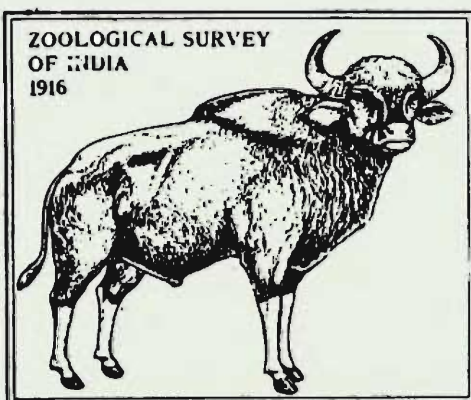


TECHNICAL MONOGRAPH No. 6

On the Lepidopterous Fauna of Arunachal Pradesh
& Adjoining Areas of Assam in North-East
India : Family Arctiidae

by
G. S. Arora
Mridula Chaudhury



**ZOOLOGICAL SURVEY
OF INDIA**

ON THE LEPIDOPTEROUS FAUNA OF
ARUNACHAL PRADESH & ADJOINING
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INDIA : FAMILY ARCTIIDAE

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BY

G. S. ARORA AND MRIDULA CHAUDHURY

Zoological Survey of India, Calcutta



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I. INTRODUCTION

The Zoological Survey of India has undertaken several faunistic surveys of northeast region, including Arunachal Pradesh and the adjoining areas of Assam, India, since 1961, and till 1973 conducted as many as nine surveys, three of which were carried out jointly with D. R. & D. O., Tezpur to Kameng, Subansiri and Siang Dists., from Dec., 1965 to Nov., 1966, and one in collaboration with G. S. I. to Daphabum in Lohit Dist., in 1969. Several parties that participated in the surveys were led by Drs K. C. Jayaram & S. Biswas (Kameng, 1961) ; S. K. Bhattacharya & A. N. T Joseph (Kameng, 1965-1966) ; A. N. T. Joseph (Kameng and Subansiri, 1966) ; S. K. Tandon & G. S. Arora (Subansiri and Siang, 1966) ; S. K. Tandon (Lohit, 1969) ; J. M. Julka (Daphabum Expd., 1969) ; G. S. Arora (Tirap, 1971) ; and S. K. Tandon & A. N. T Joseph (Kameng, 1973).

Very little comprehensive account is available about the fauna of Arunachal Pradesh. Cotes & Swinhoe (1887 -89) were the first to prepare a *Catalogue of Moths of India* and listed all the species of Arctiidae in collections of the Indian Museum (now National Zoological Collections in Zoological Survey of India). Later, Hampson (1894, 1900, 1901) dealt with the Arctiid fauna of India, including Assam and adjoining areas of the northeast region. Seitz (1913), Draudt (1914) and Rothschild (1914) dealt with the Indo-Australian fauna of Arctiidae and reported as many as 190 species from Sikkim and Assam. Strand (1919-1922) and Bryk (1937) catalogued the family and reported 413 species distributed over 85 genera from India in five subfamilies, viz., Nolinae, Arctiinae, Lithosiinae, Callimorphinae and Nyctemerinae. Of these, 285 species distributed over 65 genera occur mainly in the areas of Assam and Sikkim, so that the present account of Arctiidae constitutes the first specific report from Arunachal Pradesh.

Seitz (1910) separated Micrarctiinae and Spilosominae from Arctiinae (*sensu str.*) merely for the sake of convenience but was later followed by Rothschild (1914) and Daniel (1943), so that several generic names were revived and separated from Arctiinae (*sensu str.*) to Spilosominae. Similarly, several genera hitherto considered as synonyms of the genus *Eilema* Hübner (*vide* Hampson, 1900) were treated independently by Daniel (1954). This account mainly follows the nomenclature and classification as proposed in the above-mentioned works.

The present account deals with 55 species distributed over 26 genera in six subfamilies as follows : Callimorphinae (1 genus, 2 species) ;

Nyctemerinae (1 gen., 4 spp.) ; Micrarctiinae (1 gen., 2 spp.) ; Rhodogastrinae (1 gen., 1 sp.) ; Spilosominae (7 genera, 9 spp.) ; and Lithosiinae (15 genera, 37 spp.). The studies bring to light four species as new to India, thus bringing the total number of species from 413 to 417 ; propose a new name to replace *Systropha* Hübner to include two species from Arunachal Pradesh ; and re-establish *Teulisna* Walker.

The keys to identification of genera and species where-ever given, have been adapted from those given by Hampson (1894, 1900, 1901) which form a very valuable series of contribution on the study of Indian fauna as a whole.

The range of distribution of each species cited in the text has been collected from various sources, mainly original publication (if available), Hampson (1894, 1900, 1901, 1905, 1914), Strand (1919, 1922), Bryk (1937) and Daniel (1943, 1951, 1952, 1954). Thus, a large number of localities, both Indian and non-Indian, have been cited although the material, in many cases, from these localities was not available for study.

II. SYSTEMATIC ACCOUNT

Family ARCTIIDAE

Antennae bipectinate, unipectinate, serrate or simple. Proboscis usually well developed, rarely aborted. Labial palpi short or long, porrect or upturned. Tibial spurs short or long, rarely medial spurs absent. Fore- and hind wings without vein Cu_2 ; vein M_2 from lower angle of cell, sometimes slightly about it, or coincident with the vein M_3 in fore- or hind wings, or both wings. Hind wing with vein Sc not free at base but coincident with Rs nearly up to middle of cell, or rarely beyond it. In male frenulum present, retinaculum bar shaped.

Hampson (1894) subdivided the family Arctiidae into four subfamilies, viz., Arctiinae, Lithosiinae, Nycteolinae and Nolinae, but, in 1900, he excluded Nycteolinae from Arctiidae and thus treated only three subfamilies. Seitz (1910), however, considered eight subfamilies, viz., Nolinae, Lithosiinae, Hypsinae, Micrarctiinae, Spilosominae, Arctiinae, Callimorphinae and Nyctemerinae, and have been recognised by Daniel (1943, 1951, 1952, 1954) in series of papers on the East-Asian Arctiidae. Kiriakoff (1950) further separated the genus *Rhodogastria* Hübner (treated by Rothschild (1914) and Strand (1919) under Arctiinae and by Daniel (1943) under Micrarctiinae) under a new subfamily Rhodogastrinae.

The present account deals with the Arctiidae fauna of Arunachal Pradesh & adjoining areas, under six subfamilies, viz., Callimorphinae, Nyctemerinae, Micrarctiinae, Rhodogastrinae, Spilosominae and Lithosiinae,

(A). Subfamily CALLIMORPHINAE

Nearly all are diurnal. Wings long. Fore wings with metallic blue green lustre and invariably with rounded white or yellow spots or stripes ; hind wings bright, deep or purple-red, yellow or white. Palpi present, short or long. Proboscis strong. Antennae simple. Ocelli well developed.

Only one genus is recorded from these areas.

Genus **Callimorpha** Latreille

1809. *Callimorpha* Latreille, *Genera Crustaceorum et. Insectorum*, 4 : 200.

Type.—*Phalaena (Noctua) dominula* Linn.

Remarks.—This genus is characterised by the presence of two pairs of hind tibial spurs ; hind wings with the veins $Sc + R_1$ arising from before the middle of cell, M_2 from above the lower angle and Cu_{1a} from angle or close to it. Hampson (1894) referred to the presence of areole in fore wing as a key character, but the present study, based on the material of *C. principalis* (Kollar), *C. plagiata* (Walker) and *C. equitalis* (Walker), shows that the areole is well developed only in *principalis*, completely absent in *plagiata* and with various transitional stages in *equitalis* (*vide* Text figs. 1A, 1F).

The male genitalia have also been studied in the respective species.

Seven species have hitherto been recorded from the Indian region, out of which six, *nyctemerata*, *eques*, *similis*, *equitalis*, *principalis* and *plagiata* are reported from the northeastern region. The present study deals with only two species from Arunachal Pradesh as follows :

1. **Callimorpha principalis** (Kollar)

(Plate I, figs. 1, 1a ; Figs. 1A-E)

1844. *Euprepia principalis* Kollar, In : Hugel's *Kaschmir und das Reich der Siek*, 4 (2) : 465, pl. 20, fig. 2. (Type loc.—Himalaya, Mussoorie).

Material examined.—Arunachal Pradesh : Kameng Dist., Bomdila, 800 m., 1 ♀, 14.viii. 1961 (S. Biswas Coll.).

Wing expanse.—81 mm.

Distribution.—INDIA (N. W Himalayas ; Sikkim ; and Arunachal Pradesh) ; BURMA ; and CHINA.

