segments; 9th segment without seta.

*procellata* Denis & Schiffermüller (Mt Takao, Tokyo, 18 ix 1973). 15 mm, reddish brown.

**Photoscotosia** Warren (Plate 11, figs 182, 191)

Allied to the preceding genus, but spiracular callosity not so raised; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching two thirds the length to caudal margin of wing; 3rd abdominal spiracle half hidden under wing; dorsal groove with eight notches. SL1 seta present on 4th–5th abdominal segments; SL2 seta on 6th–7th segments.

*Lucicolens* Butler (Mt Mitake, Tokyo, 17 vii 1971). 18 mm, blackish brown, frosted.

**Philerema** Hübner (Plate 11, figs 180, 188)

Fusiform. Head striated; labial palpus minute; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna slender, ending at tip of maxilla; thorax striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity slightly raised; hindwing hidden under forewing near apex of wing on 4th abdominal segment; prothoracic leg extending seven eighths the distance to caudal margin of wing, femur appearing; mesothoracic leg ending at caudal margin of wing; metathoracic leg appearing caudal of distal end of maxilla; abdomen smooth but punctated densely on cephalic half of 5th–7th segments; 8th abdominal spiracle vestigial; lateral groove incised fully; dorsal groove with 10–11 pairs of shallow notches; cremaster conical, excavated at centre, radially striated, with a pair of stout falcate terminal setae and two pairs of short and feeble hooked setae. Pro-, meso- and metathorax with D1 and SD1 setae; abdomen with D1 seta on 1st–4th segments and D1 and D2 setae on 5th–8th segments; SL1 seta present on 4th segment but SL1 and SL2 setae on 5th–7th segments; 8th segment with D1, SD1 and L1 setae; 9th segment with D1 and L1 setae.

*transversata* Hufnagel (Kaida, Nagano, 2 vi 2001). 13 mm, dark brown.

**Rheumaptera** Hübner (Plate 11, figs 194–195)

Fusiform. Head slightly striated; labial palpus minute, oblonged trigonal; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to tip of maxilla; glazed and sculptured eye-piece never separated; thorax striated but wing smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity raised disk-like; prothoracic leg ending at four fifths the length to caudal margin of wing, femur appearing slender; mesothoracic leg reaching caudal margin of wing; metathoracic leg appearing small; hindwing hidden under forewing near caudal margin of 4th abdominal segment; 1st–8th segments punctate (rough on 1st–5th and dense on 6th–8th) but 9th segment smooth; 2nd and 3rd abdominal spiracles appearing completely; 6th and 7th spiracles situated slightly ventrad than those the other segments; spiracular furrow with two longitudinal ridges; lateral groove shallowly depressed; dorsal groove with a small notch at dorso-meson; cremaster small, trigonal, ventral side smooth and dorsal side rugous, with terminal bifurcated falcate process and three pairs of fine hooked setae. Pro-, meso- and metathorax with D1 and SD1 setae; abdominal D1 seta on 1st–3rd segments
and D1 and D2 setae on 4th–7th segments; two L setae situated obliquely to each other; SL1 seta present on 4th, 5th and 7th segments; 8th segment with L1 and L2 setae; 9th segment without seta.

Key to the species

1. Metathorax punctate; dorsal groove shallow and simple, with a small notch at dorso-meson; 13 mm, reddish brown .latifasciaria Leech (Mt Mitake, Tokyo, 31 viii 1970)
   - Metathorax never punctate; dorsal groove with some vague notches; 11 mm, brown
       .............................................hecata Butler (Mt Kusatsu-shirane, Gunma, 1 ix 1964)

Triphosa Stephens (Plate 11, figs 179, 187; Plate 33, fig. 516)

Fusiform but somewhat thickened. Head crinkled; labial palpus minute, trigonal; maxilla extending to just before caudal margin of wing, cephalic margin steeply oblique; antenna slender, reaching caudal margin of wing; thorax crinkled but wing crimped and frosted; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity obscure; prothoracic leg extending four fifths the length to caudal margin of wing, femur appearing; mesothoracic leg reaching caudal margin of wing; metathoracic leg appearing; hindwing hidden under forewing near caudal margin of 4th abdominal segment; abdomen punctate densely but 1st and 8th–9th segments smooth; 2nd–3rd abdominal spiracles appearing completely; 6th spiracle situated slightly ventral than those of the other segments; spiracular furrow comprising two long elliptical foveae bounded by considerably black edge and roughened scratches between spiracle and foveae; dorsal groove with three distinct teeth at dorso-meson and many vague notches at side; lateral groove incised fully; cremaster cordate, rugged, depressed ventrad, with bifurcated falcate process at distal end and three pairs of fine hooked setae.
Setae bristle-like. Pro-, meso- and metathorax with D1, D2 and SD1 setae; abdomen with D1 and D2 setae; SL1 seta on 4th and 8th segments and SL1 and SL2 setae on 5th–7th segments; SV1 seta present on 5th segment; 8th segment with D1, D2 and L1 setae; 9th segment without seta.

dubitata Linnaeus (Kaida, Nagano, 2 vi 2001). 16 mm, dark brown.

Telenomeuta Warren (Plate 11, figs 181–189; Plate 33, fig. 517)

Allied to the preceding genus and only differing as follows: labial palpus minute but oblonged trigonal; maxilla reaching caudal margin of wing; mesothoracic leg extending to just before tip of maxilla; metathoracic leg invisible; thorax rugous; hindwing hidden under forewing at spiracle level of 4th abdominal segment; spiracular furrow with two or three long and four or five short dentated ridges on ventrocephalad spiracle, L2 and SL2 setae present in the furrow; dorsal groove with six distinct notches; lateral groove incised deep.
Fourth abdominal segment without SL1 seta; 5th segment without SV seta; 8th segment lacking D2 seta.

punctimarginaria Leech (Mt Mitake, Tokyo, 17 vii 1971). 16 mm, dark reddish brown but caudal area blackish brown.

Eois Hübner (Plate 37, figs 630–632)

Fusiform. Head wrinkled; labial palpus concealing; maxilla reaching slightly before caudal margin of wing, cephalic margin steeply oblique; antenna slender towards extremity, extending caudal margin of wing; eye-piece smooth; pro- and mesothorax slightly wrinkled; metathorax punctated; suture between pro- and mesothorax attached to antenna at cephalic point of suture restricting proximal margin of prothoracic leg; hindwing hidden under forewing at intermediate point between apex of forewing and 4th abdominal spiracle;
prothoracic leg ending at three fourths the length to caudal margin of wing, tibia swelling, femur appearing; mesothoracic leg appearing from more caudal than that of ordinary pupa, reaching just before caudal margin of wing; metathoracic leg appearing; 1st–8th abdominal segments small punctures scattered densely; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; lateral groove shallow incised and dorsal groove with some notches; cremaster conical, with shallow concavity at centre, with one pair of large and three pairs of small hooked setae.

Pro-, meso- and metathorax with D1, D2 and SD1 setae; abdomen with D1 and D2 setae; SL1 seta on 4th, 5th and 6th segments; SL2 seta on 6th segment; 9th segment with D1, D2, SD1 and L1 setae.

*grataria* Walker (Kochinda, Okinawa, 5 vi 2001, S. Tominaga leg.) 7 mm, dusty yellow.

**Heterothera** Inoue (Plate 10, figs 165, 178)

Fusiform. Head striated; labial palpus concealed; maxilla extending to caudal margin of wing, cephalic margin steeply oblique; antenna slender, reaching tip of maxilla; suture between glazed and sculptured eye-piece invisible; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity slightly raised; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching eight ninths the length to caudal margin of wing, femur appearing; mesothoracic leg extending to tip of maxilla; metathoracic leg appearing small; abdomen smooth; 8th abdominal spiracle vestigial; lateral groove long and narrow; dorsal groove with some notches; cremaster warhead like, depressed at centre of ventral side, with four pairs of hooked setae.

Pro-, meso- and metathorax with D1, D2 and SD1 setae; abdomen with D1 and D2 setae; SL2 seta on 5th–8th segments; SV1 and SV3 setae on 5th–6th segments but SV1 seta on 7th segment; 9th segment with D1, D2, SD1 and L1 setae.

**Key to the species**

1. Labial palpus concealed; maxilla ending at caudal margin of wing; abdomen smooth; 12 mm, reddish brown but abdomen yellowish with black irregular markings, dorsal stria black and subdorsal stripe pale yellow
   
   .............................. *postalbida* Wileman (Tondabayashi, Osaka, 6 iii 1982)

   - Labial palpus appearing minute; maxilla ending before caudal margin of wing; abdomen with micro-punctures scattered on cephalic half; 18 mm, dusty brown but abdomen greenish with creamy yellow dorsal and subdorsal stripes
     
     .............................. *taigana* Djakonov (Mt Kiso-ontake, Nagano, 30 viii 1968)

**Dysstroma** Hübner (Plaeta 10, fig. 177; Plate 32, fig. 502)

Fusiform. Head smooth; labial palpus minute; maxilla extending to just before caudal margin of wing, cephalic margin steeply oblique; antenna slender, ending at caudal margin of wing; suture between glazed and sculptured eye-piece invisible; prespiracular slit distinct; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; hindwing hidden under forewing near apex of wing of 4th abdominal segment; prothoracic leg reaching slightly before caudal margin of wing, femur appearing fully; mesothoracic leg ending at caudal margin of wing; metathoracic leg appearing small; abdomen smooth; spiracle small, 2nd and 3rd abdominal spiracles appearing completely; 7th spiracle situated ventrad than those of the other segments; 8th spiracle vestigial; lateral groove long incised; dorsal groove with six or seven pairs of small vague notches; cremaster prolonged trigonal, hollowed longitudinally on proximo-ventrad, with a pair of robust terminal hooked setae and three pairs of hooked setae.

Prothorax with D1, D2 and SD1 setae, mesothorax with D1, SD1 and SD2 and metathorax
with D1, D2, SD1 and SD2; abdomen with D1 and D2 setae; SL1 and SL2 setae present on 5th–7th segments and SL1 seta on 8th segment; SV1 and SV2 setae on 5th–6th segments and SV1 seta on 7th–8th segments; 9th segment with D1, D2, SD1 and L1 setae.

citrata Linnaeus (Yuto, Shizuoka, 25 v 1980). 10 mm, pale brown.

**Chloroclystis** Hübner (Plate 11, figs 186, 198)

Fusiform. Head smooth; labial palpus minute; maxilla reaching slightly before caudal margin of wing, cephalic margin steeply oblique; antenna slender, ending at caudal margin of wing; suture between glazed and sculptured eye-piece invisible; thorax striated; suture between pro- and mesothorax attached to antenna at medium point between proximal margins of pro- and mesothoracic legs; prespiracular slit small and more or less hollow; spiracular callosity raised elliptically; prothoracic leg reaching two thirds to four fifths the length to caudal margin of wing, femur appearing large; mesothoracic leg extending to tip of maxilla; metathoracic leg appearing; hindwing hidden under forewing near cephalic margin of 4th abdominal segment; abdomen punctated; 8th abdominal spiracle vestigial; lateral groove incised small; dorsal groove with one large notch at dorso-meson; cremaster warhead shape, shallow concave in centre of ventral side, with three pairs of hooked setae. Setae bristle and hooked like. Pro-, meso- and metathorax with D1, D2 and SD1 setae; abdomen with D1 seta; SL1 seta present on 4th segment; SL1 and SL2 setae on 5th–7th segments; SV1 seta on 5th segment; 9th segment with SD1 seta.

**Key to the species**

1. Prespiracular slit appearing slender, spiracular callosity indistinct; prothoracic leg reaching two thirds the length to caudal margin of wing; cremaster shallowly concave proximo-ventrad; 5.5 mm, yellowish brown

   - Prespiracular slit appearing as cavity, spiracular callosity slightly raised on which micro setae bear; prothoracic leg reaching four fifths the length to caudal margin of wing; cremaster not so concave proximo-ventrad; 8 mm yellowish brown with green

     - **ama** Inoue (Kochinda, Okinawa, 20 x 1998, S. Tominaga leg.)

   - **ama** Haworth (Yuto, Shizuoka, 20 vi 1995)

**Gymnoscelis** Mabille (Plate 10, figs 166–167)

Closely allied to **Chloroclystis** Hübner. Only differing as follows: labial pulpus concealed; prothoracic leg ending at four fifths the length to caudal margin of wing; hindwing hidden under forewing at spiracle level of 4th abdominal segment; dorsal groove with a relatively long notch at dorso-meson. Setae bristly, 9th abdominal segment with SD1 and L1 setae.

**Key to the species**

1. Proximal part of antenna never curved ventrad; spiracular callosity raised elliptically; lateral groove short incised and dorsal groove with a shorter notch than that of following species at dorso-meson; 8 mm, yellowish brown

   - Proximal part of antenna sharply curved ventrad; spiracular callosity indistinct; lateral groove long incised and dorsal groove with a very long notch at dorso-meson; 8 mm, yellowish brown

     - **takii** Inoue (Saiki, Oita, 10 viii 1955)

**Eupithecia** Curritis (Plate 12, figs 199–202, 214–217; Plate 32, figs 508–510)

Fusiform but slightly swollen in some species. Head striated, cephalic end more or less raised; labial palpus concealed; maxilla reaching just before caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to caudal margin of wing; pro- and
mesothorax striated or punctated, metathorax punctated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity indistinct; prothoracic leg ending at three fourths the distance to caudal margin of wing, femur appearing; mesothoracic leg reaching tip of maxilla; metathoracic leg appeared; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; abdomen with deep punctures densely scattered but 9th segment smooth; abdominal spiracles small, somewhat prominent; 6th and 7th spiracles situated slightly ventrad than those of the other segments; lateral groove incised fully; dorsal groove with four to six notches; cremaster semi-circular, smooth, with a pair of terminal hooked process and three pairs of hooked setae. Pro-, meso- and metathorax with D1, D2 and SD1 setae; abdomen with D1 and D2 setae but D1 seta on 8th segment; L2 seta present on 4th–8th segments; SL1 seta on 5th–7th segments; SV1 and SV3 setae on 5th–6th segments; 8th segment with D1, SD1, L1 and L2 setae; 9th segment with one (D1) to three (D1, D2 and SD1) setae or without seta.

**Key to the species**

1. Lateral groove slightly long incised; dorsal groove with some small notches
   - Lateral groove short incised; dorsal groove with a large trigonal notch at dorso-meson

2. Mesothorax, wing, legs and maxilla bearing secondary setae; 9th abdominal segment with five pairs of setae
   - unidentified species (*lariciata* Freyer ?)† (Yunomaru Pass, Gunma, 4 ix 1983)
   - *Mesothorax* wing, legs and maxilla not bearing secondary setae

3. Dorsal groove with some vague notches; cremaster small and trigonal, never concave at centre, without basal mass, with D1 seta present near proximal area; 9th abdominal segment without seta; 5 mm, brown but greenish ventrad
   - Dorsal groove with ten small notches; cremaster slightly long, shallow concave at centre; with basal mass, with D1 seta present at normal position; 9th abdominal segment with one seta; 7 mm, brown
   - *melanolophia* Swinhoe (Kochinda, Okinawa, 15 xii 1999, S. Tominaga leg.)

4. Abdomen with small punctures scattered densely; dorsal groove with a large trigonal notch at dorso-meson
   - Abdomen with relatively large punctures scattered coarsely; dorsal groove with three trigonal notches at dorso-meson; cremaster D1 seta present at normal position; 9th abdominal segment with five setae; 6 mm, yellowish brown
   - *subbreviata* Staudinger (Mt Mitake, Tokyo, 17 vii 1971)

5. Ninth abdominal segment with three setae; terminal hooked setae of cremaster close to each other; dorsal groove with a large trigonal notch on dorso-meson; 9 mm, brown
   - Ninth abdominal segment with one seta; terminal hooked setae of cremaster apart from each other; 8 mm, pale brown
   - *clavifera* Inoue (Yuto, Shizuoka, 3 v 1962)

† From a larva taken on *Larix leptolepis* Murray at Mt Asama but not emerged.

**Asthenia** Hübner (Plate 11, figs 184–185, 196–197; Plate 32, figs 507–508)

Fusiform but somewhat swollen. Head slightly striated, cephalic end depressed; labial palpus concealed; maxilla ending just before caudal margin of wing, cephalic margin steeply oblique; antenna slender, reaching caudal margin of wing; thorax slightly striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; prespiracular slit scarcely visible; hindwing hidden under forewing at spiracle level of 3rd abdominal segment and appearing again near caudal margin of 4th segment; prothoracic leg ending at three fourths the length to caudal margin of wing, femur appearing; mesothoracic leg extending to tip of maxilla; metathoracic leg appearing
small; abdomen strikingly punctated; abdominal spiracles small and somewhat prominent; 2nd-3rd spiracles appearing completely; 6th spiracle situated ventrad than those of the other segments; dorsal groove with a heavy notch on dorso-meson; lateral groove small; cremaster small, trigonal, smooth, with a pair of terminal falcate processes and three pairs of feeble hooked setae.

Prothorax with D1, D2, SD1 and MD1 setae and meso- and metathorax with D1, D2 and SD1 setae; abdomen with D1 and D2 setae; SL1 seta on 4th segment and SL1 and SL2 setae on 5th-7th segments; SV1 seta present on 5th segment; 8th segment with D1, D2, SD1, L1 and L2 setae; 9th segment with D1 and SD1 setae.

Key to the species

1. Metathorax with punctures scattered in the whole surface ..........................2
   - Metathorax with punctures never scattered at dorso-meson ....................3
2. Abdominal segment with larger punctures densely scattered than the following species; dorsal groove with a medio-dorsal notch; 7 mm, brown
   .......................................................... corculina Butler (Hakone, Kanagawa, 31 v 1968)
   - Abdominal segment with smaller punctures than those of the preceding species; dorsal groove with many irregular small notches; 8 mm, brown
   .......................................................... nymphaeata Staudinger (Mt Mitate, Tokyo, 13 v 1970)
3. Eighth abdominal segment with punctures scattered in the whole surface; cremaster smooth; 7 mm, dark brown
   .......................................................... sachalinensis Matsumura (Kitayuzawa, Hokkaido, 20 ix 1980)
   - Eighth abdominal segment with punctures never scattered in dorsal area; cremaster with some short radial ridges; 8 mm, dark brown
   .......................................................... hamadryas Inoue (Okutama, Tokyo, 17 vii 1971)

Hydrelia Hübner (Plate 11, figs 183, 193)

Fusiform but somewhat swollen. Head striated; labial palpus concealed; maxilla reaching just before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to just beyond tip of maxilla; eye-piece with many radial striae; pro- and mesothorax rugous, metathorax punctate; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity raised semi-circularly; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg ending at seven ninths the distance to caudal margin of wing, femur appearing; mesothoracic leg reaching just before tip of antenna; metathoracic leg appearing small; abdomen punctated densely; abdominal spiracles small, somewhat prominent; 6th spiracle situated slightly ventrad than those of the other segments; 7th and 8th spiracles vestigial; lateral groove very short; dorsal groove with four or five small notches; cremaster small, conical, smooth, with a pair of terminal falcate processes and three pairs of hooked setae.

Chaetotaxy same as in the preceding genus but 9th abdominal segment with L1 and SL1 setae.

nisaria Christoph (Mt Takao, Tokyo, 10 viii 1969). 6 mm, yellowish brown.

Subdivision III-III

Aplocera Stephens (Plate 13, figs 219, 221)

Fusiform. Head raised in front, smooth but frons rugged; clypeo-labral piece situated cephalad than those of the other geometrid pupae; labial palpus small; maxilla reaching beyond caudal margin of wing and extending to caudal margin of 6th abdominal segment,
cephalic margin steeply oblique; antenna slender, reaching half the length between caudal margin of wing and tip of maxilla; eye-piece smooth; suture between glazed and sculptured pieces invisible; prothorax striated, mesothorax smooth and metathorax punctated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity large, elliptical, blackish brown protruded disk; hindwing hidden under forewing at cephalic margin of 2nd abdominal segment; prothoracic leg reaching two thirds the distance to tip of maxilla, femur appearing long; mesothoracic leg ending slightly before tip of antenna; metathoracic leg appearing beyond tip of maxilla; abdomen with punctures densely scattered; 2nd–3rd abdominal spiracles appearing completely; 6th spiracle situated ventrad than those of the other segments; lateral groove shallow and somewhat obscure; dorsal groove with a deep incision on dorso-meson; cremaster invisible but bearing bifid process.

Prothorax with XD1, XD2, D1, D2 and SD1 setae; meso- and metathorax with D1, D2 and SD1 setae each; abdomen with D1 and D2 setae; SL1 seta present on 4th–8th segments; SL2 seta on 5th–7th segments; SV1 and SV2 setae on 5th–6th segments and SV1 on 7th segment; 9th segment with D1, D2, SD1 and L1 setae.

*perlelegans* Warren (Mt Takao, Tokyo, 7 v 1970). 13 mm, reddish brown.
ENNOMINAE

Ennominae are the largest subfamily of Geometridae and 167 genera (including three genera of spring moths) are known from our country. In this paper, the pupae of 119 genera are examined and classified into four "Divisions". Each of these Divisions is divided into one to four Subdivisions.

Textfig. G. Phylogenetic Relationship of genera in Ennominae
Textfig. G. Phylogenetic Relationship of genera in Ennominae (continued)
The pupal chaetotaxy of a part of this subfamily has less variety, then the result of classification is not accord with that of adult. Following items are the main differences.

1. *Arichanna, Apocleora, Lassaba* and *Xerodes*, which were placed in various positions, are brought together to one group relevant to Boarmini.

2. *Miliona* has no connection with *Cystidia* and rather related to the genera of *Ectropis* group of Boarmini (Division I).

3. Some genera such as *Phthonandria* and *Menopha* of Boarmini were transferred to
Ennominae

4. Macarini is situated in a nearly related position to Boarmini.
5. *Heterostegane* is included Division III and make up a single Subdivision.
6. Cassymini is included in the same Subdivision with Abraxini.
7. Abraxini is an allied Subdivision to Caberini.
8. *Pterophora* is a genus situated near Baptini.
9. *Obeidia* is not connected with *Cystidia* (maybe Ennomini) and deposited in Ourapterygni.
10. *Odontoperla* is to be out of the member of Ennomini (Division IV-V) and transferred to Ourapterygni (Division IV-V).

The pupae of Ennominae resemble those of Larentiinae in general aspect, but two thoracic setae are present and the 1st abdominal segment has one seta in all genera except for *Elphos*. One D seta is present in Divisions I and II and two setae in Division III; moreover, the preceding two Divisions have none of the SL and SV setae. In more than half of the genera in this subfamily, the cremaster is bifurcate and the spiracular furrow is conspicuous on the 5th abdominal segment. In the remaining genera, the cremaster has hooked setae and the spiracular furrow is absent.

There are two types in colour, one is brownish and the other is white, yellow, green or black often with ornamental markings.

Fusiform but rather cylindrical or swollen in some genera; *Agriopis* remarkable for sexual dimorphic; *Apeira* with secondary setae scattered; F and Af setae present but absent in *Alsophila*-group and *Elphos*; labial palpus minute but completely concealed in a few genera; maxilla extending to caudal margin of wing but ending before that of wing in some genera. Thorax rugous or wrinkled but metathorax often punctate; antenna reaching to or just before caudal margin of wing but considerably before that of wing in *Apeira*; spiracular callosity distinct in most genera; pro- and mesothoracic legs not meeting on meson with a few exceptions; prothoracic femur appearing in half of the genera; hindwing hidden under forewing on 4th abdominal segment.

Abdomen punctate; abdominal spiracle situated more ventrad on 6th segment in *Apeira* and on 7th segment in *Ocneophora*; 8th abdominal spiracle generally vestigial but 7th-8th ones in *Descoreba, Colotois, Zamaqua, Paremone* and *Corymica* and 6th-8th ones in *Pachylligia* and *Wilemanus*; cremaster varying in shape but large and distinct in most genera.

In the Geometrid pupae, chaetotaxy of Ennominae is very simple. Thoracic setae stable, with D1 and D2 seta on pro-, meso- and metathorax. As already pointed out by the author (1970), abdominal D seta is variant: D2 seta on 2nd-7th segments in Division I, D1 seta on 2nd-7th ones in Division II and III, and D1 and D2 setae on 2nd-7th ones in Division IV. Besides, SL and/or SV setae absent in Division I.

The pupae of Division I and II of this subfamily are subterranean but the others pupate in the silken cocoons.

The Tribes are characteristic as in the chart below (Text-fig. H).

**Key to the genera**

1. Fourth-7th abdominal segments with one D seta ........................................... 2
2. Fourth-7th abdominal segments with two D setae or secondary setae .................................................. (Division IV) 81

3. D2 seta on 4th-7th abdominal segments; SL seta absent; cremaster bifurcate .................................................. (Division I) 3
   - D1 seta on 4th-7th abdominal segments, if not so, then abdominal setae secondary; spiracular furrow absent .................................................. 61
4. Two setae on 8th abdominal segment .................................................. (Subdivision I-I) 4
   - Three or more setae on 8th abdominal segment .................................................. (Subdivision I-II) 52
5. Mesothoracic leg as broad as prothoracic leg; bifurcate cremaster seta shorter than
Textfig. H. Relationship of Division and Subdivision of Ennominae

1. Situation of F seta is normal (○) or cephalad (●).
2. Spiracle on 7th abdominal segment is normal (○) or vestigial (●).
3. Femur of prothoracic leg is exposed (○) or concealed (●).
4. Bifurcated cremaster seta is longer (○) or shorter (●) than terminal process.
5. Fourth–7th abdominal segments have one (○) or two D setae or secondary (●).
6. Setae are primary (○) or secondary (●).
7. D seta on 4th–7th abdominal segments represents D1 (○) or D2 (●).
8. Eighth abdominal segment has no (0), or one (1), two (2), three (3), four (4) or five setae (5).
9. D seta on 2nd–3rd abdominal segments represents D1 (○) or D2 (●).
10. F and Af setae are present (○) or absent (●).
11. Cremaster seta is bifurcated (○) or hooked (●).
12. D seta on 1st abdominal segment represents D1 (○) or D2 (●).
13. Ninth abdominal segment has no (0), or one (1), two (2) or three setae (3).
14. SL seta on 4th abdominal segment is present (○) or absent (●).
15. SL seta on 7th abdominal segment is present (○) or absent (●).
16. Abdomen has one (○) or two SL setae (●).
17. First–3rd abdominal segments have one (○) or two D setae (●).
18. SV seta on abdomen is present (○) or absent (●).
19. D seta on 8th abdominal segment is present (○) or absent (●).
terminal process of cremaster ........................................... 5
- Mesothoracic leg slender than prothoracic leg; bifurcate cremaster seta longer than terminal process of cremaster ........................................... 36

5. Spiracular furrow elliptical ........................................... 6
- Spiracular furrow complicated ....................................... 30

6. Spiracular furrow simple elliptical ................................ 7
- Spiracular furrow elliptical but somewhat complicated ...... 16

7. Spiracular furrow simple oval ...................................... 8
- Spiracular furrow oval with denticle notches on upper edge .... 12

8. Pro- and mesothoracic legs meeting on meson at apical portion; femur of prothoracic leg disappearing; cremaster with side spinule .......... Acrodontis Wehrli
- Pro- and mesothoracic legs never meeting on meson at apical portion; femur of prothoracic leg appearing; cremaster without side spinule .......... 9

9. Extra D seta present on 2nd-5th abdominal segments ............ 10
- Extra D seta never present on abdominal segment ............. 11

10. Cremaster with basal mass .......................................... Ectropis Hübner
- Cremaster without basal mass ...................................... Abaciscus Butler

11. Metathorax more or less punctate; lateral furrow absent .......... Aethalura McDunnough
- Metathorax never punctate; lateral furrow present .......... 12.Milionia Walker

12. Femur of prothoracic leg concealing ............................ Dipluridis Warren
- Femur of prothoracic leg appearing ................................ 13

13. Suture between pro- and mesothorax attached to antenna at a point of suture restricting prothoracic leg; hindwing hidden under forewing at cephalic margin of 4th abdominal segment ........................................... Pharerothrysis Warren
- Suture between pro- and mesothorax attached to antenna at caudal point of suture restricting prothoracic leg; hindwing hidden under forewing at spiracular level of 4th abdominal segment ........................................... 14

14. Metathoracic leg concealing ....................................... Cleora Curtis
- Metathoracic leg appearing ........................................ 15

15. Cremaster with basal mass .......................................... Satoblephara Holloway
- Cremaster without basal mass ...................................... Ascotis Hübner

16. Spiracular furrow elliptical in which many ridges are present .... 17
- Spiracular furrow elliptical in which many interconnected punctures are present ........................................... Pseuderannis Inoue

17. Spiracular furrow elliptical in which many reticulate ridges are present .......... 18
- Spiracular furrow elliptical in which many comb-like ridges are present .......... 22

18. Femur of prothoracic leg appearing ................................ 19
- Femur of prothoracic leg disappearing ................................ 20

19. Mesothoracic leg reaching just before caudal margin of wing; cremaster without side spinule ................................. Alcis Curtis
- Mesothoracic leg reaching caudal margin of wing; cremaster with side spinule ........................................... Protoboarma McDunnough

20. Eye-piece rugged; cremaster with side spinule .................... Percinia Guennée
- Eye-piece smooth; cremaster without side spinule ................ 21

21. Antennae meet on meson at extremity; lateral and dorsal grooves disappearing; cremaster without basal mass .......................... Rikiosatoa Inoue
- Antennae never meet on meson at extremity; lateral and dorsal grooves appearing; cremaster with basal mass ........................................... Gigantalecis Inoue

22. Femur of prothoracic leg disappearing ................................ 23
- Femur of prothoracic leg appearing ................................ 25

23. Lateral and dorsal grooves present ............................... Jankowskia Oberthür
- Lateral and dorsal grooves absent .................................. 24

24. Ninth abdominal segment not punctate; cremaster without basal mass and side spinule,
terminal process very long ........................................... *Racotis* Moore
- Ninth abdominal segment punctate; cremaster with basal mass, terminal process invisible ........................................... *Anaboarmia* Inoue
25. Spiracular callosity small ........................................... 26
- Spiracular callosity large; eye-piece smooth; cremaster with side spine ........................................... 29
26. Antenna broad; spiracular furrow comprising one large and many minute pores ........................................... *Ramobia* Moore
- Antenna slender; spiracular furrow comprising one pore ........................................... 27
27. Spiracular furrow long; bifurcate setae of cremaster thick and short ........................................... *Protalcis* Sato
- Spiracular furrow short; bifurcate setae of cremaster normal ........................................... 28
28. Eye-piece smooth; cremaster with side spine ........................................... *Heterarminia* Warren
- Eye-piece punctate; cremaster without side spine ........................................... *Hypomecis* Hübner
29. Maxilla ending far before caudal margin of wing; eye-piece smooth ........................................... *Hyposidra* Guenée
- Maxilla ending slight before caudal margin of wing; eye-piece rugged ........................................... *Microcalicha* Sato
30. Eighth abdominal segment smooth ........................................... 31
- Eighth abdominal segment punctate ........................................... 35
31. Spiracular furrow comprising many punctures which are never conjoined and not possessing sclerotized caudal edge ........................................... 32
- Spiracular furrow comprising two rows which are many punctures conjoined and possessing sclerotized caudal edge ........................................... *Xerodes* Guenée
32. Femur of prothoracic leg concealing; metathoracic leg appearing; cremaster with side spine ........................................... *Apocleora* Wehrli
- Femur of prothoracic leg revealing; metathoracic leg disappearing; cremaster without side spine ........................................... 33
33. Bifurcate setae of cremaster long and curved ........................................... *Lassaba* Moore
- Bifurcate setae of cremaster short and spinous ........................................... 34
34. Mesothoracic leg reaching just beyond tip of maxilla; L1 and L2 setae situated vertically to each other and L2 seta located cephalad of spiracular level on 5th abdominal segment; punctures of spiracular furrow conjunct with each other; cremaster without side spine ........................................... *Arichnanna* Moore
- Mesothoracic leg reaching tip of maxilla; L1 and L2 setae situated obliquely to each other and L2 seta located caudal of spiracular level on 5th abdominal segment; punctures of spiracular furrow never conjunct with each other; cremaster with side spine ........................................... *Deileptenia* Hübner
35. Ninth abdominal segment without seta ........................................... *Paradararisa* Warren
- Ninth abdominal segment with seta . Unnamed genus related to *Paradararisa* Warren
36. Suture between pro- and mesothorax attached to antenna near the suture restricting prothoracic leg ........................................... 37
- Suture between pro- and mesothorax attached to antenna at a point of suture restricting mesothoracic leg ........................................... 46
37. Prothoracic leg never reaching seven eighths the length to caudal margin of wing; mesothoracic leg as broad to prothoracic leg ........................................... 38
- Prothoracic leg reaching seven eighths the length to caudal margin of wing; mesothoracic leg slender than prothoracic leg ........................................... 48
38. Suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular furrow absent ........................................... *Ophthalmitis* Fletcher
- Suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular furrow present as idiosyncratic ditch ........................................... 39
39. Spiracular callosity heavily protruded in the shape of earlobe ........................................... 40
- Spiracular callosity never protruded .................................................. 41
  40. Mesothoracic legs meeting on meson in distal part ......................... Culcula Moore
  - Mesothoracic legs never meeting on meson in distal part ................ Cusia Moore 41
  41. Femur of prothoracic leg appearing ............................................ Zancidius Prout
  - Femur of prothoracic leg disappearing ........................................ 42
  42. Mesothoracic leg extending far before tip of antenna ....................... Doliophyle Warren
  - Mesothoracic leg extending to tip of antenna ................................ 43
  43. Labial palpus appearing minute; spiracular callosity small; dorsum of 1st abdominal segment without transverse ditch; SD1 and L2 setae situated just above flange plate on 5th abdominal segment .......................... Exangerona Wehrli
  - Labial palpus concealed; spiracular callosity very large; dorsum of 1st abdominal segment with transverse dentate ditch; SD1 and L2 setae situated just below flange plate on 5th abdominal segment ......................... 44
  44. Prothoracic leg ending far before tip of maxilla .......................... Xandrames Moore
  - Prothoracic leg ending just before tip of maxilla .......................... 45
  45. Thorax more or less punctate or striated .................................... Proteosternia Warren
  - Thorax smooth .............................................................................. Calichia Moore 46
  46. Prolonged; head heavily punctate; spiracular furrow comprising a series of connecting pores; cremaster with short and thick terminal process ........ Oxymacaria Warren
  - Fusiform; head never punctate; spiracular furrow comprising many micro pores scattering densely; cremaster with long and slender terminal process ......................... 47
  47. L1 and L2 setae situated obliquely to each other on 5th abdominal segment .......................... Macaria Curtis
  - L1 and L2 setae situated vertically to each other on 5th abdominal segment .................................. Godonela Boisduval 48
  48. Spiracular furrow ellipsoidal; 9th abdominal segment punctate; lateral groove indistinct ............................. Erannis Hübner
  - Spiracular furrow reticulate; 9th abdominal segment smooth; lateral groove distinct; scar of larval anal leg knob-shaped; cremaster with basal mass and side spinule ......................................... 49
  49. Spiracular furrow with denticules on upper edge; cremaster without basal mass and side spinule ....................................................... 0.50
  - Spiracular furrow without denticules on upper edge ............................................. 50
  50. Three denticules on upper edge of spiracular furrow; terminal process of cremaster spineous ......................................................... Larerannis Wehrli
  - Two denticules on upper edge of spiracular furrow; terminal process of cremaster more or less thick ............................................................... Pachyrannus Inoue 51
  51. Sexually dimorphous distinct; cephalad abrupt in female; antenna broad; mesothoracic leg ending just before caudal margin of wing; spiracular furrow small; cremaster ridgy, without basal mass and side spinule ........................................... Agriopis Hübner
  - Sexually dimorphous indistinct; antenna very broad; mesothoracic leg ending caudal margin of wing; spiracular furrow large; cremaster roughened, without basal mass but with side spinule ......................................................... Phigalia Duponchel
  52. F seta situated slightly cephalad; labial palpus appearing small; maxilla reaching to or slightly before caudal margin of wing; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; prothoracic femur concealed; spiracular furrow absent ........................................... 53
  - F seta situated at normal position; labial palpus concealed; maxilla reaching nine elevenths the length to caudal margin of wing; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity conspicuous; 8th abdominal spiracle vestigial ........................................... 57
  53. Metathorax smooth or striated; 6th abdominal spiracle vestigial; lateral groove indistinct or only notched; cremaster smooth, without side spinule ........................ 54
- Metathorax punctate; 6th abdominal spiracle never vestigial ................. 55