Genitalia.—Male (Text-fig. 1B-E) : Uncus simple and slender, about eight times as long as its width in the middle, pointed at tip. Tegumen long and narrow and continuous with the narrowed apex of vinculum which is broad and U-shaped at base ; saccus obsolete. Valva broad and sclerotised up to proximal two-thirds, clearly demarkated from the distal membranous part, the upper mid-dorsal part sclerotised and as well developed as the base

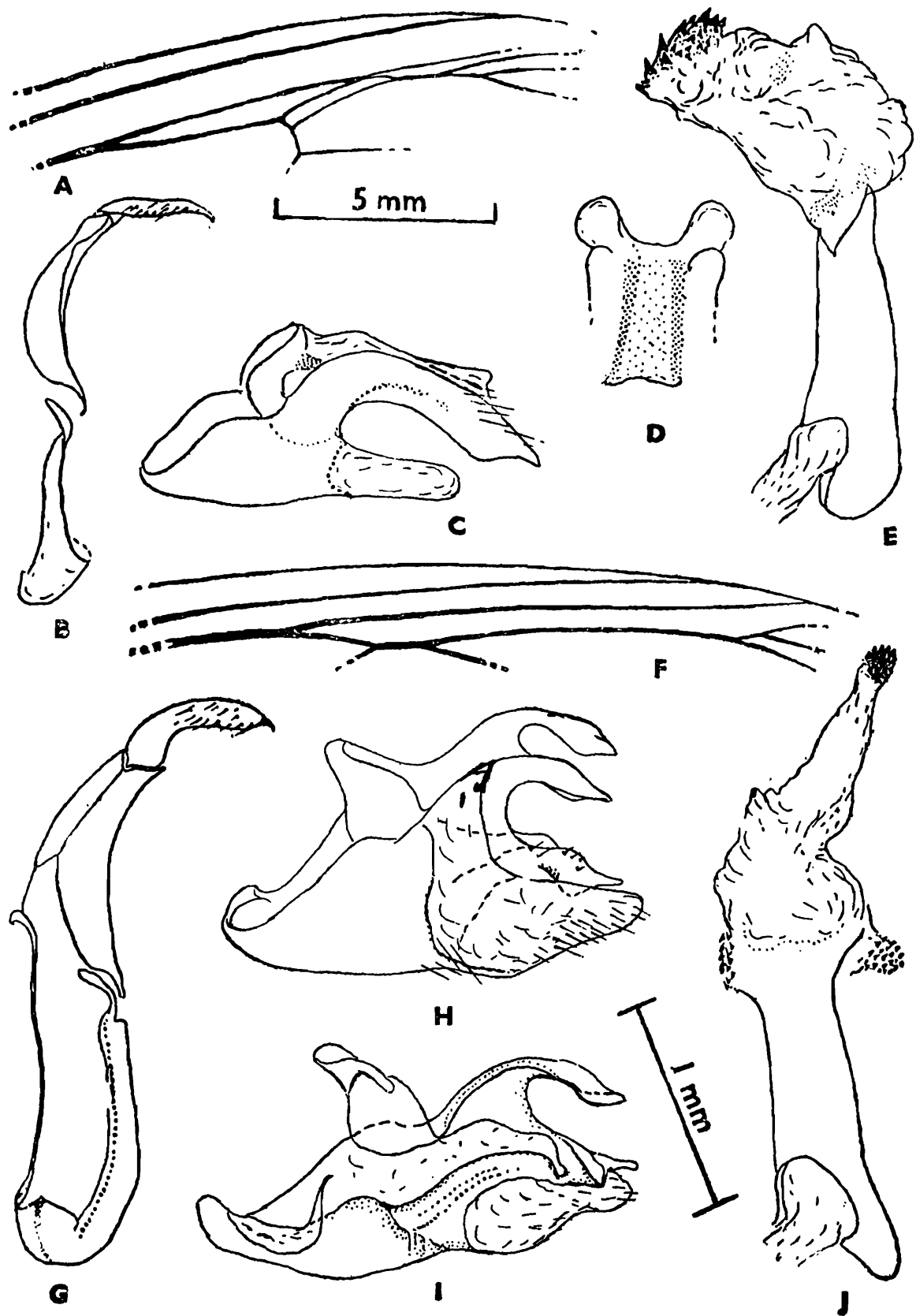


Fig. 1. 1A—E, *Callimorpha principalis* (Kollar) : A—part of the forewing venation, with areole ; B—lateral view of male genitalia, without valvae ; C—lateral view of valvae ; D—juxta ; E—Aedeagus. 1F—J, *Callimorpha plagiata* (Walker) : F—part of the forewing venation, without areole ; G—lateral view of the male genitalia, without valvae ; H—lateral view of valvae, outer side ; I—inner view of single valva ; J—Aedeagus. (A, F and all genitalia figures of same magnification).

and beset with fine long setae ; a sclerotised ridge, which is curved inwards to meet the other side to form a transtilla bridge, arises mesally from the base of upper sclerotised part. Aedeagus short and stout, apex narrower than base, without any apparent spines at vesica when the latter is fully retracted, but when the vesica is extended out it has a group of cornutal spines at its far end.

Remarks.—Except for some variations in venation of fore wing, particularly in the anastomosis of vein R_1 with R_2 distal to the origin of the latter, this description agrees with that given by Hampson (1894). This anastomosis seems to be interesting and may be precursor to complete anastomosis of R_2 with stalks of $R_3 + R_4$ and R_5 as in certain examples of *C. equitalis*, leading to absence of an areole in *plagiata*. The species is also characterised by the ground colour of both wings being metallic green with golden yellow spots ; and the abdomen crimson above with a series of ventral spots ; frons with black spots ; labial palpi with black spots on 1st and 2nd segment, the 3rd segment entirely black.

2. *Callimorpha plagiata* (Walker)

(Plate I, fig. 2 ♀ ; Figs. 1F-J).

1855. *Hypercampa plagiata* Walker, *List Lep. Insects Br. Mus.*, 3 : 655 (Type loc.—Sylhet).

Material examined.—Arunachal Pradesh : Lohit Dist., Roing, 300 m., 1 ♀, 6.iii. 1969 (S. K. Tandon Coll.).

Wing expanse.—87 mm.

Distribution.—INDIA (Assam, Khasis ; Kashmir ; Arunachal Pradesh) ; CHINA ; and BANGLADESH.

Genitalia.—Male (Text-fig. 1G-J) : Uncus long and narrow, about seven times as long as its width at middle ; beset with fine setae, the tip acuminate. Tegumen long and narrow ; vinculum broad, 'U'-shaped ; saccus obsolete. Valva well developed, the basal half highly sclerotised, distal half membranous ; a highly sclerotised distally curved process arises from the mid-ventral area and joins with mid-dorsal sclerotised part which is raised into distally curved process ; the mid-dorsal area also extends basally into ridge which is curved over to the anellus to meet its counter part from other side to form transtilla bridge ; anellus ring mostly membranous, except for a very narrow sclerotisation. Aedeagus well developed, with three groups of cornutal spines on vesica, when extended, *i.e.*, one at the far end and two on sides.

Remarks.—Hampson (1894) referred to the presence of areole in fore wing, but the material available for study, as well as a large number of

specimens present in N.Z.C., did not show any trace of areole, obviously, because of the complete anastomosis (Text-fig. 1F) of stalk of vein R_2 with that of veins $R_3 + R_4$ and R_5 . The species is also characterised by the spots on fore wing being pale and large ; hind wings yellowish ; abdomen with yellow transverse bands ; frons and labial palpi entirely black.

The species differs considerably from *C. principalis*, besides by the absence of areole in fore wing and spots ; in the male genitalia, particularly in the complicated structure of valvae ; sclerotised patches on anellus ; and aedeagus with three groups of cornutal spines unlike one in *principalis*.

(B) Subfamily NYCTEMERINAE

The moths belonging to this subfamily are nearly all diurnal. Body very long and slender ; wings large. Proboscis well developed ; labial palpi present, porrect or upturned ; antennae bipectinate in male ; simple or with extremely short and unequal rami, looking like serrations in female ; ocelli well developed. Fore wing with vein R_3 arising from R_2 and anastomosing with R_4 to form an areole.

Only single genus, *Nyctemera* Hübner, is recorded here.

Genus *Nyctemera* Hübner

1820. *Nyctemera* Hübner, *Verz. bek. Schmett.* : 178.

Type.—*Phalaena (Geometra) lacticinia* Cramer

Remarks.—A genus of moderately large and slender moths with predominantly black and white colouration ; palpi moderately long, porrect or upturned ; antennae bipectinate in male, with rami long and unequal, simple or with extremely short and unequal rami in female ; fore wings with areole present ; legs with two pairs of hind tibial spurs, some with specialised tufts on fore femora.

Swinhoe (1903) dealt with the genus *Deilemera* Hübner and included under it most of the species of *Nyctemera*. Later, Roepke (1949), while dealing with Javanese and Malayan species, synonymised the genus *Deilemera* with *Nyctemera* Hübner. He also described the male genitalia for the first time. Roepke (1957) further revised *Nyctemera* species, including *N. plagifera* Walker (now *adversata*) from Sumatra, Malaya, Celebes (Sulawesi), Moluccas and New Guinea.

Bryk (1937) recorded 12 species from the Indian region, including four from northeastern, viz., *N. cenis* (Cramer), *N. plagifera* Walker (now *adversata*) and *N. varians* Walker, and *Deilemera carissima* (Swinhoe).

Presently four species are being recorded from northeastern region.

Key to the identification of species of *Nyctemera*

1. Antennae in male with short pectinations. Fore wing with antemedial, medial and discocellular bands touching costal margin, the former two extending through inner area nearly up to the inner margin ; marginal band broad from beyond postmedial to outer margin, with two white patches on it. Hind wing with veins Rs-M₁ not stalked, either free or connate from angle ... *varians* Walker
- Antennae in male with long pectination. Hind wing with veins Rs-M₁ stalked ... 2
2. Abdomen yellowish, with a transverse black band on each segment. Fore wing with maculate bands ; medial band from cell to inner margin, interrupted at vein Cu_{1b} ; two elongate antemedial spots below the cell ; marginal band maculate from a little before apex to Cu_{1b}. Both wings without discocellular spots ... *cenis* (Cramer)
- Abdomen whitish or yellowish, with spots ... 3
3. Abdomen whitish, with dorsal, lateral and subventral black spots. Both wings normally developed, with discocellular spots. Fore wings with basal half of wing with longitudinal streaks on costa, cubito-median and anal veins reaching up to the medial band, the latter not reaching costal as well as as inner margin ... *adversata* (Schaller)
- Abdomen pale yellowish, with subdorsal, lateral and subventral spots. Both wings abnormally developed, without discocellular spots. Fore wing without streaks ; medial band extending up to costa, towards base and inner area, the latter broad ... *carissima* (Swinhoe)

3. *Nyctemera varians* Walker

(Plate I, figs. 3, 3a, 3b)

1854. *Nyctemera varians* Walker, *List Lep. Insects Br. Mus.*, 2 : 400-401 (*Type loc.*—East India).