54. Head rounded; thorax smooth and abdomen punctate; metathoracic leg exposed; lateral groove only notched ...................... Pachyligia Butler
- A pair of minute tubercles at cephalic end of head; thorax striated and abdomen smooth; metathoracic leg concealed; lateral groove indistinct ........ Wilemania Prout

55. Antennae meeting on meson at extremity; 7th–8th abdominal spiracles vestigial; 2nd and 3rd abdominal segments with two D setae each ..................... Colotois Hübner
- Antennae never meeting on meson; 8th abdominal spiracle vestigial ........... 56

56. Rather ovoid; dorsal groove appearing; cremaster without bursal mass, with a pair of falcate setae and a pair of hooked setae; 2nd and 3rd abdominal segments with one D seta each .......................... Planociampa Prout
- Fusiform; dorsal groove disappearing; cremaster with small bursal mass, with a pair of spinocephalic setae; 2nd and 3rd abdominal segments with two D setae each

........................................ Metabraxas Butler

57. Mesothoracic legs meeting on meson in apical portion; cremaster without side-spinule ...................................................... 58
- Mesothoracic legs never meeting on meson; 9th abdominal segment punctate . 59

58. Pro- and mesothorax small and situated cephalad than the following genus; body stout; 9th abdominal segment punctate; lateral groove vague, without ruggled ridge .......................... Nyssioides Oberthür

- Size and position of pro- and mesothorax same as those of general pupae; body not so stout; spiracular callosity conspicuously protruded; lateral groove distinct, ridged ruggedly or with micro spines .................................. Biston Leach

59. F seta bristle; antenna reaching caudal margin of wing and beyond tip of mesothoracic leg; thorax ruggled; scar of larval horn on 8th abdominal segment raised and spinous ........................................ Megabiston Warren
- F seta normal; antenna never reaching caudal margin of wing; thorax smooth; rugged ridges present on 10th abdominal segment dorsum ......................... 60

60. Antenna never reaching tip of mesothoracic leg; L1 seta situated just below spiracle on 5th abdominal segment; scar of larval horn on 8th abdominal segment raised ........................ Phthonosema Warren
- Antenna reaching tip of mesothoracic leg; L1 seta situated diagonally below spiracle on 5th abdominal segment; scar of larval horn on 8th abdominal segment concealed ..................................... Lycia Hübner

61. Sexually dimorphous; F and Af setae absent; maxilla narrowed halfway; prothoracic femur concealed; 8th abdominal segment with one seta; cremaster bifurcate 

........................................ (Division II) 62
- Sexually unimorphous; F and Af setae present; maxilla not so narrowed halfway; 8th abdominal segment with three or more setae; cremaster with hooked setae or bifurcate ........................................ (Division III) 64

62. Somewhat rigid; prothoracic leg ending slightly before tip of maxilla; wing of male extending to caudal margin of 4th abdominal segment; L1 and L2 setae situated obliquely to each other on 6th and 7th abdominal segments; 8th abdominal spiracle vestigial; cremaster seta absent ................................ Alsophila Hübner
- Feeble; prothoracic leg ending at or just before tip of mesothoracic leg; cremaster seta present ......................................................... 63

63. Prothoracic leg ending just before tip of mesothoracic leg; L1 and L2 setae situated vertically to each other on 6th–7th abdominal segments; 6th–8th abdominal spiracles vestigial ................................ Alsophiloides Inoue
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- SV seta present on 5th or 6th abdominal segment ..................... 68
68. Maxilla reaching slightly before caudal margin of wing, cephalic margin steeply oblique; abdominal segments with excess D seta; SL seta present on 5th segment ........................................ Menophra Moore
- Maxilla reaching far before caudal margin of wing, cephalic margin gently oblique; abdominal segments without excess D seta; SL seta present on 6th abdominal segment ........................................... Phthonandria Warren
69. SL seta present on 5th or 6th abdominal segment; 8th segment with four setae or secondary setae ........................................................................................................... (Subdivision III–III) 70
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70. Femur of prothoracic leg exposed .............................................. Pareclipsis Warren
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76. Seventh–8th abdominal spiracles vestigial; lateral groove broad; cremaster without side spinule ................................................................. Bizia Walker
- Eighth abdominal spiracle vestigial; lateral groove slender; cremaster with side spinule ................................. Ctenognaphos Prout
77. Spiracular callosity large; mesothoracic leg reaching slightly before caudal margin of wing ........................................................................ Charisaspilates Wehrli
- Spiracular callosity small; mesothoracic leg reaching caudal margin of wing .... 78
78. Ninth abdominal segment with one seta ................................... Xyloscia Warren
- Ninth abdominal segment with two setae ..................................... 79
79. First abdominal segment smooth; 8th abdominal spiracle vestigial ................................................. Endrapiodes Warren
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80. SL seta absent on 6th abdominal segment ................................... Psyra Walker
- SL seta present on 6th abdominal segment ................................... Garaeus Moore
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- Second–3rd abdominal segments with D1 and D2 setae; 8th segment with seta or secondary setae ................................................................. 83
82. Prolonged; spiracular callosity protruded acutely; mesothoracic legs never meet on meson at apical portion; lateral groove long incised. 

- Fusiform but rather short; spiracular callosity ellipsoid; mesothoracic legs meet on meson at apical portion; lateral groove short incised. 

*Corynica* Walker

83. Cremaster bifurcated, if not, then spiracular furrow present on 5th abdominal segment; 8th segment with two setae; 9th segment without seta. 

- Cremaster with hooked setae; spiracular furrow absent or present on 5th–7th abdominal segments. 

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84. Suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; cephalic margin of maxilla gently oblique; femur of prothoracic leg exposed; D2 seta absent on 1st abdominal segment. 

- Suture between pro- and mesothorax attached to antenna at slightly caudal point of suture restricting proximal margin of prothoracic leg; femur of prothoracic leg concealed. 

85. Spiracular callosity large; antenna relatively broad; hindwing hidden under forewing near caudal margin of 4th abdominal segment; cremaster long, with spinous bifurcated setae; SL and SV setae absent; 9th abdominal segment without seta. 

- Spiracular callosity not so large; antenna slender; hindwing hidden under forewing at spiracular level of 4th abdominal segment; cremaster short. 

86. Metathoracic leg appearing small; setae absent in spiracular furrow; cremaster with spinous bifurcated setae; SD2 seta absent on 5th abdominal segment; 9th segment with two setae. 

- Metathoracic leg concealed; SD1, L2 and SL2 setae present in spiracular furrow on 5th abdominal segment; cremaster short, with hooked setae; SL and SV setae present on 4th–6th abdominal segments; SD2 seta present on 5th segment; 9th segment with one setae. 

*Krananda* Moore

87. Antenna broad; lateral groove indistinct; thorax with three setae; abdominal setae bristly; D2 seta present on 1st abdominal segment; SD1 and L2 setae situated in spiracular furrow on 5th abdominal segment. 

- Antenna slender; lateral groove distinct; thorax with two setae; abdominal setae normal; D2 seta absent on 1st abdominal segment; SD1 and L2 setae never situated in spiracular furrow on 5th abdominal segment. 

*Elphos* Guenée

88. Spiracular furrow absent; SV seta never present; three setae on 8th abdominal segment; cremaster with three pairs of hooked setae. 

- Spiracular furrow present; SV seta present; two setae on 8th abdominal segment. 

*Orthocabera* Butler

89. Femur of prothoracic leg appearing; spiracular furrow scabrous; cremaster with four pairs of hooked setae; 2nd–3rd abdominal segments with D1 seta. 

- Femur of prothoracic leg disappearing; spiracular furrow smooth; cremaster bifurcate; 2nd–3rd abdominal segments with D1 and D2 setae. 

*Abaxaxas* Leach

90. Suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; 8th abdominal segment with three setae; 9th segment without seta. 

- Suture between pro- and mesothorax attached to antenna at caudal point of suture restricting proximal margin of prothoracic leg; 8th abdominal segment with four or five setae. 

(Subdivision IV–III) 91

91. Femur of prothoracic leg exposed; spiracular furrow present on 5th–7th abdominal segments; D1 seta present on 1st–3rd abdominal segments; SV seta absent. 

- D1 and D2 setae present on 1st–3rd abdominal segments or secondary setae. 

*Thinopteryx* Butler

92. Femur of prothoracic leg exposed; SV seta absent. 

- Femur of prothoracic leg concealed.
93. Second–7th abdominal segments punctate ...........................................94
   - Second–8th abdominal segments punctate .......................................97
94. Antenna extending far beyond caudal margin of wing ....................... Petelia Herrich-Schäffer
   - Antenna extending to caudal margin of wing ..................................95
95. SD1 and L2 setae situated on upper flange plate ................................96
   - SD1 and L2 setae situated on lower flange plate ...............................97
96. Suture between pro- and mesothorax attached to antenna at a caudal point of suture
   restricting proximal margin of prothoracic leg; femur of prothoracic leg very small
   - Suture between pro- and mesothorax attached to antenna at a point of suture restricting
     proximal margin of prothoracic leg; femur of prothoracic leg moderately large
   .................................................. Astyglia Wehrli
97. Prothorax smooth; metathoracic leg appearing ................................. Scionomia Warren
   - Prothorax striated; metathoracic leg concealed ..................................98
98. Head striated; medium area of frons protruded ................................. Synegia Guenee
   - Head smooth; medium area of frons never protruded ..........................99
99. Somewhat puffy; metathoracic leg appearing ................................. Borbacha Moore
   - Somewhat slim; metathoracic leg disappearing .............................. Plesiomorpha Warren
100. Femur of prothoracic leg appearing .............................................101
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101. First–3rd abdominal segments coarsely punctate ............................ Cabera Treitschke
    - First–3rd abdominal segments densely punctate ................................102
102. Tentorium pit-like; spiracular callosity distinct; dorsal groove with seven notches;
    cremaster with four pairs of setae ........................................... Rhynchobapta Hampson
    - Tentorium slit-like; spiracular callosity indistinct; dorsal groove with one notch;
      cremaster with two pairs of setae .......................................... Lamproscabera Inoue
103. SV seta present; 8th abdominal segment punctate ................................104
    - SV seta absent; 8th abdominal segment smooth ................................108
104. SV1 seta present on abdominal segments ....................................105
    - SV1 and SV2 setae present on abdominal segments .........................107
105. First abdominal segment smooth; cremaster with basal mass ............. Nothomiza Warren
    - First abdominal segment punctate; spiracular callosity absent; cremaster without basal
      mass ......................................................................................106
106. Suture between pro- and mesothorax attached to antenna at a point of suture restricting
    proximal margin of prothoracic leg; hindwing hidden under forewing at medium point
    between apex of forewing and 4th abdominal spiracle; 8th abdominal segment with L2
    seta only .............................................................. Petrophora Hübner
    - Suture between pro- and mesothorax attached to antenna at a point of suture restricting
      proximal margin of mesothoracic leg; hindwing hidden under forewing near
      cephalic margin of 4th abdominal segment; 8th abdominal segment with SD1, L1 and
      L2 setae ...................................................... Oceolephora Warren
107. SL1 seta present on 5th–6th abdominal segments ............................. Euchristophia Fletcher
    - SL1 seta present on 5th–7th abdominal segments .......................... Ellcrinia Hübner
108. Two SL setae situated obliquely to each other ................................ Parabapta Warren
    - Two SL setae situated vertically to each other ........................................109
109. Head smooth; maxilla reaching tip of mesothoracic leg; spiracular callosity present
    - Head wrinkled; maxilla never reaching tip of mesothoracic leg; spiracular callosity
      absent ........................................................................ Lomographa Hübner
110. Femur of prothoracic leg exposed; 8th abdominal segment with four setae
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    - Femur of prothoracic leg concealed; 8th abdominal segment with five setae or secondary
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111. Mesothoracic leg ending caudal margin of wing; SL seta absent
   - Mesothoracic leg ending just before caudal margin of wing; SL seta present ..........112

112. SL setae present on 5th and 6th abdominal segments; 9th segment with three setae
   - SL setae present on 5th abdominal segment .................................................113

113. Fusiform; a small knob absent on frons; mesothoracic leg never reaching caudal margin
   of wing; hindwing hidden under forewing at spiracular level of 4th abdominal segment;
   one SL seta present on 6th abdominal segment ..................Odontopera Stephens
   - Prolonged; a small knob present on frons; mesothoracic leg reaching caudal margin
     of wing; hindwing hidden under forewing at the median point between 4th abdominal
     spiracle and apex of wing; two SL setae present on 6th abdominal segment
   ....................................................................................................................Obeidia Walker

114. Antenna slightly broad, extending to just before caudal margin of wing; two SL setae
   present on 5th abdominal segment; 9th segment without seta Euctenuraapteryx Warren
   - Antenna slender, extending to caudal margin of wing; one SL seta present on 5th
     abdominal segment; 9th segment with two setae .........................Ourapteryx Leach

115. Somewhat swollen; antenna slightly broad; 7th–8th abdominal spiracles vestigial;
   lateral groove only notched; SL seta absent; 9th segment without seta .............116
   - Rather slimmer; antenna slender; 8th abdominal spiracle vestigial; lateral groove long
     incised; SL seta present .................................................................117

116. Head prominent; 1st–8th abdominal segments smooth; dorsal groove simple; cremaster
   small, with one pair of thickened falcate setae ..................Apochima Agassiz
   - Head rounded; 1st–8th abdominal segments punctate; dorsal groove with distinct
     notch; cremaster globulus, with one pair of falcate setae and one pair of hooked
     setae .....................................................................................Descoreba Butler

117. Maxilla reaching near caudal margin of wing; 4th–7th abdominal segments slightly
   punctate; spiracular callosity distinct; dorsal groove distinct; mesothoracic legs never
   meeting on meson; SL seta present on 5th–7th abdominal segments
   - Maxilla never reaching near caudal margin of wing; 4th–7th abdominal segments
     rugous; dorsal groove more or less indistinct; mesothoracic legs meeting on meson;
     SL seta absent on 7th abdominal segment ............................................118

118. Secondary setae present; body short and thick; spiracular callosity distinct ..........119
   - Primary setae present; body long; spiracular callosity indistinct ...............120

119. Maxilla ending far cephalad to tip of prothoracic leg; 6th abdominal spiracle situated
   at normal position; setae beared more or less roughly ......................Apeira Gistl
   - Maxilla ending slightly beyond tip of prothoracic leg; 6th abdominal spiracle situated
     ventrad than those of the other segments; setae present more thickly
     ...........................................................................................................Agaraeus Kuznetsov & Stekolnikov

120. Maxilla extending beyond tip of prothoracic leg; antenna reaching slightly before
   caudal margin of wing; SL seta absent .....................................Auaxa Walker
   - Maxilla never extending to tip of prothoracic leg; antenna reaching caudal margin
     of wing; 5th abdominal segment with two SL setae and 6th segment with one
     .........................................................................................Ennomos Treitschke

As was shown in this key, the arrangement differs between adult and pupal classification and
arrangement correct cannot be deiced hastily. It is in accord with Patočka (1994) said on
the pupa of Ennominae “Abraxini, Ennomini, Ourapterygin, Colotoini, Angeronini,
Caberini und Campaeini, sowie Gnophini kaum oder unsicher voneinander trennen kann”.
Description of the genera

Division I

Subdivision I-I

*Arichanna* Moore (Plate 13, fig. 222; Plate 18, figs 271–272; Plate 33, figs. 523–524)

Fusiform. Head almost smooth; labial palpus trigonal; maxilla reaching just before caudal margin of wing, cephalic margin gently oblique; antenna relatively broad, extending to caudal margin of wing; thorax smooth; cephalic margin of prothorax curved towards medio-dorsum; suture between pro- and mesothorax attached to antenna at slightly cephalic point of suture restricting proximal margin of mesothoracic leg; spiracular callosity black, disk-like, pubescent; prothoracic leg reaching five sixths the length to caudal margin of wing, femur appearing small; mesothoracic leg ending the midway between tips of antenna and maxilla; metathoracic leg exposed; hindwing hidden under forewing near apex of wing; 1st–7th abdominal segments with shallow punctures sparsely scattered but 8th–9th segments smooth; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; scar of larval proleg on 6th segment raised; spiracular furrow comprising many pores close to each other; dorsal groove with many notches; lateral groove long; cremaster conical, rugous, bifurcate but bifid terminal spines short.

Pro-, meso- and metathorax with D1 and SD1 setae; abdomen with D2 seta; 8th abdominal segment with L1 and L2 setae; 9th segment without seta.

**Key to the species**

1. Abdomen punctated sparsely than that of *melanaria* Linnaeus; spiracular furrow situated slightly ventrad of spiracle; cremaster with basal mass but without side spinele; L2 seta situated ventro-cephalad of L1 seta on 5th abdominal segment; 19 mm, brown

*..........................*jaguararia* Guenée (Mt Kurama, Kyoto, 24 iv 1982)

- Abdomen punctated densely than that of precedings; spiracular furrow situated slightly dorsum of spiracle; cremaster without basal mass and with side spineule; L2 seta situated just cephalad L1 seta on 5th abdominal segment; 17 mm, brown

*..........................*melanaria* Linnaeus (Mt Takao, Tokyo, 5 v 1969)

*Deileptenia* Hübner (Plate 13, fig. 223; Plate 18, fig. 273; Plate 33, fig. 525)

Closely allied to *Arichanna* Moore and only differing as follows: prothoracic leg ending at three fourths the length to caudal margin of wing; mesothoracic leg reaching tip of maxilla; spiracular furrow comprising many pores independently of each other; cremaster with basal mass and side spinele, bifid terminal spines long.

*Chetotaxy same as in the preceding genus.*

*ribeata* Clerck (Mt Togakushi, Nagano, 18 ix 1984). 16 mm, brown.

*Apolaeora* Wehrli (Plate 1, fig. 8; Plate 13, fig. 227; Plate 33, fig. 526)

Fusiform. Head almost smooth; labial palpus minute, trigonal; maxilla extending to just before caudal margin of wing, cephalic margin gently oblique; antenna relatively broad, reaching caudal margin of wing; thorax punctate; cephalic margin of prothorax curved towards medio-dorsum; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity black, disk-like, scabrous; prothoracic leg reaching seven ninths the distance to caudal margin of wing, femur scarcely visible; mesothoracic leg ending at tip of maxilla; metathoracic leg appearing; hindwing hidden under forewing at spiracle level of 4th abdominal segment; abdomen with
shallow punctures scattered; 2nd–3rd abdominal spiracles appering completely; 6th spiracle situated slightly ventrad; 8th spiracle vestigial; scar of larval proleg on 6th segment slightly convex; spiracular furrow comprising many pores close to each other; lateral groove long; dorsal groove with some notches; cremaster conical, dorsal side rugged and ventral side slightly crinkled, with basal mass and side spine, bifid terminal spine moderately long. Chaetotaxy same as in *Arichanna* Moore.

*rimosata* Butler (Komoro, Nagano, 28 vi 1980). 15 mm, brown but cephalic area greenish and abdomen reddish.

**Lassaba** Moore (Plate 13, fig. 225; Plate 18, fig. 275; Plate 33, fig. 527)

Fusiform. Head heavily rugose; labial palpus minute; maxilla reaching just before caudal margin of wing, cephalic margin steeply oblique; antennae relatively broad, reaching caudal margin of wing, met on meson at extremity; eye-piece striated; suture between pro- and mesothorax attached to antenna at slightly caudal point of suture restricting proximal margin of prothoracic leg; spiracular callosity relatively small, slightly raised, black and pubescent; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg extending five sevenths the length to caudal margin of wing, femur appearing slender; mesothoracic leg reaching just before tip of maxilla; metathoracic leg concealed; abdomen with punctures densely scattered but 9th–10th segments smooth; 2nd–3rd abdominal spiracles appering completely; 8th spiracle vestigial; spiracular furrow comprising many small pores; lateral groove with marginal dentate protuberance; dorsal groove scarcely visible; cremaster conical, rugous in both sides, bifid terminal spine relatively long. Chaetotaxy same as in *Arichanna* Moore.

*nikkonis* Butler (Mt Takao, Tokyo, 10 vi 1969). 20 mm, dark reddish brown.

**Xerodes** Guenée (Plate 13, fig. 226; Plate 18, figs 277–278; Plate 33, figs 528–529)

Fusiform. Head somewhat smooth; labial palpus minute, pentagonal; maxilla reaching caudal margin of wing, cephalic margin gently oblique; antenna relatively broad, reaching tip of maxilla; prothorax rugged and rugous, meso- and metathorax crinkled; suture between pro- and mesothorax attached to antenna at a medial point between suture restricting proximal margin of pro- and mesothoracic legs; spiracular callosity black, disk-like and pubescent, not projected; prothoracic leg ending at three fourths the length to caudal margin of wing, femur appearing small; mesothoracic leg extending caudal margin of wing; metathoracic leg concealed; hindwing hidden under forewing on spiracle level of 4th abdominal segment; abdomen punctate but scattering more or less sparsely on 5th–8th segments; 2nd–3rd abdominal spiracles appearing completely, 8th spiracle vestigial; spiracular furrow comprising two rows of small pores; dorsal groove with some obscure notches; lateral groove short; cremaster conical, rugged on dorsal side, smooth on ventral side, basal mass present, with bifid terminal spines moderately long, with or without side spine. Chaetotaxy same as in *Arichanna* Moore.

**Key to the species**

1. Head rugged; lower pores row of spiracular furrow with black edge; cremaster shorter than that of the following species, without side spine; 15 mm, reddish brown but darker on caudal area ................. *albonotaria* Bremer (Hakone, Kanagawa, 21 vii 1968)
   - Head smooth; upper and lower pores rows of spiracular furrow with black edge; cremaster longer than that of *albonotaria* Bremer, with side spine; 15 mm, reddish brown ................. *rufescens* Motschulsky (Mt Mitake, Tokyo, 17 vii 1971)
**Paradarisa** Warren (Plate 17, fig. 263; Plate 19, fig. 305; Plate 34, fig. 534)

Somewhat prolonged. Head rugged and rugous; labial palpus small; maxilla extending slightly beyond caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending slightly beyond tip of maxilla and reaching caudal margin of 4th abdominal segment; eye-piece smooth; thorax rugous; suture between pro- and mesothorax attached to antenna at caudal point of suture restricting proximal margin of prothoracic leg; spiracular callosity dark brown, ovoid and pubescent; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg slender, ending at three fourths the distance to caudal margin of wing, femur appearing; mesothoracic leg reaching tip of maxilla; metathoracic leg disappearing; abdomen scattered shallow punctures but 9th segment smooth; spiracular furrow with horizontal pore in which many small punctures are present; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; lateral groove shallow and indistinct; dorsal groove disappearing; cremaster small, with radial ridges; without basal mass and side spinule, terminal process long and slender, with short bifid piece.

Seta long. 1st–9th abdominal segments with D2 seta; SL and SV setae absent; 8th segment with L1 and L2 setae.

**chloauges** Prout (Horai, Aichi, 5 v 1988). 17 mm, reddish brown.

**Unnamed genus related to Paradarisa** Warren (Plate 17, fig. 264; Plate 19, fig. 306)

**Ectropis consonaria** Hübner has been transferred to the genus *Paradarisa* Warren by Sato (1980), but the pupal character of this species is conspicuously differs from that of *P. chloauges* Prout. Then **consonaria** Hübner was treated under the separate genus which is unnamed in this paper, however, the pupa of **comparataria** Walker, the type species of *Paradarisa* Warren, was not examined.

Fusiform. Head rugged; a pair of knobbles in medio-cephalad of frons; maxilla extending just before caudal margin of wing, cephalic margin gently oblique; antenna reaching caudal margin of wing; sculptured eye-piece rugged; thorax striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity dark brown, small and protruded; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg ending at seven ninths the length to caudal margin of wing, femur appearing small; mesothoracic leg reaching tip of maxilla; metathoracic leg appearing; abdomen punctate; spiracular furrow comprising many small punctures; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; lateral groove disappearing; dorsal groove with nine notches; cremaster conical with vertical rugged striae, without basal mass and side spinule; terminal process never possessed, with bifid piece.

Seta short. Chaetotaxy same as in *Paradarisa* Warren.

**consonaria** Hübner (Mt Mitake, Tokyo, 17 vii 1971). 11 mm, dark brown.

**Oxymacaria** Warren (Plate 13, fig. 224; Plate 18, fig. 276)

Prolonged: Head punctate, two distinct tubercles in frons; labial palpus small; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to tip of maxilla; sculptured eye-piece punctate; prothorax with reticulated ridges, mesothorax with shallow punctures scattered and metathorax slightly crinkled; cephalic and caudal margins of prothorax sharply curved at medio-dorsum; suture between pro- and mesothorax attached to antenna at a medium point of sutures restricting proximal margins of pro- and mesothoracic legs; spiracular callosity small, black and crescent; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg reaching seven ninths the distance to caudal margin of wing, femur exposed; mesothoracic leg ending at tip of maxilla; metathoracic leg concealed; abdomen with deep punctures densely scattered;
2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow comprising a series of pores; cremaster small, trigonal, ventral side smooth and dorsal side rugged, basal mass indistinct, with short and falcate terminal spines rising away from each other.
Chaetotaxy same as in _Paradarisasa_ Warren.

*normata* Alphéraky (Mt Takao, Tokyo, 10 viii 1969). 12 mm, blackish brown.

Godonela Boisduval (Plate 14, fig. 228; Plate 18, fig. 279)

Fusiform. Head rugous; labial palpus minute; maxilla reaching just before caudal margin of wing, cephalic margin gently oblique; antenna slender, reaching tip of maxilla; sculptured eye-piece rugged; thorax rugged and rugous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothehalic leg; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg ending slightly before caudal margin of wing, femur exposed; mesothoracic leg reaching tip of maxilla; metathoracic leg appearing; abdomen with small deep punctures densely scattered; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; cremaster trigonal, ventral side smooth and dorsal side punctate, basal mass small, side spinule disappearing, with long terminal process which is bifurcate at tip.
Chaetotaxy same as in _Paradarisasa_ Moore.

**Key to the species**

1. Spiracular callosity indistinct; spiracular furrow with a relatively small pore at cephalo-dorsal spiracle; lateral groove short, dorsal groove with many small notches; ventral side of cremaster without concavity; 13 mm, blackish brown.

- hebesata Walker (Yoshimi-hyakketu, Saitama, 10 x 1969)

- Spiracular callosity black, disk-like and pubescent; spiracular furrow indistinct but consisting of many micro pores; lateral and dorsal grooves indistinct; ventral side of cremaster with concavity; 9 mm, brown but greenish on head and thorax.

- emersaria Walker (Kochinda, Okinawa, 26 vii 1999, S. Tominaga leg.)

Macaria Curtis (Plate 14, fig. 229; Plate 18, figs 280–281; Plate 37, figs 640–643)

Fusiform. Head smooth but frons striated; labial palpus minute, trigonal; maxilla ending slightly before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to caudal margin of wing; eye-piece smooth; thorax rugous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity black, disk-like and pubescent; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg reaching fifth sixths the length to caudal margin of wing, femur exposed large; mesothoracic leg ending just before tip of antenna; metathoracic leg exposed; abdomen with deep punctures densely scattered; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow indistinct but consisting of many micro pores; cremaster somewhat globular with reticulate ridges on both sides, without basal mass and side spinule, with relatively long terminal process which is bifd shortly at distal end.
Chaetotaxy like the preceding genus except for the seta on 9th segment shown in the following key.

**Key to the species**

1. Cremaster somewhat globular, terminal process long, with vertical carinated ridges in all ventral surface ................................................................. 2

- Cremaster conical, terminal process short, with a central cavity and some radial stripes
around it in proximal end of ventral surface ................................. 3
2. Ninth abdominal segment with one seta; 12 mm, blackish brown ........................... shanghaiaria Walker (Sagami-hakusan, Kanagawa, 6 ix 1980)
   - Ninth abdominal segment without seta; 12 mm, brown. ............................... liturata Clerck (Mt Kusatu-shirane, Gunma, 1 ix 1964)
3. Central cavity of cremaster small; 10 mm, brown .............................. abydata Guenée (Kochinda, Okinawa, 18 xii 2001, S. Tominaga leg.)
   - Central cavity of cremaster slightly large; 10 mm, brown .............................. fuscaria Leech (Tochimoto, Oodaki, Saitama, 20 ix 1972, H. Nakajima leg.)

Ectropis Hübner (Plate 15, figs 238–240, 247–249)

Fusiform. Head slightly crinkled; frons striated, with a pair of tubercles; labial palpus minute, trigonal; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to caudal margin of wing; sculptured eye-piece rugged; thorax rugose; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity black, elliptical and pubescent; hindwing hidden under forewing at spiralce level of 4th abdominal segment; prothoracic leg ending at four fifths the distance to caudal margin of wing, femur appearing; mesothoracic leg reaching tip of maxilla; metathoracic leg appearing; abdomen with shallow punctures densely scattered; 2nd–3rd abdominal spiracles appearing completely; 8th spiralce vestigial; spiracular furrow consisting of a large elliptical pore situated slightly dorsocephalad of spiralce; scar of larval tubercle present on 8th segment dorsad; lateral groove disappearing in some species; dorsal groove with some minute notches; cremaster conical, dorsal side rugged, with or without basal mass and without side spinule, bifid spine relatively short.

Two D setae (D2 and excess seta of D) present on 2nd–5th abdominal segments but D1 seta on 1st segment and only D2 seta on 6th–7th segments.

Key to the species

1. Tubercle on frons vague; scar of larval tubercle on 8th abdominal segment distinct; 9th segment punctate; cremaster with basal mass. 14 mm, brown. ............................... excellens Butler (Sagami-hakusan, Kanagawa, 6 ix 1964)
   - Tubercle on frons conspicuous; scar of larval tubercle on 8th abdominal segment indistinct; 9th segment smooth ...................................................... 2
2. Scar of larval tubercule inconspicuous; lateral groove obsolete; cremaster without basal mass; ventral side of cremaster smooth; 11 mm, brown ............................... crepuscularis Denis & Schiffermüller (Mt Mitake, Tokyo, 17 vii 1971)
   - Scar of larval tubercule conspicuous; lateral groove short; cremaster with basal mass; ventral side of cremaster striated; 18 mm, reddish brown ............................... obliqua Prout (Meguro, Tokyo, 3 viii 1953)

Abaciscus Butler (Plate 15, figs 237, 246)

Closely allied to Ectropis Hübner but only differs in the following points: head and thorax crinkled; a pair of distinct tubercules in frons; 1st–8th abdominal segments with deep punctures densely scattered; scar of larval tubercle on 8th segment dorsad conspicuous; lateral groove rounded small; dorsal groove with a notch at dorso-meson; cremaster trapezoid in frontal view, with acute spines at both corners, without basal mass and side spinule. Chaetotaxy same as in Ectropis Hübner.

albipunctatus Inoue (Hakone, Kanagawa, 21 vii 1968). 11 mm, brown.
**Milonia** Walker (Plate 37, figs 633–636)

Nearly to *Ectropis* Hübner. Fusiform. Head slightly striated; labial palpus minute, trigonal; maxilla reaching slightly before caudal margin of wing, cephalic margin somewhat steeply oblique; antenna slender, extending caudal margin of wing; eye-piece smooth; pro- and mesothorax smooth but metathorax rugous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity indistinct; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; prothoracic leg ending at four fifths the length to caudal margin of wing, femur appearing; mesothoracic leg reaching tip of maxilla; metathoracic leg appearing; abdomen with shallow punctures on 1st–4th segments and deep punctures on 5th–8th segments scattered; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow consisting of an elliptical pore situated dorso-cephalad of spiracle; scar of larval tubercle absent; lateral groove with dentated edge; dorsal groove with some notches; cremaster conical, without basal mass and side spinule. Chaetotaxy identical with that of *Arichanna* Moore.

*basalis* Walker (Kochinda, Okinawa, 3 vi 2000, S. Tominaga leg.). 21 mm, dark brown.

**Aethalura** McDunnough (Plate 14, fig. 230; Plate 18, fig. 282; Plate 35, fig. 595)

Fusiform. Head crinkled; a pairs of conspicuous tubercules on frons medio-cephalad; labial palpus small, trigonal; maxilla ending just before caudal margin of wing, cephalic margin gently oblique; antenna slender, reaching caudal margin of wing; sculptured eye-piece slightly punctate; thorax crinkled but metathorax with some punctures; suture between pro- and mesothorax attached to antenna at the medium point of sutures restricting proximal margins of pro- and mesothoracic legs; spiracular callosity raised; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; prothoracic leg extending three fourths the length to caudal margin of wing, femur appearing small; mesothoracic leg ending at caudal margin of wing; metathoracic leg appearing; abdomen with shallow punctures scattered; 2nd–3rd abdominal spiracles appearing completely; 6th spiracle situated slightly ventral than those the other segments; 8th spiracle vestigial; spiracular furrow comprising a simple elliptical pore; lateral and dorsal grooves ill-defined; cremaster small, rugous, without basal mass, side spinule and terminal process, bifid spines short. Chaetotaxy same as in *Arichanna* Moore.

**Key to the species**

1. Tubercules on frons arising at a distance; cephalic margin of maxilla gently oblique; cremaster trapezoidal, bifid spines relatively long and rising at a distance; 10 mm, brown

   --------------------------nanaria Staudinger (Mt Mitake, Tokyo, 17 vii 1971)

   - Tubercules on frons fused together and becoming separated only at distal end; trigonal, bifid spines short and rising close to each other; 11 mm, brown

   --------------------------ignobilis Butler (Hakone, Kanagawa, 21 vi 1968)

**Satoblephara** Holloway (Plate 14, fig. 231; Plate 18, fig. 283)

Fusiform. Head crinkled; labial palpus minute, trigonal; maxilla ending just before caudal margin of wing, cephalic margin gently oblique; antenna slender, reaching caudal margin of wing; sculptured eye-piece slightly punctate; thorax crinkled but metathorax with some punctures; suture between pro- and mesothorax attached to antenna at a medium point of sutures restricting proximal margins of pro- and mesothoracic legs; spiracular callosity relatively small, elliptical and raised; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; prothoracic leg extending three fourths the length to caudal margin of wing, femur appearing small; mesothoracic leg ending at caudal margin of wing; metath-
Ennominae

oracic leg appearing; abdomen scattered shallow punctures; 2nd–3rd abdominal spiracles appearing completely; 6th spiracle situated slightly ventrad than those the other segments; 8th spiracle vestigial; spiracular furrow comprising a simple elliptical pore; lateral and dorsal grooves ill-defined; cremaster small, rugous, without basal mass, side spinule and terminal process.

Chaetotaxy same as in the preceding genus.

**parvularia** Leech (Mt Takao, Tokyo, 10 vi 1969). 9 mm, brown.

**Jankowskia** Oberthür (Plate 14, fig. 232; Plate 18, fig. 286; Plate 33, fig. 530)

Fusiform. Head slightly striated; labial palpus concealed; maxilla ending slightly before caudal margin of wing, cephalic margin gently oblique; antenna relatively broad, extending to midway between tip of maxilla and caudal margin of wing; thorax crinkled; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity raised, rugged; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg extending five sixths the distance to caudal margin of wing, femur appearing small; mesothoracic leg reaching caudal margin of wing; metathoracic leg appearing; abdomen with deep punctures scattered; 2nd–3rd abdominal spiracles half hidden under wing; 8th spiracle vestigial; spiracular furrow forming a large elliptical pore in which many interconnected punctures are present; lateral groove deep and slender; dorsal groove with many small notches; cremaster conical, ventral side smooth and dorsal side rugged, large basal mass with some faint ridges, side spinule minute, terminal process long.

Chaetotaxy identical with that of *Arichanna* Moore.

**athleta** Oberthür (Mt Takao, Tokyo, 29 iv 1981). 18 mm, dark reddish brown.

**Cleora** Curtis (Plate 17, fig. 265; Plate 19, figs 307–308; Plate 34, figs 545–546)

Fusiform. Head rugged; labial palpus minute; maxilla reaching just before caudal margin of wing, cephalic margin steeply oblique; antenna extending to caudal margin of wing; sculptured eye-piece rugged; pro- and mesothorax crinkled, metathorax punctate; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity indistinct; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching seven tenths the distance to caudal margin of wing, femur exposed; mesothoracic leg ending just before tip of maxilla; metathoracic leg concealed; abdomen punctate but 9th segment smooth; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow comprising long pore with some notches on upper edge; dorsal groove with many small notches; cremaster trigonal, ventral side rugous and dorsal side rugged, without basal mass, terminal process absent, bifurcated piece moderate.

Chaetotaxy same as in *Arichanna* Moore.

**Key to the species**

1. Lateral groove invisible; dorsal groove with many incisions; cremaster heavy ditch, with small side spinule; bifurcated piece very long; 16 mm, dark brown  ........................................ *leucophaea* Butler (Sakai, Osaka, 18 v 1982)

- Lateral and dorsal grooves invisible; cremaster not so ditch, smooth, without side spinule; bifurcated piece moderate long ........................................ 2

2. Spiracular callosity slightly raised; lateral and dorsal grooves invisible; cremaster more or less rounded, smooth; 15 mm, brown .......... *insolita* Butler (Meguro, Tokyo, 28 v 1950)

- Spiracular callosity never raised; lateral and dorsal grooves barely visible; cremaster rather trigonal, slightly wrinkled; 18 mm, dark brown.
 repulsaria Walker (Yuto, Shizuoka, 12 vii 1997)

Ascotis Hübner (Plate 14, fig. 234; Plate 18, fig. 287; Plate 34, fig. 547)

Fusiform. Head rugged; labial palpus minute; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to just before caudal margin of wing; sculptured eye-piece rugged; pro- and mesothorax crinkled, metathorax punctate; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity black, elliptical and pubescent; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching three fourths the length to caudal margin of wing, femur exposed; mesothoracic leg ending at the midway between tips of maxilla and antanna; metathoracic leg appearing; abdomen with deep punctures scattered; 2nd-3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow comprising long pore with some notches on upper edge; lateral groove short; dorsal groove with many small notches; cremaster small, trigonal, ventral side rugous and dorsal side rugged, with basal mass and inconspicuous side spinule, terminal process thick, bifurcated piece long.

Chaetotaxy same as in Arichanna Moore.

selenaria Denis & Schiffermüller (Sakai, Osaka, 12 ix 1982). 21 mm, dark brown.

Ramobia Moore (Plate 14, fig. 235; Plate 18, fig. 288; Plate 34, fig. 538)

Fusiform. Head heavily striated; frons with a small tubercle at centre; labial palpus concealed; maxilla extending to caudal margin of wing, cephalic margin gently oblique; antenna broad, reaching tip of maxilla; eye-piece roughened; thorax crinkled; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity small and black, pubescent; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg ending at seven ninths the distance to caudal margin of wing, femur appearing small; mesothoracic leg appearing from caudal than those of the ordinary pupae, reaching slightly before tip of maxilla; metathoracic leg concealed; abdomen with shallow punctures scattered; 2nd-3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow comprising a long pore accompanied by some punctures on both sides; lateral groove ill-defined; dorsal groove dentate; cremaster conical, rugged on both sides, basal mass scarcely recognized, terminal process short, bifurcated at tip.

Chaetotaxy identical with that of Arichanna Moore.

basifuscaria Leech (Muikamachi, Niigata, 1 v 1979, R. Sato leg.). 12 mm, brown.

Phanerothryis Warren (Plate 14, fig. 236; Plate 18, fig. 285; Plate 34, fig. 548)

Fusiform. Head punctate but striated on frons; labial palpus rhombic, slightly longer than those of allied genera; maxilla extending to slightly before caudal margin of wing, cephalic margin gently oblique; antenna slender, ending at caudal margin of wing; sculptured eye-piece punctate; thorax rugged; suture between pro- and mesothorax attached to antenna at a medium point of suture restricting proximal margins of pro- and mesothoracic legs; prothoracic leg reaching five sixths the length to caudal margin of wing, femur exposed small; mesothoracic leg ending just beyond tip of maxilla; metathoracic leg appearing; spiracular callosity black, disk-like, scabrous; hindwing hidden under forewing at spiracle level of 4th abdominal segment; abdomen with densely punctures scattered; 2nd-3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow similar to the preceding genus; lateral groove short; dorsal groove with some dentate notches; cremaster conical, dorsal side punctate and ventral side smooth, with basal mass but without side spinule, terminal process long, bifurcated at tip, distal spines short.
Chaetotaxy same as in *Arichanna* Moore.

*sinearia* Guenée (Karuizawa, Nagano, 11 viii 1965). 10 mm, brown.

**Racotis** Moore (Plate 15, figs 241, 251–252; Plate 34, fig. 537)

Fusiform. Head almost smooth; labial palpus minute; maxilla reaching just before caudal margin of wing, cephalic margin steeply oblique; antenna slender, reaching caudal margin of wing; eye-piece smooth; pro- and mesothorax striated, metathorax punctuated; suture between pro- and mesothorax attached to antenna at caudal point of suture restricting proximal margin of prothoracic leg; spiracular callosity small, elliptical and pubescent; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg ending at seven ninths the length to caudal margin of wing, femur appearing small; mesothoracic leg extending to tip of maxilla; metathoracic leg appeared; abdomen punctate; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow large elliptical pore, fill with many long comb-like ridges; lateral and dorsal grooves ill-defined; cremaster small, conical, smooth on both sides, without basal mass, terminal process long and slender, bifid piece short.

Chaetotaxy similar to the preceding genus but L2 seta present on 4th abdominal segment.

**Key to the species**

1. Cremaster striated, with ridges in proximo-lateral portion, terminal process more or less thick; two L setae situated vertically to each other on 8th abdominal segment; dorsum of 10th abdominal segment heavy striated; 16 mm, reddish brown

   *boarniaria* Guenée (Sagami-hakusan, Kanagawa, 6 ix 1980)

   - Cremaster smooth, without ridges in proximo-lateral portion, terminal process very slender; two L setae situated obliquely to each other on 8th abdominal segment; dorsum of 10th abdominal segment weakly striated; 14 mm, yellowish brown

   *petrosa* Butler (Mt Takatori, Kanagawa, 4 x 1980)

**Diplurodes** Warren (Plate 14, fig. 233; Plate 18, fig. 284)

Fusiform. Head striated; frons slightly raised; labial palpus minute; maxilla reaching slightly before caudal margin of wing, cephalic margin steeply oblique; antenna slender in distal portion, extending to caudal margin of wing; sculptured eye-piece rugged; pro- and mesothorax wrinkled, metathorax with densely punctures scattered; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity elliptical, raised and pubescent; hindwing hidden under forewing near cephalic margin of 4th abdominal segment; prothoracic leg ending at three fourths the length to caudal margin of wing, femur appearing; mesothoracic leg reaching tip of maxilla; metathoracic leg appearing; abdomen with small punctures densely scattered, but 9th segment smooth; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow comprising a long pore with some notches on upper edge; lateral and dorsal grooves indistinct; cremaster conical, both sides punctate, without basal mass, with side spinule, terminal process short but bifid piece very long.

Chaetotaxy same as in *Arichanna* Moore.

*vestitus* Warren (Mt Takao, Tokyo, 5 v 1969). 15 mm, dark reddish brown.

**Anaboarmia** Inoue (Plate 15, fig. 242; Plate 20, fig. 330; Plate 34, fig. 536)

Fusiform. Head almost smooth; labial palpus minute; maxilla reaching just before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to caudal margin of wing; thorax rugose; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity darker, disk-
like and pubescent; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending slightly before caudal margin of wing, femur appearing small; mesothoracic leg extending to caudal margin of wing; metathoracic leg appearing; abdomen with shallow punctures scattered densely; 2nd–3rd abdominal spiracles half hidden under wing; 8th spiracle vestigial; spiracular furrow comprising a large comb-like elliptical pore; lateral and dorsal grooves invisible; cremaster small, conical and concave at centre, smooth on ventral and rugged on dorsal sides, basal mass appearing some ditches, without side spinule, terminal process thick and short, bifurcated piece relatively long.
Chaetotaxy same as in *Arichanna* Moore.

*aechmeessa* Prout (Mt Zao, Yamagata, 30 vi 1968). 10 mm, brown, wing and legs suffused with dark green.

*Percinia* Guenée (Plate 15, figs 243–244; Plate 18, figs 289–290; Plate 34, fig. 533)

Fusiform. Head crinkled; labial palpus trigonal; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna slightly broad, extending to just before caudal margin of wing; sculptured eye-piece rugged; thorax rugged; suture between pro- and mesothorax attached to antenna at medium point of suture restricting proximal margins of pro- and mesothoracic legs; spiracular callosity black, semi-circular and heavily protruded; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg reaching three fourths the length to caudal margin of wing, femur appearing slender; mesothoracic leg ending at tip of antenna; metathoracic leg exposed; 2nd–3rd abdominal spiracles appearing completely; 6th spiracle situated slightly ventrad than those of ordinary pupae; 8th spiracle vestigial; spiracular furrow comprising many punctures in contact with one another; lateral groove long and broad; dorsal groove with five vague notches; cremaster long, ventral side striated and dorsal side smooth, without basal mass, side spinule barely recognized, terminal process long, bifid piece moderately long.
Chaetotaxy same as in *Arichanna* Moore.

**Key to the species**

1. Spiracular callosity large and smooth with some shallow pits; spiracular furrow extending from dorsad to ventrad of 5th abdominal spiracle; lateral groove very broad; 24 mm, blackish brown. ......................... *giraffata* Guenée (Asakawa, Tokyo, 28 vi 1970)
- Spiracular callosity smaller than the preceding species, scabrous; spiracular furrow present dorsad of 5th abdominal spiracle; lateral groove narrower than that of *giraffata* Guenée; 20 mm, reddish brown ............. *albinigrata* Warren (Mt Mitake, Tokyo, 17 vii 1971)

*Pseuderannis* Inoue (Plate 15, figs 245, 250)

Fusiform. Head striated; labial palpus minute; maxilla extending to caudal margin of wing, cephalic margin gently oblique; antenna relatively broad, reaching tip of maxilla; eye-piece roughened; prothorax rugged and punctated, meso- and metathorax slightly striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity raised, black, elliptical and pubescent; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg reaching five sixths the length to caudal margin of wing, femur concealed; mesothoracic leg ending at caudal margin of wing; metathoracic leg concealed; abdomen with small punctures scattered sparsely but 9th–10th segments roughened; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow comprising many punctures in contact with one another, with black sclerotized lower edge; lateral and dorsal grooves indistinct; cremaster conical, rugous on both sides, with vague basal mass terminal process long and bifid piece long.
Chaetotaxy same as in *Arichanna* Moore.
**lonozemia** Prout (Mt Takao, Tokyo, 28 vi 1970). 12 mm, dark reddish brown.

**Alcis** Curtis (Plate 16, fig. 253; Plate 18, figs 291–293; Plate 34, fig. 542)

Fusiform. Head rugged; a pair of small tubercules present on frons; labial palpus concealed or appearing minute; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna slender, reaching caudal margin of wing; sculptured eye-piece rugged; thorax variant; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity black, scabrous; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg ending at four fifths the distance to caudal margin of wing, femur appearing; mesothoracic leg extending to just before caudal margin of wing; metathoracic leg exposed; abdomen with deep punctures more or less densely scattered; abdominal spiracle more or less small; 2nd and 3rd spiracles appearing completely; 8th spiracle vestigial; spiracular furrow comprised a large elliptical pore including many small collapsed punctures in contact with one another; lateral and dorsal grooves disappearing; cremaster long trigonal, ventral side smooth and dorsal side with reticulated ridges, with basal mass, without side spinule, terminal process moderately long, bifid piece rather long.

Chaetotaxy same as in *Arichanna* Moore.

**Key to the species**

1. Two L setae situated ventrad than the ventral corner of spiracular furrow on 5th abdominal segment; spiracular furrow never including many small punctures; punctures scattered on abdomen deep and more or less large; 9 mm, brown  
   - *jubata* Thunberg (Hiraga, Aomori, 20 iv 1980, R. Sato leg.)
   - Two L setae situated dorsad than the ventral corner of spiracular furrow on 5th abdominal segment; spiracular furrow containing many small punctures; punctures scattered on abdomen shallow and slightly smaller than that of the preceding species  
   - *angulifera* Butler (Hakone, Kanagawa, 21 vii 1968)

2. Thorax smooth; upper edge of spiracular furrow distinguished; punctures inside spiracular furrow lattice-like; 13 mm, reddish brown  
   - *medialbifera* Inoue (Mt Kusatsu-shirane, Gunma, 30 viii 1962)

**Gigantalcis** Inoue (Plate 16, fig. 254; Plate 18, fig. 294; Plate 34, fig. 543)

Indistinguishable from the preceding genus and only differs in the thorax being crinkled; antenna broad; femur of prothoracic leg disappearing; abdominal spiracle slightly larger; two L setae situated dorsad than the ventral corner of spiracular furrow on 5th abdominal segment; spiracular furrow large, containing many small punctures; lateral groove incised long and broad; dorsal groove with many small notches; cremaster with quadrate basal mass, bifid piece short.

Chaetotaxy same as in preceding genus.

**flavolinearia** Leech (Mt Takao, Tokyo, 28 v 1967). 17 mm, reddish brown.

**Rikiosatao** Inoue (Plate 18, fig. 295; Plate 34, fig. 535)

Closely allied to *Alcis* Curtis but head and thorax crinkled and scattered micro punctures; antennae meet on meson at extremity; eye-piece smooth; prothotacic leg reaching seven tenths the length to caudal margin of wing, femur concealed; hindwing hidden under forewing near apex; 1st–8th abdominal segments scattered small and shallow punctures; spiracular furrow comprised a long pore including many comb-like ridges; lateral and dorsal
grooves disappearing; cremaster with slightly swollen basal mass, without side spinule; bifid piece moderately long.
Chaetotaxy same as in *Ariehanna* Moore but long.

*grisea* Butler (Mt Takao, Tokyo, 7 v 1970). 15 mm, brown.

*Protoboarmia* McDunnough (Plate 20, fig. 331; Plate 34, fig. 532)
Allied to preceding genus but head smooth; eye-piece smooth; prothoracic leg ending seven eighths the distance to caudal margin of wing, femur appearing small; mesothoracic leg reaching caudal margin of wing; hindwing hidden under forewing near caudal margin of 3rd abdominal segment; 1st–7th abdominal segments shallow punctured scattered; lateral and dorsal grooves disappearing; cremaster more or less long conical, slender concavity at centre of ventrad, basal mass scarcely visible, with side spinule.
Chaetotaxy same as in the preceding genus.

**Key to the species**

1. Central cavity of cremaster ventrad oval; 12 mm, brown
   - Central cavity of cremaster ventrad gourd-shaped; 12 mm, brown
     - *simpliciparia* Leech (Mt Mitake, Tokyo, 17 vii 1971)
     - *faustinata* Warren (Mt Takao, Tokyo, 10 viii 1969)

*Hypomecis* Hübner (Plate 16, figs 255–256; Plate 19, figs 296–298; Plate 34, fig. 540)
Fusiform. Head almost smooth or striated; a pair of slight knobs present on frons; labial palpus concealed or appearing small; maxilla reaching caudal margin of wing, cephalic margin gently oblique; antenna broad but tapering to apex, extending to tip of maxilla; eye-piece smooth but often bossed at centre; pro- and mesothorax almost smooth, metathorax punctate; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity large, oval-shaped, reticulated ridges present on surface; hindwing hidden under forewing at spiral level of 4th abdominal segment; prothoracic leg reaching five sixths the length to caudal margin of wing, femur concealed; mesothoracic leg ending at or slightly before tip of maxilla; metathoracic leg appearing or disappearing; abdomen with deep punctures scattered sparsely; 2nd–3rd abdominal spiracles appearing completely; 6th spiracle situated slightly ventrad than those of the other segments; 8th spiracle vestigial but swollen; spiracular furrow long and ditched comb-like; lateral groove long and incised deeply; dorsal groove with many heavy notches; cremaster conical but slightly prolonged, rugous on both sides, with large basal mass, with or without side spinule, terminal process very long, bifid piece short.
Chaetotaxy same as in *Ariehanna* Moore.

**Key to the species**

1. Head striated; labial palpus appearing small; mesothoracic leg ending at tip of maxilla; metathoracic leg appearing; teeth of spiracular furrow in number from 35 to 40; lateral groove relatively short; side spinule never present; 17 mm, dark reddish brown
   - *punctinalis* Scopoli (Ebina, Kanagawa, 25 vii 1982, M. Yamamoto leg.)
   - Head smooth; labial palpus concealed; mesothoracic leg ending slightly before tip of maxilla; metathoracic leg concealed; lateral groove long; side spinule present. ....2

2. Spiracular callosity reticulated roughly; punctures on mesothorax scattered only dorsad; spiracular furrow broad and the teeth in larger number (35–40) than that of the following species; apex of lateral groove very narrow; 20 mm, dark reddish brown
   - *lunifera* Butler (Mt Zinha, Tokyo, 12 v 1968)
   - Spiracular callosity reticulated finely; spiracular furrow narrow and the teeth in small
number (25–30); apex of lateral groove broad and rounded; 19 mm, dark reddish brown .............. roboraria Denis & Schiffermüller (Mt Takao, Tokyo, 3 viii 1965)

**Microcalicha** Sato (Plate 16, fig. 257; Plate 19, fig. 300; Plae 34, fig. 541)

Fusiform. Head striated; labial palpus concealed; maxilla ending before caudal margin of wing, cephalic margin gently oblique; antenna broad, reaching caudal margin of wing; sculptured eye-piece rugged; pro- and mesothorax punctured shallowly and metathorax deeply; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity black, protruded disk-like; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; prothoracic leg reaching seventh eighths the length to caudal margin of wing, femur concealed; mesothoracic leg extending to caudal margin of wing; metathoracic leg appearing relatively large; 2nd–3rd abdominal spiracles half hidden under wing; 6th spiracle situated slightly ventrad than those of the other segments; 8th spiracle vestigial; spiracular furrow comprising comb-like elliptical pore, situated dorsad of 5th abdominal spiracle; lateral groove scarcely recognized; dorsal groove with many notches; cremaster small, conical, ventral side smooth and dorsal side rugged, basal mass never recognized, with small side spinule, terminal process relatively long, bifid piece moderate long.

Chaetotaxy same as in *Arichanna* Moore.

**sordida** Butler (Mt Myoko, Niigata, 27 vi 1970, R. Sato leg.). 11 mm, dark brown.

**Hyposidra** Guenée (Plate 17, fig. 262; Plate 19, fig. 304)

Fusiform. Head striated; labial palpus concealed; maxilla ending at fourth the distance to caudal margin of wing, cephalic margin nearly horizontal; antenna reaching just before tip of mesothoracic leg; eye-piece smooth; thorax wrinkled; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity not so conspicuous; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at just before tip of maxilla, femur disappearing; mesothoracic leg reaching just beyond tip of antenna; metathoracic leg appearing; abdomen with deep punctures densely scattered; 2nd–3rd abdominal spiracles appearing completely; 6th spiracle situated slightly ventrad than those of the other segments; 8th spiracle vestigial; spiracular furrow comprising a long pore with many comb-like ditches; lateral groove long; dorsal groove vague; cremaster small, without basal mass and with side spinule, terminal process long but bifid piece short.

Setae relatively long. Chaetotaxy same as in *Microcalicha* Sato.

**talaca** Walker (Oosato, Niigata, 21 x 1999, R. Sato leg.). 15 mm, dark reddish brown.

**Heterarmia** Warren (Plate 16, fig. 258; Plate 19, fig. 299; Plae 34, fig. 544)

Fusiform. Head smooth but striated in frons; labial palpus trigonal; maxilla ending just before caudal margin of wing, cephalic margin gently oblique; antenna slender, reaching caudal margin of wing; eye-piece smooth, bossed at centre; thorax punctate; suture between pro- and mesothorax attached to antenna at a medium point of suture restricting proximal margins of pro- and mesothoracic legs; spiracular callosity disk-like, with reticulated black ridges; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at six sevenths the distance to caudal margin of wing, femur concealed; mesothoracic leg extending to caudal margin of wing; metathoracic leg appearing; abdomen with deep punctures scattered densely; 2nd–3rd abdominal spiracles appearing completely; 6th spiracle situated slightly ventrad than in the other segments; 8th spiracle vestigial; spiracular furrow comprising a long pore with comb-like ditch; lateral groove long; dorsal groove with many heavy notches; cremaster long, basal mass rounded, with side spinule,
terminal process long, bifid piece short.
Chaetotaxy same as in Microcalicha Sato, but setae somewhat bristle-like.

charon Butler (Mt Takao, Tokyo, 16 v 1970). 16 mm, brown.

Duliofyle Warren (Plate 16, fig. 259; Plate 19, fig. 301; Plate 34, fig. 539)
Fusiform. Head rugous; labial palpus concealed; maxilla reaching slightly before caudal margin of wing, cephalic margin nearly horizontal; antenna broad, extending to caudal margin of wing; eye-piece rugous; thorax rugous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity small, black, scabrous; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg reaching four fifths the length to caudal margin of wing, femur concealed; mesothoracic leg appearing slightly caudal of the ordinary position, extending to just before caudal margin of wing; metathoracic leg appearing; abdomen with deep punctures scattered densely; 2nd-3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow comprising a large long pore and a few small pores; lateral groove long and deep incised; dorsal groove with five large notches; cremaster without basal mass and side spine, terminal process long, bifid piece short.
Chaetotaxy same as in the preceding genus.

majuscularia Leech (Mt Mitake, Tokyo, 22 ix 1918). 22 mm, dark reddish brown.

Calicha Moore (Plate 17, fig. 266; Plate 19, fig. 310; Plate 33, fig. 531)
Fusiform. Head broken in an examined specimen before the author; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to just before caudal margin of wing; thorax rugous and rugous; spiracular callosity black, disk-like and somewhat protruded; prothoracic leg ending at six-sevenths the distance to caudal margin of wing, femur concealed; mesothoracic leg reaching caudal margin of wing; metathoracic leg exposed; hindwing hidden under forewing at spiracle level of 4th abdominal segment; abdomen with deep punctures scattered; 3rd abdominal spiracle appearing completely; 6th spiracle situated slightly ventrad than in the other segments; 8th spiracle vestigial; spiracular furrow comprising many small pores in contact with one another; lateral groove long and deep; dorsal groove with many notches; cremaster conical but somewhat prolonged, rugous on both sides, basal mass obsolescent, with small side spine, bifid piece short.
Chaetotaxy same as in Duliofyle Warren but the setae long and bristle-like.

ornataria Leech (Mt Myoken, Sado, Niigata, 5 viii 1971, R. Sato leg.). 15 mm, reddish brown.

Xandrames Moore (Plate 16, figs 260–261; Plate 19, figs 302–303; Plate 34, figs 551–552)
Fusiform. Head heavily striated; a pair of small tubercules present on frons; labial palpus concealed or appearing minute; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna broad in basal portion, reaching at or slightly before caudal margin of wing; thorax rugous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity small, semi-circular and slightly raised; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg extending four fifths the length to caudal margin of wing, femur concealed; mesothoracic leg reaching slightly before tip of antenna; metathoracic leg appearing; abdomen with punctures scattered and more or less rugous; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow comprising many minute punctures in contact with one another; scar of larval proleg present on 6th abdominal segment; lateral groove long; dorsal groove with some notches;
cremaster conical, rugous on both sides, with small basal mass, with or without side spinule, bifid piece very short.
Chaetotaxy same as in the preceding genus.

Key to the species

1. Cephalic portion of frons with small tubercules; antenna reaching a medium point of tip of maxilla and caudal margin of wing; mesothoracic leg ending at tip of antenna; spiracular furrow comprising a cluster of punctures; lateral groove slender; terminal process of cremaster long; 28 mm, blackish brown

· Central portion of frons with small tubercles; antenna reaching caudal margin of wing; mesothoracic leg ending a medium point between tips of maxilla and antenna; spiracular furrow comprising two clusters of punctures; abdominal dorsum scattered micro spines; lateral groove somewhat broad; terminal process of cremaster short; 23 mm, dark brown

·.......................... *dholaria* Moore (Mt Mitake, Tokyo, 22 ix 1968)

·.......................... *latiferaria* Walker (Karuizawa, Nagano, 8 vi 1965)

*Culcula* Moore (Plate 17, fig. 267; Plate 19, fig. 311)

Fusiform. Head slightly striated; caudal portion of frons slightly projected; labial palpus concealed; maxilla ending at four fifths the length to caudal margin of wing, cephalic margin gently oblique; sculptured eye-piece rugous; antenna slender, reaching a medium point between tip of maxilla and caudal margin of wing; thorax heavily punctuated excepting lateral portion of mesothorax; cephalic portion of prothorax raised; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity large, conspicuously protruded; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; prothoracic leg reaching four fifths the distance to caudal margin of wing, femur concealed; mesothoracic leg extending to tip of antenna; metathoracic leg appearing; abdomen with deep punctures scattered; 2nd–3rd abdominal spiracles fully appearing; 8th spiracle vestigial; spiracular furrow absent; lateral groove long but ill-defined; dorsal groove with some notches; cremaster relatively small, with deep ditches, without basal mass and side spinule, terminal process long.
Chaetotaxy same as in *Arichanna* Moore.

*panterinaria* Bremer & Grey (Mine, Tushima, Nagasaki, H. Nakajima leg.). 24 mm, blackish brown.

*Cusiala* Moore (Plate 17, fig. 269; Plate 19, fig. 313)

Fusiform. Head slightly rugged; frons almost smooth, with a pair of small tubercles at cephalic end; labial palpus concealed; maxilla rugous, reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna broad and tapered to apex, reaching just before caudal margin of wing; thorax rugous; medio-dorsal ridge running from prothorax to mesothorax; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity large, semi-elliptical and black, with reticulated ridges on surface; hindwing hidden under forewing near cephalic margin of 4th abdominal segment; prothoracic leg ending at four fifths the distance to caudal margin of wing, femur concealed; mesothoracic leg extending to tip of maxilla; metathoracic leg appearing; 1st abdominal segment smooth, encircled by dentated narrow ditch just below cephalic margin; 2nd–8th segments with deep punctures scattered; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow idiosyncratic, comprising many small pubescent spheres within narrow ditch; lateral groove long and shallowly incised; dorsal groove simple; cremaster conical, rugged on dorsal side and rugous on ventral side, with basal mass and without side spinule, terminal process very long, bifurcated piece moderately long.
Chaetotaxy same as in *Culcula* Moore, but the setae bristle-like.

*stipitaria* Oberthür (Hakone, Kanagawa, 21 vii 1968). 22 mm, blackish brown.

**Exangerona** Wehrli (Plate 19, fig. 318)

Fusiform. Head slightly striated; labial palpus minute; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; sculptured eye-piece slightly striated; antenna slender, pointed at extremity, reaching just before caudal margin of wing; thorax slightly striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity small, black and pubescent; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at five sevenths the length to caudal margin of wing, femur concealed; mesothoracic leg extending to tip of antenna; metathoracic leg appearing; abdomen with shallow punctures scattered sparsely; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow comprising a large number of interconnected small and deep pores; lateral groove long and deep incised; dorsal groove with many vague notches; cremaster small and conical, striated on ventral side and rugged on dorsal side, without basal mass and side spinule, terminal process long.

Chaetotaxy same as in *Arichanna* Moore.


**Ophthalmopsis** Fletcher (Plate 17, fig. 270; Plate 19, figs 314–315)

Fusiform. Head striated; labial palpus appearing; sculptured eye-piece rugged and punctated; maxilla extending to slightly before caudal margin of wing, cephalic margin steeply oblique; antenna ending at a medium point of tip of maxilla and caudal margin of wing; thorax striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity large, elliptical and slightly raised, with micro-punctures scattered densely on upper surface; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg extending five sevenths the distance to caudal margin of wing, femur concealed; mesothoracic leg reaching tip of antenna; metathoracic leg appearing; abdomen with punctures scattered densely on 1st–3rd segments and sparsely on 4th–8th segments but 9th segment smooth; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow comprising a series of many interconnecting small punctures; lateral groove long and broad, with marginal ridge; dorsal groove with five large and some vague notches; cremaster conical, rugous on both sides, without basal mass, with minute side spinule, terminal process long, bifid piece very short.

Pro-, meso- and metathorax with D1 and SD1 setae. First abdominal segment with D1 seta and 2nd–7th segments with D2 seta. SL and SV setae absent. 8th segment with L1 and L2 setae.

**Key to the species**

1. Dorsum of metathorax without punctures; cremaster slimmer; 20 mm, reddish brown ................................. **albosignaria** Bremer & Grey (Mt Takao, Tokyo, 5 v 1969)
   - Dorsum of metathorax with some punctures; cremaster swelling; 15 mm, brown ................................. **irrorataria** Bremer & Grey (Tugeno, Aichi, 31 v 1988)

**Proteosternia** Warren (Plate 17, fig. 268; Plate 19, fig. 312)

Fusiform. Head slightly rugged; frons striated; labial palpus concealed; eye-piece smooth; maxilla reaching five sixths the length to caudal margin of wing, cephalic margin nearly horizontal; antenna relatively broad, ending slightly before caudal margin of wing; pro-
mesothorax faintly rugose but metathorax punctate; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity small, elliptical and pubescent, slightly raised; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg reaching four fifths the length to caudal margin of wing, femur concealed; mesothoracic legs extending to tip of antenna, meeting on meson in apical portion; metathoracic leg appearing large; abdomen with deep punctures densely scattered but 9th segment smooth; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow long elliptical, fill with many interconnected small punctures; lateral and dorsal grooves indistinct; cremaster conical, rugged on dorsal side and radially striated on ventral side, large concavity in medio-basal area of ventral side, without basal mass, with side spine, terminal process almost equal to cremaster in length, bifid piece short and extended laterally.
Chaetotaxy same as in *Ophthalmitis* Fletcher.

*leda* Butler (Karuizawa, Nagano, 8 vi 1969). 13 mm, brown.

*Acradonitis* Wehrli (Plate 19, fig. 316; Plate 20, fig. 321)
Fusiform. Head relatively small and rugged; frons almost smooth with a pair of small knobs at cephalic end; labial palpus concealed; maxilla ending at five ninths the length to caudal margin of wing, cephalic margin gently oblique; eye-piece more or less small, roughened; antenna broad, with series of minute tubercles, reaching slightly before caudal margin of wing; prothorax rugged, with some small knobs at cephalic margin; mesothorax relatively small, heavily rugose; metathorax punctated; suture between pro- and mesothorax attached to antenna at a slightly cephalic point of suture restricting proximal margin of prothoracic leg; spiracular callosity large, oval-shaped, black and pubescent, with reticulated ridges on surface; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching seven ninths the length to caudal margin of wing, femur concealed; mesothoracic leg very narrow, appearing far caudad than in the other genera, reaching slightly before tip of antenna; metathoracic leg exposed; abdomen with large and deep punctures scattered densely but 3rd–7th segments dorsum heavily rugged, with a spinous prominence on 7th–10th segments subventral; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow comprising a simple and elliptical pore; lateral groove shallow and dorsal groove ill-defined; environs of caudal dehiscens protuberkant; cremaster somewhat cylindrical, smooth and slightly concave at base of ventral side, rugged on dorsal side, without basal mass, with three pairs of large and sharp spines (scar of D1, SD1 and SD2 setae).
Setae bristle-like. Chaetotaxy same as in *Ophthalmitis* Fletcher.

*fumosa* Prout (Mt Takao, Tokyo, 15 vi 1969). 22 mm, dark reddish brown.

*Zanclidia* Prout (Plate 19, fig. 320)
Fusiform. Head smooth; frons faintly striated; labial palpus minute; maxilla hidden under mesothoracic leg at four fifths the distance to caudal margin of wing, cephalic margin nearly horizontal; mandible raised and projected below; eye-piece smooth; antenna slender, extending to just beyond mesothoracic leg but not reaching caudal margin of wing; pro- and mesothorax wrinkled; metathorax with punctures scattered; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity slightly raised, nearly trigonal, surface flattened and scabrous; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg ending at two thirds the length to caudal margin of wing, femur appearing; mesothoracic leg reaching slightly before caudal margin of wing; metathoracic leg exposed; abdomen with deep punctures scattered densely; 2nd–3rd abdominal spiracles appearing completely; 6th spiracle situated slightly ventral than those of other segments; 8th spiracle vestigial; spir-
acicular furrow comprising a large horizontal pore and many small interconnected punctures; lateral groove shallow; dorsal groove without notch; cremaster conical, ridgy on both sides, with small side spinule, terminal process short.
Chaetotaxy same as in *Ophthalmitis* Fletcher.

*testaceata* Butler (Mt Mitake, Tokyo, 17 vii 1965). 19 mm, dark reddish brown.

*Protaleis* Sato (Plate 19, fig. 317)
Fusiform. Head rugous; labial palpus concealed; maxilla reaching caudal margin of wing, cephalic margin gently oblique; antenna reaching caudal margin of wing; eye-piece rugous; thorax rugous; suture between pro- and mesothoracic legs attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity indistinct but faintly raised; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg extending at slightly before tip of maxilla, femur concealed; mesothoracic leg ending caudal margin of wing; metastharcic leg disappearing; abdomen with punctures densely scattered but 9th segment smooth; spiracular furrow a large elliptical pore; 2nd-3rd abdominal spiracles appearing completely; 8th spiracle vestigial; lateral groove short; dorsal groove indistinct; cremaster short, crinkled on both sides, with small side spinule, terminal bifid pieces short.
First abdominal segment with D1 seta and 2nd-7th segments with D2 seta; SL and SV setae absent; 8th segment with L1 and L2 setae; 9th segment without seta.