Material examined.—Arunachal Pradesh : Lohit Dist., Daphabum Expd., Wakro, 520 m., 1 ♀, 3.xii. 1969 (*J. M. Julka* Coll.) ; Tirap Dist., Changlong, around camp, 600 m., 1 ♀, 2.xi. 1971 (*G. S. Arora* Coll.) ; 1 ♂, Sikkim (no other data) (Old collns. *Z. S. I.*).

Wing expanse.—Male, 51 mm. ; female, 57 mm.

Distribution.—INDIA (Kashmir ; Sikkim ; Assam ; Arunachal Pradesh). Also BURMA.

Remarks.—The species is close to *N. adversata*, apparently due to fore wing spots, particularly the medial spots, being continuous below the cell ;

discocellular spots present on fore wings. Also, it is separable from *adversata* by absence of white spots on terminal band, presence of two patches on submarginal area in fore wing, absence of discocellular spot on hind wing, vein Rs and M₁ not stalked in hind wing ; and shorter antennal rami and palpi.

4. *Nyctemera cenis* (Cramer)

(Plate I, fig. 4 ♀)

1779. *Phalaena cenis* Cramer, *Papil. Exot.*, 2.: 82, pl. 147, fig. E. (*Type loc.*—China).

Material examined.—Assam : Sonai Rupai Forest, 343 m., 1 ♀, 2.xii.1965 (S. K. Bhattacharya and A. N. T. Joseph Coll.). Arunachal Pradesh : Siang Dist., Dapporijobeta, 150 m., 2 ♀ ♀, 22, 28.x.1966 (S. K. Tandon and G. S. Arora Coll.) ; Lohit Dist., Chikrung Village, 1924 m., 1 ♀, 18.xii.1969 (J. M. Julka Coll.).

Wing expanse.—Female, 41-43 mm.

Distribution.—INDIA (Kashmir ; Himachal Pradesh, Simla ; U.P. ; W.B. ; Assam, Sibsagar, Khasis ; Sikkim ; Arunachal Pradesh). Also CHINA ; BURMA and BANGLADESH.

Remarks.—The species is characterised by the antennal rami being unequal in male, with rami of one side reduced to extremely short serrations. Swinhoe (1903) placed the species in a group, along with '*N. plagifera*', characterised by the "veins 6 and 7 of hind wings stalked, palpi longer, antennae with long pectination". Although veins, as mentioned above, are stalked in both the species, the palpi and antennal rami differ in size, being smaller in *cenis* than in *adversata*. Besides, it differs from both the species, viz., *adversata* and *varians* by complete absence of discocellular spots on both pair of wings ; the medial spots not continuous with those below the cell and inner area ; and in the abdomen marked with transverse black bands.

5. *Nyctemera adversata* (Schaller)

(Plate I, fig. 5 ♀, 5a ♂)

1788. *Phalaena (Geometra) adversata* Schaller, *Naturforscher*, 23 : 52.

Material examined.—Assam : Dibrugar, 100 m., 1 ♀, 27.ii.1969 (S. K. Tandon Coll.). Arunachal Pradesh : Kameng Dist., Ankaling, 77 m., 1 ♂, 10.iii.1961 (K. C. Jayaram Coll.), Pinjuli, 244 m., 1 ♀, 4.v.1966 (A. N. T. Joseph Coll.), Tapii, 175 m., 1 ♀, 20.iii.1973, Sena, 1067 m., 1 ♀, 21.iii.1973 (S. K. Tandon Coll.) ; Subansiri Dist., Tamen, 457 m., 1 ♂, 20.v.1966, Didi camp, 1128 m., 1 ♂, 22.v.1966 (A. N. T. Joseph Coll.) ; Siang Dist, Siji, Likhabali, 165-200 m., 1 ♀, 8.x.1966, 3 kms. NS of Dali Village, 200 m., 1 ♂, 10.x.1966, Kambang, 200 m., 1 ♀, 16.x.1966, New Jining, 200 m., 1 ♂, 19.x.

1966, Tappi Dulla, 500 m., 1 ♀, 22.v.1966, Dopporijo, 150 m., 1 ♀, 27.x.1966 (all *S. K. Tandon* and *G. S. Arora* Coll.) ; Lohit Dist., Sunpara, 100 m., 1 ♂, 1 ♀, 3.iii.1969 (*S. K. Tandon* Coll.) ; Daphabum, Chowkham, 244 m., 1 ♀, 22.xi.1969, Gogoi camp, 244 m., 2 ♀ ♀, 29.xi.1969 (all *J. M. Julka* Coll.) ; Tirap Dist., Changlong around camp, 540-600 m., 3 ♀ ♀, 30.x.1971, 2.xi.1971, Khonsa, 700 m., 1 ♀, 7.xi.1971 (*G. S. Arora* Coll.).

Wing expanse.—Male, 49-52 mm. ; female, 51-55 mm. (in literature : 48-60 mm. ; 48-64 mm., respectively).

Distribution.—Throughout INDIA. Also BANGLADESH ; HONGKONG ; TONKIN ; S. CHINA ; INDOCHINA ; JAPAN ; SUMATRA and MALAYSIA.

Remarks.—Although Roepke (1957) accepted the priority of *Nyctemera adversata* (Schaller) over *N. plagifera*, he retained the latter and pleaded for its retention owing to its wider usage which is permissible under the code of ICZN. However, Okagaki (1977) treated *plagifera* Walker as a synonym of *adversata*. The present paper retains the name *adversata* in accordance with the views expressed by Okagaki (1977).

The species is quite common throughout Arunachal Pradesh as is evident from the collection present from all the five districts as well as the adjoining areas of Assam.

The species is characterised by the antennae being bipectinate in male with rami long, unipectinate in female with rami short, *i.e.*, those of inner side with reduced to minute serrations ; the medial spots of cell continuous with the spots below the cell and on inner area, the inner edge of which send spurs along veins towards base ; the discocellular spots present on both pair of wings ; fore wing with three minute white spots on terminal band between veins R_5 and M_2 ; hind wing with veins R_s and M_1 stalked ; abdomen whitish, with the tip yellowish, marked with dorsal and lateral rows of black spots.

6. *Nyctemera* (*Arctata*) *carissima* (Swinhoe) n. comb.

1891. *Deilemra carissima* Swinhoe, *Trans. ent. Soc. Lond.* : 477, pl. 19. fig. 1

Material examined.—Tirap Dist. : Khonsa, Power House, 800 m., 1 ♂, 6.xi.1971 (*G. S. Arora* Coll.) [abdomen incomplete].

Wing expanse.—60 mm.

Distribution.—INDIA (Sikkim ; Assam, Khasis ; Naga Hills ; and Arunachal Pradesh).

Remarks.—Originally described under the genus *Deilemra*, this nomenclature was followed by Hampson (1894), Swinhoe (1903) and Bryk (1937)

but the genus was, later, synonymised to *Nyctemera* (*vide* Roepke, 1949), to which the species is now assigned. The species is characterised by the abnormally developed fore and hind wings (this character is also reported to be present only in one more species, viz. *N. arctata* (Walker) in India (*vide* Swinhoe, 1903). Roepke (1949) while studying *N. arctata scalarium* Vollenhoven, defined the characteristics of the species and was of the opinion that in forewing markings this species resembled *Abraxas* (Geomteridae) so that based on these characters along with those of genitalic features he proposed the new subgenus *Arctata*. The material available for study also resembles in pattern and matches the description given by Roepke (*loc. cit.*), and is, therefore, being assigned to the subgenus *Arctata*.

(C) Subfamily MICRARCTIINAE

Seitz (1910) introduced a division of the subfamily Arctiinae (*sensu lat.*) to separate certain genera, including *Utetheisa* and *Argina* from among the Indian genera, under Micrarctiinae. He characterised the subfamily as follows :

Moths are partially diurnal and very often abundant at their flight places, sometimes forming swarms. The body of male slender ; the fore wings elongate, with short distal margin, with light, white, or ivory or brown ground-colour, marked with small dashes or dots, the hind wings very broad, with long outer margin.

The present study deals with one genus, *Argina* Hübner, which, along with *Utetheisa* and *Rhodogastria*, had been referred to this subfamily by Daniel (1943). There is no record of *Utetheisa* from Arunachal Pradesh, and *Rhodogastria* has been placed here in a separate subfamily Rhodogastrinae (following Kiriakoff, 1950).

Genus *Argina* Hübner

1818. *Argina* Hübner, *Verz. bek. Schmett.* : 167.

Type.—*Phalaena cribraria* Clerck

Remarks.—The genus can be distinguished by the labial palpi being short and porrect ; proboscis present but thin ; abdomen golden yellow or reddish, marked with dorsal and lateral rows of dots.

The species belonging to this genus are with the antennae minutely serrate in male and the hind tibiae with minute terminal pair of spurs ; ocelli well developed (Plate II, fig. 6).

Bryk (1937) treated the genus under subfamily Callimorphinae, with three species from Indian region. Daniel (1943) treated it under subfamily Micrarctiinae.

Two species are being recorded from Arunachal Pradesh.

7 *Argina argus* (Kollar)

1844. *Euprepia argus* Kollar, *In : Hugel's Kaschmir und das Reich der Siek*, 4 : 467, pl. 21, fig. 3. (Type loc.—Himalayas, Mussoorie)

Material examined.—Arunachal Pradesh : Tirap dist. ; Khonsa, Power House, 1 ♂ , 6.xi.1971 (*G.S. Arora* Coll.).