*concinnata* Wileman (Tobira Spa, Nagano, 14 vi 1980). 14 mm, reddish brown.

*Erannis* Hübner (Plate 20, fig. 326; Plate 22, fig. 345; Plate 34, fig. 559)
Fusiform. Head rugous; labial palpus concealed; maxilla extending to slightly before caudal margin of wing, cephalic margin gently oblique; antenna reaching caudal margin of wing; sculptured eye-piece punctate; prothorax rugged; meso- and metathorax crinkled; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity heavily protruded, darker, pubescent and rugged; hindwing hidden under forewing near apex; prothoracic leg ending at seven eighths the length to caudal margin of wing, femur concealed; mesothoracic leg reaching medium point of tips of maxilla and antenna; metathoracic leg appearing or disappearing; abdomen with shallow punctures scattered more or less sparsely; 2nd-3rd abdominal spiracles appearing completely; 8th spiracle vestigial but raised; spiracular furrow comprising longitudinal pore; lateral groove long and deep incised; dorsal groove with many notches; 10th tergite with some vertical ridges; cremaster relatively small, rugged, with small basal mass and side spinule, terminal process same in length as cremaster; bifid piece short and acute. Chaetotaxy same as in the preceding genus.

**Key to the species**

1. Maxilla reaching tip of mesothoracic leg; metathoracic leg appearing; 15 mm, brown
   - Maxilla extending just beyond tip of mesothoracic leg; metathoracic leg disappearing; 15 mm, light brown

   *golden* Diakonov (Mt Hoto, Saitama, 18 v 1970)

   *defoliaria* Clerck (Karuiwawa, Nagano, 8 vi 1969)

*Larerannis* Wehrli (Plate 20, figs 324–325; Plate 22, figs 343–344)
Fusiform. Head rugged and rugous; frons with a pair of small tubercles at cephalic end; labial palpus concealed; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna broad, tapered at apex, extending to just before caudal margin of wing; glazed eye-piece roughened; thorax rugged; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothor-
acic leg; spiracular callosity semi-elliptical; hindwing hidden under forewing near apex; prothoracic legs narrowing in apical half, reaching slightly before caudal margin of wing, meeting on meson at extremity, femur concealed; mesothoracic leg narrow, ending at tip of antenna; metathoracic leg appearing; abdomen with deep punctures scattered densely; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow comprising an oblong pore, upper edge with three dentiform acute incisions; cremaster rhombic, ridgy on both sides, basal mass indistinct, terminal process short but bifid pieces spiculate and very long.
Setae long. Chaetotaxy same as in *Erannis* Hübner.

**Key to the species**

1. Seta very long; tubercules on frons remarkable; spiracular furrow smaller than that of *miracula* Prout; flange-plate indistinct; dorsal groove with irregular notches; cremaster scarcely angular in shoulder, smooth on ventral side; 11 mm, reddish brown but cephalo-ventral half suffused greenish tint. .... *filipjevi* Wehrli (Karuizawa, Nagano, 8 vi 1969)
- Seta relatively long; tubercules on frons moderately; spiracular furrow larger than that of the preceding species; flange plate distinct on 4th abdominal conjunctiva; dorsal groove with vague notches; cremaster distinctly angular in shoulder, ventral side with vertical ridges; 17 mm, reddish brown but suffused with greenish tint in cephalo-ventral half. ..................... *miracula* Prout (Mt Takao, Tokyo, 16 v 1969)

*Pachyerannis* Inoue

Closely allied to the preceding genus. Only differs in upper edge of spiracular furrow with two incisions and cremaster with slightly thick terminal piece.

*obliquaria* Motschulsky (Mt Takao, Tokyo, 29 iv 1981). 10 mm, reddish brown.

*Agriops* Hübner (Plate 20, figs 327–328; Plate 22, fig. 346)

Showing sexually dimorphous; fusiform but less rounded at cephalic end in male, and slightly swollen, abrupt and strongly angulate at cephalic end in female. Head heavily rugged; labial palpus concealed or appearing minute; maxilla reaching just before caudal margin of wing, cephalic margin slight gently oblique; antenna with two rows of minute tubercules, extending to caudal margin of wing; prothorax ridged, meso- and metathorax rugged; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity darker, more or less raised; hindwing hidden under forewing near apex; prothoracic leg reaching seven eighths the length to caudal margin of wing, femur concealed; mesothoracic leg extending at medium point of tips of maxilla and antenna; metathoracic leg appearing small; abdomen with deep punctures densely scattered but 10th segment with some vertical ridges; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow simple and oval-shaped pore with black lower edge; lateral groove scarcely recognised; dorsal groove simple and shallow; cremaster warhead-shaped, with irregular ridges on both sides, without basal mass and side spine, terminal process short, bifid pieces long and acute.
Chaetotaxy same as in *Erannis* Hübner.

dira Butler (Mt Takao, Tokyo, 16 v 1970). 9 mm, brown.

*Phigalia* Duponchel (Plate 20, fig. 323; Plate 22, figs 341–342)

Fusiform but slightly swollen in cephalic half of dorsum. Head rugged and rugous; labial palpus appearing minute or disappering; maxilla ending slightly before caudal margin of wing, cephalic margin gently oblique; eye-piece heavily punctate; antenna broad, reaching caudal margin of wing; thorax with densely punctures scattered; suture between pro- and
mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity black, elliptical and smooth; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg reaching slightly before caudal margin of wing, femur concealed; mesothoracic leg slender, appearing from caudal portion than the normal position, reaching tip of antenna; metathoracic leg appearing; abdomen with deep punctures densely scattered; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow as a large elliptical pore with four denticulate incisions on upper edge; lateral and dorsal grooves obscure; cremaster conical, rugged on both sides, with basal mass and side spinule, bifid pieces very long.
Chaetotaxy same as in *Erannis* Hübner.

**Key to the species**

1. Cremaster broad, with one pair of side spinules (scar of SD1 seta); 17 mm; reddish brown ........................................... *sinuosaria* Leech (Mt Takao, Tokyo, 25 iv 1970)
   - Cremaster slimmer, with two pairs of side spinules (scar of SD1 and SD2 setae); 10 mm, reddish brown ............................................ *vereundaria* Leech (Mt Takao, Tokyo, 28 v 1967)

**Subdivision I–II**

**Nyssiodes** Oberthür (Plate 21, fig. 332; Plate 22, fig. 349; Plate 34, fig. 557)

Ovoid. Head rugous; labial palpus concealed; maxilla ending three fourths the length to caudal margin of wing, cephalic margin nearly horizontal; antenna broad, reaching caudal margin of wing; eye-piece small and rugged; thorax rugged; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity dark, semi-circular and pubescent; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending slightly before tip of maxilla, femur concealed; mesothoracic legs extending to slightly before caudal margin of wing, meeting on meson in subapical portion; metathoracic leg appearing large; abdomen with deep punctures scattered densely but 10th tergite rugged with ridges; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow a long elliptical pore, with black sclerotised edge; lateral groove ill-defined; dorsal groove with many irregular notches; cremaster trigonal, rugous on ventral side, terminal process relatively long, bifid piece short.

Setae bristle-like. Chaetotaxy same as in *Erannis* Hübner but SD1 seta present on 8th abdominal segment.

**lefurius** Ershoff (Kanuma, Tochigi, 19 iv 1961, K. Gotanda leg.). 15 mm, brown.

**Biston** Leach (Plate 21, figs 334–335; Plate 22, figs 350–351; Plate 34, figs 553–555)

Fusiform. Head rugous; labial palpus concealed; maxilla reaching four fifths the distance to caudal margin of wing, cephalic margin gently oblique; antenna broad, tapered to apex, extending to slightly before caudal margin of wing; eye-piece rugous; thorax slightly rugged; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity large, conspicuously protruded, oval-shaped, black and pubescent; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; prothoracic leg ending slightly before tip of maxilla, femur concealed; mesothoracic legs reaching just before caudal margin of wing, meeting on meson in apical portion; metathoracic leg appearing; abdomen with punctures scattered but 10th tergite with some vertical ridges; spiracular furrow comprising a long elliptical pore which is filled up with reticulated small pores; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; lateral groove long and deep incised with dentated edge; dorsal groove
with many small notches; cremaster ridgy on both sides, with basal mass, side spinule shifted dorsally, terminal process long but bifid piece moderately. Setae bristle-like. Chaetotaxy same as in *Protalis* Sato.

**Key to the species**

1. Frons protruded at the base of antennae; spiracular callosity raised in the shape of semi-discus; spiracular furrow with series of many short vertical ridges; hindwing hidden under forewing at spiracle level of 4th abdominal segment; cremaster with side spinule; dorsal groove with some irregular notches on dorso-meson; 16 mm, blackish brown ........................................... *thoracica* Oberthür (Meguro, Tokyo, 5 v 1951)

   - Frons never protruded at the base of antennae; spiracular callosity raised in the shape of semi-globule; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; spiracular furrow without the above-mentioned ridges; dorsal groove with irregular notches from laterum to dorsum ..........................................................2

2. Spiracular callosity pubescent on upper surface; spiracular furrow with many irregular pores; lateral groove without notches on ventral margin; dorsal groove with seven notches; cremaster without distinct side spinule; 25 mm, blackish brown ..................................................*regalis* Moore (Kunitachi, Tokyo, 10 v 1973)

   - Spiracular callosity pubescent on both upper and lower surfaces; spiracular furrow with very many reticulated pores; lateral groove with notches on ventral margin; dorsal groove with 15–17 notches; cremaster with sharp side spinule; 30 mm, blackish brown ..................................................*robustum* Butler (Siki, Saitama, 2 v 1966)

**Megabisston** Warren (Plate 21, fig. 333; Plate 22, fig. 352; Plate 34, fig. 556)

Fusiform. Head rugged and rugose; labial palpus concealed; maxilla reaching eight ninths the length to caudal margin of wing, cephalic margin gently oblique; antenna broad, tapered to apex, with two rows of minute warts, extending to caudal margin of wing; thorax rugged and rugose; suture between pro- and mesothorax attached to antenna at slightly cephalic point of suture restricting proximal margin of prothoracic leg; prespiracular slit opened fully; spiracular callosity semi-circular, flattened and pubescent; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; prothoracic leg ending at five sixths the distance to caudal margin of wing, femur concealed; mesothoracic leg slender, appearing from caudal position than that of ordinary pupa, reaching just before caudal margin of wing; metathoracic leg appearing large; abdomen with deep punctures scattered; 8th abdominal spiracle vestigial; spiracular furrow comprising a long elliptical pore; scar of larval horn on 8th segment raised like spine; dorsal groove vague; lateral groove disappearing but two or three sharp spines taking its position; cremaster relatively small, rugous on both sides, terminal process rather short, bifid piece sharpened as spine. Setae bristly. Chaetotaxy same as in *Biston* Leach but SD1 seta present on 8th abdominal segment.

*plumosaria* Leech (Mt Takao, Tokyo, 25 iv 1970). 20 mm, dark reddish brown.

**Phthonosema** Warren (Plate 21, fig. 337; Plate 22, figs 353–354; Plate 34, figs 549–550)

Fusiform. Head rugged and rugose; frons with two pairs of small tubercules; labial palpus concealed; maxilla ending at fifth sixths the length to caudal margin of wing, cephalic margin gently oblique; antenna slightly broad, rugous, reaching medium point between caudal margin of wing and tip of maxilla; prothorax rugged and rugose, meso- and metathorax rugous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity narrow, pubescent and slightly raised; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching just before tip of maxilla, femur concealed; mesothoracic leg ending
medium point between caudal margin of wing and tip of antenna; metathoracic leg appearing large; abdomen with large and deep punctures scattered densely; 2nd-3rd abdominal spiracles appearing completely; 8th spiracle vestigial; scar of larval proleg on 6th segment conspicuously raised; spiracular furrow comprising only dentated lower edge; scar of larval horn on 8th segment protruded small; lateral groove long with raised edge; dorsal groove with many irregular small notches; cremaster trigonal, rugous on dorsal sides, with vague side spinule, terminal process short and thickened, bifid piece long. Seta bristle-like. Chaetotaxy same as in Protalcis Sato.

Key to the species

1. Edge of lateral groove expanded; oblong pore on the base of cremaster ventrum; terminal process of cremaster smooth; 28 mm, dark reddish brown

   - Edge of lateral groove not expanded; rounded pore at the centre of cremaster ventrum; terminal process of cremaster ruged; 25 mm, dark brown

   .......... tendinosaria Bremer (Mt Sekison, Chiba, 23 x 1968)
   .......... invenustaria Leech (Mt Takao, Tokyo, 3 viii 1970)

Lycia Hübner (Plate 21, fig. 336; Plate 22, fig. 355; Plate 34, fig. 558)

Fusiform. Head rugged and rugous; frons with two pairs of small tubercules at cephalic end; labial palpus concealed; maxilla reaching four fifths the distance to caudal margin of wing, cephalic margin gently oblique; antenna slender, tapered to apex, with two rows of minute warts, reaching caudal margin of wing; thorax rugged and rugous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity black, semi-circular, with radial ridges on upper surface; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending slightly before tip of maxilla, femur concealed; mesothoracic leg reaching tip of antenna; metathoracic leg appearing large; abdomen with deep punctures scattered densely; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow a large elliptical pore; scar of larval horn on 8th segment scarcely raised; lateral groove obsolescent but with a spinous tubercule at cephalic end; dorsal groove with many vague notches; cremaster trigonal, rugous on both sides, basal mass slightly protruded, with distinct side spinule, terminal process short, bifid piece relatively long. Seta bristle-like. Chaetotaxy same as in Protalcis Sato.

hirtaria Clerck (Mt Azusa, Nagano, 23 vi 1974, H. Nakajima leg.). 22 mm, blackish brown.

Planociampa Prout (Plate 21, fig. 339; Plate 22, fig. 357; Plate 35, fig. 560)

Rather ovoid. Head slightly striated; frons prominent to cephalic end; labial palpus small and pentagonal; maxilla reaching just before caudal margin of wing, cephalic margin steeply oblique; antenna rather broad, reaching caudal margin of wing; eye-piece smooth; pro- and mesothorax slightly crinkled, metathorax punctated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity black and rectangular with sclerotized edge; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg ending at four fifths the length to caudal margin of wing, femur concealed; mesothoracic leg extending to tip of maxilla; metathoracic leg appearing; abdomen with small punctures scattered densely; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove obsolescent as small notch; dorsal groove deep, with three notches; cremaster small, scabrous, without basal mass, with a pair of short falcate setae and a pair of hooked setae. Chaetotaxy same as in Protalcis Sato.
**Ennominae**

*modesta* Butler (Mt Hoto, Saitama, 18 v 1970). 13 mm, brown.

**Colotois** Hübner (Plate 21, fig. 340; Plate 22, fig. 358; Plate 35, fig. 561)

Allied to *Planociampa* Prout but only differing as follows: labial palpus trigonal; maxilla reaching slightly before caudal margin of wing, cephalic margin more or less steeply oblique; antennae meeting on meson at extremity; thorax punctated; suture between pro- and mesothorax attached to antenna at a slightly caudal point of suture restricting proximal margin of prothoracic leg; spiracular callosity absent; mesothoracic leg extending to slightly before tip of maxilla; metathoracic leg concealed; 2nd-3rd abdominal spiracles appearing completely; 7th-8th spiracles vestigial; scar of larval horn on 8th segment slightly protruded; dorsal groove with 13 small notches; cremaster without basal mass, seta longer than that of the preceding genus.

Chaetotaxy same as in *Protalcis* Sato.

*pennaria* Linnaeus (Karuizawa, Nagano, 29 vii 1967). 18 mm, light brown.

**Metabraxas** Butler (Plate 22, fig. 359)

Fusiform. Head heavily striated; labial palpus concealed; maxilla reaching caudal margin of wing, cephalic margin nearly horizontal; antenna broad, extending to caudal margin of wing; eye-piece rugged and rugous; pro- and mesothorax rugged and wrinkled, metathorax punctated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity disappearing; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg covered partly with antenna, ending at seven tenths the length to caudal margin of wing, femur concealed; mesothoracic leg appearing very small; metathoracic leg disappearing; abdomen with deep punctures scattered; 2nd-3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; 10th segment heavily protruded on latero-dorsum; cremaster relatively small, rugged on dorsal side and rugous on ventral side, with small basal mass, bifid piece short.

Chaetotaxy same as in *Protalcis* Sato.

*paucimaculata* Inoue (Takaragawa Spa, Gunma, 28 iv 1977, H. Nakajima leg.). 21 mm, blackish brown.

**Pachyligia** Butler (Plate 21, fig. 338; Plate 22, fig. 348; Plate 35, fig. 562)

Fusiform but somewhat bulgy. Head rounded, nearly smooth; labial palpus minute; maxilla reaching just before caudal margin of wing, cephalic margin steeply oblique; antenna broad, rounded at extremity, ending at caudal margin of wing; sculptured eye-piece striated; thorax smooth; suture between pro- and mesothorax attached to antenna at a just caudal point of suture restricting proximal margin of prothoracic leg; spiracular callosity absent; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching two thirds the distance to caudal margin of wing, femur concealed; mesothoracic leg ending at tip of maxilla; metathoracic leg appearing; 1st-7th abdominal segments with shallow punctures scattered and 8th-10th segments smooth; 2nd-3rd abdominal spiracles appearing completely; 6th-8th spiracles vestigial; spiracular furrow absent; lateral groove long and shallowly incised; dorsal groove deep incised, with nine notches on lower edge; cremaster warhead shaped, prolonged, smooth on ventral side and rugged on dorsal side, without basal mass, bifid piece long and thick.

Setae conspicuously short. Chaetotaxy same as in *Protalcis* Sato.

*dolosa* Butler (Amami, Osaka, 9 viii 1981). 19 mm, glossy brown.
**Wilemania** Prout (Plate 20, fig. 329; Plate 22, fig. 347; Plate 35, fig. 563)

Fusiform but somewhat bulgy. Head rounded and smooth, a pair of minute tubercules at cephalic end; labial palpus minute; maxilla ending at seven eighths the distance to caudal margin of wing, cephalic margin steeply oblique; antenna broad, rounded at extremity, reaching caudal margin of wing; eye-piece smooth; thorax slightly striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity disappearing; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching three fourths the length to caudal margin of wing, femur concealed; mesothoracic leg ending at five sixths the length to caudal margin of wing; metathoracic leg appearing large; abdomen smooth; 2nd–3rd abdominal spiracles appearing completely; 6th–8th spiracles vestigial; spiracular furrow absent; lateral groove small but obsolescent, dorsal groove with distinct seven notches; cremaster warhead shaped and prolonged, smooth on ventral side and striated on dorsal side, without basal mass, bifid piece long and thick.

Seta short. Chaetotaxy same as in *Protalis* Sato.

**nitobei** Nitobe (Mt Hoto, Saitama, 18 iv 1970). 10 mm, brown, cremaster blackish brown.

**Division II**

**Alsophila** Hübner (Plate 23, figs 369, 372, 384)

Showing sexually dimorphous. Somewhat cylindrical in male but rather ovoid in female. Head smooth; adfrontal suture invisible; frons slightly striated; labial palpus concealed; maxilla ending at caudal margin of 4th abdominal segment, tapered from middle to apex, cephalic margin gently oblique; antenna relatively broad, reaching just before caudal margin of wing; thorax smooth; prothorax small; suture between pro- and mesothorax attached to antenna at a point of or slightly caudal point of suture restricting proximal margin of prothoracic leg; spiracular callosity absent; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at slightly cephalad to tip of maxilla, femur disappearing; mesothoracic leg reaching just before tip of maxilla; metathoracic leg concealed; 1st and 8th–9th abdominal segments smooth but 2nd–7th segments punctate; 2nd–3rd abdominal spiracles appearing completely; 6th–8th spiracles vestigial; lateral and dorsal grooves disappearing; cremaster and its setae absent.

Setae short. Head without seta. Pro-, meso- and metathorax with D1 and SD1 setae; 1st–7th abdominal segments with D1 seta, two L setae situated obliquely on 5th–7th segments, 8th segment with only SD1 seta, 9th segment without seta.

**japonensis** Warren (Mt Takao, Tokyo, 1 v 1968). ♂ 8 mm, ♀ 9 mm, brown to dark brown.

**Alsophiloides** Inoue (Plate 23, figs 373, 383)

Closely allied to *Inurois* Butler. Head smooth; frons coarsely striated; adfrontal suture invisibl; labial palpus concealed; maxilla reaching slightly beyond caudal margin of 4th abdominal segment in both sexes, tapered from middle to apex, cephalic margin gently oblique; antenna reaching tip of maxilla; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity absent; hindwing hidden under forewing at spiracle level of 4th abdominal segment; pro- and mesothoracic legs reaching tip of maxilla; 1st and 8th–9th abdominal segments smooth but 2nd–7th segments punctate; 6th–8th abdominal spiracles vestigial; cremaster small especially in male, trapezoidal, with a pair of horizontally extended spinous setae.
Chaetotaxy same as in the preceding genus but abdominal two L setae situated vertically to each other.

*acroama* Inoue (Mt Takao, Tokyo, I v 1968).  ♂, ♀ 8 mm, light brown.

*Inurois* Butler (Plate 23, figs 367–368, 371, 379–382)

In comparison with *Alsophila* Hübner, abdomen slightly narrower. Head smooth; adfrontal suture invisible; labial palpus minute; maxilla reaching middle of 5th abdominal segment in male and caudal margin of 4th segment in female; antenna ending at or just beyond tip of maxilla; suture between glazed and sculptured eye-pieces disappearing; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of or slightly caudal point of suture restricting proximal margin of prothoracic leg; prothoracic leg extending to or just before tip of maxilla, femur concealed; mesothoracic leg ending at or just beyond tip of maxilla; metathoracic leg concealed; abdomen punctate; 2nd–3rd abdominal spiracles appearing completely; 6th–8th spiracles vestigial; lateral and dorsal grooves invisible; cremaster small especially in male, trigonal or trapezoidal, with a pair of spinous setae. Chaetotaxy same as in *Alsophila* Hübner but abdominal two L setae situated vertically to each other, 8th segment with D1, SD1 and L1 setae.

**Key to the species**

1. Eye-piece intricately striated; antenna reaching just beyond tip of maxilla; cremaster slightly larger than in *tenuis* Butler with setae not curved; ♂, ♀ 8 mm, light brown

   .......................... *fletcheri* Inoue (Mt Takao, Tokyo, I v 1968)

   - Eye-piece barely striated; antenna reaching tip of maxilla; cremaster slightly smaller than in *fletcheri* Inoue with setae curved; ♂, ♀ 8 mm, light brown

   .......................... *tenuis* Butler (Mt Takao, Tokyo, I v 1968)

Division III

Subdivision III–I

*Heterostegane* Hampson (Plate 22, fig. 356; Plate 35, fig. 565)

Fusiform. Head slightly rugged; labial palpus concealed; maxilla extending to slightly before caudal margin of wing, cephalic margin gently oblique; antenna ending at caudal margin of wing; eye-piece smooth; thorax slightly crinkled; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity small, slightly raised; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching three fourths the distance to caudal margin of wing, femur concealed; mesothoracic leg extending to tip of antenna; metathoracic leg appearing; abdomen punctate but 9th segment smooth; spiracular furrow curved ellipsoidal pore; 2nd–3rd abdominal spiracles situated at a distance from wing; 5th spiracle situated dorsal than those of the other segments; 8th spiracle vestigial; lateral and dorsal grooves disappearing; cremaster small and smooth, with a pair of terminal falcate setae.

Second–9th abdominal segments with D2 seta; SL1 seta on 5th, 6th and 8th segments and SL2 seta on 5th and 7th segments; 8th segment with D2, SD1, L1, L2 and SL1 setae; 9th segment with D2, SD1 and L1 setae.

*hyriaria* Warren (Mt Takao, Tokyo, 7 v 1970). 7 mm, brown.
Subdivision III-II

**Heterolocha** Lederer (Plate 22, figs 365–366; Plate 35, figs 566–567)

Fusiform. Head smooth with a few striae; labial palpus appearing small; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to caudal margin of wing; eye-piece smooth; thorax smooth with a few striae; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity darker, slightly raised; prespiracular slit with several ribs on upper margin; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at five sixths the length to caudal margin of wing, femur concealed; mesothoracic leg reaching or slightly before tip of maxilla; metathoracic leg appearing; abdomen with densely punctures scattered; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove disappearing or moderately incised, both edges black; dorsal groove with some irregular notches; cremaster small and conical, rugous on dorsal and ridgy on ventral sides, with four pairs of hooked setae.

Head with F1, Afl and Afl setae; pro-, meso- and metathorax with D1 and SD1 setae; 1st–7th abdominal segments with D1 seta, SL and SV setae absent, 8th segment with SD1, L1 and L2 setae, 9th segment without seta.

**Key to the species**

1. Meso-thoracic leg reaching tip of maxilla; lateral groove moderately incised; dorsal groove with some notches; centre of cremaster slight concave; 11 mm, brown
   - .................. *aristonaria* Walker (Ozenji, Kawasaki, 16 x 1983)
   - Meso-thoracic leg reaching slightly before tip of maxilla; lateral groove invisible; dorsal groove with many notches; centre of cremaster slight convex; 10 mm, brown
     - .................. *stulta* Butler (Umegashima, Shizuoka, 1 x 1977, H. Nakajima leg)

**Angerona** Duponchel (Plate 23, figs 374–375, 385–386; Plate 35, figs 568–569)

Prolonged. Smooth; frons with a pair of small protuberances at cephalic end; labial palpus small; maxilla ending at five sevenths the distance to caudal margin of wing, cephalic margin gently oblique; antenna relatively broad, reaching slightly before caudal margin of wing; suture between glazed and sculptured eye-pieces invisible; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity large, semi-elliptical and raised, surface roughened and pubescent; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg extending to just before tip of maxilla, femur concealed; mesothoracic leg reaching tip of antenna; metathoracic leg appearing; abdomen smooth but cephalic margin of 5th–7th segments scattered densely shallow small punctures and micro warts; 8th abdominal spiracle vestigial; spiracular furrow absent; lateral groove long; dorsal groove with many irregular small notches but a medio-dorsal notch long; cremaster globulous, ridgy on both sides, basal mass large, with four pairs of hooked setae.

Pro-, meso- and metathorax with D1 and SD1 setae; 1st–8th abdominal segments with D1 seta, SL1 seta on 5th–6th segments; 9th segment with one setae.

**Key to the species**

1. Frons protuberances recognized; maxilla ending at five sevenths the distance to caudal margin of wing; antenna reaching slightly before caudal margin of wing; prothoracic leg extending to just beyond tip of maxilla; 5th–7th abdominal segments punctate; lateral groove broad; basal mass of cremaster large; 17 mm, glossy reddish brown
Ennominae

- *nigrisparsa* Butler (Mt Hoto, Saitama, 23 v 1970)
  - Frons protuberances barely recognized; maxilla ending at four fifths the distance to caudal margin of wing; antenna reaching caudal margin of wing; prothoracic leg extending just before tip of maxilla; 1st-8th abdominal segments punctate; lateral groove slender; basal mass of cremaster small; 17 mm, glossy reddish brown

- *prunaria* Linnaeus (Mt Togakushi, Nagano, 18 ix 1984)

**Phthonandria** Warren (Plate 23, figs 376–377, 387–388; Plate 35, figs 570–571)

Fusiform but somewhat prolonged. Head smooth; labial palpus small; maxilla ending at five sevenths the length to caudal margin of wing, cephalic margin gently oblique; antenna slender, reaching at or just before tip of mesothoracic leg; prothorax wrinkled, meso- and metathorax striated; suture between pro- and mesothorax attached to antenna at slightly caudal point of suture restricting proximal margin of prothoracic leg; spiracular callosity raised, elliptical and pubescent; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending slightly before tip of maxilla, femur concealed; mesothoracic leg reaching slightly before caudal margin of wing; metathoracic leg appearing large; 1st-3rd abdominal segments slightly wrinkled and 4th–7th or 8th segments with small punctures scattered shallowly; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove long; dorsal groove with 6 to 14 distinct notches; cremaster with basal mass and without side spinule, with one pair of thickened falcate setae and three pairs of hooked setae.

Chaetotaxy somewhat similar to that of *Angerona* Duponchel but abdominal D1 seta without 8th segment, SV1 seta present on 6th segment.

**Key to the species**

1. Antenna ending just before tip of mesothoracic leg; sculptured eye-piece rugged; spiracular callosity large; 4th–8th abdominal segments punctate; lateral groove narrow; dorsal groove with 6–8 notches; cremaster conical; 18 mm, dark reddish brown
   - *atrineata* Butler (Asakawa, Tokyo, 18 ix 1973)

1. Antenna ending just beyond tip of mesothoracic leg; sculptured eye-piece smooth; spiracular callosity smaller than the preceding species; 4th–7th abdominal segments punctate; lateral groove broad; dorsal groove with 12–14 notches; cremaster long; 15 mm, dark reddish brown
   - *enaria* Bremer (Shibecha, Hokkaido, 3 x 1975, R. Sato leg.)

**Menophra** Moore (Plate 23, figs 378, 389; Plate 35, fig. 572)

Closely allied to *Phthonandria* Warren but differing as follows: frons more or less sharpened at cephalic end; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna reaching just beyond tip of mesothoracic leg; prothorax slightly rugose, meso- and metathorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity slender, black and scabrous; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching four fifths the length to caudal margin of wing, femur concealed; mesothoracic leg ending just before caudal margin of wing; metathoracic leg disappearing; abdomen with shallow punctures scattered; lateral groove short; dorsal groove with 11 distinct notches; cremaster conical, rugged and rugose on both sides, basal mass present, with three pairs of hooked setae and one pair of terminal falcate setae.

Chaetotaxy similar to that of *Phthonandria* Warren but 2nd–5th abdominal segments with an excess D seta; SL1 seta on 5th segment.

**Key to the species**

1. Sculptured eye-piece smooth; spiracular callosity larger and abdomen punctures smaller
than in *senilis* Butler; 17 mm, dark reddish brown

- Sculptured eye-piece wrinkled; spiracular callosity smaller and abdomen punctures larger than in the preceding species; 14–15 mm, brown

*senilis* Butler (Kunitachi, Tokyo, 10 v 1973)

Subdivision III–III

**Selenia** Hübner (Plate 22, figs 360–361; Plate 24, figs 390–391; Plate 35, figs 573–574)

Fusiform. Head roughened and striated; frons somewhat acute; labial palpus appearing small; maxilla extending to slightly before caudal margin of wing, cephalic margin steeply oblique; antenna relatively broad, with two rows of minute warts, reaching just beyond caudal margin of wing; sculptured eye-piece striated; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity black, disk-like and pubescent; hindwing hidden under forewing near cephalic margin of 4th abdominal segment; prothoracic leg reaching seven tenths the length to caudal margin of wing, femur concealed; mesothoracic leg ending at tip of maxilla; metathoracic leg appearing; abdomen with small and shallow punctures scattered densely; 8th abdominal spiracle vestigial; spiracular furrow absent; lateral groove long and deeply incised, ventral area swollen; dorsal groove with many notches; cremaster small, conical, rugous on both sides, basal mass weakly protruded, without side spinule, with four pairs of hooked setae.

Chaetotaxy similar to that of *Phthonandria* Warren but SV1 or SV1, SV2 and SV3 setae on 6th abdominal segment, 8th segment with D1 seta.

**Key to the species**

1. Fusiform; antenna reaching slightly before caudal margin of wing; hindwing hidden under forewing at spiracle level of 4th abdominal segment; 2nd–3rd abdominal spiracles appearing completely .............................................. 2

- Somewhat prolonged; antenna reaching just before caudal margin of wing; hindwing hidden under forewing near cephalic margin of 4th abdominal segment; 2nd–3rd abdominal spiracles half hidden under forewing; SV setae trisetose; 16 mm, reddish brown, cremaster blackish brown ........... *sordidaria* Leech (Karuizawa, Nagano, 29 vii 1967)

2. SV seta unisetose; 12 mm, reddish brown

- *adustaria* Leech (Mt Mitake, Tokyo, 17 vii 1971)

- SV setae trisetose; 13 mm, green, cremaster brown

- *tetralunaria* Hufnagel (Karuizawa, Nagano, 29 vii 1967)

**Bizia** Walker (Plate 22, fig. 362; Plate 24, fig. 392; Plate 35, fig. 575)

Fusiform. Head striated; labial palpus trigonal; maxilla reaching just before caudal margin of wing, cephalic margin nearly horizontal; antenna slender, extending to tip of maxilla; eye-piece smooth; prothorax rugous, meso- and metathorax wrinkled; suture between pro- and mesothorax attached to antenna at a medium point of suture restricting proximal margins of pro- and mesothoracic legs; spiracular callosity large, black, orbiculate and pubescent, heavily protruded; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching slightly before tip of maxilla, femur concealed; mesothoracic leg ending just beyond tip of maxilla; metathoracic leg appearing; abdomen rugous and punctated in cephalic area but 8th–9th segments smooth; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove broad, pubescent on edge; dorsal groove with nine distinct notches; cremaster hemispheric, rugged, with basal mass and without side spinule, with four pairs of hooked setae.
Chaetotaxy similar to that of *Selenia* Hübner but SL1 seta on 5th–6th abdominal segments. *aexaria* Walker (Yuto, Shizuoka, 23 x 1992). 22 mm, blackish brown, abdominal conjunctiva reddish brown.

**Ctenognophos** Prout

Fusiform. Head striated; mandible raised; labial palpus pentagonal; maxilla reaching slightly before caudal margin of wing, cephalic margin steeply oblique; antenna slender, with two rows of minute warts, extending to just beyond tip of maxilla; eye-piece smooth; prothorax rugous, meso- and metathorax crinkled; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity black, scabrous and slightly raised; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching slightly before tip of maxilla, femur concealed; mesothoracic leg ending just before tip of maxilla; metathoracic leg appearing large; 1st abdominal segment rugous, 2nd–7th segments with shallow punctures scattered sparsely, 8th–9th segments smooth; 2nd–3rd abdominal spiracles half hidden under wing; 8th spiracle vestigial; lateral groove long and sinuous, pubescent on edge, ventral area projected; dorsal groove with seven distinct notches; cremaster long and thin, smooth, without basal mass, with distinct side spine, bifid piece long. Chaetotaxy same as in *Bizia* Walker.

*grandinaria* Motchulsky (Kusatu, Gunma, 20 viii 1984). 20 mm, slightly glossy, blackish brown but abdomen suffused with reddish tint.

**Plagodis** Hübner (Plate 22, fig. 364; Plate 24, fig. 393; Plate 35, figs. 576–577)

Fusiform but somewhat slender. Head rugous, frons striated; labial palpus small; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna reaching caudal margin of wing; sculptured eye-piece striated; prothorax slightly ruged, mesothorax smooth and metathorax crinkled; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity small, slender and pubescent; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending slightly before caudal margin of wing, femur concealed; mesothoracic leg extending to or slightly before tip of antenna; metathoracic leg appearing; abdomen with small punctures scattered densely; 2nd–3rd abdominal spiracles appearing completely; 8th or 7th–8th spiracles vestigial; spiracular furrow absent; lateral groove vague; cremaster relatively small and conical, with basal mass and without side spine, with three pairs of hooked or four pairs of falcate setae. Pro-, meso- and metathotax with D1 and SD1 setae. Abdomen with D1 seta. SL and SV setae absent. 8th segment with D1, SD1, L1 and L2 setae. 9th segment without seta.