Wing expanse.—Male, 55 mm.

Distribution.—Throughout INDIA ; SRI LANKA ; and BURMA. Also EASTERN ASIA.

Remarks.—The species is characterised by the bright greyish-red head, thorax and fore wings, the latter marked with numerous pale rings with black centres and arranged in rows ; hind wings purple-red, with black spots on costa, discocellulars, submarginal area and anal area ; abdomen greyish red, with dorsal, lateral and ventral row of black spots.

8. *Argina cribraria* (Clerck)

(Plate II, fig. 6 ♂)

1759. *Phalaena cribraria* Clerck, *Icon. Inst.*, 2 : pl. 54, fig. 4.

Material examined.—Arunachal Pradesh : Tirap dist. ; Khonsa, Power House, 800 m., 1 ♂ , 6.xi.1971 (*G. S. Arora* Coll.).

Wing expanse.—42 mm.

Distribution.—Throughout INDIA ; CHINA ; SRI LANKA ; BURMA ; and PHILIPPINES.

Remarks.—The species differs from *argus* in head, thorax, abdomen and wings being yellowish ; forewing spots quite large, with light edges.

(D) Subfamily RHODOGASTRIINAE

Kiriakoff (1950) separated the genus *Rhodogastria* Hübner, which was hitherto treated either under Arctiinae (*vide* Rothschild, 1914 and Strand, 1919) or Micrarctiinae (*vide* Daniel, 1943), and introduced a new subfamily Rhodogastrinae.

The species of the genus *Rhodogastria* belonging to this subfamily, are distinguishable in both sexes by simple antennae, well developed ocelli, hind

tibiae with two pairs of spurs, and fore wings with areole, formed by the anastomosis of vein R_2 with R_3 , and R_1 free.

Genus *Rhodogastria* Hübner

1816. *Rhodogastria* Hübner, *verz. bek. Schmett.* : 172.

Type.—*Phalaena amasis* Cramer

Remarks.—Strand (1919) recorded five species under this genus from the Indian region, including *phaedra* Weymer from Khasia Hills, *eugenia* Fabricius from Central India, Southern India and Bombay and *rhodopa* Walker from Sikkim, Naga Hills and Southern India, all of which were treated by Hampson (1901) as synonyms of *R. astreus* Drury; and *omissa* Rothschild, which has been reported to occur in Assam and Khasia Hills of northeastern region.

The present study, however, deals with only *R. astreus* (Drury) from Arunachal Pradesh.

9. *Rhodogastria astreus* (Drury)

(Plate II, fig. 7 ♂)

1773. *Sphinx astreus* Drury, *Ill. Exot. Ent.*, 2 : 50, Pl. 28, fig. 4. (Type loc.—Bengal).

Material examined.—Arunachal Pradesh : Tirap Dist., Khonsa, Power House, 800 m., 2 ♂♂, 1 ♀, 7.xi.1971 (G. S. Arora Coll.).

Wing expanse.—Male 70 mm.; female, 72 mm.

Distribution.—INDIA (W Bengal; Arunachal Pradesh; Maharashtra and Tamil Nadu); WEST CHINA; BURMA; INDONESIA; PHILIPPINES; NEW GUINEA and SRI LANKA.

Remarks.—Hitherto known up to Bengal in the eastern India, the species' record from Tirap district extends its distribution deep into north-eastern region of India. It is characterised by the wings being semi-diaphanous, nearly throughout except at costa, discocellulars and apical areas of fore wings which are brownish; head, thorax, tegulae and base of fore wings marked with black spots; legs tinged with crimson.

(E) Subfamily SPILOSOMINAE

Seitz (1910) introduced the division of Arctiinae (*sensu lat.*) into Micrarc-tiinae, Spilosominae and Arctiinae (*sensu str.*) merely in order to have what he regarded as "lucidity of arrangement" Later, Daniel (1943) recognised this division inspite of the fact that Strand (1919) treated Spilosominae as synonym of Arctiinae. Keeping in view the utility of the purpose for which

the division of Arctiinae was proposed by Seitz (1910), the present authors have retained not only the classification but the nomenclature of various genera as well as species to avoid any confusion whatsoever.

The subfamily was characterised by Seitz (1910) as follows :

Moths are of nocturnal habits. Head broad, with antennae sometimes quite short ; thorax broad and woolly, almost often without markings ; abdomen very slender in male ; legs short and strong ; fore wings often long, with sparse marking often reduced to dots.

Besides, in the subfamily Spilosominae proboscis is more or less aborted ; antennae variable in male ; fore wing with vein R_2 free or stalked. It is well distributed in Indian region and is presently represented by seven genera and nine species from northeastern region of India.

Key to the identification of genera of SPILOSOMINAE

1. Antennae ciliate in both sexes. Hind legs with one pair of tibial spurs ; fore tibiae without curved apical claw ... 2
- Antennae minutely serrate or pectinate in male. Hind legs with two pairs of tibial spurs, rarely the middle pair extremely reduced ; fore tibiae with or without curved apical claw ... 3
2. Thorax marked. Legs with coxae and femora pale yellow above ; tibiae and tarsi dark brown, unmarked ... *Cretonotos* Hübner (1 sp.)
- Thorax unmarked. Legs with coxae and femora yellow ; tibiae and tarsi ivory white, marked with dark brown stripes ... *Phissama* Moore (1 sp.)
3. Fore tibiae with curved apical claw ... 4
- Fore tibiae without curved apical claw ... 5
4. Antennae minutely serrate in male, about one-third the length of costa. Hind legs with the medial spurs shorter than the terminal spurs ... *Aloa* Walker (1 sp.)
- Antennae pectinate in male, slightly less than half the length of costa. Hind legs with tibial spurs moderately long and nearly equal ... *Alphaea* Walker (1 sp.)
5. Head, thorax and abdomen with large woolly hair. Antennae about half the length of costa. Proboscis extremely short, not exceeding the width of head ... *Spilarctia* Butler (3 spp.)
- Head, thorax and abdomen smoothly scaled. Antennae less than half the length of costa. Proboscis extending the width of head ... 6
6. Labial palpi long and porrect, projecting beyond frons ; proboscis twice the width of head ... *Areas* Walker (1 sp.)
- Labial palpi short and porrect, not projecting beyond frons ; proboscis not twice the width of head ... *Olepa* Watson (1 sp.)

Genus **Cretonotos** Hübner

1816. *Cretonotos* Hübner, *Verz. bek. Schmett.* : 169.

Type.—*Phalaena interrupta* Linnaeus (= *Phalaena gangis* Linn.)

Remarks.—Strand (1919) recorded two species, *gangis* and *transiens* under this genus from India, but later Daniel (1943) treated both of these separately under *Cretonotos* and *Phissama*, as followed earlier by Hampson (1894) and Seitz (1910) and now by the present authors.

The genus *Cretonotos* is distinguishable by the antennae being ciliate in both sexes ; hind tibiae with a single pair of spurs. Fore wing with vein R_2 free or stalked with $R_3 + R_5$ and M_3 from lower angle, arising free or stalked with Cu_{1a} .

Cretonotos gangis (Linn.) is being recorded here from Assam and Arunachal Pradesh.

10. **Cretonotos gangis** (Linn.)

(Plate II, fig. 8 ♂)

1764. *Phalaena gangis* Linn., *Amoen. Acad.*, 6 : 410.

Material examined.—Assam : North Lakhimpur, 3 ♂ ♂ , 3 ♀ ♀ , 3.x. 1966. Arunachal Pradesh : Siang Dist., New Jinning, 100 m., 1 ♂ , 19.x. 1966 (all *S. K. Tandon* and *G. S. Arora* Coll.) ; Lohit Dist., Sadiya, 100 m., 1 ♂ , 28.ii. 1969, Namsai, 100-150 m., 4 ♂ ♂ , 3 ♀ ♀ , 14-15.iii.1969 (all *S. K. Tandon* Coll.) ; Triap Dist., Jairampur, 200 m., 4 ♂ ♂ , 2 ♀ ♀ , 24, 26.x. 1971 (*G. S. Arora* Coll.).

Wing expanse.—Male, 34-41 mm. ; female, 30-42 mm.

Distribution.—Throughout INDIA. Also SRI LANKA ; MALAYSIA (Singapore) ; NEPAL ; PAKISTAN ; EASTERN ASIA ; CHINA (Formosa) ; and N. AUSTRALIA.

Remarks.—This species is characterised by the antennae being ciliate in both sexes ; wings semi-diaphanous ; thorax with an oblong patch from beyond collar ; and fore wing white, with a black fascia below the cell from base to Cu_{1a} and another between M_1 and M_3 from lower angle to a little before margin ; a minute spot present on inner side of upper- and lower angle of cell in fore wing ; abdomen crimson, tinged with red, with a prominent series of dorsal and lateral black spots. Under side from frons to abdominal tip, tibiae and tarsi dark fuscous ; sides of coxae and femora pale yellowish.

Genus **Phissama** Moore

1859. *Phissama* Moore, *Lep. East India Comp.* : 362.

Type.—*Amphissa vacillans* Walker, 1855 (= *Spilosoma transiens* Walker).

Remarks.—The genus is very close to the preceding genus, i. e., *Cretonotos*, particularly in the antennae being ciliate in both sexes ; hind tibiae with one pair of spurs and the wing being semi-diaphanous. It can, however, be differentiated by the complete absence of black patch on thorax and fascia on fore wings, the latter with four minute discocellular spots ; legs with the coxae and femora yellowish and the tibiae and tarsi ivory white, marked with longitudinal stripes.

The genus *Phissama* contains only single species from Assam and Arunachal Pradesh and is being dealt with here.