**Key to the species**

1. Mesothoracic leg reaching tip of antenna; 7th–8th abdominal spiracles vestigial; cremaster with four pairs of falcate setae; 14 mm, brown
   - *pulveraria* Linnaeus (Hakone, Kanagawa, 21 vii 1968)
   - Mesothoracic leg reaching slightly before tip of antenna; 8th abdominal spiracle vestigial; cremaster with three pairs of hooked setae; 13 mm, reddish brown
   - *dolabraria* Linnaeus (Mt Takao, Tokyo, 26 vi 1969)

**Achrosis** Guenée (Plate 22, fig. 363; Plate 24, fig. 395; Plate 35, fig. 578)

Fusiform but cephalic end somewhat flattened. Head slightly striated; labial palpus small; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna broad but tapered to apex, reaching tip of maxilla; sculptured eye-piece rugged; prothorax roughened,
mesothorax striated and metathorax punctated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity dark, glossy and heavily raised; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; prothoracic leg extending seven ninths the length to caudal margin of wing, femur concealed; mesothoracic leg ending slightly before tip of maxilla; metathoracic leg concealed; abdomen with deep punctures densely scattered; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove incised rounded; dorsal groove disappearing; cremaster small, conical and vertically rugous on both sides, without basal mass and side spineule, with four pairs of hooked setae.

Chaetotaxy similar to that of *Plagodis* Hübner but SL1 seta present on 5th abdominal segment.

*paupera* Butler (Tokuyama, Gifu, 20 x 1976, R. Sato leg.). 11 mm, reddish brown with blackish shades.

**Endropiodes** Warren (Plate 24, fig. 396; Plate 27, fig. 417; Plate 35, fig. 579)

Fusiform. Head almost smooth; labial palpus small; maxilla reaching just before caudal margin of wing, cephalic margin steeply oblique; antenna extending to caudal margin of wing; eye-piece smooth; prothorax slightly striated, meso- and metathorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity black, disk-like and pubescent; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at three fourths the distance to caudal margin of wing, femur concealed; mesothoracic leg reaching tip of maxilla; metathoracic leg appearing; abdomen with small shallow punctures scattered but 1st segment smooth; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove long and trigonal; dorsal groove with a large medio-dorsal notch and many vague notches; cremaster pentagonal, vertically ridgy on both sides, basal mass present, with four pairs of hooked setae.

Chaetotaxy similar to that of *Phthonandria* Warren but 8th abdominal segment with D1 seta, 9th segment with SD1 seta and 5th segment with SV1 seta.

*indictinaria* Bremer (Mt Hoto, Saitama, 27 ix 1970). 13 mm, yellowish brown.

**Parepione** Warren (Plate 24, fig. 394; Plate 27, fig. 418; Plate 35, fig. 580)

Fusiform but somewhat swollen. Head smooth; labial palpus small; maxilla reaching slightly before caudal margin of wing, cephalic margin steeply oblique; antenna broad, extending to caudal margin of wing; eye-piece smooth; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity black, disk-like, scabrous and heavily protruded; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at two thirds the length to caudal margin of wing, femur concealed; mesothoracic leg reaching midway between tips of maxilla and antenna; metathoracic leg appearing; abdomen with small shallow punctures scattered but 1st segment smooth; 2nd–3rd abdominal spiracles appearing completely; 8th spiracles vestigial; spiracular furrow absent; lateral groove disappearing; dorsal groove with many small notches; cremaster rugged on ventral and vertical ridgy on dorsal sides, basal mass vague, with three pairs of small hooked setae and a pair of terminal long and thickened hooked setae.

Chaetotaxy same as in *Endropiodes* Warren but seta on head, thorax and abdominal D1 long.

*grata* Butler (Hakone, Kanagawa, 21 vii 1968). 14 mm, brown, cremaster blackish brown.
**Garaeus** Moore (Plate 24, fig. 397; Plate 27, figs 419–420; Plate 35, figs 583–584)

Fusiform. Head striated; labial palpus minute; maxilla reaching slightly before caudal margin of wing; cephalic margin steeply oblique; antenna slightly broad, extending to just before caudal margin of wing; eye-piece smooth; thorax striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity black, disk-like and pubescent; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; prothoracic leg reaching three fifths the distance to caudal margin of wing, femur concealed; mesothoracic leg ending tip of maxilla; metathoracic leg appearing; abdomen with small shallow punctures scattered; 8th abdominal spiracle vestigial; spiracular furrow absent; lateral groove trigonal; dorsal groove with many small notches; cremaster small, ridgy on both sides, with four pairs of hooked setae. Chaetotaxy same as in *Selenia* Hübner.

**Key to the species**

1. Mesothoracic leg reaching just beyond tip of maxilla; metathoracic leg disappearing; lateral groove slender; 15 mm, brown
   - Mesothoracic leg reaching tip of maxilla; metathoracic leg appearing; lateral groove trigonal; 16 mm, brown ............... *mirandus* Butler (Kitayuzawa, Hokkaido, 21 ix 1968)
   - Mesothoracic leg reaching tip of maxilla; metathoracic leg appearing; lateral groove trigonal; 16 mm, brown ............... *specularia* Moore (Karuizawa, Gunma, 8 vi 1969)

**Psyra** Walker (Plate 24, fig. 398; Plate 27, fig. 427; Plate 35, fig. 581)

Fusiform but somewhat bulgy. Head smooth; frons striated; labial palpus small; maxilla reaching just before caudal margin of wing, cephalic margin gently oblique; antenna slender, ending at tip of maxilla; eye-piece smooth; thorax smooth but prothorax with a few striae; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity large, black, scabrous and heavily raised; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg reaching three fourths the length to caudal margin of wing, femur concealed; mesothoracic leg ending at tip of antenna; metathoracic leg appearing; abdomen smooth but 5th–7th segments with some punctures; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove rounded; dorsal groove with five distinct notches; cremaster small, conical, rugged and rugous on both sides, without basal mass, with three pairs of hooked setae. Setae very long and bristly especially F1, Afl and Af2 setae. Chaetotaxy similar to *Selenia* Hübner but L1 seta situated fairly dorso-caudal of spiracle on 5th–8th segments, SL seta never present on 6th abdominal segment.

*bluethgeni* Püngeler (Mt Hoto, Saitama, 23 v 1970). 14 mm, reddish brown, 10th segment darker, cremaster blackish brown.

**Xyloscia** Warren (Plate 25, fig. 400; Plate 27, fig. 421; Plate 35, fig. 582)

Fusiform. Head rugous; labial palpus small; maxilla reaching just before caudal margin of wing, cephalic margin steeply oblique; antennae extending to caudal margin of wing, meeting on meson at extremity; eye-piece smooth; thorax rugous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity invisible; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg extending seven ninths the length to caudal margin of wing, femur concealed; mesothoracic leg ending just beyond tip of maxilla; metathoracic leg appearing; abdomen rugous but 8th–9th segments smooth; 8th abdominal spiracle vestigial; spiracular furrow absent; lateral groove long and sinuate; dorsal groove with vague five notches; cremaster warhead shaped, smooth on ventral and rugous on dorsal sides, without
basal mass, with three pairs of hooked and a pair of terminal falcate setae. Setae short but visible fully on 8th abdominal segment. Chaetotaxy same as in *Psyra* Walker, but 9th segment with one pair of setae. 

*subpersata* Felder & Rogenhofer (Ozenji, Kawasaki, Kanagawa, 18 ix 1983). 16 mm, reddish brown.

*Charriaspiatus* Wehrli (Plate 25, fig. 399; Plate 27, fig. 422; Plate 35, fig. 585) 

Fusiform. Head frosted; labial palpus small; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to just before caudal margin of wing; eye-piece smooth; thorax scabrous and slightly rugous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity black, disk-like, pubescent and somewhat protruded; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at three fourths the distance to caudal margin of wing, femur concealed; mesothoracic leg reaching tip of antenna; metathoracic leg appearing; abdomen with small punctures densely scattered but 8th-9th segments smooth; 2nd-3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove long; dorsal groove with many small notches; cremaster warhead shaped, rugged and rugous on both sides, basal mass present, with three pairs of short setae and one pair of terminal thickened hooked setae. Chaetotaxy similar to that of *Selenia* Hübner but SL1 seta on 5th and 6th abdominal segments.

*formosaria* Eversmann (Hakone, Kanagawa, 21 vii 1968). 18 mm, blackish brown.

*Pareclipsis* Warren (Plate 25, fig. 402; Plate 27, fig. 423; Plate 35, fig. 586) 

Fusiform. Head smooth with some radial striae; labial palpus small; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to just before caudal margin of wing; eye-piece smooth; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity dark, pubescent and not protruded; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at four fifths the length to caudal margin of wing, femur exposed; mesothoracic leg reaching caudal margin of wing; metathoracic leg appearing; abdomen with small and shallow punctures scattered densely but 1st-3rd segments smooth; 2nd-3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; scar of larval proleg scarcely raised on 6th segment; lateral groove long and remarkably narrow at extremity; dorsal groove with several pubescent notches; cremaster small, conical, rugged on both sides, with four pairs of long hooked setae. Chaetotaxy same as in *Psyra* Walker but seta short.

*gracilis* Butler (Hudo Spa, Hukushima, 24 viii 1972, H. Nakajima leg.). 11 mm, brown.

Subdivision III-IV

*Epholca* Fletcher (Plate 25, fig. 401; Plate 27, fig. 424; Plate 35, fig. 587) 

Fusiform. Head smooth but frosted; labial palpus minute; maxilla reaching just before caudal margin of wing, cephalic margin nearly horizontal; antenna slender, extending to caudal margin of wing; eye-piece roughened; thorax rugous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity slightly protruded; hindwing hidden under forewing at spiracle
level of 4th abdominal segment; prothoracic leg ending at three fourths the distance to caudal margin of wing, femur concealed; mesothoracic leg reaching tip of maxilla; metathoracic leg appearing; abdomen with punctures scattered; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove trigonal; dorsal groove with 11 small notches; cremaster conical, slightly rugous on ventral and vertically crinkled on dorsal sides, without basal mass, with three pairs of delicately hooked setae and a pair of terminal falcate setae.

Setae relatively long. Pro-, meso- and metathorax with D1 and SD1 setae. Abdomen with D1 seta on 1st–9th segments, SL1 and SL2 setae on 5th–7th segments and SL1 seta on 8th segment.

*arenosa* Butler (Mt Takao, Tokyo, 10 viii 1969). 12 mm, reddish brown, cremaster blackish brown.

Division IV

Subdivision IV–1

*Corymica* Walker (Plate 25, fig. 404; Plate 27, fig. 425; Plate 35, fig. 588)

Somewhat prolonged. Head smooth; labial palpus small; maxilla reaching slightly before caudal margin of wing, cephalic margin more or less steeply oblique; antenna narrow, extending to caudal margin of wing; eye-piece smooth; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity black, pubescent and protruded; hindwing hidden under forewing at cephalic margin of 3rd abdominal segment or spiracle level of 4th segment; prothoracic leg reaching two thirds the length to caudal margin of wing, femur concealed; mesothoracic leg extending to just before caudal margin of wing; metathoracic leg appearing; 1st, 8th and 9th abdominal segments smooth but the other segments with small shallow punctures scattered sparsely; 8th–9th segments as broad as the other segments; abdominal spiracle small, 7th and 8th spiracles vestigial; spiracular furrow absent; lateral groove long; dorsal groove with many small notches; cremaster small, globulous, smooth on ventral and ridged on dorsal sides, without basal mass, with four pairs of hooked setae.

Pro-, meso- and metathorax with D1 and SD1 setae. 1st–3rd abdominal segments with D1 and 4th–7th segments with D1 and D2 setae each, 8th and 9th segments without seta.

*pryeri* Butler (Sagami-hakusan, Kanagawa, 6 ix 1980). 12 mm, brown, head and thoracic appendices green.

*Caprilia* Walker (Plate 25, fig. 403; Plate 27, fig. 426; Plate 35, fig. 589)

(From the view of the pupal characteristics, *Caprilia* is reated as the valid genus in this paper)

Fusiform but rather short. Head smooth; labial palpus minute; maxilla ending at five sixths the length to caudal margin of wing, cephalic margin steeply oblique; antenna reaching caudal margin of wing; eye-piece large; thorax smooth; suture between pro- and mesothorax attached to antenna at medium point of proximal margin of pro- and mesothoracic legs; spiracular callosity ellipsoid but never protruded acutely; hindwing hidden under forewing near cephalic margin of 3rd abdominal segment; prothoracic leg reaching seven tenths the length to caudal margin of wing, femur concealed; mesothoracic legs extending to slightly before caudal margin of wing, never sharpened and meeting on meson at extremity; metathoracic leg appearing small; abdomen with small shallow punctures scattered; abdominal spiracle minute and protruded; 3rd spiracle appearing completely; 6th spiracle situated slightly ventrad than those of the other segments; 7th–8th spiracles vestigial; lateral groove short; dorsal groove with 11 small notches; cremaster rather rectangle, without basal mass,
with a pair of robust falcate setae and three pairs of hooked setae. Chaetotaxy same as in *Corymica* Walker.

*deducta* Walker (Sagami-hakusan, Kanagawa, 6 ix 1980). 11 mm, brown with gray ill-defined marks, shedding highly shell-like luster.

Subdivision IV–II

*Cryptochorina* Wehrli (Plate 25, fig. 406; Plate 27, fig. 429; Plate 35, fig. 590)

Fusiform. A pair of small tubercules at cephalic end of frons. Head rugous; labial palpus small; maxilla reaching just before caudal margin of wing, cephalic margin gently oblique; antenna extending to caudal margin of wing; small tubercle raised on sculptured eye-piece; thorax rugous; suture between pro- and mesothorax attached to antenna at a slightly caudal point of suture restricting proximal margin of prothoracic leg; spiracular callosity black, elliptical, scabrous and slightly raised; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg reaching two thirds the length to caudal margin of wing, femur concealed; mesothoracic leg extending tip of maxilla; metathoracic leg appearing small; abdomen with small shallow punctures scattered; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow comprised longitudinal groove filled with a series of many interconnected pores; lateral groove long; dorsal groove with five notches; cremaster slender, rugous on both sides, basal mass small, without side spinule, bifid pieces long and spinous.

Pro-, meso- and metathorax with D1 and SD1 setae. Abdomen with D1 and D2 setae on 2nd–7th segments but 1st segment with D1 seta only and 8th–9th segments without D seta, SL or SV setae never present, 8th segment with L1 and L2 setae.

*amphidasyaria* Oberthür (Karuizawa, Nagano, 8 vi 1969). 19 mm, dark reddish brown.

*Krananda* Moore (Plate 27, figs 430–431; Plate 33, figs 512–515)

Fusiform. Head smooth; labial palpus small; maxilla extending to slightly before caudal margin of wing, cephalic margin gently oblique; antenna slender, ending at caudal margin of wing; pro- and mesothorax rugous, metathorax striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity indistinct, slightly raised; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching two thirds the length to caudal margin of wing, femur appearing; mesothoracic leg ending slightly before tip of maxilla; metathoracic leg appearing; abdomen heavily punctate; 8th abdominal spiracle vestigial; spiracular furrow comprising many punctures; lateral groove long; dorsal groove with many vague notches; cremaster warhead shaped, rugous on both sides, without basal mass, with pointed side spinule, terminal piece bifurcated.

Second–7th abdominal segments with D1 and D2 setae; SL and SV setae absent; 8th segment with L1 and L2 setae; 9th segment without seta.

**Key to the species**

1. Spiracular callosity slightly larger; cremaster long, without basal mass; 20 mm, brown
   - Spiracular callosity smaller; cremaster short, with basal mass; 14 mm, reddish brown
     - *semihyalina* Moore (Yuto, Shizuoka, 19 xi 1993)
     - *latinmarginaria* Leech (Yuto, Shizuoka, 19 xi 1993)

*Peratostega* Warren (Plate 25, fig. 405; Plate 27, fig. 428; Plate 35, fig. 591)

Fusiform. Head slightly striated; labial palpus minute; maxilla reaching caudal margin of
wing, cephalic margin gently oblique; antennae extending just beyond tip of maxilla, meeting on meson at extremity; eye-piece smooth; thorax slightly striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity brown, slightly raised; hindwing hidden under forewing at spiral level of 4th abdominal segment; prothoracic leg ending at five sevenths the distance to caudal margin of wing, femur appearing slender; mesothoracic leg extending to caudal margin of wing; metathoracicleg concealed; abdomen with punctures scattered on whole surface; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow existing as longitudinal pore in which SD1, SD2 and L2 setae beared; lateral groove shallow and broad; dorsal groove with some vague notches; scar of larval anal leg raising as small spine; slightly large tubercle present on laterad of 10th segment; cremaster warhead shaped, rugous on ventral, and rugged and retiform on dorsal sides, basal mass small, with minute side spinule, terminal bifid seta thickened and hooked.

Pro-, meso- and metathorax with D1 and SD1 setae. 2nd–7th abdominal segments with D1 and D2 setae and 1st segment with D1 seta, 4th–8th segments with SL1 seta and 5th–8th segments with SL2 seta, SD2 seta on 5th segment (singular characteristic in the lepidopterous pupae). 8th segment with SD1, L2 and SL1 setae and 9th segment with L1 seta.

deletaria Moore (Tugenno, Horai, Aichi, 27 iv 1990). 12 mm, pale yellowish brown with many black spots.

Abraxas Leach (Plate 26, fig. 408; Plate 27, fig. 435; Plate 36, fig. 597)

Fusiform. Head smooth; labial palpus minute and never adjoined with mandible; maxilla reaching slightly before caudal margin of wing, cephalic margin nearly holizontal; antenna slender, extending to caudal margin of wing; eye-piece smooth; thorax smooth; suture between pro- and mesothorax attached to antenna at slightly caudal point of suture restricting proximal margin of prothoracic leg; spiracular callosity pubescent but not raised; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg ending at six sevenths the length to caudal margin of wing, femur concealed; mesothoracic leg reaching just before tip of antenna; metathoracic leg appearing; abdomen smooth but with punctures sparsely scattered on cephalic margin; abdominal spiracle small; 8th spiracle vestigial; spiracular furrow large elliptical pore situated slightly behind spiracle, inner surface scabrous; lateral groove trigonal and deep incised; dorsal groove with some notches; cremaster small, globular and smooth on both sides, basal mass absent, with side spinule and four pairs of hooked setae.

First–3rd abdominal segments with D1 seta and 4th–7th segments with D1 and D2 setae. SL1 and SL2 setae on 4th–7th segments; SV1 seta on 4th–5th segments; 8th segment with L1 and L2 setae and 9th segment without seta.

grossulariata Linnaeus (Tanigawa, Gunma, 29 vi 1958). 15 mm, glossy reddish brown.

Calopsilos Hübner (Plate 26, fig. 409; Plate 27, figs 433–434; Plate 36, figs 598–600)

Fusiform. Head striated; labial palpus minute; maxilla reaching just before caudal margin of wing, cephalic margin nearly holizontal; antenna slender, extending to caudal margin of wing; thorax with deep punctures scattered; suture between pro- and mesothorax attached to antenna at medium point of suture restricting proximal margins of pro- and mesothoracic legs; spiracular callosity black, pubescent and slightly raised; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg ending at five sevenths the length to caudal margin of wing, femur concealed; mesothoracic leg reaching tip of maxilla; metathoracic leg appearing small; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow elliptical and relatively large, situated dorsal of spiracle; lateral groove shallowly incised; dorsal groove with many irregular notches; cremaster globular, punctated on dorsal and wrinkled on ventral sides; basal mass absent, with short
bifid piece.
Chaetotaxy similar to Abraxas Leach but 2nd–3rd abdominal segments with D1 and D2 setae; 4th segment without SL2 and SV1 setae; 5th segment without SV1 seta.

Key to the species

1. Spiracular furrow somewhat trigonal; 9th abdominal segment bearing many punctures scatteringly excepting dorso-medium area; medio-dorsal notch of dorsal groove large; cremaster punctated on dorsal side, with side spinule, terminal process leaned dorsad; 15 mm, dark reddish brown .......... latifasciata Warren (Kunitachi, Tokyo, 10 v 1973)
   - Medio-dorsal notch of dorsal groove small; cremaster rugged and rugous on dorsal side ........................................2

2. Ninth abdominal segment smooth; lateral groove long; cremaster without side spinule, terminal process leaned dorsad; 15 mm, dark reddish brown
   - Ninth abdominal segment never smooth; terminal process of cremaster never or slightly leaned dorsad ........................................3

3. Spiracular furrow elliptical; 9th abdominal segment with a few punctures scattered at side; lateral groove short; cremaster without side spinule; terminal process never leaned dorsad; 15 mm, dark reddish brown .......... miranda Butler (Meguro, Tokyo, 12 v 1952)
   - Ninth abdominal segment with many punctures scattered excepting dorso-medium area; lateral groove long; cremaster with minute side spinule, terminal process slightly leaned dorsad ........................................4

4. Spiracular furrow somewhat trigonal; 11 mm, dark reddish brown
   - Spiracular furrow somewhat rhomboidal; 13 mm, dark reddish brown
     - Fulvobasalis Staudinger (Hakone, Kanagawa, 21 vii 1968)

Elphos Guenée (Plate 26, fig. 410; Plate 27, fig. 432; Plate 36, fig. 596)

Fusiform and prolonged. Head striated; tentorium with a pair of large pores; labial palpus appearing; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna relatively broad, extending to caudal margin of wing; sculptured eye-piece striated; pro- and mesothorax striated, metathorax smooth; suture between pro- and mesothorax attached to antenna at medium point of suture restricting proximal margin of pro- and mesothoracic legs; spiracular callosity black and pubescent; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg reaching five sevenths the length to caudal margin of wing, femur concealed; mesothoracic leg very slender, extending to slightly before caudal margin of wing; metathoracic leg concealed; abdomen with small punctures scattered densely but 9th segment smooth; 8th abdominal spiracle vestigial; spiracular furrow forming a longitudinal pore, with black and sclerotized lower edge, SD1 and L2 setae bearing inside; lateral groove long and slender; dorsal groove incised deep, with somewhat dentate lower edge; cremaster conical but slimmer striated on both sides, basal mass absent, with two pairs of side spinules, bifid piece short.
Seta bristly. Pro-, meso- and metathorax with D1, D2 and SD1 setae; 1st–7th abdominal segments with D1 and D2 setae; SL and SV setae absent; 8th segment with L1 and L2 setae. insueta Butler (Hakone, Kanagawa, 27 vi 1975). 27 mm, dark greyish brown.

Subdivision IV–III

Thinopteryx Butler (Plate 27, fig. 436; Plate 33, fig. 511)
Prolonged. Head scabrous; frons protruded cephalad; labial palpus small; mandible rela-
Ennominae

Relatively large; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to tip of maxilla; eye-piece smooth; thorax scabrous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; prespiracular slit elongate and pubescent; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at two thirds the length to caudal margin of wing, femur exposed; mesothoracic leg reaching slightly before tip of maxilla; metathoracic leg appearing small; abdomen smooth but 1st–4th segments with small punctures densely scattered; 2nd–3rd abdominal spiracles slightly hidden under wing and 4th spiracle attached to wing; 8th spiracle vestigial; spiracular furrow present on 5th–7th segments, comprising many punctures which are small, shallow and densely scattered; lateral groove long and slender; dorsal groove with some vague notches; cremaster relatively small, conical, ridgy on both sides, without side spinule, with four pairs of hooked setae.

First–3rd abdominal segments with D1 seta and 4th–7th segments with D1 and D2 setae; D1, SD1 and L2 setae situated upside of flange plate on 5th–7th segments; SL and SV setae absent; 8th segment with SD1, L1 and L2 setae; 9th segment without seta.

crocoptera Kollar (Mt Hoto, Saitama, 23 v 1970). 24 mm, dark reddish brown.

Petelia Herrich-Schäffer (Plate 26, fig. 411; Plate 27, fig. 438; Plate 35, fig. 593)

Fusiform but somewhat slender. Head slightly striated; labial palpus small; maxilla reaching caudal margin of 5th abdominal segment, cephalic margin steeply oblique; antenna slender, extending far beyond caudal margin of wing; eye-piece smooth; thorax almost smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity black, semi-circular, scabrous and never protruded; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending three fourths the length to tip of maxilla, femur appearing; mesothoracic leg reaching just before tip of maxilla; metathoracic leg appearing, acute at tip; abdomen with punctures densely scattered but 1st and 8th segments smooth; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove long and deep incised; dorsal groove with seven notches on dorsum and a large excavation on subdorsum; cremaster globular but flattened at dorso-meson, ridgy vertically on ventral and reticular on dorsal sides, with three pairs of short hooked setae and a pair of terminal falcate setae.

First abdominal segment with D1 seta and 2nd–7th segments with D1 and D2 setae; SL and SV setae absent; 8th segment with SD1, L1 and L2 setae; 9th segment without seta.

rivulosa Butler (Mt Yahiko, Niigata, 7 vi 1972, R. Sato leg.). 17 mm, reddish brown, cremaster blackish brown.

Astygisa Walker (Plate 26, fig. 412; Plate 27, fig. 439; Plate 35, fig. 594)

Fusiform. Head almost smooth; labial palpus trigonal; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to caudal margin of wing; eye-piece smooth; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity same as the preceding genus; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at three fourths the distance to caudal margin of wing, femur appearing small; mesothoracic leg reaching just before caudal margin of wing; metathoracic leg appearing; abdomen with small and deep punctures densely scattered; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove long and deep incised; dorsal groove with some notches; cremaster globular, with three pairs of hooked setae and a pair of terminal falcate setae. Seta short. Chaetotaxy same as in Petelia Herrich-Schäffer.
*morosa* Butler (Mt Kakuta, Niigata, 6 viii 1973, R. Sato leg.). 12 mm, brown.

**Ecpetelia** Wehrli (Plate 26, fig. 413; Plate 27, fig. 437; Plate 35, fig. 592)

Fusiform. Head rugous; labial palpus small, trigonal; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna extending to caudal margin of wing; sculptured eye-piece rugged; pro- and mesothorax rugous, metathorax furrowed vertically; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity dark, semi-elliptical, smooth and slightly raised; hindwing hidden under forewing near spiracle level of 4th abdominal segment; prothoracic leg ending at five sevenths the distance to caudal margin of wing, femur appearing small; mesothoracic leg extending to medium point of tips of antenna and maxilla; metathoracic leg appearing; abdomen with large and deep punctures scattered coarsely on 1st–3rd and densely on 4th–8th segments; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove notch-like but deep incised; dorsal groove with a dorso-medium notch and several small vague notches; cremaster small, globular, smooth on both sides, with four pairs of hooked setae.

Seta short. First abdominal segment with D1 seta and 2nd–7th segments with D1 and D2 setae; SL1 seta on 6th segment; 8th segment with SD1, L1 and L2 setae; 9th segment without seta.

*albifrontaria* Leech (Mt Yahiko, Niigata, 22 vi 1971, R. Sato leg.). 13 mm, brown.

**Lamprocabera** Inoue (Plate 31, fig. 475)

Fusiform. Head faintly striated; labial palpus minute; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to caudal margin of wing; eye-piece smooth; thorax striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity disappearing; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg ending at three fourths the distance to caudal margin of wing, femur appearing; mesothoracic leg extending to tip of antenna; metathoracic leg appearing; abdomen with small punctures densely scattered but 9th segment smooth; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove rounded; dorsal groove with a large medio-dorsal notch; cremaster conical, smooth, with a pair of weakly hooked setae and a pair of terminal thickened falcate setae.

Seta short. First abdominal segment with D1 seta and 2nd–7th segments with D1 and D2 setae; SL and SV setae absent; 8th–9th segments without seta.

*candidaria* Leech (Karuizawa, Gunma, 8 vi 1969). 9 mm, brown.

**Scionemia** Warren (Plate 26, fig. 414; Plate 27, fig. 441; Plate 36, fig. 603)

Fusiform. Head faintly striated; labial palpus small; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending at tip of maxilla; eye-piece smooth; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity small, elliptical, scabrous and slightly raised; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at five sevenths the length to caudal margin of wing, femur appearing small; mesothoracic leg reaching slightly before caudal margin of wing; metathoracic leg small; abdomen with small and shallow punctures scattered, but 8th–10th segments smooth; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove deep but small; dorsal groove with distinct seven notches; cremaster conical and smooth, with three pairs of hooked setae and one pair of long terminal hooked setae.
First abdominal segment with D1 seta and 2nd–7th segments with D1 and D2 setae; SL1 seta on 6th segment; 8th segment with SD1 and L2 setae; 9th segment without seta.

* mendica * Butler (Mt Takao, Tokyo, 10 viii 1969). 12 mm, brown.

** Synegia ** Guenée (Plate 26, fig. 415; Plate 31, fig. 470)

Fusiform but somewhat prolonged. Head striated; frons with a protuberance on ventromeson; labial palpus small, trigonal; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to caudal margin of wing; eye-piece smooth; prothorax striated, meso- and metathorax smooth; suture between pro- and mesothorax attached to antenna at slightly cephalic point of suture restricting proximal margin of mesothoracic leg; spiracular callosity slender, dark and pubescent, but never protruded; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at five sevenths the distance to caudal margin of wing, femur appearing; mesothoracic leg reaching just before caudal margin of wing; metathoracic leg concealed; abdomen with shallow punctures densely scattered but 1st segment smooth; abdominal spiracle small, 2nd–3rd spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove moderately long; dorsal groove with nine notches; cremaster somewhat globulous, scabrous of both sides, basal mass absent, with three pairs of weakly hooked setae and one pair of robust hooked setae.

Pro-, meso- and metathorax with D1 and SD1 setae, 2nd–7th abdominal segments with D1 and D2 setae but 1st segment with D1 seta and 8th segment without seta. SL and SV setae never present. 9th segment without seta.

* esther * Butler (Asakawa, Tokyo, 28 vi 1970). 13 mm, brown but suffused with greenish tint on thoracic appendices.

** Borbacha ** Moore (Plate 26, fig. 416; Plate 31, fig. 471)

Allied to * Synegia * Guenée. Fusiform but somewhat bulgy. Maxilla ending just before caudal margin of wing; antenna more or less broad; eye-piece slightly rugous; thorax striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; prothoracic leg ending at two thirds the distance to caudal margin of wing, femur appearing very small; mesothoracic leg ending at tip of maxilla; metathoracic leg appearing small; abdomen with punctures densely scattered but 1st and 9th segments smooth; 2nd–3rd abdominal spiracles half hidden under wing; lateral groove short; dorsal groove with 14 notches; cremaster small, pentagonal, dorsal side crinkly.

Chaetotaxy same as in * Synegia * Guenée.

* pardaria * Guenée (Nakizin, Okinawa, 24 x 1999, S. Tominaga leg.). 13 mm, reddish brown.

** Rhynchobapta ** Hampson (Plate 28, fig. 443; Plate 31, fig. 473; Plate 36, fig. 604)

Fusiform. Head faintly striated; labial palpus small, pentagonal; maxilla reaching just before caudal margin of wing, cephalic margin steeply oblique; antenna ending at caudal margin of wing; sculptured eye-piece with some striae; thorax striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity black, scabrous but never protruded; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at three fourths the length to caudal margin of wing, femur appearing; mesothoracic leg extending to tip of antenna; metathoracic leg appearing; abdomen with punctures scattered densely; abdominal spiracle small, 2nd–3rd spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove small; dorsal groove with seven notches; cremaster semi-globular but somewhat flattened, smooth on ventral and striated on dorsal sides, basal
mass absent, with four pairs of hooked setae. Chaetotaxy same as in *Syngia* Guenéé.

*cervinaria* Moore (Mt Takao, Tokyo, 7 v 1970). 11 mm, brown but suffused with greenish tint on thoracic appendices.

**Plesiomorpha** Warren (Plate 28, fig. 444; Plate 31, fig. 472; Plate 36, fig. 605)

Closely allied to *Rhynchobapta* Hampson, but slightly slimmer; head smooth; spiracular callosity lightly swollen; metathoracic leg concealed; 8th abdominal segment smooth; lateral groove relatively long. Chaetotaxy same as in the preceding genus.

*flaviceps* Butler (Meguro, Tokyo, 5 v 1951). 12 mm, brown but suffused with greenish tint on thoracic appendices.

**Euchristophia** Fletcher (Plate 28, fig. 442; Plate 31, fig. 474)

Fusiform. Head faintly striated; labial palpus minute; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to caudal margin of wing; sculptured eye-piece striated; thorax striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity faintly raised and smooth; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; prothoracic leg ending at three fourths the length to caudal margin of wing, femur exposed; mesothoracic leg reaching tip of maxilla; metathoracic leg appearing; abdomen punctate; abdominal spiracle small, 2nd–3rd spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove short; dorsal groove with seven notches; cremaster rather small, conical, almost smooth on ventral and ridgy on dorsal sides, with three pairs of weakly hooked setae and one pair of terminal falcate setae. Chaetotaxy same as in *Syngia* Guenéé but SL1 seta present on 5th–6th abdominal segments.

*cumulata* Christoph (Hakone, Kanagawa, 27 vi 1975). 10 mm, reddish brown.

**Cabera** Treitschke (Plate 28, fig. 447; Plate 31, figs 476–478; Plate 36, figs 606–607)

Fusiform. Head striated and somewhat rugous; labial palpus small; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna extending to caudal margin of wing; eye-piece smooth; thorax slightly wrinkled; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity small, black, scabrous and never protruded; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at three fourths the length to caudal margin of wing, femur appearing slenderly; mesothoracic leg reaching just before caudal margin of wing; metathoracic leg appearing; abdomen with punctures scattered coarsely on 1st–3rd and 8th segments and densely on 4th–7th segments; abdominal spiracle small, 2nd–3rd spiracles appearing completely, 8th spiracle vestigial; spiracular furrow absent; lateral groove only notched; dorsal groove with many notches; cremaster conical, smooth on both sides, with or without basal mass and without side spinule, with a pair of terminal hooked setae and three pairs of weakly hooked setae. First abdominal segment with D1 seta and 2nd–7th segments with D1 and D2 setae; SL1 seta on 6th–7th segments; 8th segment with SD1, L1 and L2 setae; 9th segment without seta.

**Key to the species**

1. Eye-piece smooth; thorax slightly striated; 8th abdominal segment smooth; lateral groove more or less long; cremaster rounded; 10 mm, reddish brown
- Sculptured eye-piece slightly rugged; thorax striated; 8th abdominal segment with punctures scattered.................................2

2. Eighth abdominal segment with punctures scattered densely; cremaster rounded, with basal mass; 12 mm, reddish brown..........purus Butler (Mt Mitake, Tokyo, 17 vii 1971)
- Eighth abdominal segment with punctures scattered more or less roughly; cremaster warhead shaped, without basal mass; 10 mm, reddish brown

..........................................................exanthemata Scopoli (Mt Takao, Tokyo, 2 vii 1968)

Orthocabera Butler (Plate 28, fig. 446; Plate 32, fig. 495; Plate 36, fig. 608)

Fusiform. Head rugous; labial palpus minute; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to caudal margin of wing; eye-piece rugous; thorax faintly rugous; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity darker, pubescent and not so protruded; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching two thirds the length to caudal margin of wing, femur appearing minutely; mesothoracic leg ending at tip of maxilla; metathoracic leg appearing; abdomen scattered densely with faint punctures on 1st–8th segments; abdominal spiracles small, 2nd–3rd spiracles appearing completely, 8th spiracle vestigial; spiracular furrow absent; lateral groove small; dorsal groove shallow with some vague notches; cremaster conical with three pairs of hooked setae.
First abdominal segment with D1 and 2nd–7th abdominal segments with D1 and D2 setae; SL seta absent; 8th segment with SD1, L1 and L2 setae; 9th segment without seta.

punctata Warren (Hoshi Spa, Gunma, 24 vi 1984, H. Nakajima leg.). 12 mm, brown.

Nothomiza Warren (Plate 28, fig. 445; Plate 31, fig. 479; Plate 36, fig. 609)

Fusiform. Head smooth; labial palpus small; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to tip of maxilla; eye-piece smooth; thorax smooth; suture between pro- and mesothorax attached to antenna at medium point of suture restricting proximal margins of pro- and mesothoracic legs; spiracular callosity slender and scabrous; hindwing hidden under forewing near cephalic margin of 4th abdominal segment; prothoracic leg ending at seven ninths the distance to caudal margin of wing, femur concealed; mesothoracic leg reaching slightly before caudal margin of wing; metathoracic leg concealed; abdomen with shallow punctures scattered coarsely but 1st and 8th–9th segments smooth; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove slightly long; dorsal groove with many small notches; cremaster conical, smooth on ventral and rugged on dorsal sides, basal mass absent, with four pairs of short hooked setae.
First abdominal segment with D1 seta and 2nd–7th segments with D1 and D2 setae; SL and SV setae absent; 8th segment with SD1, L1 and L2 setae.

formosa Butler (Meguro, Tokyo, 8 vi 1950). 11 mm, brown.

Ocoelophora Warren (Plate 28, fig. 448; Plate 31, fig. 480; Plate 36, fig. 610)

Fusiform. Head smooth; labial palpus minute; maxilla reaching caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to tip of maxilla; eye-piece smooth; prothorax slightly wrinkled, mesothorax smooth and metathorax punctate; suture between pro- and mesothorax attached to antenna at medium point of suture restricting proximal margins of pro- and mesothoracic legs; spiracular callosity disappearing; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at three fourths the length to caudal margin of wing, femur concealed; mesothoracic leg
reaching just before tip of maxilla; metathoracic leg appearing small; abdomen with small shallow punctures scattered but 8th–9th segments smooth; 2nd–3rd abdominal spiracles appearing completely; 7th–8th spiracles vestigial; spiracular furrow absent; lateral groove only notched; dorsal groove with many small notches; cremaster conical, rigid on dorsal and roughened on ventral sides, without basal mass, with three pairs of short setae and a pair of terminal long hooked setae.

First abdominal segment with D1 seta and 2nd–7th segments with D1 and D2 setae; SL and SV setae absent; 8th segment with SD1, L1 and L2 setae; 9th segment without seta.

lentiginosaria Leech (Mt Takao, Tokyo, 28 vi 1977). 10 mm, brown

Petrophora Hübner (Plate 37, figs 637–639)

Fusiform. Head smooth; labial palpus minute, pentagonal; maxilla reaching caudal margin of wing, cephalic margin gently oblique; antenna extending extremity of maxilla; eye-piece smooth; pro- and mesothorax slightly wrinkled but metathorax punctuated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity disappearing; hindwing hidden under forewing at medium point between apex of wing and 4th abdominal spiracle; prothoracic leg reaching nine eleventh the distance to caudal margin of wing, femur disappearing; mesothoracic leg ending just before tip of maxilla; metathoracic leg concealing; abdomen with punctures scattered densely; 2nd–3rd abdominal spiracles appearing nearly completely; 8th spiracle vestigial; lateral groove broadly incised; dorsal groove with three notches; cremaster conical, shallow concave at centre of ventrum, without basal mass, with a pair of twisted long terminal setae and three pairs of hooked setae.

First abdominal segment with D1 seta and 2nd–7th segments with D1 and D2 setae; SL and SV setae absent; 8th segment with one (L2) seta; 9th segment without seta.

chlorosata Scopoli (Kaidai, Nagano, 2 vi 2001). 11 mm, brown.

Parabapta Warren (Plate 29, fig. 454, Plate 31, fig. 484; Plate 36, figs 612–613)

Fusiform. Head smooth; labial palpus small; maxilla reaching slightly before caudal margin of wing, cephalic margin steeply oblique; antenna slender, ending at caudal margin of wing; eye-piece smooth; thorax striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity slightly raised; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; prothoracic leg extending three fourths the distance to caudal margin of wing, femur concealed; mesothoracic leg ending at medium point between tips of maxilla and antenna; metathoracic leg appearing; abdomen punctate; abdominal spiracle small; 2nd–3rd spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove short; dorsal groove with nine notches; cremaster small, conical, smooth on ventral side and ridged on dorsal side, basal mass absent, with three pairs of weakly hooked setae and one pair of thickened falcate setae.

First abdominal segment with D1 seta and 2nd–7th segments with D1 and D2 setae; SL1 seta on 5th, and SL1 and SL2 setae on 6th–7th segments; SV1 seta on 5th segment; 8th segment with SD1, L1 and L2 setae; 9th segment without seta.

Key to the species

1. Ninth abdominal segment smooth; lateral groove short; centre of cremaster slight convex on ventral side and ridged reticulated on dorsal side; 12 mm, reddish brown
   - clarissa Butler (Mt Takao, Tokyo, 28 vi 1970)

   Eighth–9th abdominal segments smooth; lateral groove moderately long; centre of cremaster slight concave on ventral side and ridged vertically on dorsal side; 12 mm,
reddish brown .................. *aetheriata* Graeser (Mt Amagi, Shizuoka, 18 vii 1970)

**Eilicrinia** Hübner (Plate 31, fig. 481; Plate 36, fig. 611)

Fusiform but slightly slimmer. Head faintly striated; labial palpus small and pentagonal; maxilla reaching just before caudal margin of wing, cephalic margin steeply oblique; antenna slender, reaching caudal margin of wing; eye-piece smooth; thorax striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity soybean-shaped, smooth, slightly raised, upper margin scbrous and black; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at two thirds the length to caudal margin of wing, femur concealed; mesothoracic leg extending to tip of maxilla; metathoracic leg appearing; abdomen with densely punctures scattered; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove short; dorsal groove with many notches; cremaster conical, wrinkled on both sides; basal mass absent, with three pairs of weakly hooked setae and a pair of terminal falcate setae.

Chaetotaxy same as in *Parabapta* Warren but SL1 seta on 5th–6th abdominal segments.

**parvula** Wehrli (Mt Zao, Yamagata, 29 viii 1968). 12 mm, brown.

**Lomographa** Hübner (Plate 29, fig. 451; Plate 31, fig. 482; Plate 36, fig. 614)

Fusiform. Head smooth; labial palpus minute; maxilla reaching just before caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to caudal margin of wing; sculptured eye-piece rugous; prothorax slightly rugged, meso- and metathorax wrinkled; suture between pro- and mesothorax attached to antenna at medium point between sutures restricting proximal margins of pro- and mesothoracic legs; spiracular callosity ellipsoid, scabrous and slightly raised; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at five sevenths the length to caudal margin of wing, femur concealed; mesothoracic leg reaching tip of maxilla; metathoracic leg appearing; abdomen with small punctures scattered coarsely; abdominal spiracle small; 2nd–3rd spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove small; dorsal groove with many small notches; cremaster small, conical, smooth on both sides, without basal mass, with three pairs of weakly hooked setae and a pair of falcate setae.

First abdominal segment with D1 seta and 2nd–7th segments with D1 and D2 setae; SL1 seta on 6th and 8th segments; 9th segment without seta.

**temerata** Denis & Schiffermüller (Mt Takao, Tokyo, 28 v 1977). 11 mm, brown.

**Cirretaera** Wehrli (Plate 29, figs 452–453; Plate 31, fig. 483; Plate 36, figs 615–616)

Closely allied to *Lomographa* Hübner but differing as follows: head slightly wrinkled; spiracular callosity absent; hindwing hidden under forewing at cephalic margin of 4th abdominal segment; lateral groove long; cremaster scabrous. Chaetotaxy same as in *Lomographa* Hübner.

**Key to the species**

1. Maxilla ending at six sevenths the length to caudal margin of wing; lateral groove trigonal; 8 mm, brown .................. *simplicior* Butler (Kunitachi, Tokyo, 10 v 1973)
   - Maxilla ending slightly before caudal margin of wing; lateral groove slender; 9 mm, yellowish brown .................. *bimaculata* Fabricius (Meguro, Tokyo, 3 v 1950)
Subdivision IV–IV

Euryobeidida Wehrli (Plate 29, fig. 455; Plate 31, fig. 485)

Fusiform. Head smooth; labial palpus appearing; maxilla reaching slightly before caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to tip of maxilla; eye-piece smooth, suture restricting between glazed and sculptured pieces disappearing; thorax smooth; suture between pro- and mesothorax attached to antenna at medium point of suture restricting proximal margins of pro- and mesothoracic legs; spiracular callosity black, elliptical and slightly raised; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at five sevenths the length to caudal margin of wing, femur appearing; mesothoracic leg reaching tip of maxilla; metathoracic leg appearing; abdomen with punctures scattered but 1st–3rd and 8th–9th segments smooth; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove relatively long and deep incised; dorsal groove with many notches; cremaster conical, ruged on both sides, without basal mass, with four pairs of hooked setae.

Seta short. First abdominal segment with D1 seta and 2nd–7th segments with D1 and D2 setae; SL and SV setae absent; 8th segment with SD1, L1 and L2 setae; 9th segment without seta.

languidata Walker (Tanigawa, Gunma, 9 v 1970). 11 mm, brown.

Odontoperida Stephens (Plate 29, fig. 457; Plate 31, fig. 486; Plate 35, fig. 564)

Fusiform. Head rugous; a pair of small tubercules on cephalic end of frons; labial palpus small; maxilla reaching caudal margin of wing, cephalic margin steeply oblique; antenna slender, extending to just before caudal margin of wing; suture between glazed and sculptured eye-pieces vague; thorax roughened; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity absent; hindwing hidden under forewing near caudal margin of 4th abdominal segment; prothoracic leg ending at seven tenths the length to caudal margin of wing, femur appearing small; mesothoracic leg reaching nine tenths the length to caudal margin of wing; metathoracic legs appearing but never meeting on meson; abdomen with small shallow punctures scattered; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove long and shallow; dorsal groove with or without distinct notches; cremaster conical, almost smooth on ventral and wrinkled on dorsal sides, without basal mass, with three pairs of short hooked setae and a pair of terminal long hooked setae.

Seta long. First and 8th abdominal segments with D1 seta but 2nd–7th segments with D1 and D2 setae; SL1 seta on 5th segment; 8th segment with D1, SD1, L1 and L2 setae; 9th segment with SD1, L1 and SL1 setae.

Key to the species

1. Scar of larval proleg on 6th abdominal segment raised; dorsal groove without distinct notches; cremaster smaller than the following species; 17 mm, brown
   - Scar of larval proleg on 6th abdominal segment disappearing; dorsal groove with seven distinct notches; cremaster larger than the preceding species; 18 mm, brown
      - aurata Prout (Mt Takao, Tokyo, 28 v 1977)

- arida Butler (Yuto, Shizuoka, 17 v 1970)

Obeidida Walker (Plate 38, figs 646–647)

External appearance and colouration similar to Cystidia species. Fusiform but somewhat prolonged. Head smooth, a small tubercule at medio-cephalic end of frons; labial pulpus
small; maxilla reaching just before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to caudal margin of wing; eye-piece smooth; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity indistinct; hindwing hidden under forewing at medium point between 4th abdominal spiracle and apex of wing; prothoracic leg ending at three fourths the length to caudal margin of wing, femur appearing small; mesothoracic leg reaching tip of maxilla; metathoracic leg appearing large; abdomen smooth; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow absent; lateral groove long, caudal edge somewhat swollen; dorsal groove with many notches; cremaster broad, warhead like, ridgy on ventral and dorsal sides, acuted basal mass present, with a pair of thickened falcate setae and three pairs of hooked setae. Seta relatively long. Abdomen with D1 and D2 setae but 1st and 8th segments with D1 seta; SL1 seta present on 5th and SL1 and SL2 setae on 6th abdominal segments; 9th segment with D1, D2 and L1 setae.

tigrata Guenée (Tokuji, Yamaguchi, 9 vi 2001, T. Ikenoue leg.). 18 mm, dark brownish black but caudal parts of 4th–6th abdominal segments reddish yellow.

Ourapteryx Leach (Plate 30, figs 461–463; Plate 31, figs 487–489; Plate 36, figs 620–622)
Fusiform but prolonged. Head rugged and rugose; labial palpus small but prolonged; maxilla reaching near caudal margin of wing, cephalic margin steeply oblique; antenna slender, ending at caudal margin of wing; eye-piece rugous; thorax rugged and rugous; suture between pro- and mesothorax attached to antenna at medium point of suture restricting proximal margins of pro- and mesothoracic legs; spiracular callosity indistinct; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at four or five sevenths the length to caudal margin of wing, femur appearing; mesothoracic leg reaching slightly before caudal margin of wing; metathoracic leg appearing or disappearing; abdomen wrinkled, with or without some vague punctures, but 8th and/or 9th–10th segments smooth; 2nd–3rd abdominal spiracles hidden or never hidden under wing; 8th spiracle vestigial; spiracular furrow absent; scar of larval horn on 8th segment spine-like; lateral groove shallow and broad; dorsal groove with irregular lower edge; cremaster warhead shaped, basal mass absent, with four pairs of short hooked setae. First abdominal segment with D1 seta and 2nd–7th segments with D1 and D2 setae; SL1 seta on 5th segment; 8th segment with SD1, L1 and L2 setae; 9th segment with D1 and L1 setae.

Key to the species
1. Maxilla reaching slightly before caudal margin of wing; prespiracular slit distinct and raised in upper portion; prothoracic leg ending at four sevenths the length to caudal margin of wing; metathoracic leg appearing; 9th–10th abdominal segments smooth; cremaster ridgy on ventral and wrinkled on dorsal sides; very long ............2
   - Maxilla reaching caudal margin of wing; presspiracular slit indistinct; prothoracic leg ending at five sevenths the length to caudal margin of wing; 8th–10th abdominal segments smooth; rather fusiform ........................................3
2. Small tubercule present at proximal end of antenna; 1st–5th abdominal segments wrinkled but never punctate; 2nd–3rd abdominal spiracles half hidden under wing; 30 mm, brown .......................................................... nivea Butler (Mt Takao, Tokyo, 5 v 1967)
   - Small tubercule never present at proximal end of antenna; 1st–5th abdominal segments wrinkled and slightly punctate; 3rd abdominal spiracle half hidden under wing; 25 mm, brown .................................................. nomurai Inoue (Nikko, Tochigi, 5 vi 1977)
3. Sculptured eye-piece slightly roughened; upper edge of prespiracular slit flattened; punctures of abdomen small and vague; 2nd abdominal spiracle half hidden under wing; scar of larval horn on 8th abdominal segment absent; cremaster roughened and slightly rugged
with one shallow concavity at the base of dorsum; 14 mm, brown

\textit{subpunctaria} Leech (Mt Takao, Tokyo, 6 vi 1970)

- Sculptured eye-piece smooth; upper edge of prespiracular slit slightly raised; punctures of abdomen more or less large and distinct; 2nd abdominal spiracle never hidden under wing; scar of larval horn on 8th abdominal segment present; cremaster punctate, with three shallow concavities at the base of dorsum; 18 mm, brown

\textit{obtusicauda} Warren (Mt Takao, Tokyo, 28 vi 1970)

\textit{Euctenuraapteryx} Warren (in this paper, \textit{Euctenuraapteryx} is designated as a valid genus from the view of the pupal characteristics) (Plate 30, fig. 460; Plate 31, fig. 490; Plate 36, fig. 619)

Allied to \textit{Ourapteryx} Leach, but differing in the following points. Head rugous; cephalic margin of maxilla gently oblique; glazed eye-piece striated and sculptured piece rugged; antenna relatively broad, reaching tip of maxilla but never reaching caudal margin of wing; pro- and mesothorax rugous but metathorax roughened; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; upper portion of prespiracular slit heavily raised; mesothoracic leg extending to tip of maxilla; metathoracic leg appearing; abdomen rugous and with shallow punctures scattered sparsely but 9th segment smooth; dorsal groove with some small and vague notches; cremaster with three pairs of hooked setae and one pair of terminal thickened falcate setae. Chaetotaxy same as in \textit{Ourapteryx} Leach excepting for SL1 and SL2 seta on 5th segment; 9th abdominal segment without seta.

\textit{maculicauadaria} Motschulsky (Mt Takao, Tokyo, 5 v 1869). 21 mm, dull green with black streaks.

Subdivision IV-V

\textit{Descoreba} Butler (Plate 29, fig. 456; Plate 31, fig. 491)

Fusiform but somewhat bulgy. Head smooth; labial palpus small, pentagonal; maxilla reaching caudal margin of wing, cephalic margin gently oblique; antenna relatively broad, extending to tip of maxilla; eye-piece smooth with some striae; prothorax striated, meso- and metathorax smooth; sutures between pro- and mesothorax attached to antenna at medium point of sutures restricting proximal margin of pro- and mesothoracic legs; spiracular callosity dark and scabrous, not so raised; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at three fourths the distance to caudal margin of wing, femur concealed; mesothoracic leg reaching slightly before tip of maxilla; metathoracic leg concealed; abdomen with punctures scattered coarsely; 2nd-3rd abdominal spiracles appearing completely; 7th-8th spiracles vestigial; spiracular furrow absent; scar of larval proleg on 6th segment raised; lateral groove short and shallow; dorsal groove with three conspicuous notches on dorsum and a shallow excavation on subdorsum; cremaster small and massive, smooth on ventral and rugous on dorsal sides, without basal mass, with four pairs of short hooked setae. Chaetotaxy similar to that of \textit{Ourapteryx} Leach but SL1 seta lacking on 5th abdominal segment and 9th segment without seta.

\textit{simplex} Butler (Hakone, Kanagawa, 31 v 1968). 17 mm, reddish brown.

\textit{Apochima} Agassiz (Plate 29, fig. 458; Plate 31, fig. 492; Plate 36, fig. 618)

Rather ovoid. Head rugous; frons prominent at cephalic end; labial palpus minute; maxilla reaching caudal margin of wing, cephalic margin gently oblique; antenna rather slender, ending at tip of maxilla; eye-piece rugous; thorax slightly striated; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of
mesothoracic leg; spiracular callosity black, ridgy and raised; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg reaching four fifths the length to caudal margin of wing, femur concealed; mesothoracic leg extending to slightly before tip of maxilla; metathoracic leg concealed; abdomen smooth; 2nd–3rd abdominal spiracles appearing completely; 6th spiracle situated ventrad than those of the other segments; 7th–8th spiracles vestigial; spiracular furrow absent; lateral groove simple and shallow ditch; cremaster lacking, but a pair of thickened falcate setae present.

First abdominal segment with D1 seta and 2nd–8th segments with D1 and D2 setae; 4th segment with L2 seta; SL and SV setae absent; 8th segment with D1, D2, SD1, L1 and L2 setae; 9th segment without seta.

_juglansiaria_ Graeser (Mt Takao, Tokyo, 5 v 1869). 14 mm, brown but head reddish brown and 4th–6th abdominal conjunctivae black.

**Apeira** Gistl (Plate 30, fig. 464; Plate 31, fig. 493; Plate 36, fig. 601)

Short and swelling. Head smooth but faintly rugose in cephalic area; frons with acute angle between both eye-pieces on medium; labial palpus small; maxilla ending at half the length to caudal margin of wing, cephalic margin gently oblique; antenna broad and tapered at extremity, reaching tip of mesothoracic leg; sculptured eye-piece punctate; prothorax rugous, meso- and metathorax punctate; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of prothoracic leg; spiracular callosity large, dish-like, pubescent, with flattened upper surface and projected margin; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg extending three fourths the distance to caudal margin of wing, femur concealed; mesothoracic leg reaching tip of antenna; metathoracic leg appearing long; abdomen with deep punctures scattered but 9th–10th segments smooth; abdomen angled sharp on 3rd segment; 2nd–3rd abdominal spiracles appearing completely; 4th spiracle swelling; 8th spiracle vestigial; spiracular furrow absent; lateral and dorsal grooves indistinct; cremaster small, ridgy on both sides, basal mass minute, with three pairs of short hooked setae and one pair of thickened anchor-like setae. Setae very short and secondary.

**syringaria** Linnaeus (Komoro, Nagano, 28 vi 1980). 10 mm, yellowish brown with dark brown irregular striae, spiracular callosity dark reddish brown, antenna blackish brown, forewing shedding faintly aureate luster, abdominal conjunctiva white and cremaster blackish brown.

**Agaraeus** Kuzunetsov & Stekolnikov (Plate 30, fig. 465; Plate 31, fig. 494; Plate 36, fig. 602)

Closely allied to *Apeira* Gistl but frons and 3rd abdominal segment more conspicuously anglar; maxilla ending at six sevenths the length to caudal margin of wing; antenna reaching just before tip of mesothoracic leg; prothoracic leg ending just before tip of maxilla; metathoracic leg appearing minute; 6th abdominal spiracle situated ventrad than those of the other segments; lateral groove long and shallow; dorsal groove without notch; cremaster with eight or more pairs of short hooked setae and one pair of thickened hooked setae. Secondary setae present more thickly than the preceding genus.

**parvus** Heidemann (Sagaishio, Yamanashi, 19 v 1969). 10 mm, head glossy blackish brown, body pale yellowish brown, suffused with greenish tint on dorsum, spiracular callosity dark brown, forewing shedding faintly aureate luster, upper half of 2nd–3rd abdominal segment white, abdominal conjunctiva yellowish brown with black band.

**Auaxa** Walker (Plate 30, fig. 466; Plate 32, fig. 496; Plate 36, fig. 623)

Fusiform but abdomen tapered to caudal portion. Head rugged and rugous; labial palpus minute; maxilla ending at six sevenths the length to caudal margin of wing, cephalic margin
nearly horizontal; antenna slender, reaching just beyond tip of mesothoracic leg; eye-piece rugged; thorax rugged; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity absent; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending four fifth the length to caudal margin of wing, femur concealed; mesothoracic legs reaching slightly before tip of antenna, meeting on meson at extremity; metathoracic leg appearing long; abdomen rugous; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; several longitudinal vermicular ridges present on cephalic margin of 5th–7th segments; lateral groove shallow and broad; dorsal groove with irregular vague edge; cremaster warhead shaped, wrinkled, basal mass absent, with four pairs of short hooked setae. D1 and D2 setae on 2nd–7th abdominal segments but D1 seta on 1st segment; SL and SV setae absent; 8th segment with SD1 and L1 setae.

* sulphurea* Butler (Mt Takao, Tokyo, 5 v 1969). 13 mm, pale green.

**Ennomos** Treitschke (Plate 32, fig. 497; Plate 36, fig. 626)

Fusiform but frons protruded. Head rugged and rugous; labial palpus minute; maxilla ending at five ninths the length to caudal margin of wing, cephalic margin nearly horizontal; antenna slender, extending to caudal margin of wing; thorax rugged; suture between pro- and mesothorax attached to antenna at slightly cephalic point of suture restricting proximal margin of prothoracic leg; spiracular callosity indistinct; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic legs reaching seven ninths the length to caudal margin of wing, meeting on meson beyond tip of maxilla, femur concealed; mesothoracic legs extending slightly before caudal margin of wing, meeting on meson beyond tip of prothoracic leg; metathoracic leg appearing; abdomen rugous, 9th segment with vertical striae; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow with slightly vermicular ridges in which punctures exist among ridges; lateral groove shallow and trigonal; dorsal groove with indistinct notches; cremaster prolonged and wrinkled, without basal mass, with two pairs of normal setae and two pairs of robust short hooked setae. Seta relatively long. Abdomen with D1 and D2 setae but 1st segment with D1 seta only; L2 and SL1 setae present on 4th segment; SL1 and SL2 setae present on 5th segment and SL1 seta on 6th segment; 9th segment with D1, D2, SD1 and L1 setae.

* autumnaria* Werneburg (Hakone, Kanagawa, 7 vii 1968). 25 mm, dusty yellowish brown.

**Cystidia** Hübner (Plate 30, figs 467–469; Plate 32, figs 498–499; Plate 36, figs 624–625)

Fusiform but prolonged. Head smooth, a pair of small tubercules at medio-cephalic end of frons; labial palpus small; maxilla reaching slightly before caudal margin of wing, cephalic margin gently oblique; antenna slender, extending to just beyond caudal margin of wing; eye-piece smooth; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; spiracular callosity black, semi-circular, scabrous and pubescent, slightly raised; hindwing hidden under forewing at spiracle level of 4th abdominal segment; prothoracic leg ending at three fourths the distance to caudal margin of wing, femur concealed; mesothoracic leg reaching just beyond tip of maxilla; metathoracic leg appearing largely; abdomen smooth but 4th–7th segments with small shallow punctures scattered in cephalic portion; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow indistinct; scar of larval proleg on 6th segment protruded; lateral groove long, caudal edge swelled; dorsal groove with many irregular notches; cremaster broad, warhead like, ridgy on ventral and wrinkled on dorsal sides, basal mass absent, with four pairs of hooked setae. Seta relatively long. Abdomen with D1 and D2 setae but 1st segment with D1 seta; SL1 and SL2 setae present on 5th and 6th segments and SL1 seta on 7th segment; 9th segment with
D1, D2 and L1 setae.

**Key to the species**

1. Frons tubercule conspicuous; mesothoracic leg extending to tip of maxilla; caudal edge of lateral groove swelling ........................................ 2
   - Frons tubercule not so conspicuous; mesothoracic leg extending to just beyond tip of maxilla; caudal edge of lateral groove not so swollen; 18 mm, head, thorax and its appendices, and caudal portion of abdomen black, abdomen creamy yellow with large black markings on dorsum, subdorsum, laterum, subventrum and ventrum ........................................... *stratonice* Stoll (Meguro, Tokyo, 28 v 1950)

2. Frons tubercule divided at centre; cremaster more or less long; 17 mm, pale reddish yellow, black stripes on thoracic appendices, thorax and abdomen with large black markings on dorsum, laterum and subdorsum; 4th–6th abdominal conjunctiva black ........................................... *couaggaria* Guenée (Meguro, Tokyo, 3 v 1950)
   - Frons tubercule not divided at centre; cremaster broad; 18 mm, pale yellow; some black patches on head and thorax, abdomen with small black patches on subdorsum, laterum and subventrum ........................................... *truncangulata* Wehrli (Mt Takao, Tokyo, 1 v 1968)

**Appendix**

**DESMOBATHRINAE**

*Eumelea* Duncan (Plate 39, figs 651–653)

Prolonged. Somewhat feeble. Head slightly flattened, smooth, with a pair of knobs which combine at base; frontal suture scarcely visible; labrum swollen; labial palpus small, pentagonal; maxilla very long, reaching 9th abdominal segment, cephalic margin steeply oblique; antenna slender, ending slightly beyond tip of maxilla; eye-piece smooth; thorax smooth; suture between pro- and mesothorax attached to antenna at a point of suture restricting proximal margin of mesothoracic leg; prothoracic leg reaching 5th abdominal segment, femur never exposed; mesothoracic leg ending slightly before tip of maxilla; metathoracic leg concealed; wing slender; hindwing hidden under forewing at spiracular level of 4th abdominal segment; abdomen smooth; 2nd–3rd abdominal spiracles appearing completely; 8th spiracle vestigial; spiracular furrow comprising a pair of adjoined shallow trigonal cavities; lateral groove disappearing; dorsal groove appearing but never possessed notches; cremaster flabellate, separated two pairs pieces at caudal margin, with four pairs of hooked setae. Setae long excepting D setae; head with F1, A1 and A2 setae; pro-, meso- and metathorax each with D1 and SD1 setae; 1st abdominal segment with D1 seta, 2nd–7th segments with D1 and D2 setae and 8th segment with D2 seta; 2nd–8th segments with SD1 setae; 4th–8th segments with L1 setae; 5th–7th segments with L2 and SL1 setae.

*biflavata* Warren (Kochinda, Okinawa, 15 vi 2002, S. Tominaga leg.). 23 mm, white but inclining to pale brown on head and caudal end of body.

Notes: Pupa of *Eumelea* Duncan shows an unusual feature for the Geometridae as the appendices of head and thorax extend free for a considerable distance beyond caudal margin of wing, showing intermediate characteristics between *Ozola* Walker and *Naxa* Walker. Then the subfamily position of this genus should be determined in a further study.
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References

Igarashi, S., 1984. The classification of the Papilionidae mainly based on the morphology of their


References


1990. Description of the pupa of Cassyra deletaria Moore (Geometridae). Yugato 121: 123-
References


References

129

Japanese).


——— 1959. On the larva and pupa of Comma tarcha palaeseema Meyrick, with its biological notes (Lepidoptera, Carposinidae). Kontyû 27: 214–217, pl. 14


要旨

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日本産シュガ科204属295種の亀を探査的に分類した。取り扱ったものはおおむね自然群産する亀科に属するが、いわゆるフエシュガ亜科（Alosophilinae）を含む3属については、亀の形態上エダシュガ亜科と差異が認められないので、ここではエダシュガ亜科を含めた。亀は種間の差異が軽微で固有の特徴や変異と区別がつけにくく、識別に困難なことが多いため、記載は属についてのみ行ない、種はそれぞれの属の下に検索表を掲げることにした。

亀の亀のなかでシュガ科亀の亀は腹部でL1刺毛が晴間の尾方におあり、SD2刺毛が欠如すること、小脇稜が現われないこと、下脇稜が現われないこと、外見が極小であること（カバシュガ亜科を除く）、ほとんどどの属で尾刺毛を有すること、尾眼を限った錦の下端が前脚と接すること等により容易に区別出来る。

シュガ科の亀は属によって刺毛式が著しく異なっており、分類上最も重要な標識となる。その根拠はシュガ亜科の一部を除き、主として刺毛式の差異に基づいて分類を行なった。亀の刺毛式は幼虫のそれと全く同一であり、両者の演変は演変が著しく変化していることからみて、亀は自然群産する亀科に属しており、比較的長期間刺毛の同定は不可能であった。なお刺毛式による分類はシャガ亜科、近縁のカバ亜科上科でも容易に行える。

本科の分類で刺毛式以外の外部標識も併せ用いているが、これら外部標識のうちのものをは、従来用意用されたMosh（1916）等の用法に誤りや不十分な点が認められたので、ここではそれを訂正の上使用している。なお鰓化、特に鰓の頭部が幼虫のそれに変化したかについてもここに記しておいたが、それらについては中村（1987d）に詳述してあるので御覧頂きたい。

シュガ科は現在7亜科（フエシュガ亜科を除く）に分けられている。現在これらの亜科を刺毛式のみで識別する試みも成功していき、亜科を分類したDivision毎に区別することは可能であり、その検索表を掲げた。このDivisionおよびその下位単位としてのSubdivisionは本文で仮に設定したものであるが、これらの演変を設けることにより亀科内における亜属、亜属の類縁関係を極めて明確なことが可能となった。

シュガ科の亀はその外部形質と鰓化習性とがよく一致している。大部分のものは地上で葉を摂るか捜ちなどの間に縄目を織ってその中に鰓化するが、エダシュガ亜科の一部のものなどは土中に潜って鰓化する。鰓の発育については第5腹節側面の気門前方に気門溝と称する異形の溝があり、尾刺毛は鰓状に二重になる。前後に鰓化溝がない、尾刺毛は数対の鰓毛ととなる。

鰓の位置の変化については不明で、Edmons（1974）は甲虫の胸で微小な土粒子などが気門に入るものを防ぐ為の機能としているがこの説明は現状で模倣している。尾刺毛の形状の土中に鰓化のものか土塊埋もは土中に埋めつける、尾刺毛の鰓の発育するものを織りに絡めるなどして鰓化の安定化させる機能として変化したもののと考える。また一般に土中に鰓化する亀では体表の刺毛数が少なくなる傾向があるが、これは直接外部から触覚を受けることが少ないからではないかと考えられる。

シュガ科の亀は、この表の如く刺毛のみでDivision毎に分類することが可能である。

（亀亜科名の後につける括弧内のローマ数字はDivisionを示す）

1. 第1腹節に1本の刺毛を有する .......................... 3
   - 第1腹節に刺毛を欠く、もし有する場合は1本である .......................... 2
2. 前頭にF刺毛を有する .................................. Sterrhinae (I)
   - 前頭にF刺毛を欠く .................................. Sterrhinae (II)
3. 第5-7腹節にそれぞれ1本のD刺毛を有する、もし有する場合は1本である .......................... 4
   - 第5-7腹節にそれぞれ2本のD刺毛を有する .................................. Larentiinae (I)
   - 第9腹節にD刺毛を有する .................................. 5
4. 第2-3腹節に夫々D刺毛を有する .......................... Ennominae (I)
第2-3腹部に夫々D1刺毛がある

6. 腹節にSV刺毛を有しない

7. 前胸にFおよびAf刺毛を有する

8. 腹節にSL刺毛を具える。もし欠く場合は第5腹節のL1とL2刺毛が互いに斜に位置する

9. 第8腹節にD刺毛を有する

10. 前胸に1本の刺毛を具える

11. 第1-4腹節にそれぞれ2本のD刺毛を具える

12. 腹節にSV刺毛を有する

13. 前胸に2本の刺毛を有する

14. 第4腹節にSL1刺毛を有する；第1腹節に2本の刺毛を具える

15. 第1腹節に1本の刺毛を有する

カバシシケ亜科 (Archiearinae)

ヤサ科の鈎などにみられる大形の小腹を現す点シクガ亜科としては特異なものである。しかし前、中、後胸の刺毛数が2-2-2, 3-3-3または5-3-3であるヤサ科の鈎と同形刺毛数が2-3-3であるので識別は容易である。

Archearis属の2種、parthenias Linnaeusとnotha Hübnerとを記載した。

フリショウ亜科 (Oenochrominae)

Naxa属のみ検した。

刺毛が極めて多く、気門腹部がこんと突出し、その上に多数の棘毛を生ずるので直ちに判別出来る。

ホソシシケ亜科 (Desmobathrinae)

Ozola属を検したのみである。本属は前亜科とは逆に刺毛が著しく少ない。細長く、第5腹部以下が幅狭く。(Eumelea属を追記した。)

アオシシケ亜科 (Geometrinae)

25属を調べ得た。これらは4Divisionに分けられ、それぞれのDivisionは2Subdivisionに分割されたが、その関係は文中に示した。

次に属までの検索表を示す。

1. 腹節にSV刺毛を欠く ...........................................(Division I) 2

2. 前胸刺毛は1本；第5-8腹節のL刺毛は互いに斜に位置する (Subdivision I-II) Pingsasa Moore

3. 胸部刺毛を欠く；尾突起は小さく数十かの微小な刺状刺毛を生ずる

4. 胸部刺毛にL刺毛を生ずる；第1-8腹部のD1とSD1間に1本の過剰刺毛を有する；第7-8腹部の気門が退化する；尾突起に1本の刺状刺毛を具える .................................................. Dindica Moore