11. **Phissama transiens** (Walker)
(Plate II, fig. 9 ♂)

1855. *Spilosoma transiens* Walker, *List Lep. Insects Br. Mus.*, 3 : 675 (Type loc.—North India).

Material examined.—Assam : North Lakhimpur, 3 ♂ ♂ , 3.x.1966 (S. K. Tandon and G. S. Arora Coll.). Arunachal Pradesh : Kameng Dist., Dirang Drong, 1600 m., 1 ♂ , 19.vii.1961, Rohang, 1830 m., 1 ♂ , 14.ix.1961 (S. Biswas Coll.) ; Siang Dist., Dali camp, 2 ♂ ♂ , 12.x.1966, Kambang, 200 m., 4 ♂ ♂ , 14, 15.x.1966, New Jinning, 100 m., 3 ♂ ♂ , 18, 20.x.1966, Tappi Dulla, 500 m., 1 ♂ , 22.x.1966, Tapi, 600 m., 2 ♂ ♂ , 23.x.1966, Bali, 600 m., 1 ♂ , 30.x.1966 (all S. K. Tandon and G. S. Arora Coll.) ; Lohit Dist., Roing, 300 m., 8 ♂ ♂ , 2 ♀ ♀ , 5-8.iii.1969, Hayliang, 700 m., 1 ♀ , 12.ii.1969, Teju, 150 m., 1 ♀ , 13.iii.1969, Namsai, 100 m., 2 ♂ ♂ , 2 ♀ ♀ , 15-16.iii.1969 (S. K. Tandon Coll.) ; Tirap Dist., Jairampur, 225 m., 5 ♂ ♂ , 2 ♀ ♀ , 25-26.x.1971, Changlong, around camp, 540 m., 36 ♂ ♂ , 4 ♀ ♀ , 30-31.x.1971, Khonsa, Power House, 800 m., 1 ♂ , 1 ♀ , 6.xi.1971, Deomali, 200 m., 5 ♂ ♂ , 8 ♀ ♀ , 9, 10, 12.xi.1971 (all G. S. Arora Coll.).

Wing expanse.—Male, 35-47 mm. ; female, 46-50 mm.

Distribution.—INDIA (Assam ; Sikkim ; Arunachal Pradesh ; West Bengal). Also CHINA (Formosa) ; INDONESIA (Borneo, Sulawesi) ; and PHILIPPINES.

Remarks.—This species shows some sexual dimorphism in colouration. Both the pairs of wings are dark grey brown in the male, except at costa of fore wing, which is ivory white ; in the female the hind pair is more diaphan-

ous, whitish and without scales on under side in inner area and the fore wings lack white along the costa. The abdomen is orange or yellow above, ivory white below, marked with prominent series of dorsal, lateral, subventral and ventral spots ; fore wings with a black dot each on inner and outer side of upper and lower angle of cell.

For other remarks see under the genus.

Genus *Aloa* Walker

1855. *Aloa* Walker, *List Lep. Insects Br. Mus.*, 3 : 699.

Type.—*Phalaena lactinea* Cramer

Remarks.—Walker (1855) gave the diagnosis of the genus on the basis of antennae being simple in both sexes ; proboscis moderately long ; labial palpi short and porrect, with the 2nd joint being much longer than the first, the third conical ; abdomen extending slightly beyond hind wings. Legs with two pairs of hind tibial spurs.

Hampson (1901) and Strand (1919) synonymised the genus *Aloa* to *Diacrisia* Hübner. Seitz (1910), and more recently Daniel (1943), treated it independently under the subfamily Spilosominae and included in it the following species, viz., *lactinea* (Cramer).

12. *Aloa lactinea* (Cramer)

(Plate II, fig. 10 ♂)

1777. *Bombyx lactinea* Cramer, *Pap. Exot.*, 2 : 58, 149, pl. 133, fig. D.

Material examined.—Arunachal Pradesh : Lohit Dist., Roing, 300 m., 2 ♂♂, 7.iii.1969 (S. K. Tandon Coll.).

Wing expanse.—Male, 52-55 mm.

Distribution.—INDIA (Assam ; Arunachal Pradesh ; West Bengal ; Kashmir ; Maharashtra ; Kerala ; Tamil Nadu). Also SRI LANKA ; JAPAN ; CHINA ; E. ASIA ; and INDONESIA (Java and Sumatra).

Remarks.—Whereas the genus *Aloa* was treated as a synonym of *Diacrisia* by Hampson (1901) and Strand (1919) as mentioned above, the species *lactinea* was treated under the genus *Amsacta* Walker. Seitz (1910) and Daniel (1943), however, placed *lactinea* in *Aloa*.

This species is close to *Aloa moorei* in general facies except that the latter species has only one pair of hind tibial spurs. The two otherwise exactly similar examples present for study are interesting in that in one of the two examples, the middle pair of spurs is extremely reduced almost giving an

appearance of one pair. The abdomen is orange above, marked with narrow transverse bands, underside whitish, unmarked ; patagia with the edges scarlet ; tegulae with black spots ; fore and mid tibiae striped with black, tarsi white, with segmental black bands.

Genus *Alphaea* Walker

1855. *Alphaea* Walker, *List Lep. Insects Br. Mus.*, 3 : 683.

Type.—*Alphaea fulvohirta* Walker

Remarks.—Seitz (1910) was of the opinion that "From morphological point of view the genus [*Alphaea*] must perhaps be sunk as Hampson does ; but as the facies is very different, *Alphaea* may here be retained for the sake of convenience" Whereas Hampson (1894) retained *Alphaea* as valid, he not only synonymised it, in 1901, to the genus *Diacrisia* Hübner, about which the above-mentioned reference has been made, but transferred another species *quadriramosa* (Kollar) to the genus *Estigmene* Hübner. While Strand (1919) merely followed Hampson (1901) in his catalogue, in treating *Alphaea* as a synonym of *Diacrisia* as well as treating *quadriramosa* under *Estigmene*, Daniel (1943) revalidated *Alphaea* again and included in it not only *obliquifascia* Hampson (1894), an Indian species, but also *anopunctata* Oberthür and *phasma* Leech, all treated by Strand (1919) as species of *Diacrisia* Hübner. Keeping in mind the views expressed by Seitz (1910) and Rothschild (1914) that *Diacrisia* belongs to the subfamily Arctiinae (*sensu str.*) and *Alphaea* is a Spilosominae genus, the authors feel that it is quite logical to keep the latter independent of *Diacrisia*, so as to include not only the above-mentioned three species (*vide* Daniel, 1943) but also *quadriramosa*.

The genus is characterised by the antennae in the male being bipectinate ; fore tibiae with short curved apical claws ; hind tibiae with two pairs of spurs ; fore wings with veins R_{2-5} stalked, M_1 either arising free or stalked with Radials ; hind wings with the veins $Rs-M_1$ from angle or shortly stalked.

One species is included here.

13. *Alphaea quadriramosa* (Kollar)

(Plate II, fig. 11 ♂)

1844. *Euprepia quadriramosa* Kollar, In : Hugel's *Kaschmir und das Reich der Siek*, 4 (2) : 468 (*Type loc.*—Himalayas, Kashmir).

Material examined.—Arunachal Pradesh : Kameng Dist., Sangloom, 690 m., 2 ♂♂, 6.vi.1961, Domko, 650 m., 1 ♂, 8.vi.1961 (all K. C. Jayaram Coll.).

Wing expanse.—Male, 36-40 mm.

Distribution.—INDIA (Assam, Khasis ; Arunachal Pradesh ; Sikkim ; Kashmir ; Himachal Pradesh, Kangra and Dalhousie).

Remarks.—The species is characterised by the presence of fascia on patagia, tegulae, costa, subcosta, median and inner veins ; the fascia on median veins extending along M_2 , M_3 and Cu_{1a-b} , and the one between M_3 and Cu_{1a} reaching the terminal margin. The abdomen is orange above, marked with transverse patches dorsally and spots laterally ; ventrally whitish, marked with a series of subventral spots.

The species is very close to *A. fulvohirta* in characters as given in remarks under the genus, but differs in the colouration and pattern.

Genus *Spilarctia* Butler

1875. *Spilarctia* Butler, *Cist. Ent.*, 2 : 39.

Type.—*Phalaena lutea* Hufnagel

Remarks.—Seitz (1910) while introducing the division of Arctiinae (*sensu lat.*) into Spilosominae, Micrarctiinae and Arctiinae (*sensu str.*), separated some of the old-world species placed in the genus *Diacrisia* Hübner (*Sensu* Hampson, 1901) into *Spilarctia*, and treated *Diacrisia* under the subfamily Arctiinae (*sensu str.*).

The present paper deals with the following three species viz., *casigneta*, *obliqua* and *rubitincta*, all of which were treated by Daniel (1943) under this genus.

14. *Spilarctia rubitincta* (Moore)

1865. *Spilosoma rubitincta* Moore, *Proc. zool. Soc. Lond.* : 809 (*Type loc.*—Darjeeling).

Material examined.—Arunachal Pradesh : Kameng Dist., Sangloom, 2 ♂♂, 14.ix.1961 (*S. Biswas* Coll.).

Wing expanse.—Male, 34 mm.

Distribution.—INDIA (West Bengal ; Sikkim ; Arunachal Pradesh). Also BHUTAN.

Remarks.—The species is characterised by the fore wing being orange, tinged with crimson and the presence of an oblique series of well developed spots from below vein M_1 to middle of inner margin on fore wing ; hind wing whitish. The antennae in male are bipectinate nearly up to the tip, the last segment simple ; the labial palpi are black at sides and extremity but crimson below ; the abdomen crimson, marked with a series of dorsal and lateral spots.

15. *Spilarctia obliqua* (Walker)

(Plate II, fig. 12 ♂)

1855. *Spilosoma obliqua* Walker, *List Lep. Insects Br. Mus.*, 3 : 679 (Type loc.—Sydney, N. S. Wales Australia).