Pachista Prout
5. 前胸気門は隆起する；中脚の基部は後胸の位置から現われる。（Division IV）
- 前胸気門は隆起しない；中脚の基部は中胸の位置から現われる；触角は短い
6. 前胸刺毛は1または2本；第5腹節の2本のL刺毛は互いに縦に位置する。もし斜に位置する場合
は前胸刺毛が1本。（Division II）
7. 前胸刺毛は2本；第5腹節の2本のL刺毛は互いに斜に位置する。（Division III）
8. 前胸刺毛は2本；第5腹節の2本のL刺毛は互いに斜に位置する。（Subdivision II-I）
9. 前胸刺毛は2本；第5腹節の2本のL刺毛は互いに斜に位置する。（Subdivision II-II）
10. 粗眼部は著しく粗；触角は翅の尾縁に達しない；第6腹節気門は他の腹節の気門より腹方に位置す
る；第4腹節にL2刺毛を欠く；腹部に微線を散布する。Araçina Butler
11. 粗眼部は平滑；触角は翅の尾縁に達する；第6腹節気門は通常の位置にある；第4腹節にL2刺毛
を有する；腹部は平滑または微小な点刻を散布する。Geotoma Linnaeus
12. 腹部は粗；小脛と中脚とは翅の尾縁に達しない；第8腹節にD刺毛を欠く；第5腹節に1本
のSV刺毛を有する。Geotoma Linnaeus
13. 头部は粗；小脛と中脚とは翅の尾縁の直前に達する；第8腹節にD刺毛を欠く；第5腹節に3
本のSV刺毛を有する。Tanaorchius Butler
14. 大脛と触角とは翅の尾縁に達する；前胸と中胸の間の縫線は前脚の基部を限る縫線の尾方で触
角と接する；第8腹節にD刺毛を欠く；第4.5および第8腹節で2本のL刺毛が互いに縦に位置す
る。Megalochela Meyrick
15. 大脛と触角とは翅の尾縁を僅かに超える；前胸と中胸の間の縫線は前脚の基部を限る縫線で触
角と接する；第8腹節にD刺毛を欠く；第4.5および第8腹節で2本のL刺毛が互いに斜に位置す
る。Mixochola Warren
16. 小脛は中脚先端の直前に達する；腹部には微線を散布する；第4腹節にSD1刺毛を有する
Eucylcudes Warren
17. 小脛は中脚先端に達する；腹部は平滑；第4腹節にSD1刺毛を欠く。Neophipparches Inoue
18. 头部に突起がない；前胸にD1およびSD1刺毛を欠える。Af刺毛は触角近くに位置する
(Taxonomy III-I）
19. 翅の基部は膨れる。前脚脛節は小さく現われる。第6腹節の気門は通常の位置にある。第5腹節
に1本のSV刺毛を有する。幼虫の尾端部は著しく隆起し、多数の棘状刺毛を有する
Maxates Moore
20. 触角の基部は膨れる。前脚脛節は小さく現われる。第6腹節の気門は通常の位置より腹方にある；第
5腹節に2本のSV刺毛を有する。幼虫の尾端部は膨し、刺毛を生じない
Jodis Hübner
21. 尾突起には9対の棘状毛を有する。Hemistola Warren
22. 尾突起には4対の棘状毛を有する。Hemistola Warren 近似の命名されていない属

触角基部は膨れる。後翅は第4腹節の気門位置で前翅下に隠れる。第5腹節に2本のSV刺毛を有
する。Rhomborista Warren
23. 触角は翅の外縁に達する。左右の中脚は先端部分で相和しない。前脚先端に現する

触角は翅の外縁のやや手前で終わる。左右の中脚は先端部分で相和する。前脚先端は鈍い

中脚は翅の外縁の直前に終わる。中脚の背面は平滑。Idiocola Warren
24. 胸部背面は著しく平滑；触角は中脚先端に達する。後翅は翅端に隠れる。Culpinia Prout
- 胸部背面はやや平滑；触角は中脚先端を超える。後翅は翅端に現われる

Summary in Japanese: 133
22. 左右の中脚は中央で相会する；D 剌毛は第 1-4 腹節でそれぞれ 1 本であるが、第 5-7 腹節ではそれぞれ 2 本；第 5 腹節に 3 本の SV 剌毛を観える；第 4 腹節に L2 剌毛を有する ................. 23
- 左右の中脚は中央で相会しない；D 剌毛は第 1-8 腹節でそれぞれ 1 本；第 5 腹節に 2 本の SV 剌毛を観える；第 4 腹節に L2 剌毛を有しない .................. Comostyla Meyrick
- 前気門裂溝は大きく開口し、著しく隆起する；第 5 腹節に SV 剌毛を観える ..... Comibaena Hübnern
- 前気門裂溝は盛上がる；第 5-8 腹節に SV 剌毛を観える .................. Thetidia Boisduval

*1 蝟の形態下 tenuillinea Alpheraky を Hemistola 属とは別属として扱った。

ヒメシアク亜科 (Sterrhinae)

12 属の蜷を検した。
1. 紡錘形；前頭に F 剌毛を観える；第 9 腹節に刺毛を欠く；背溝および側溝を有する ............... (Division I) 2
- 円筒形；前頭に F 剌毛を欠く；第 9 腹節に刺毛を観える；尾刺毛は 4 対；背溝および側溝を有するものと有しないものとある .................. (Division II) (Cosymbiini) 9
2. 尾突起は 3 本の釣刺毛を有する；第 4-7 腹節に D2 剌毛を生ずる

(Subdivision I) (Sterrhini) Idaea Treitschke
- 尾突起は 2 または 3 本の釣刺毛を有する；第 4-7 腹節に D1 剌毛を生ずる .......... (Subdivision II) 3
3. 第 8 腹節の刺毛は 3 または 5 本；後翅は第 2 または 3 腹節で前翅下に隠れる。もし第 4 腹節で隠れる場合は第 8 腹節の刺毛は 3 本 .................. (Rhodostrophini) 4
- 第 8 腹節の刺毛は 4 本；後翅は第 4 腹節で前翅下に隠れる .................. (Scopuliini) 6
4. 小腿は前脚を僅かに超え、左右の中脚は先端で相会する；前胸と中胸との間の縦線は小腿と前脚の基部との間の縦線の位置で触角と接する；側溝は常態；D の過剝刺毛を欠き；SL 刺毛を有する .............. 5
- 小腿は前脚を僅かに超え、左右の中脚は先端で相会しない；前胸と中胸との間の縦線は小腿と前脚の基部を限る縦線の尾の位置で触角と接する；側溝は弱い；D の過剝刺毛を有する；SL 剌毛を欠く .................. Pylargosceles Frout
5. 後翅は第 2 腹節のやや尾方で前翅下に隠れる；第 2-4 腹節に点刻列を有しない；第 5-7 腹節は頭部のみ点刻を散布する；第 8 腹節には D 刺毛を観え、1 本の SL 剌毛を有する Dilhodes Warren
- 後翅は第 4 腹節で前翅下に隠れる；第 2-4 腹節は頭部に沿って点刻列を観える；第 5-7 腹節は全体に点刻を散布する；第 8 腹節は D 刺毛を欠き、SL 剌毛を欠如する .......... Organopoda Hampson
6. SL1 剌毛を欠く；刺毛は長い；気門隆部状は頑著 .................. 7
- 第 5-8 腹節に SL1 刺毛を有する；刺毛は短い；尾刺毛は 4 本；気門隆部状は頑著でない ............... Scopula Schrank
7. 第 2-7 腹節に点刻を散布する；尾刺毛は 3 本 .................. Somatina Guenée
- 第 1-8 腹節に点刻を散布する；尾刺毛は 1 本 .................. 8
8. 前胸と中胸との間の縦線は中胸の基部を限る縦線の位置で触角と接する；気門隆部状は大きい；後脚は現われない .................. Antitygodes Warren
- 前胸と中胸との間の縦線は前脚と中脚基部の間の位置で触角と接する；気門隆部状はそれほど大きくない；後脚が現われる .................. Proplepis Lederer
9. 前頭には 1 本の鈍角、互いに融着し、先端に多数の微小な鈍刺毛を有する突起を有する；中胸には小溝がある；後翅は第 1 または第 4 腹節で前翅下に隠れる；側溝および背溝を欠く；腹節の D 剌毛は 2 本 .................. 10
- 前頭にはその様々な突起がない；中胸の頭側角には 1 本の小溝がある；後翅は第 4 腹節で前翅下に隠れる；側溝および背溝はあるが明瞭ではない；腹節の D 剌毛は 1 本 .................. 11
10. 後翅は第 1 腹節で前翅下に隠れる；前脚は小脚先端の鈍角手前で終わる；前脚の腿節が現われる；第 7 腹節気門は常態；第 5 腹節に SL1 剌毛を有する；前脚刺毛は 3 本 ........ Cyclophora Hübner
- 後翅は第 4 腹節で前翅下に隠れる；前脚は小脚先端の直接に終わる；前脚の腿節は現われない；第 7 腹節気門は退化する；第 5 および第 6 腹節に SL1 剌毛を有する；前脚刺毛は 2 本 .................. Perizera Meyrick
11. 前頭の突起は互いに先端迄融着する；左右の中脚先端は中央で相会しない；尾突起は先端に鈍刺毛を有する；中、後胸の刺毛は 2 本；第 9 腹節の刺毛は 1 本 ............... Traminida Saalmüller
- 前頭の突起は互いに先端で分離する；左右の中脚先端は中央で相会する；尾突起の鈍刺毛は互いに
離れた位置から生ずる；中、後胸の刺毛は3本；第9腹節の刺毛は5本。…Timandra Duponchel

ナミシャク亜科 (Larentiinae)
1. 中胸には2本の刺毛を具える、もし3本の場合には前胸腿節は現われない……2
2. 中胸には3本の刺毛を具える；前胸腿節が現われる…………………………(Division III) 21
3. 第1-3腹節にはそれぞれ1本のD刺毛を具える……………………………(Division I) 3
4. 第1-3腹節にはそれぞれ1本のD刺毛を具える……………………………(Division II) 13
5. 第4-7腹節にはそれぞれ1本のD刺毛を具える……………………………(Subdivision I-II) 4
6. 第4-7腹節にはそれぞれ2本のD刺毛を具える……………………………(Subdivision I-I) 10
7. 前脚腿節は現われない；後翅は第2または第3腹節で前翅下に隠れる；第7-第8腹節の気門は退化する；第4腹節にSL1刺毛を有する…………………………5
8. 前脚腿節が現われる；後翅は第4腹節で前翅下に隠れる……………………7
9. 紡錦形；下唇鱗は現われない；触角基部の間の副前頭縫線を欠如する；第8腹節にD刺毛はない…………………………………………………………………………………………Otioptera Warren
10. 紡錦形；下唇鱗は小さく現われる；触角基部の間の副前頭縫線は存在する；第8腹節にD刺毛がある…………………………………………………………………………6
11. 中脚は小観先端に達する；背鱗は不明瞭；第9腹節に2本の刺毛を有する……Sauris Walker
12. 中脚は小観端部に達する；背鱗は明瞭；第9腹節に刺毛を有しない…………Epistrea Warren
13. 第4腹節にSL1刺毛がある；第5腹節に刺毛がない；尾刺毛は2または3本…………Xanthorhoe Hübner
14. 第4腹節にSL1刺毛がない；第5腹節に1本の刺毛がある；尾刺毛は4本…………8
15. 比例細長；第3腹節の気門は翅の下に隠れる；第8腹節の気門は退化する；尾突起の末端毛は鈍状…………………………………………………………………Loebogonodes Bastelberger
16. 紡錦形；第3腹節の気門は現われず；第7および第8腹節の気門は退化する；尾突起の末端毛は鈍状…………………………………………………………………9
17. 前脚腿節は現われず；後脚が現われる；第6-8腹節の気門は退化する………Anticollis Prout
18. 前脚腿節は現われず；後脚は現われず；第7-8腹節の気門は退化する………Collix Guenée
19. 第3腹節の気門は半ば現われる；第8腹節の気門は退化する；尾突起には2本の鈍状毛を具える……第8腹節の刺毛は2または3本…………Tyloptera Christoph
20. 第3腹節の気門は翅の下に隠れる；第7-8腹節の気門は退化する；尾突起は3本の鈍状毛を具える；第8腹節の刺毛は4本………………11
21. 下唇鱗は現われず；尾突起は1本の鈍状毛を具えるか具えない…………12
22. 下唇鱗は現われず；尾突起は2本の刺毛を具える…………Trichopteridia Hampson
23. 尾突起には1本の鈍状毛がある…………………………………………………12
24. 尾突起には鈍状毛がある………………………………………………………11
25. 尾突起には鈍状毛がない………………………………………………………11
26. 第8腹節の刺毛は4本かそれ以下；第9腹節に1本の刺毛を有するか刺毛を有しない…………………………………………………………………(Subdivision II-I) 14
27. 第8腹節の刺毛は6本；第9腹節に3または4本の刺毛を有する…………18
28. 前脚腿節は現われず；第3腹節の気門は翅の下に隠れる；尾突起は鈍状毛を具える…………15
29. 前脚腿節は現われる；第3腹節の気門は露出する；尾突起は鈍状毛を具えない…………16
30. 尾突起は1本の鈍状毛と3本の鈍状毛を具える……………………………Hydromena Hübner
31. 尾突起は3本の鈍状毛を具える…………………………………………………Idiotephria Inoue
32. 小鱗は翅の外縁迄の長さの半分で終わる…………………………Operoptera Hübner
33. 小鱗は翅の外縁の直前に達する…………………………………………………17
34. 前胸と中胸の間の縫線は中脚の基部を限る縫線のやや頭方で触角と接する；左右の中脚は中央で相合しない；第3-4腹節の気門は翅の下に隠れる……Epirrita Hübner
35. 前胸と中胸の間の縫線は中脚の基部を限る縫線の位置で触角と接する；左右の中脚は中央で相合する；第4腹節の気門は現われる……………………………Nothoporinia Inoue
36. 第8腹節の気門は退化する；第6-7腹節に2本のまたは5および第8腹節に1本のSL刺毛を有する；第9腹節の刺毛は5本……………………………19
37. 第6-第8腹節の気門は退化する；第6-7腹節に1本のSL刺毛を有する…………20
38. 第8腹節の点刻を散布する；尾突起の末端毛は鈍状；第6-7腹節に2本のSL刺毛を有する……………Pseudostegania Butler
- 第8腹節は点刻を散布しない；尾突起の末端毛は鈍状；第6-7腹節に1本のSL刺毛を有する

- Lacinioides Warren

20. 後翅は第2腹節で前翅下に隠れる；尾刺毛は4本；第9腹節の刺毛は3本… Trichodesia Warren
- 後翅は第4腹節で前翅下に隠れる；尾刺毛は3本；第9腹節の刺毛は4本… Trichobaptia Prout

21. 前胸は5本の刺毛を具える；小脇と触角とは翅の外縁を遙かに越える；尾突起は二叉する；第5-6腹節にはSV1とSV2刺毛を、第7腹節にはSV1刺毛を具える

(Subdivision III-III) Aplocera Stephens
- 前胸は3または4本の刺毛を具える；小脇と触角とは翅の外縁をそれ程越えることはない；尾突起は鈍状毛を具える

22. 触角基部の間に副前頭縫線を欠く；第9腹節に3本またはそれ以下の刺毛を有するか刺毛を有しない

(Subdivision III-I) 23
- 触角基部の間に副前頭縫線が現われる

23. 第4腹節にSL1刺毛を欠く
- 第4腹節にSL1刺毛を生ずる

24. 前胸に3本の刺毛を有する；第1腹節に1本の刺毛を具える；第6腹節に3本のSV刺毛がある

- 前胸に4本の刺毛を有する；第1腹節に2本の刺毛を具える；第6腹節に2本のSV刺毛がある

25. 第5腹節に2本、第6腹節に1本のSV刺毛を具える
- 第5腹節に1本、第6腹節に3本のSV刺毛を具える

(Eucosmabrañas Prout
- 後脚は現われず；第5-6腹節の翅間部には多数の不規則な隆起溝を具える Eulithis Hübner
- 後脚が現われる；第5-6腹節の翅間部には前属の如き隆起溝はな

27. 触角は中脚の先端で終わる
- 触角は中脚の先端直前に終わる

28. 第5腹節にSV1刺毛がある
- 第5腹節にSV1とSV2刺毛がある

29. 前胸に4本の刺毛を有する；第1腹節に2本の刺毛を具える
- 前胸に2本の刺毛を有する；第1腹節に1本の刺毛を具える；第6腹節に3本のSV刺毛を生ずる

Calleulype Warren

30. 第9腹節に刺毛を有する
- 第9腹節に刺毛を有しない

31. 第4腹節にSL1刺毛を生ずる
- 第4腹節にSL1刺毛を生じない

32. 後胸に3本の刺毛を有する；第6-8腹節にV刺毛を欠く
- 後胸に4本の刺毛を有する；第6-8腹節にV刺毛を有する

Distroma Hübner
- 後胸と腹節とに點刻を散布する；背溝に1個の切れ込みがある

33. 細長；前脚の腿節は膨らまない；第5-7腹節にSV刺毛を具える
- 太い；前脚の腿節は膨らむ；第5-7腹節にSV刺毛を欠く

Heterothera Inoue
- Eosi Hübner

34. 腹節に1本のD刺毛 (D1) を有する
- 腹節に2本のD刺毛（D1およびD2）を有する

35. 第1-7腹節に点刻を散布する；背溝に3個の切れ込みがある

Chloroclystis Hübner
- 後胸と腹節とに点刻を散布する；背溝に1個の切れ込みがある

36. 第9腹節に5本の刺毛を具える
- 第9腹節に2本の刺毛を具える

Eupithecia Curtis
- Asthen a Hübner
- 7-8腹節の気門が退化する；第9腹節に1本の刺毛を具える

Hydrelia Hübner

38. 気門溝を有する
- 気門溝を有しない

39. 第2-3腹節にD2刺毛を欠く
- 第2-3腹節にD2刺毛を有する

40. 第4腹節にD1刺毛を有する；第4, 5, 6, 7腹節にSL1刺毛を具える；第2-3腹節で平滑

- 第4腹節にD1とD2刺毛を有する；第4, 5, 7腹節にSL1刺毛を具える；第2-3腹節に点刻を散布する

Philerema Hübner

- Rheumaptera Hübner
41. 第4腹節にL1刺毛を有する；尾突起は翅頂近くに現われる；第5腹節にSV1刺毛を有する

- 第4腹節にL1刺毛を欠く；尾突起は第4腹節で前翅下に隠れる；第5腹節にSV1刺毛を欠く

Triphosa Stephens

Telenomeuta Warren

42. 第6腹節に4本の刺毛を具える

- 第6腹節に3本の刺毛を具える

Melanthis Duponchel

Photoscotostia Warren

エダシヤク亜科 (Ennominae)

1. 第4-7腹節に1本のD刺毛を生じる

- 第4-7腹節に2本のD刺毛を生じる

2. 第4-7腹節にD2刺毛を生じる；SL刺毛を欠く；尾突起は二叉する

- 第4-7腹節にD1刺毛を生じる

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3. 第8腹節に2本の刺毛を有する

- 第8腹節に3本またはそれ以上の刺毛を有する

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4. 中脚は前脚と同様；二叉した刺毛は尾突起より短い

- 中脚は前脚より長く；二叉した刺毛は尾突起より長い

5. 気門溝の形状は楕円形

- 気門溝の形状は複雑

6. 気門溝の形状は単純な楕円形

- 気門溝の形状は楕円形であるがやや複雑

7. 気門溝の形状は単純な卵形

8. 気門溝の形状は卵形で上縁に歯状の切れ込みを有する

9. 左右の前脚と中脚とはそれぞれ先端が中央で相合する；前脚の腿節は現われず；尾突起は側線を具える

- 右右の前脚と中脚とはそれぞれ先端が中央で相合しない；前脚の腿節は現われる；尾突起は側線を具えない

Acrodontis Wehrli

10. 竜突起は基部線を具える

- 尾突起は基部線を具えない

Ectopsis Hübner

Abacicus Butler

11. 後脚には多少とも点刻がある；側溝を欠く

- 後脚には点刻がない；側溝を有する

Aethalura McDunnough

Milliona Walker

12. 前脚腿節は現われない

- 前脚腿節は現われる

Diplurodis Warren

Pharerothryis Warren

13. 前胸と中胸との間の縫線は前胸を限る縫線の位置で触角に接する；尾突起は第4腹節腿節で前翅下に隠れる

- 前胸と中胸との間の縫線は前胸を限る縫線の尾方で触角に接する；尾突起は第4腹節の気門位置で前翅下に隠れる

14. 後脚は現われない

- 後脚は現われる

Cleora Curtis

15. 尾突起は基部線を具える

- 尾突起は基部線を具えない

Satoblephara Holloway

Ascots Hübner

16. 気門溝は内側に多くの隆起のある楕円形

- 気門溝は内側に多くの隆起のある楕円形

Pseuderaniss Inoue

17. 気門溝は内側に多くの隆起のある楕円形

- 気門溝は内側に多くの隆起のある楕円形

18. 前脚腿節は現われる

- 前脚腿節は現われない

19. 中脚は翅の外縁の直前に達する；尾突起に側線を有しない

- 中脚は翅の外縁に達する；尾突起に側線を有する

Alcis Curtis

Protooarmia McDunnough

20. 眼部域は粗；尾突起に側線を有する

- 眼部域は平滑；尾突起に側線を有しない

Percnia Guenée
21. 左右の触角は先端において中央で相会する；側溝および背溝は現われない；尾突起は基部瘤を具え
   する。........................................... Rikiosatoa Inoue
   - 左右の触角は先端において中央で相会しない；側溝および背溝は現われる；尾突起は基部瘤を具える
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61. 性的二形を示す；頭部に F および AF 刺毛を欠く；小腿は半分が細長い；前脚の腿節は現れ
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- 第2-3腹節にD1刺毛を生ずる
- 第2-3腹節にD1刺毛を生ずる
- 第2-3腹節にD1刺毛を生ずる

82. 円筒形。気門隆状部は鎧隆起する：左右の中脚先端は中央で相会しない；側溝は短く切れ込む
- コリンマガ Waker
- シロアゲガ Moore

83. 尾突起は二叉する。もし二叉しない場合は第5腹節に気門溝を欠く
- 第8腹節に2本の刺毛を有する
- 第9腹節に刺毛を欠く

84. 前胸と中胸との間の縫線は前脚基部を限る縫線の位置で触角を接する。小腹の側縫は縫やかに傾斜する
- 前脚の腿剣は丸まる
- 第1腹節にD2刺毛がない
- 前脚と中胸との間の縫線は前脚基部を限る縫線のやや尾方に触角を接する
- 前脚の脚剣は丸まる

85. 気門隆状部は大きい。触角は割合幅広い。尾殻は第4腹節の外縫近くで前翅下に隠れる
- 第5-7腹節に刺毛を欠く
- 第9腹節に刺毛を欠く

86. 頭部は小さく現われる。気門溝中に刺毛を生じない。尾突起は棘状の二叉刺毛を有する
- 第5腹節にSD2刺毛を有する
- 第5腹節に2本の刺毛を欠く

87. 触角は幅広。側溝は不明瞭。胸部に3本の刺毛を有する
- 腹部刺毛は刺毛
- 第1腹節にD2刺毛を有する

88. 気門溝を欠く。SV刺毛を有しない。第8腹節に3本の刺毛がある
- 尾突起は3本の触状刺毛を欠く

89. 前脚の腿剣が現われる。気門溝が凸凹している
- 尾突起は4本の刺毛を欠く
- 第2および第3腹節にD1刺毛を有する

90. 前脚と中胸との間の縫線は前脚基部を限る縫線の位置で触角を接する
- 第8腹節に3本の刺毛を有する
- 第9腹節に刺毛を欠く

91. 前脚の脚剣が現われる。第5-7腹節に気門溝を欠く
- 第1-3腹節にD1刺毛がある

92. 前脚の腿剣が現われる。SV刺毛を欠く
- 前脚の腿剣は現われない

93. 第2-7腹節は点刻を帯びる
- 第2-8腹節は点刻を帯びる

94. 触角は翅の外縫に達する
- 触角は翅の外縫に達する

95. SD1およびL2刺毛は上関板にある
- SD1およびL2刺毛は下関板にある

96. 前胸と中胸との間の縫線は前脚基部を限る縫線の尾方に触角を接する。前脚腿節はごく小さい
- 前胸と中胸との間の縦線は前脚基部を限定縦線の位置で触角と接する; 前脚腿節はかなり大き

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111. 中脚は翅の外縁に達する; SL 剃毛を欠く .................................... Euryobeidia Wehrli  
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116. 頭部は突出する; 第 1-8 腹節は平滑; 背溝は単純; 尾突起は小さく、1 本の太い刺状刺毛を具える  
- 頭部は小さい; 第 1-8 腹節は点刻を帯び; 背溝には明瞭な切り込みがある; 尾突起は球状で、1 本
の鋸状刺毛と1本の錐状刺毛を具える。Descoreba Butler

117. 小腿は翅の外縁近く迄達する；第4-7腹節は少しく点刻を帯びる；気門隆状部は明瞭；背溝は明瞭；左右の中脚は中央で相会しない；第5-7腹節にSL刺毛を生じる。Cystidia Hübner

*小腿は翅の外縁近くに達しない；第4-7腹節には點が寄る；背溝は余り明瞭ではない；左右の中脚は中央で相会する；第7腹節にSL刺毛を欠く。118

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*小腿は前脚先端をやや超える；第6腹節の気門は他の節より腹方に位置する；刺毛はより密に生じる。Agaraeus Kuznetsov & Stekolnikov

120. 小腿は前脚先端を超える；触角は翅の外縁のやや手前で終わる；SL刺毛を欠く。Auaxa Walker

*小腿は前脚先端に達しない；触角は翅の外縁に達する；第5腹節に2本の、また第6腹節に1本のSL刺毛を有する。Ennomos Treitschke

*2 類の形態上consonaria HübnerをParadarisa属とは別属として扱った。
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Plate 1

Fig. 1 Pupal pilifer of *Polygonia c-aureum* Linnaeus (Nymphalidae). Inside view of the pupal exuvia. lb: labial palpus, m: mandible, pf: pilifer, t: tentorium.

Fig. 2 Comparison of heads of pupa (upper) and larva (lower), showing the difference of adfrontal suture. afs: adfrontal suture, an: antenna, co: coronal suture, m: mandible.

Fig. 3 Presumable transformation of the larval head at the pupation. The white arrows show the direction of the contraction of the muscle and black arrow the direction of the turning of the procephalon. The pupal head forms from the procephalon (hatching area) of the larval head and the gnathocephalon (white ground) becomes depressed at pupation. am: antennal muscle, lm: labrum muscle, mm: mandibular muscle.

Fig. 4 Prothoracic spiracle of the pupal exuvia of *Endoclyta excrescens* Butler (Hepialidae). c: callosity, s: spiracle, ss: prespiracular slit.

Fig. 5 Prothoracic spiracle of the pupal exuvia of *Mamneta brassicae* Linnaeus (Noctuidae), lateral view. a: atrium, f: filter, mt: mesothorax, pa: preatrium, pt: prothorax, sc: spiracular callosity, ss: prespiracular slit, t: trachea.

Fig. 6 Conceptual figure of relationship between the dorsal part of the thorax and the 1st abdominal segment in larva and pupa. The dotting part changes into the pupal cuticle and the white part folds and sinks into the pupal body. The white arrow shows the direction of the shifting of the larval cuticle into the pupal body. sc: spiracular callosity, sp: prothoracic spiracle, T1, T2, T3: pro-, meso- and metathorax; A1: 1st abdominal segment.

Fig. 7 An example of primitive spiracular furrow. *Calicha ornataria* Leech (Geometridae), (s: scar of SD2 seta).

Fig. 8 Typical bifurcated cremaster of Ennomine pupa. *Apocleora rimosana* Butler (Geometridae). bm: basal mass, bs: bifid seta (=D1), cd: caudal dehiscens, ss: side spinule (=SD2).

Fig. 9 Caudal end of the pupa of *Crambus argyrophorus* Butler (Pyralidae), lateral view, showing lateral and dorsal grooves. al: scar of larval anal leg, as: scar of larval anal shield, dg: dorsal groove, lg: lateral groove.

Fig. 10 Theoretical tracheal deflexion types (A to N) in the forewing radius of lepidopterous pupae and the process of their transformation (shown by white arrows) from the basal pattern (A) to respective patterns (B to N).

Fig. 11 An example of the pupa showing plesiomorphic chaetoraxy. *Gandaritis agnes* Butler (Geometridae).

Fig. 12 The pupa of *Xyridacma verosicae* Prout, New Zealand (member of true Oeno- chrominae). a: cremaster.
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Figs 16–17 Pupa of *Archiearis notha* Linnaeus. 16: head and thorax, a: dorso-lateral view; 17: caudal portion, ventral and lateral views.

Figs 18–19 Pupa of *Naxa seriaria* Motschulsky. 19: cremaster (sp: scar of larval anal leg.).

Figs 20–21 Pupa of *Ozola defictata* Inoue. 21: cremaster.


Figs 27–28 Pupa of *Agathia carissima* Butler. a: spiracular callosity. 28: cremaster.

Figs 29–30 Pupa of *Agathia visenda* Butler. a: spiracular callosity, a': excess seta of L on 6th abdominal segment. 30: cremaster.
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Figs 31–39  Pupae of Geometrinae.
Fig. 31  *Pachista superans* Butler.
Fig. 32  *Dindica virescens* Butler.
Fig. 33  *Pingasa pseudoterpnaria* Guenée.
Fig. 34  *Megalochlora dieckmanni* Graeser.
Fig. 35  *Megalochlora valida* Felder & Rogenhofer.
Fig. 36  *Geometra papilionaria* Linnaeus.
Fig. 37  *Tanaorhinus reciprocata* Walker.
Fig. 38  *Mixochlora vittata* Moore.
Fig. 39  *Aracima muscosa* Butler

Figs 40–42  Cremaster and others of Geometrine pupae.
Fig. 40  Spiracular furrow of *Pachista superans* Butler.
Fig. 41  Cremaster of *Eucyclodes difficta* Walker
Fig. 42  Cremaster of *Rhomborista megaspilaria* Guenée.
Plate 4

Figs 43-54 Pupae of Geometrinae.
Fig. 43 *Eucycloides infracta* Wileman.
Fig. 44 “Unnamed genus” *tenuilinea* Alphéraky.
Fig. 45 *Jodis argutaria* Walker.
Fig. 46 *Jodia urosticta* Prout.
Fig. 47 *Maxates grandificata* Graeser.
Fig. 48 *Maxates protrusa* Butler.
Fig. 49 *Maxates illiturata* Walker.
Fig. 50 *Idiochlorella ussuriaria* Bremer.
Fig. 51 *Hemithea marina* Butler.
Fig. 52 *Hemithea aestivaria* Hübner.
Fig. 53 *Chlorissa anadema* Prout.
Fig. 54 *Culpinia diffusa* Walker.
Plate 5

Figs 55–65  Pupae of Geometrinae.

Fig. 55  *Neohipparchus vallata* Butler.
Fig. 56  *Hemistola venata* Butler.
Fig. 57  *Rhomborista megaspilaria* Guenée.
Fig. 58  *Pelagodes subquadrita* Inoue.
Fig. 59  *Pelagodes immissaria* Walker.
Fig. 60  *Comibaena delicatior* Warren.
Fig. 61  *Thetidia albocostaria* Bremer.
Fig. 62  *Thetidia smaragdaria* Fabricius.
Fig. 63  *Comostola subtilaria* Bremer.
Fig. 64  *Comibaena argentataria* Leech.
Fig. 65  *Comibaena amoenaaria* Oberthür.
Plate 6

Figs 66–100  Cremaster of Geometrine pupae.
Fig. 66  Pachista superans Butler.
Fig. 67  Dindica virescens Butler.
Fig. 68  Megalochlora dieckmanni Graeser.
Fig. 69  Neohipparchus vallata Butler.
Fig. 70  Maxates illiturata Walker.
Fig. 71  Pingasa pseudoterpnaria Guenée.
Fig. 72  Megalochlora valida Felder & Rogenhofer.
Fig. 73  Eucyclodes difficta Walker.
Fig. 74  Hemithea marina Butler.
Fig. 75  Hemithea aestivaria Hübner.
Fig. 76  Mixochlora vittata Moore.
Fig. 77  Pelagodes subquadrata Inoue.
Fig. 78  Pelagodes inmissaria Walker.
Fig. 79  Megalochlora sponsaria Bremer.
Fig. 80  Tanaorhinus reciprocata Walker.
Fig. 81  Idiochlora ussuriaria Bremer.
Fig. 82  Aracima muscosa Butler.
Fig. 83  Maxates protrusa Butler.
Fig. 84  Maxates grandificaria Graeser.
Fig. 85  Chlorissa anadema Prout.
Fig. 86  Culpinia diffusa Walker.
Fig. 87  Hemistola dijuncta Walker.
Fig. 88  Hemistola venata Butler.
Fig. 89  “Unnamed genus” tenuilinea Alphéraky.
Fig. 90  Jodis urosticta Prout.
Fig. 91  Jodis argutaria Walker.
Fig. 92  Jodis lactearia Linnaeus.
Fig. 93  Comosiola subtiaria Bremer.
Fig. 94  Comostiola rubripunctata Warren.
Fig. 95  Comibaena delicatior Warren.
Fig. 96  Comibaena procumbaria Pryer.
Fig. 97  Comibaena amoenaria Oberthür.
Fig. 98  Comibaena argentaria Leech.
Fig. 99  Thetidia albocostaria Bremer.
Fig. 100  Thetidia smaragdaria Fabricius.
Plate 7

Figs 101-113  Pupae of Sterrhinae.
Fig. 101  *Traminda aventiaria* Guenée.
Fig. 102  Do, tip of frontal protrusion.
Fig. 103  *Timandra comptaria* Walker.
Fig. 104  Do, tip of frontal protrusion.
Fig. 105  *Cyclophora albipunctata* Hufnagel.
Fig. 106  Do, prothorax, dorsal view.
Fig. 107  *Scopula confusa* Butler.
Fig. 108  *Scopula semignobilis* Inoue.
Fig. 109  *Scopula ignobilis* Warren.
Fig. 110  *Pylargosceles steganioides* Butler.
Fig. 111  *Organopoda carnearia* Warren.
Fig. 112  *Dithecodes erasa* Warren.
Fig. 113  *Perixera minorata* Warren.
Plate 8

Figs 114-129  Cremaster of Sterrhine pupae.
Fig. 114  *Traminda aventiaria* Guenée.
Fig. 115  *Problepsis albidior* Warren.
Fig. 116  *Somatina indicataria* Walker.
Fig. 117  *Cyclophora albipunctata* Hufnagel.
Fig. 118  *Organopoda carnearia* Warren.
Fig. 119  *Idaea muricata* Hufnagel.
Fig. 120  *Pylargosceles steganioides* Butler.
Fig. 121  *Dithecodes erasa* Warren.
Fig. 122  *Scopula confusa* Butler.
Fig. 123  *Scopula ignobilis* Inoue.
Fig. 124  *Scopula emma* Prout.
Fig. 125  *Perixera minorata* Warren.
Fig. 126  *Timandra apicirosea* Prout.
Fig. 127  *Timandra amata* Linnaeus.
Fig. 128  *Timandra dichela* Prout.
Fig. 129  *Timandra comptaria* Walker.