Material examined.—Arunachal Pradesh : Kameng Dist., Kalaktong village, 412 m., 2 ♂♂, 16.iii.1961 (K. C. Jayaram Coll.), Jungle camp, 1 ♂, 28.ix.1961 (S. Biswas Coll.) ; Siang Dist., Kambang, 200 m., 1 ♂, 15.x.1966 (S. K. Tandon and G. S. Arora Coll.) ; Lohit Dist., Namsai, 100 m., 1 ♀, 15.iii.1969, 1 ♀, 150 m., 17.iii.1969 (S. K. Tandon Coll.).

Wing expanse.—Male, 39-47 mm. ; female 52 mm.

Distribution.—Throughout INDIA. Also BHUTAN ; JAPAN ; EASTERN ASIA ; CHINA ; and NEPAL.

Remarks.—The species, popularly known as the 'Bihar hairy caterpillar', is characterised by the antennae being dark, but weakly bipectinate (i.e. the rami of inner side are half the length of rami of outer row and are much reduced at basal as well as apical areas so as to give the antennae a serrate appearance ; the longest rami of the outer row about the length of three shaft-segments taken together). The oblique series of black spots on fore wing starts from apex ; hind wing being of the same colour as of fore wing. This character separates this species from *rubitincta*.

The species is very common throughout India and is economically important, being a pest of a variety of hosts, including vegetables, grains, spices, soybeans, tobacco, sunflower, oil seeds, lablab, and lantana.

16. *Spilarctia casigneta* (Kollar)

(Plate II, fig. 13 ♂)

1844. *Euprepia casigneta* Kollar, *In : Hugel's Kaschmir und das Reich der Siek*, 4 (2) : 469 (Type loc.—Mussoorie).

Material examined.—Arunachal Pradesh : Siang Dist., Dali camp, 300 m., 1 ♂, 9.x.1966 (S. K. Tandon and G. S. Arora Coll.) ; Lohit Dist., Teju, 150 m., 1 ♂, 13.iii.1969, Namsai, 100 m., 4 ♂♂, 15.iii.1969 (S. K. Tandon Coll.).

Wing expanse.—Male, 37-39 mm.

Distribution.—INDIA (Assam ; Nagaland ; Manipur ; Sikkim ; Arunachal Pradesh ; Tamil Nadu, Nilgiris ; N. W Himalayas). Also BHUTAN, WESTERN CHINA and EAST ASIA.

Remarks.—The species differs from both the preceding species by the antennae being pale brown, strongly bipectinate nearly up to tip, the last

segment simple ; rami moderately long but unequal on both sides, i. e., the rami of outer row being longer than those of inner row, the longest being equal to the length of six shaft-segments taken together unlike that of the inner being maximum of four segments. Labial palpi dark, except on under-side of 1st segment, or rarely up to 2nd segment which is paler ; fore wing buff-yellow, with a series of dashes in submarginal area on each side of vein, particularly between vein R_5 and Cu_{1a} and marginal dots, the oblique series of spots is not prominent ; hind wing tinged with crimson. Abdomen tinged with crimson, with a series of dorsal and lateral spots.

Genus *Areas* Walker

1855. *Areas* Walker, *List Lep. Insects Br. Mus.*, 3 : 658.

Type.—*Areas orientalis* Walker, 1855 by Monotypy, from North India (= *Chelonia galactina* Hoeven, 1840).

Remarks.—Walker (1855) erected the genus to include in it a north Indian species *Areas orientalis* Walker which was treated as a synonym of *A. galactina* (Hoev.) by Hampson, (1894). Hampson (1901), later, treated *Areas* as a synonym of *Pericallia* Hübner. Seitz (1910) not only treated *Areas* independently as a monotypic genus under Spilosominae, but placed *Pericallia* separately under Arctiinae (*sensu str.*), which has been followed by Daniel (1943) as well as in the present account.

The genus is characterised by the antennae being minutely pectinate in male, serrate in female ; frons being broad, labial palpi fairly long and porrect the 1st joint longer than the length of 2nd. Legs stout ; hind tibiae with two pairs of spurs. Abdomen extending as far as the hind wings. Fore wings rather long and broad ; hind wings short.

The genus is represented by one species from N. E. India as follows :

17 *Areas galactina* (Hoeven)

(Plate II, fig. 14 ♂)

1840. *Chelonia galactina* Hoeven, *Tijdschr. Nat. Ges. Phys.*, 7 : 280, pl. VI, fig. 5 (*Type loc.*—Brazil).

Material examined.—Arunachal Pradesh : Subansiri Dist., Hapoli, 1585 m., 1 ♂, 15.v.1966 (*A. N. T Joseph* Coll.).

Wing expanse.—80 mm.

Distribution.—INDIA (N. W Himalayas ; Assam, Khasis ; Naga Hills ; Arunachal Pradesh). Also INDONESIA (Borneo) ; SARAWAK ; W CHINA ; EASTERN ASIA ; and S. AMERICA.

Remarks.—The species is quite large, with the abdomen being crimson, tinged with red above and marked with a series of large black patches dorsally and spots laterally ; ventrally pale yellowish and with a series of subventral black spots. Fore wing dark brown, marked with large white patches ; hind wing pale yellowish, with a spot on discal area, two in inner area and one in submarginal area between M_1 - M_2 , and short dash-marks on veins M_3 , Cu_{1a} and Cu_{1b} towards base. Patagia and tegulae with large rounded black spots. Thorax with a broad elongate patch.

Genus *Olepa* Watson

1980. *Olepa* Watson, *The Generic Names of the Moths of the World*, 2 : 133 (Replacement name for *Alope* Walker, 1855 Preoccupied by *Alope* White, 1847—Crustacea).

Type.—*Alope ocellifera* Walker, 1855 (= *Bombyx ricini* Fabricius)

Remarks.—Hampson, in 1894, treated this as a synonym of the genus *Arctia* Schrank, but he considered it, in 1901, as a synonym of the genus *Pericallia* Hübner. This placement was followed by Hampson (1905), Rothschild (1914) and Strand (1919). Considering the fact that true *Pericallia* belong to the subfamily Arctiinae (*sensu str.*) and is quite different from *Olepa* Watson, the latter is treated independantly under Spilosominae as advocated by Seitz (1910).

The genus *Olepa* is distinguishable by the antennae being slightly pectinate in male, shortly serrate in female ; proboscis a little longer than the width of head ; labial palpi short, with the 2nd joint as long as the first, the third very short ; abdomen generally extending as far as hind wings ; legs with tibial spurs moderately long.

A single species is included here.

18. *Olepa ricini* (Fabricius)

1775. *Bombyx ricini* Fabricius, *Syst. Entom.* : 583 (Type loc.—Oriental India).

Material examined.—Assam : Kaziranga, 100 m., 1 ♀ , 24.ii.1969 (S. K. Tandon Coll.).

Wing expanse.—Female, 56 mm.

Distribution.—INDIA (Sikkim ; Assam ; Arunachal Pradesh ; Panjab ; Madhya Pradesh ; Karnataka ; Tamil Nadu). Also BANGLADESH ; (Sylhet) ; and SRI LANKA (Trincomali).

Remarks.—The species is of great economic importance, commonly known as “Woolly Bear” and is reported (Nayar *et al.* 1976) to be a pest of sweet potato, castor, cotton, banana, brinjal, pumpkin, *Calotropis*, *Oleander*, *Sesbania*, etc.

The species is characterised by the fore wing being darker throughout, marked with a series of black brown spots edged with white ; hind wings are also similarly marked with maculate bands particularly in subbasal, medial, postmedial and terminal area but without pale edging. The antennae in the specimen presently studied, show that these are very minutely serrate on one side.

(F) Subfamily LITHOSIINAE

The Moths are generally of slender built, with the abdomen generally just reaching the anal margin of hind wings. The general diagnostic features of the subfamily are : Head broad, with the frons large and flat ; eyes bulging ; ocelli present, absent or weakly marked ; labial palpi generally short, slightly upturned or porrect ; proboscis usually strong ; antennae shortly pectinate in male or simple in both sexes. Legs strong, often with coxae very long ; hind tibiae with two pairs of spurs. Fore wings generally long and narrow ; hind wings usually large.

It was generally believed that ocelli are absent in Lithosiinae, and on this basis Hampson (1900) divided the whole Arctiidae into two groups, i.e., with ocelli, -Arctiinae (*sens. lat.*), and without ocelli, -Nolinae and Lithosiinae. The three subfamilies were further classified into various genera on the basis of other taxonomical characters, wing pattern, etc., but the belief remained that the lithosine moths were without ocelli. However, during the course of study it was discovered that not all the species in Lithosiinae were without ocelli. As briefly reported earlier (*vide* Arora, 1975), while some of the species particularly in the following genera, *Tigrioides*, *Chrysorabdia*, *Oeonistis*, *Agylla* and *Agrisius*, are with fairly well developed ocelli (Plates II and III), those species in genera like *Miltochrista* and *Asura*, are without any trace. In between these two such groups as with or without ocelli, there appears to be an intermediate one where ocelli are very poorly marked, as in *Cyana*, *Garudinia*, *Eilema*, etc. It is interesting to observe that what phylogenetic relationship Hampson (1900) tried to establish among the various genera of Lithosiinae about three quarters of a century ago, proved not only useful but very relevant in as far as this particular character is concerned. Obviously, the first group (*vide* Hampson, 1900), is quite distinct from the one without ocelli, and assumes a close phylogenetic relationship to the subfamily Arctiinae (*sensu* Hampson, 1900). Although all the Indian genera that have been mentioned in the chart, could not be studied, this being a small faunistic account and not a systematic revision of the whole of Indian Arctiidae, the variation in occurrence of ocelli in these

genera should not be ruled out. Further studies, therefore, may throw more light on this character, facilitating understanding of the genera in the light of observations made by Hampson (1900) on phylogenetic relationship.

Fifteen genera represented by 37 species are dealt with here. The genera may be identified by the following key.

Key to the identification of genera of LITHOSIINAE

1. Fore wing without vein M_2	...	...	2
— Fore wing with vein M_2	...	...	9
2. Hind wing with vein M_2 . Fore wing with veins R_1, R_2 free ; R_3 absent	...	Garudinia Moore (1 sp.)	
— Hind wing without vein M_2 . Fore wing with vein R_3 present	...	...	3
3. Fore wing with vein R_1 anastomosing with Sc ; R_2 free from cell ; R_5 from R_4 beyond R_3	...	Tigrioides Butler (1 sp.)	
— Fore wing with vein R_1 free or anastomosing ; R_2 free or R_3 from R_2 and anastomosing with R_4 to form an areole ; R_5 from R_4 before R_3	...	...	4
4. Hind wing with the cell open ; a recurrent vein in the cell	...	Chrysorabdia Butler (1 sp.)	
— Hind wing with the cell closed ; no recurrent vein in the cell	...	...	5
5. Fore wings in male with secondary sexual characters, or both wings without secondary sexual character	...	...	6
— Fore and hind wings in male with secondary sexual characters	...	...	7
6. Male genitalia with scaphium	...	Strytopha nom. nov. (2 spp.)	
— Male genitalia without scaphium	...	Eilema Hübner (3 spp.)	
7. Forewing cell half the length of wing ; tufts half the length of cell. Uncus broad ; sacculus with the distal process broad and serrated	...	Teulisna Walker (2 spp)	
— Forewing cell more than half the length of wing. Uncus long and narrow ; sacculus not as above	...	...	8
8. Forewing cell a little over half the length of wing ; tufts about half the length of cell	...	Prabhasa Moore (2 spp.)	
— Forewing cell about two-third the length of wing , tufts two-third the length of cell	...	Zadadra Moore (1 sp.)	

- | | | |
|--|---------------------------------------|----|
| 9. Hind wing without vein M_2 . Fore wing with vein R_1 connected with Sc by a bar ; R_2 - R_4 from cell ; R_5 stalked with M_1 ... | Hemonia Walker
(1 sp.) | |
| — Hind wing with vein M_2 . Fore wing with R_1 free or anastomosed with Sc ... | ... | 10 |
| 10. Fore wing with areole ... | ... | 11 |
| — Fore wing without areole ... | ... | 12 |
| 11. Fore wing with vein R_3 from R_2 and anastomosing with R_4 to form the areole. Hind wing with veins Rs - M_1 stalked or from angle ; M_2 - M_3 shortly stalked or from angle ... | Agylla Walker
(4 spp.) | |
| — Fore wing with veins R_2 and R_3 stalked and anastomosing with R_4 to form areole. Hind wing with veins Rs - M_1 not stalked ; M_2 from above the lower angle ; and M_3 from angle ... | Agrisius Walker
(1 sp.) | |
| 12. Fore wing with veins R_3 - R_5 stalked in female, R_3 - R_4 absent in male ... | Cyana Walker
(2 spp.) | |
| — Fore wing with veins R_3 - R_5 stalked in both sexes ... | ... | 13 |
| 13. Fore wing with vein R_1 anastomosing with Sc. Hind wing with veins Rs - M_1 stalked ... | Asura Walker
(7 spp.) | |
| — Fore wing with vein R_1 free ... | ... | 14 |
| 14. Fore wing with vein Cu_{1b} oblique. Hind wing with veins Rs - M_1 on a long stalk ... | Mitochrista Hübner
(8 spp.) | |
| — Fore wing with vein Cu_{1b} strongly curved at base. Hind wing with Rs - M_1 separate or shortly stalked ... | Oeonistis Hübner
(1 sp.) | |

Genus **Garudinia** Moore

1882. *Garudinia* Moore, *Lep. Ceylon*, 2 : 59.

Type.—*Tospitis latana* Walker

Remarks.—Strand (1922) recorded six species under this genus, including *biguttata* Rothschild from Assam. Recently, Arora and Singh (1975) recorded another species viz., *G. simulana* (Walker) from India. The present account brings to light *G. biplagiata* Hampson, which is hitherto known from Bhutan, thus filling the distribution gap of the genus from Bhutan through the north eastern region to Sri Lanka and Gt. Nicobar Is.

The genus *Garudinia* Moore is characterised by the antennae being ciliate in both sexes ; legs with the tibial spurs moderately long ; fore wings rather

narrow ; costa arched ; veins R_1, R_2 free ; R_3 absent ; R_{4-5} stalked or R_4 absent ; M_1 free, arising from below upper angle ; M_2 absent ; M_3 from angle, Cu_{1a} slightly before the angle ; Cu_{1b} , when bent, touches the Anal vein ; male with a fringe of hair on under side. Hind wing with or without androconia ; $Rs-M_1$ coincident ; M_2 present.

A single species is recorded from N. E. India.

19. *Garudinia biplagiata* Hampson

1896. *Garudinia biplagiata* Hampson, *Fauna Br. India, Moths*, 4 : 408 (*Type loc.*—Bhutan).

Material examined.—Arunachal Pradesh : Tirap Dist., Deomali, 200 m., 1 ♂, 11.xi.1971 (G. S. Arora Coll.).

Wing expanse.—16 mm.

Distribution.—INDIA (Arunachal Pradesh) and BHUTAN.

Remarks.—The species hitherto known only from Bhutan, is recorded from the areas of N. E. India, particularly the Arunachal Pradesh. It differs from *G. biguttata* Rothschild, from Assam, in the patches on fore wing being purple black (vs. blackish olive in *biguttata*) and the abdomen being tinged with fuscous (vs. dark in *biguttata*). The species is close to *G. simulana* (Walker) except that the postmedian patch on fore wing does not extend to the costal margin.

Genus *Tigrioides* Butler

1877. *Tigrioides* Butler, *Trans. ent. Soc. Lond.* : 369.

Type.—*Setina alterna* Walker

Remarks.—Strand (1922) recorded 22 species under the genus including *T. fulveola* Hampson (from Calcutta and Sikkim) and *T. phaeola* Hampson (from Bombay and Sri Lanka). The present species, *T. leucanioides* (Walker) is being recorded from India for the first time and brings the total to three species.

The genus is characterised by the absence of vein M_2 in both wings, the anastomosis of R_1 in fore wing with Sc ; the shortly pectinate in male or simple antennae in both sexes ; and the presence of ocelli.

A single species is described here.

20. *Tigrioides leucanioides* (Walker)

(Plate II, figs. 15, 15a)

1862. *Lithosia leucanioides* Walker, *J. Proc. Linn. Soc. Zool.*, 6 : 103 (*Type loc.*, —Sarawak).

Material examined.—Arunachal Pradesh : Tirap Dist. ; Jairampur, 200 m., 1 ♂, 25.x.1971 (G. S. Arora Coll.).

Wing expanse.—33 mm.

Distribution.—INDIA (Arunachal Pradesh) ; MALAYSIA (Singapore, Sarawak, Penang) ; INDONESIA (Borneo) ; BURMA ; and PHILIPPINES.

Remarks.—The species is characterised by the simple antennae in males ; forewing veins are streaked with black except the costal and subcostal nervures, and by the fore coxae in male with thick tufts of black hairs. By the latter character, the species is differentiated from the other hitherto known species from India.

Genus **Chrysorabdia** Butler

1877. *Chrysorabdia* Butler, *Trans. ent. Soc. Lond.* : 357.

Type.—*Lithosia viridata* Walker

Remarks.—Strand (1922) recorded five species under this genus, with three from India, viz. *aurantiaca*, *bivitta* and *viridata*. The latter is now being recorded from Arunachal Pradesh.

The genus is characterised by the antennae being ciliate in both sexes ; ocelli present ; vein M_2 absent in both wings ; fore wing with R_1 free ; R_3 from R_2 and anastomosing with R_{4+5} to form an areole ; M_1 from angle of cell ; M_3 and Cu_{1a} from lower angle ; Cu_{1b} from near middle, slightly curved at base. Hind wing with the cell open due to absence of discocellulars.

One species is dealt with here.

21. **Chrysorabdia viridata** (Walker)

(Plate III, fig. 16 ♀)

1864. *Lithosia viridata* Walker, *List Lep. Insects Br. Mus.*, 31 : 225 (Type loc. —Darjiling).

Material examined.—Arunachal Pradesh : Kameng Dist., Sangloom village, 1 ♀, 12.ix.1961 (S. Biswas Coll.).

Wing expanse.—44 mm.

Distribution.—INDIA (Sikkim ; Assam ; Arunachal Pradesh ; West Bengal ; and Himachal Pradesh, Simla, Dalhousie) ; BHUTAN ; BANGLADESH ; and CHINA (South Shensi).

Remarks.—Hampson (1900) placed this species along with *C. bivitta* (Walker) in a group of species having a patch of androconia on fore wing in male, but it is differentiated by the presence of fascia along costa and below

the cell nearly up to terminal margin, and thorax being black. The species is very close to *C. aurantiaca* Hampson, particularly in respect of fascia on fore wing, but the latter differs by the absence of androconial streaks and thorax not being entirely black.

It is interesting that while Walker (1864) described the species from Darjiling, both neither Hampson (1900) nor Strand (1922) recorded the species from this area.

Genus *Strysopha* nom. nov.

Strysopha nom. nov. : A replacement name for *Systropha* Hübner, 1816. *Verz. bek. Schmett.*, p. 166 (preoccupied by *Systropha* Illiger, 1806. *Insecta : Hymenoptera*).