Figs 130-138  Pupae of Larentiinae.
Fig. 130  Cremaster of *Esakiopteryx volitans* Butler.
Fig. 131  *Trichopteryx microloba* Inoue.
Fig. 132  Ditto, cremaster.
Fig. 133  *Trichopterigia consobrina* Leech.
Fig. 134  Ditto, cremaster.
Fig. 135  *Otopecta frigida* Butler.
Fig. 136  Ditto, cremaster.
Fig. 137  *Tyloptera bella* Butler.
Fig. 138  Ditto, cremaster.
Plate 9

Figs 139–147  Pupae of Larentiinae.
Fig. 139  *Sauris nanaria* Leech.
Fig. 140  *Episteira nigrilinearia* Leech.
Fig. 141  *Episteira eupena* Prout.
Fig. 142  *Collix ghosha* Guenée.
Fig. 143  *Xanthorhoe muscicapata* Christoph.
Fig. 144  *Xanthorhoe saturata* Guenée.
Fig. 145  *Pseudostegania defectata* Christoph.
Fig. 146  *Idiotephria amelia* Butler.
Fig. 147  *Laciniodes unistripis* Butler.

Figs 148–158  Cremaster of Larentiine pupae.
Fig. 148  *Sauris nanaria* Leech.
Fig. 149  *Episteira nigrilinearia* Leech.
Fig. 150  *Episteira eupena* Prout.
Fig. 151  *Collix ghosha* Guenée.
Fig. 152  *Anticollix sparsata* Treitschke.
Fig. 153  *Idiotephria amelia* Butler.
Fig. 154  *Xanthorhoe saturata* Guenée.
Fig. 155  *Xanthorhoe muscicapata* Christoph.
Fig. 156  *Pseudostegania defectata* Christoph.
Fig. 157  *Hydriomena furcata* Thunberg.
Fig. 158  *Laciniodes unistripis* Butler.
Plate 10

Figs 159–167  Pupae of Larentiinae.
Fig. 159  *Operophtera rectipostmediana* Inoue.
Fig. 160  *Operophtera brumata* Linnaeus.
Fig. 161  *Epirrta viridipurpureascens* Prout.
Fig. 162  *Nothoperinia mediolineata* Prout.
Fig. 163  *Tricodezia kindermannii* Bremer.
Fig. 164  *Trichobaptria exsecuta* Felder & Rogenhofer.
Fig. 165  *Heterothera postalbida* Wileman.
Fig. 166  *Gymnosceles esakii* Inoue.
Fig. 167  *Gymnosceles tristrigosa* Butler.

Figs 168–178  Cremaster and other feature of Larentiine pupae.
Fig. 168  Punctures of 5th abdominal segment of *Operophtera* spp. and *Epirrta* sp. A: *Operophtera japonaria* Leech, B: *O. relegata* Prout, C: *O. brumata* Linnaeus, D: *Epirrta viridipurpureascens* Prout.
Fig. 169  *Operophtera rectipostmediana* Inoue.
Fig. 170  *Operophtera brumata* Linnaeus.
Fig. 171  *Operophtera relegata* Prout.
Fig. 172  *Operophtera japonaria* Leech.
Fig. 173  *Nothoperinia mediolineata* Prout.
Fig. 174  *Epirrta viridipurpureascens* Prout.
Fig. 175  *Trichobaptria exsecuta* Felder & Rogenhofer.
Fig. 176  *Lobogonodes erectaria* Leech.
Fig. 177  *Disstroma citrata* Linnaeus.
Fig. 178  *Heterothera postalbida* Wileman.
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Figs 179–186 Pupae of Larentiinae.
Fig. 179 Triphosa dubitata Linnaeus.
Fig. 180 Philerema transversata Hufnagel.
Fig. 181 Telenomeuta punctimarginaria Leech.
Fig. 182 Photoscotosia lucicolens Butler.
Fig. 183 Hydrelia misaria Christoph.
Fig. 184 Asthena sachalinensis Matsumura.
Fig. 185 Asthena hamadryas Inoue.
Fig. 186 Chloroclystis yata Haworth.

Figs 187–198 Cremaster of Larentiine pupae.
Fig. 187 Triphosa dubitata Linnaeus.
Fig. 188 Philerema transversata Hufnagel.
Fig. 189 Telenomeuta punctimarginaria Leech.
Fig. 190 Gandaritis agnes Butler.
Fig. 191 Photoscotosia lucicolens Butler.
Fig. 192 Melanthia procellata Denis & Schiffermüller.
Fig. 193 Hydrelia misaria Christoph.
Fig. 194 Rheumaptera latifasciaria Leech.
Fig. 195 Rheumaptera hecata Butler.
Fig. 196 Asthena sachalinensis Matsumura.
Fig. 197 Asthena hamadryas Inoue.
Fig. 198 Chloroclystis azumai Inoue.
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Figs 199–207  Pupae of Laretiinae.
Fig. 199  *Eupithecia tabidaria* Inoue.
Fig. 200  *Eupithecia clavifera* Inoue.  a: head and prothorax, latero-dorsal view.
Fig. 201  *Eupithecia proterva* Butler.
Fig. 202  *Eupithecia lariciata* Freyer ?
Fig. 203  *Ecliptopera umbrosaria* Motschulsky.
Fig. 204  *Calleulype whitelyi* Butler.
Fig. 205  *Eucosmabraxas placida* Butler.
Fig. 206  *Eulithis convergenata* Bremer.
Fig. 207  *Evecliptopera decurrens* Moore.

Figs 208–217  Cremasters of Laretiine pupae.
Fig. 208  *Sibatania mactata* Felder & Rogenhofer.
Fig. 209  *Ecliptopera umbrosaria* Motschulsky.
Fig. 210  *Calleulype whitelyi* Butler.
Fig. 211  *Eucosmabraxas placida* Butler.
Fig. 212  *Eulithis convergenata* Bremer.
Fig. 213  *Evecliptopera decurrens* Moore.
Fig. 214  *Eupithecia clavifera* Inoue.
Fig. 215  *Eupithecia tabidaria* Inoue.
Fig. 216  *Eupithecia proterva* Butler.
Fig. 217  *Eupithecia lariciata* Freyer ?
Plate 13

Figs 218–219  Pupae of Larentiinae.
Fig. 218  *Eschatarchia lineata* Warren.
Fig. 219  *Aplocera perelegans* Warren.  a: extremity of metathoracic leg, lateral view.

Figs 220–221  Cremasters of Larentiine pupae.
Fig. 220  *Eschatarchia lineata* Warren.
Fig. 221  *Aplocera perelegans* Warren.

Figs 222–227  Pupae of Ennominae.
Fig. 222  *Arichanna jaguararia* Guenée.
Fig. 223  *Deileptenia riebata* Clerck.
Fig. 224  *Oxymacaria normata* Alphéraky.  a: spiracular furrow.
Fig. 225  *Lassaba nikkonis* Butler.
Fig. 226  *Xerodes rufescensaria* Motschulsky.
Fig. 227  *Apolleora rimosa* Butler.
Plate 14

Figs 228–236  Pupae of Ennominae.
Fig. 228  *Godonela hebesata* Walker.
Fig. 229  *Macaria liturata* Clerck.
Fig. 230  *Aethalura nanaria* Staudinger.
Fig. 231  *Satoblephara parvularia* Oberthür.
Fig. 232  *Jankowskia athleta* Oberthür.
Fig. 233  *Diplurodes vestitus* Warren.
Fig. 234  *Ascotis selenaria* Denis & Schiffermüller.
Fig. 235  *Ramobia basifuscaria* Leech.
Fig. 236  *Pharierotheys sinearia* Guenée.
Plate 15

Figs 237–245  Pupae of Ennominae.
Fig. 237  *Abaciscus aigner* Prout.
Fig. 238  *Ectropis crepuscularis* Denis & Schiffermüller.
Fig. 239  *Ectropis obliqua* Prout.
Fig. 240  *Ectropis excellens* Butler.
Fig. 241  *Racotis petrosa* Butler.
Fig. 242  *Anaboarmia aechmeessa* Prout.
Fig. 243  *Percnia albinigrata* Warren, with spiracular callosity.
Fig. 244  *Percnia giraffata* Guenée, with spiracular callosity.
Fig. 245  *Pseuderannis lomozemia* Prout.

Figs 246–252  Cremaster of Ennomine pupae.
Fig. 246  *Abaciscus aigner* Prout.
Fig. 247  *Ectropis crepuscularis* Denis & Schiffermüller.
Fig. 248  *Ectropis excellens* Butler.
Fig. 249  *Ectropis obliqua* Prout.
Fig. 250  *Pseuderannis lomozemia* Prout.
Fig. 251  *Racotis petrosa* Butler.
Fig. 252  *Racotis boarminaria* Guenée.
Plate 16

Figs 253–261  Pupae of Ennominae.
Fig. 253  *Alcis angulifera* Butler.
Fig. 254  *Gigantalcis flavolinearia* Leech.
Fig. 255  *Hypomecis punctinalis* Scopoli.
Fig. 256  *Hypomecis roboraria* Denis & Schiffermüller.
Fig. 257  *Microcalicha sordida* Butler.
Fig. 258  *Heteramia charon* Butler.
Fig. 259  *Duliophyle majuscularia* Leech.
Fig. 260  *Xandrames dholaria* Moore.
Fig. 261  *Xandrames latifereria* Walker.
Plate 17

Figs 262-270 Pupae of Ennominae.
Fig. 262 *Hyposidra talaca* Walker.
Fig. 263 *Paradarsia chloauges* Prout.
Fig. 264 Unnamed genus *consonaria* Hübner.
Fig. 265 *Cleora repulsaria* Walker.
Fig. 266 *Calicha ornataria* Leech.
Fig. 267 *Culcula panterinaria* Bremer & Grey.
Fig. 268 *Proteosternia leda* Butler.
Fig. 269 *Custala stipitaria* Oberthür.
Fig. 270 *Ophthalmitis albosignaria* Bremer & Grey.
Plate 18

Figs 271–295 Cremasters of Ennomine pupae.
Fig. 271 *Arichanna jaguararia* Guenée.
Fig. 272 *Arichanna melanaria* Linnaeus.
Fig. 273 *Deileptenia ribeata* Clerck.
Fig. 274 *Aethalura nanaria* Staudinger.
Fig. 275 *Lassaba nikkonis* Butler.
Fig. 276 *Oxymacaria normata* Alphéraky.
Fig. 277 *Xerodes rufescentaria* Motschulsky.
Fig. 278 *Xerodes albonotaria* Bremer.
Fig. 279 *Godonela hebesata* Walker.
Fig. 280 *Macaria liturata* Clerck.
Fig. 281 *Macaria shanghaisaria* Walker.
Fig. 282 *Aethalura ignobilis* Butler.
Fig. 283 *Satoblephara parvularia* Leech.
Fig. 284 *Diplurodes vestitus* Warren.
Fig. 285 *Phanerothyris sinearia* Guenée.
Fig. 286 *Jankowskia athleta* Oberthür.
Fig. 287 *Ascotis selenaria* Denis & Schiffermüller.
Fig. 288 *Ramobia basifascia* Leech.
Fig. 289 *Percnia albinigrata* Warren.
Fig. 290 *Percnia giraffata* Guenée.
Fig. 291 *Alcis angulifera* Butler.
Fig. 292 *Alcis jubata* Thunberg.
Fig. 293 *Alcis mediaalbifera* Inoue.
Fig. 294 *Gigantalcis flavolinearia* Leech.
Fig. 295 *Rikiosatoa grisea* Butler.
Plate 19

Figs 296–320 Cremasters of Ennomine pupae.
Fig. 296 Hypomecis punctinalis Scopoli.
Fig. 297 Hypomecis roboraria Denis & Schiffermüller.
Fig. 298 Hypomecis lunifera Butler.
Fig. 299 Heterarmia charon Butler.
Fig. 300 Microcalicha sordida Butler.
Fig. 301 Duliophyle majuscularia Leech.
Fig. 302 Xandrames dholaria Moore.
Fig. 303 Xandrames latiferaria Walker.
Fig. 304 Hyposidra talaca Walker.
Fig. 305 Paradarisa chloauges Prout.
Fig. 306 Unnamed genus consonaria Hübner.
Fig. 307 Cleora repulsaria Walker.
Fig. 308 Cleora insolita Butler.
Fig. 309 Cleora leucophaea Butler.
Fig. 310 Calicha ornataria Leech.
Fig. 311 Culcula panterinaria Bremer & Grey.
Fig. 312 Proteosternia leda Butler.
Fig. 313 Cusiala stipitaria Oberthür.
Fig. 314 Ophthalmis albosignaria Bremer & Grey.
Fig. 315 Ophthalmis irrorataria Bremer and Grey.
Fig. 316 Acrodontis fumosa Prout.
Fig. 317 Protalcis concinnata Wileman.
Fig. 318 Exangerona prattiaria Leech.
Fig. 319 Phanerothyris sinearia Guenée.
Fig. 320 Zanclidia testaceata Butler.
Plate 20

Figs 321–329 Pupae of Ennominae.

Fig. 321 *Acrodontis fumosa* Prout.

Fig. 322 *Protalcis concinnata* Wileman.

Fig. 323 *Phigalaia verecundaria* Leech.

Fig. 324 *Larerannis filipjevi* Wehrli.

Fig. 325 *Larerannis miracula* Prout.

Fig. 326 *Erannis golda* Diakonov.

Fig. 327 *Agriopis dira* Butler, ♂.

Fig. 328 Do., ♀, lateral view.

Fig. 329 *Wilemania nitobei* Nitobe.

Figs 330–331 Cremasters of Ennomine pupae.

Fig. 330 *Anaboarmia aechmeessa* Prout.

Fig. 331 *Protoboarmia faustinata* Warren.
Plate 21

Figs 332–340 Pupae of Ennominae.
Fig. 332 *Nyssiodes lefuarius* Erschoff.
Fig. 333 *Megabiston plumosaria* Leech, with spiracular callosity.
Fig. 334 *Biston thoracicaria* Oberthür.
Fig. 335 *Biston robustum* Butler.
Fig. 336 *Lycia hirtaria* Clerck.
Fig. 337 *Phthonosema tendinosaria* Bremer.
Fig. 338 *Pachyliogla dolosa* Butler.
Fig. 339 *Planociampa modesta* Butler.
Fig. 340 *Colotois pennaria* Linnaeus.
Plate 22

Figs 341-366  Cremasters of Ennomine pupae.
Fig. 341  *Phigalia verecundaria* Leech.
Fig. 342  *Phigalia sinuosaria* Leech.
Fig. 343  *Larerannis filipjevi* Wehrli.
Fig. 344  *Larerannis miracula* Prout.
Fig. 345  *Erannis golda* Diakonov.
Fig. 346  *Agriopis dira* Butler.
Fig. 347  *Wilemania nitobei* Nitobe.
Fig. 348  *Pachyligia dolosa* Butler.
Fig. 349  *Nyssiodes lefuarius* Erschoff.
Fig. 350  *Biston robustum* Butler.
Fig. 351  *Biston thoracica* Oberthür.
Fig. 352  *Megabiston plumosaria* Leech.
Fig. 353  *Phthonosema invenustaria* Leech.
Fig. 354  *Phthonosema tendinosaria* Bremer.
Fig. 355  *Lycia hirtaria* Clerck.
Fig. 356  *Heterostegane hyriaria* Oberthür.
Fig. 357  *Planociampa modesta* Butler.
Fig. 358  *Colotois pennaria* Linnaeus.
Fig. 359  *Metabraxas paucimaculata* Inoue.
Fig. 360  *Selenia adustaria* Leech.
Fig. 361  *Selenia tetralunaria* Leech.
Fig. 362  *Bizia aexaria* Walker.
Fig. 363  *Achrosis paupera* Butler.
Fig. 364  *Plagodis dolabraria* Linnaeus.
Fig. 365  *Heterolocha stulta* Butler.
Fig. 366  *Heterolocha aristonaria* Walker.
Plate 23

Figs 367–378 Pupae of Ennominae.
Fig. 367 *Inurois fletcheri* Inoue, ♂.
Fig. 368 Do., ♀.
Fig. 369 *Alsophila japonensis* Inoue, ♂.
Fig. 370 *Alsophiloides acroama* Inoue, ♀.
Fig. 371 Eye part of *Inurois tenuis* Butler, left half.
Fig. 372 Do., *Alsophila japonensis* Inoue.
Fig. 373 Do., *Alsophiloides acroama* Inoue.
Fig. 374 *Angeronca nigrisparsa* Butler.
Fig. 375 Do., lateral groove.
Fig. 376 *Phthonandria atrilineata* Butler.
Fig. 377 Do., lateral groove.
Fig. 378 *Menopha harutai* Inoue.

Figs 379–389 Cremasters of Ennomine pupae.
Fig. 379 *Inurois tenuis* Butler, ♂.
Fig. 380 Do., ♀.
Fig. 381 *Inurois fletcheri* Inoue, ♂.
Fig. 382 Do., ♀.
Fig. 383 *Alsophiloides acroama* Inoue, ♂.
Fig. 384 *Alsophila japonensis* Inoue, ♀.
Fig. 385 *Angeronca nigrisparsa* Butler.
Fig. 386 *Angeronca prunaria* Linnaeus.
Fig. 387 *Phthonandria atrilineata* Butler.
Fig. 388 *Phthonandria emaria* Bremer.
Fig. 389 *Menopha harutai* Inoue.
Plate 24

Figs 390-398  Pupae of Ennominae.
Fig. 390  *Selenia sordidaria* Leech.
Fig. 391  *Selenia adustaria* Leech.
Fig. 392  *Bizia aexaria* Walker.
Fig. 393  *Plagodis dolabraria* Linnaeus.
Fig. 394  *Parepione grata* Butler.
Fig. 395  *Achrosis paupera* Butler.
Fig. 396  *Endropioodes indictinaria* Bremer.
Fig. 397  *Garaeus specularis* Moore.
Fig. 398  *Psyra bluethgeni* Püngeler.
Plate 25

Figs 399–407  Pupae of Ennominae.
Fig. 399  *Chariaspilates formosaria* Eversmann.
Fig. 400  *Xylocia subspersata* Felder & Rogenhofer.
Fig. 401  *Epholca arenosa* Butler.
Fig. 402  *Pareclipsis gracilis* Butler.
Fig. 403  *Caprilia deducta* Walker.
Fig. 404  *Corymica specularia* Moore.
Fig. 405  *Peratostega deletaria* Moore.
Fig. 406  *Cryptochorina amphidasyria* Oberthür.
Fig. 407  *Eilicrinia* parvula Wehrli.
Plate 26

Figs 408–416  Pupae of Ennominae.

Fig. 408  Abraxas grossulariata Hübner.

Fig. 409  Calospilos miranda Butler.

Fig. 410  Elphos insueta Butler.

Fig. 411  Petelia rivulosa Butler.

Fig. 412  Astygisa morosa Butler.

Fig. 413  Epetelia albifrontalia Leech.

Fig. 414  Scionomia mendica Butler.

Fig. 415  Synegia esther Butler.

Fig. 416  Borbacha pardaria Guenée.
Plate 27

Figs 417–441 Cremaster of Ennomine pupae.
Fig. 417 Endropiodes dictinaria Bremer.
Fig. 418 Parepione grata Butler.
Fig. 419 Garaeus specularis Moore.
Fig. 420 Garaeus mirandus Butler.
Fig. 421 Xylocia subspersata Felder and Rogenhofer.
Fig. 422 Chariaspilates formosaria Eversmann.
Fig. 423 Pareclipsis gracilis Butler.
Fig. 424 Epholca arenosa Butler.
Fig. 425 Corymica specularis Moore.
Fig. 426 Caprilia deducta Walker.
Fig. 427 Psyra bluethgeni Püngeler.
Fig. 428 Peratostega deletaria Moore. a: dorsal view (ps: scar of larval anal leg seta, ss: side spinule).
Fig. 429 Cryptochorina amphidasyma Oberthür.
Fig. 430 Krananda semihyarina Moore.
Fig. 431 Krananda latimarginaria Leech.
Fig. 432 Elphos insueta Butler.
Fig. 433 Calospilos miranda Butler.
Fig. 434 Calospilos sylvata Scopoli.
Fig. 435 Abraxas grossulariata Hübner.
Fig. 436 Thinopteryx crocoptera Kollar.
Fig. 437 Ecpetelia albifrontaria Leech.
Fig. 438 Petelia rivulosa Butler.
Fig. 439 Astygisa morosa Butler.
Fig. 440 Orthocabera punctata Warren.
Fig. 441 Scionokia mendica Butler.
Plate 28

Figs 442–450  Pupae of Ennominae.
Fig. 442  *Euchristophia cumulata* Christoph.
Fig. 443  *Rhynchobapta cervinaria* Moore.
Fig. 444  *Plesiomorpha flaviceps* Butler.
Fig. 445  *Nothomiza formosa* Butler.
Fig. 446  *Orthocabera punctata* Warren.
Fig. 447  *Cabera schaefferi* Bremer.
Fig. 448  *Ocoelophora lentiginosaria* Leech.
Fig. 449  *Exangerona prattaria* Leech, a: lateral groove.
Fig. 450  *Heterostegane hyriaria* Warren.
Plate 29

Figs 451-459 Pupae of Ennominae.
Fig. 451 *Lomographa temerata* Denis & Schiffermüller.
Fig. 452 *Cirretaera simplicior* Butler.
Fig. 453 *Cirretaera bimaculata* Fabricius.
Fig. 454 *Parabapta clarissa* Butler.
Fig. 455 *Eurybeidia languardata* Walker.
Fig. 456 *Descoreba simplex* Butler.
Fig. 457 *Odontopera aurata* Prout.
Fig. 458 *Apochima juglansiaria* Graeser.
Fig. 459 *Ennomos autumnaria* Werneburg.
Plate 30

Figs 460–469  Pupae of Ennominae.
Fig. 460  *Euctenurapteryx maculicaudaria* Motschulsky.
Fig. 461  *Ourapteryx subpunctaria* Leech.
Fig. 462  *Ourapteryx obtusicauda* Warren.
Fig. 463  *Ourapteryx nivea* Butler.
Fig. 464  *Apeira syringaria* Linnaeus.
Fig. 465  *Agaraeus parvus* Hedemann.
Fig. 466  *Auaxa sulphurea* Butler.
Fig. 467  *Cystidia couaggaria* Guenée.
Fig. 468  *Cystidia stratonice* Stoll, lateral view.
Fig. 469  *Cystidia truncangulata* Wehrli, lateral view.
Plate 31

Figs 470–494  Cremasters of Ennomine pupae.
Fig. 470  *Synegetia esther* Butler.
Fig. 471  *Borbacha pardaria* Guenée.
Fig. 472  *Plesiomorpha flaviceps* Butler.
Fig. 473  *Rhynchobapta cervinaria* Moore.
Fig. 474  *Euchristophia cumulata* Christoph.
Fig. 475  *Lamprocabera candidaria* Leech.
Fig. 476  *Cabera exanthemata* Scopoli.
Fig. 477  *Cabera purus* Butler.
Fig. 478  *Cabera schaefferi* Bremer.
Fig. 479  *Nothomiza formosa* Butler.
Fig. 480  *Ocoelophora lentiginosaria* Leech.
Fig. 481  *Ellicrinia parvula* Wehrli.
Fig. 482  *Lomographa temerata* Denis & Schiffermüller.
Fig. 483  *Cirretaera simplicior* Butler.
Fig. 484  *Parabapta clarissa* Butler.
Fig. 485  *Euryboeidia languidata* Walker.
Fig. 486  *Odontopera aurata* Prout.
Fig. 487  *Ourapteryx obtusicauda* Warren.
Fig. 488  *Ourapteryx nomurai* Inoue.
Fig. 489  *Ourapteryx nivea* Butler.
Fig. 490  *Euctenourapteryx maculcaudaria* Motschulsky.
Fig. 491  *Descoreba simplex* Butler.
Fig. 492  *Apochima juglansaria* Graeser.
Fig. 493  *Apeira syringaria* Linnaeus.
Fig. 494  *Agaraeus parvus* Hedemann.
Plate 32

Figs 495–499 Cremaster of Ennomine pupae.
Fig. 495 Orthocabera pinctata Warren.
Fig. 496 Auaxa sulphurea Butler.
Fig. 497 Ennomos autumaria Werneburg.
Fig. 498 Cystidia couaggaria Guenée.
Fig. 499 Cystidia truncangulata Wehrli.
Fig. 500 Pupa of Antitrygodes divisaria Walker.
Fig. 501 Do., cremaster.
Fig. 502 Pupa of Dysstroma citrata Linnaeus.
Fig. 503 Pupa of Melanthia procollata Denis & Schiffermuller, a: spiracular furrow.
Fig. 504 Cremaster and lateral groove of Ecliptopera capitata Herrich-Schäffer.
Fig. 505 Cremaster of Trichopterygia costipunctaria Leech.

Fig. 506 Asthenia corculina Butler.
Fig. 507 Asthenia nymphaeata Staudinger.
Fig. 508 Cremaster and lateral groove of Eupithecia melanolophia Swinhoe.
Fig. 509 Lateral and dorsal grooves of Eupithecia spp., a: clavifera Inoue, b: proterva Butler, c: subbreviata Staudinger, d: melanolophia Swinhoe, e: tabidaria Inoue, f: lariciata Freyer ?.
Fig. 510 Cremaster of Eupithecia lariciata Freyer ?.
Plate 33

Figs 511-513  Pupae of Ennomine pupae.
Fig. 511  _Thinopteryx crocoptera_ Kollar, a: mandible (M), b: lateral groove.
Fig. 512  _Krananda latimarginaria_ Leech.
Fig. 513  _Krananda. semihyalina_ Moore.

Figs 514-515  Cremaster of Ennomine pupae.
Fig. 514  _Krananda latimarginaria_ Leech.
Fig. 515  _Krananda semihyalina_ Moore.

Figs 516-522  Spiracular furrow and lateral groove of Larentiine pupae.
Fig. 516  _Triphosa dubitata_ Linnaeus.
Fig. 517  _Telenomeuta punctimarginaria_ Leech.
Fig. 518  _Episteira eupena_ Prout.
Fig. 519  _Episteira nigrilinearia_ Leech.
Fig. 520  _Sauris nanaria_ Leech.
Fig. 521  _Xanthorhoe muscicapata_ Christoph.
Fig. 522  _Xanthorhoe saturata_ Guenée.

Figs 523-531  Spiracular furrow and lateral groove of Ennomine pupae.
Fig. 523  _Arichanna jaguararia_ Moore.
Fig. 524  _Arichanna melanaria_ Linnaeus.
Fig. 525  _Deileptenio riebeata_ Clerck.
Fig. 526  _Apocleora rimosas_ Butler.
Fig. 527  _Lassaba nikkonis_ Butler.
Fig. 528  _Xerodes albonotaria_ Bremer.
Fig. 529  _Xerodes rufescencia_ Motschulsky.
Fig. 530  _Jankowskaia athleta_ Oberthür.
Fig. 531  _Calicha ornata_ Leech.
Plate 34

Figs 532–559  Spiracular furrow and lateral groove of Ennomine pupae.
Fig. 532  *Protoboarmia simpliciaria* Leech.
Fig. 533  *Percnia giraffata* Guenée.
Fig. 534  *Paradarsia chloauges* Prout.
Fig. 535  *Rikiosatoa grisea* Butler.
Fig. 536  *Anaboarmia aechmeessa* Prout.
Fig. 537  *Racotis boarminaria* Guenée.
Fig. 538  *Ramobia basifuscaria* Leech.
Fig. 539  *Duliohyle majuscularia* Leech.
Fig. 540  *Hypomecis roboraria* Denis & Schiffermüller.
Fig. 541  *Microcalicha sordida* Butler.
Fig. 542  *Aelis medialbifera* Inoue.
Fig. 543  *Gigantalcis flavolinearia* Leech.
Fig. 544  *Heterarmia charon* Butler.
Fig. 545  *Cleora repulsaria* Walker.
Fig. 546  *Cleora leucophaea* Butler.
Fig. 547  *Ascotis selenaria* Denis & Schiffermüller.
Fig. 548  *Phanerothyris sineraria* Guenée.
Fig. 549  *Phthonosema tendinosaria* Bremer.
Fig. 550  *Phthonosema inuenstaria* Leech.
Fig. 551  *Xandrames dholaria* Moore.
Fig. 552  *Xandrames latifasciaria* Walker.
Fig. 553  *Biston robustum* Butler.
Fig. 554  *Biston latifasciaria* Walker.
Fig. 555  *Biston regalis* Moore.
Fig. 556  *Megabiston plumosaria* Leech.
Fig. 557  *Nyssiodes lefuarius* Erschoff.
Fig. 558  *Lycia hirtaria* Clerck.
Fig. 559  *Erannis golda* Diakonov.
Plate 35

Figs 560–595. Spiracular furrow and lateral groove of Ennomine pupae.

Fig. 560 *Planociampa modesta* Butler.
Fig. 561 *Colotois pennaria* Linnaeus.
Fig. 562 *Pachyligia dolosa* Butler.
Fig. 563 *Wilemania nitobei* Nitobe.
Fig. 564 *Odontopera aurata* Prout.
Fig. 565 *Heterostegan hyriaria* Warren.
Fig. 566 *Heterolocha aristonaria* Walker.
Fig. 567 *Heterolocha stulta* Butler.
Fig. 568 *Angerona nigrisparsa* Butler.
Fig. 569 *Angerona prunaria* Linnaeus.
Fig. 570 *Phthonandria atrilineata* Butler.
Fig. 571 *Phthonandria emaria* Bremer.
Fig. 572 *Menopha harutai* Inoue.
Fig. 573 *Selenia adustaria* Leech.
Fig. 574 *Selenia sordidaria* Leech.
Fig. 575 *Bzia aexaria* Walker.
Fig. 576 *Plagodis pulveraria* Linnaeus.
Fig. 577 *Plagodis dolabraria* Linnaeus.
Fig. 578 *Achrosis paupera* Butler.
Fig. 579 *Endropiodes indictinaria* Bremer.
Fig. 580 *Parepione grafa* Butler.
Fig. 581 *Psya bluethenii* Püngeler.
Fig. 582 *Xyloscia subspersata* Felder & Rogenhofer.
Fig. 583 *Garaeus specularis* Moore.
Fig. 584 *Garaeus mirandus* Butler.
Fig. 585 *Chariapilates formosaria* Eversmann.
Fig. 586 *Pareclipsis gracilis* Butler.
Fig. 587 *Epholca arenosa* Butler.
Fig. 588 *Corymica specularia* Moore.
Fig. 589 *Caprilia deducta* Walker.
Fig. 590 *Cryptochorina amphidasyaria* Oberthür.
Fig. 591 *Peratostega deletaria* Moore.
Fig. 592 *Ecpetelia albifrontalia* Leech.
Fig. 593 *Petelia rivulosa* Butler.
Fig. 594 *Astygisa morosa* Butler.
Fig. 595 *Aethalura nanaria* Staudinger.
Plate 36

Fig. 596  Spiracular furrow and lateral groove of *Elphos insueta* Butler.

Figs 597–600  Lateral grooves of Ennomine pupae.
Fig. 597  *Abraxas grossulariata* Linnaeus.
Fig. 598  *Calospilos sylvata* Scopoli.
Fig. 599  *Calospilos fulvobasalis* Staudinger.
Fig. 600  *Calospilos miranda* Butler.

Figs 601–602  Lateral groove and setal pattern of 5th abdominal segment of Ennomine pupae.
Fig. 601  *Apeira syringaria* Linnaeus.
Fig. 602  *Agaraeus parvus* Hedemann.

Figs 603–626  Lateral groove of Ennomine pupae.
Fig. 603  *Scionomia mendica* Butler.
Fig. 604  *Rhynchobapta cervinaria* Moore.
Fig. 605  *Plesiomorpha flaviceps* Butler.
Fig. 606  *Cabera schaefferi* Bremer.
Fig. 607  *Cabera purus* Butler.
Fig. 608  *Orthocabera punctata* Warren.
Fig. 609  *Nothomiza formosa* Butler.
Fig. 610  *Ocoelophora lentiginosaria* Leech.
Fig. 611  *Eilicrinia parvula* Wehrli.
Fig. 612  *Parabapta aetheriata* Graeser.
Fig. 613  *Parabapta clarissa* Butler.
Fig. 614  *Lomographa temerata* Denis & Schiffermüller.
Fig. 615  *Lomographa bimaculata* Fabricius.
Fig. 616  *Cirretaera simplicior* Butler.
Fig. 617  *Descoreba simplex* Butler.
Fig. 618  *Apochima juglanstaria* Graeser.
Fig. 619  *Euctenurapteryx maculicaudaria* Motschulsky.
Fig. 620  *Ourapteryx obtusicauda* Warren.
Fig. 621  *Ourapteryx nivea* Butler.
Fig. 622  *Ourapteryx subpunctaria* Leech.
Fig. 623  *Auaxa sulphurea* Butler.
Fig. 624  *Cystidia truncangulata* Wehrli.
Fig. 625  *Cystidia stratonice* Stoll.
Fig. 626  *Ennomos autumnaria* Werneburg.
Plate 37

Figs 627–645  Pupae of some Geometrid pupae.
Fig. 627  Perixera obrinaria Guenée, a: dorsal view of thoracic part (Sterrhinae).
Fig. 628  Do, cremaster.
Fig. 629  Do, lateral groove.
Fig. 630  Eois grataria Walker (Larentiinae).
Fig. 631  Do, cremaster.
Fig. 632  Dolateral groove.
Fig. 633  Miliona basalis Walker (Ennominae).
Fig. 634  Do, spiracular furrow.
Fig. 635  Do, cremaster.
Fig. 636  Do, lateral groove.
Fig. 637  Petrophora chlorosata Scopoli (Ennominae).
Fig. 638  Do, cremaster.
Fig. 639  Do, lateral groove
Fig. 640  Macaria abydata Guenée (Ennominae).
Fig. 641  Do, spiracular furrow.
Fig. 642  Do, cremaster.
Fig. 643  Cremaster of Macaria fuscaria Leech.
Fig. 644  Chlorissa inornata Matsumura (Geometrinae).
Fig. 645  Do, cremaster.
Plate 38

Figs 646–647  Pupa of Ennominae.
Fig. 646  *Oheidia tigrata* Guenée.
Fig. 647  Do, cremaster.

Figs 648–649  Pupa of Geometrinae.
Fig. 648  *Pingasa ruginaria* Guenée.
Fig. 649  Do, cremaster.
Fig. 650  Hypothetical relationship among subfamilies of the Geometridae on the basis of pupal chaetotaxic diagnoses.

Figs 651–653  Pupa of Desmobathrinae.
Fig. 651  *Eumelea biflavata* Warren.
Fig. 652  Do, spiracular furrow.
Fig. 653  Do, cremaster.
Number of setae on mero or metathorax.
Number of abdominal D setae.
Presence or absence of abdominal SL and/or SV setae.
Presence or absence of setae on 9th abdominal segment.

Apomorphic (—) plasmomorph (——)

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Arch: Archicarenae, Desm: Desmobathrinae, En: Enominae, Ge: Geometrinae, La: Larentinae, Oeno: Oenochroinae, St: Sterrhinae. (Roman numbers indicate Division in a subfamily).