Type.—*Bombyx aureola* Hübner, 1803 (= *Lithosia sororcula* Hufnagel)

Remarks.—The genus *Systropha* was erected to include *Bombyx aureola* Hübner (1803). The latter species was synonymised to *sororcula* Hufnagel (*vide* Strand, 1922). However, the genus *Systropha* Hübner (1816) is a junior homonym of *Systropha* Illiger (1806), and there is no objective replacement name so far for the genus (*vide* Watson, 1980). The new name *Strysopha* is proposed to include the type species '*Bombyx aureola* Hübner' (= *Lithosia sororcula* Hufnagel).

Moore (1878) included under '*Systropha*' two new species, viz., *auriflua* from Darjiling and *dorsalia* from N. W India. While Hampson (1894) synonymised *dorsalia* to *calamaria* Moore and treated *Systropha* as a synonym of *Lithosia*, Strand (1922) synonymised *calamaria* to *affineola* Bremer and *dorsalis* to *auriflua* under *Eilema*. Daniel (1954) has dealt with both the species, viz., *affineola* Bremer and *auriflua* under *Lithosia* and not under *Systropha*, and placed *calamaria* as a distinct species of *Lithosia*.

Daniel (1954) also revived the genus *Systropha* Hübner and dealt with five species, including *xanthocraspis* Hampson and *tortricoides* Walker, from India, on the basis of external characters and the male genitalia, particularly the presence of a scaphium (which he reported to be absent in *Lithosia*). This genus has been renamed here as *Strysopha*. The genus is characterised by the following main features : Antennae simple ; labial palpi short and porrect ; ocelli very poorly marked. Wings small. Fore wings short and narrow ; the vein R'_1 anastomosing with Sc ; R_2 free, or R_3 arising from R_2 and anastomosing with R_4 to form a short areole ; R_5 free or stalked with R_4 ; M_1 free ; M_2 absent. Hind wing with veins Rs— M_1 and M_3 — Cu_{1a} stalked. In the male genitalia, the uncus long and narrowing gradually towards apex ; scaphium present ; valva with the sacculus produced distad into a free process or fold ; aedeagus simple.

The genus *Strysopha* includes two species presently, viz., *tortricoides* (Walker) and *perdentata* (Walker). Both the species differ from each other externally in as far as secondary sexual characters are concerned, these being present in *tortricoides* and absent in *perdentata*. Besides, in the latter species the lines on fore wings are prominently marked than in *tortricoides*. Both the species are dealt with here.

22. *Strysopha tortricoides* (Walker) n. comb.
(Figs. 2A-C)

1862. *Lithosia tortricoides* Walker, J. Proc. Linn. Soc. Zool., 6: 107 (type loc.—Sarawak).

Material examined.—Arunachal Pradesh : Tirap Dist., Changlong, 540 m., 1 ♂, 31.x.1971 (G. S. Arora Coll.).

Wing expanse.—26 mm.

Distribution.—INDIA (Tamil Nadu, Nilgiris ; Sikkim ; Arunachal Pradesh) ; BHUTAN ; INDONESIA ; (Borneo ; Java ; Bali) ; MALAYSIA (Sarawak ; Singapore) ; CHINA (Fukien).

Remarks.—Although Dudgeon (1903) recorded the species from Sikkim and Bhutan, Strand (1922) did not report the species from north-eastern India. The present report of the species from Arunachal Pradesh confirms its occurrence in northeastern region.

The species is characterised by the presence of a well developed secondary sexual character on fore wings, particularly the cell being folded and covered with some tufts up to three-fourth the length of cell, the latter slightly two-third the length of wing. A triangular black spot is present on costa beyond middle. In forewing, the vein R_1 is free ; R_3 from R_2 and anastomosing with R_4 to form a small areole ; R_5 from angle ; M_1 and M_3 well shifted due to the presence of a bar in the end of cell ; Cu_{1a} bent down and coincident with Cu_{1b} . Hind wing with $Rs-M_1$ and M_3-Cu_{1a} stalked.

Daniel (1954) described the genitalia of this species and placed it in the genus '*Systropha*'. The valvae are narrow with the sacculus produced distally into a free process that does not extend beyond the apical end of valva ; costal process sclerotised, curved distad and well developed ; juxta with well developed lobes. Aedeagus long and narrow, without sclerotisation.

In keeping the species under this genus, we have merely followed Daniel (1954), particularly due to the presence of scaphium in '*Systropha*' (now *Strysopha*), although the species has secondary sexual characters, which have been referred to neither by Moore (1878) nor by Daniel (1954).

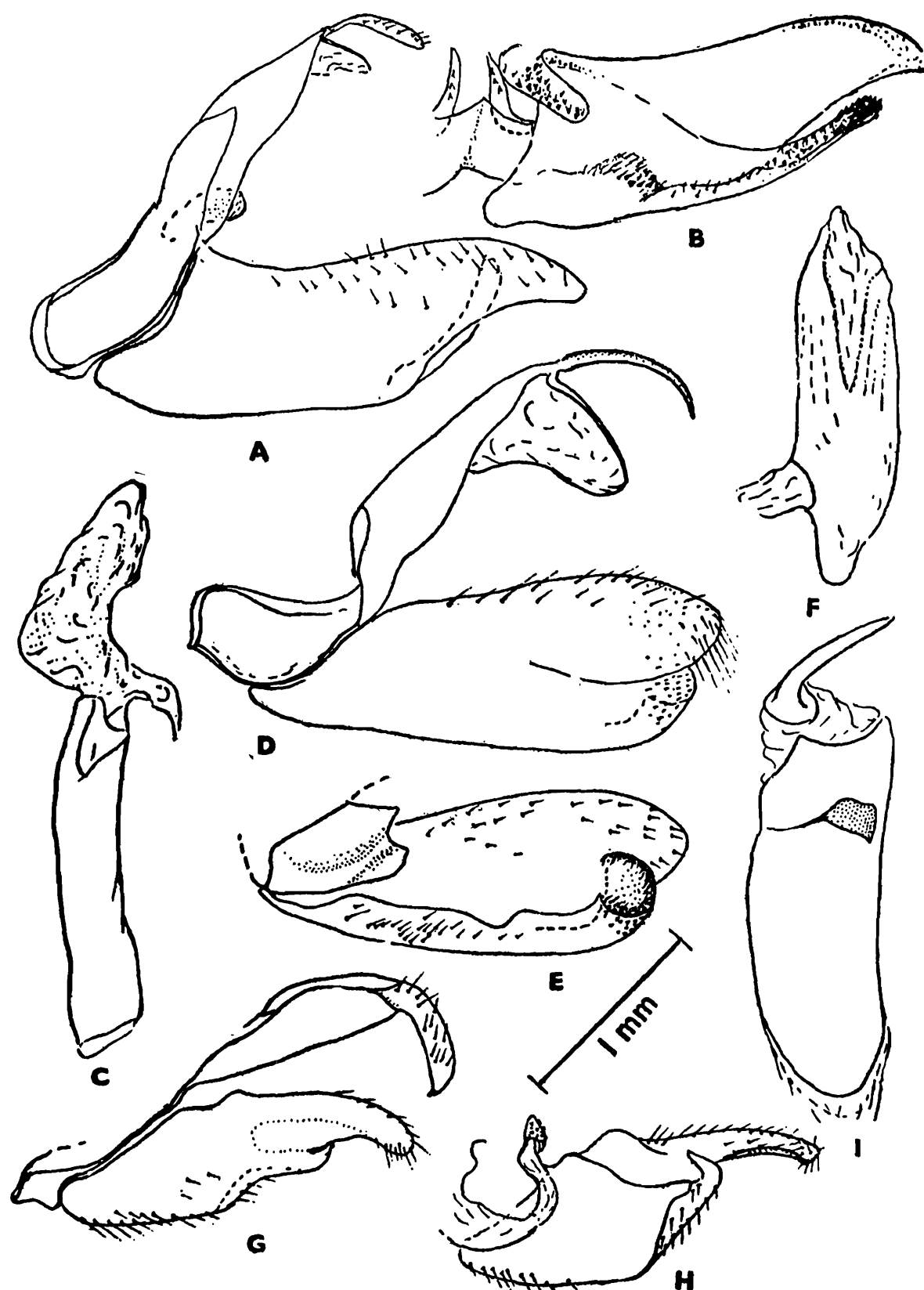


Fig. 2. 2A-C, *Stryzopha tortricoides* (Walker) : A—lateral view of male genitalia, with valvae ; B—inner view of a single valva ; C—Aedeagus. 2D-F, *Stryzopha perdentata* (Druce) : D—lateral view of the male genitalia, with valvae ; E—inner view of a single valva ; F—Aedeagus. 2G-I, *Eilema vicaria* (Walker) : G—lateral view of the male genitalia, with valvae ; H—inner view of a single valva ; I—Aedeagus (All genitalia figs. of same magnification).

23. **Strysopha perdentata** (Druce) n.comb.
(Figs. 2D-F)

1899. *Ilema perdentata* Druce, *Ann. Mag. nat. Hist.*, (7) 4 : 201 (Type loc.—Perak).

Material examined.—Arunachal Pradesh ; Siang Dist., Lekhabali, 1 ♀, 7.x.1966, Tappi Dulla, 500 m., 1 ♀, 22.x.1966 (S.K. Tandon and G. S. Arora Coll.) ; Lohit Dist., Daphabum Expd., Chowkham, 244 m., 1 ♂, 26.xi.1969 (J.M. Julka Coll.).

Wing expanse.—Male, 22 mm ; female 21 mm.

Distribution.—INDIA (Arunachal Pradesh) ; BHUTAN ; Perak.

Remarks.—Hitherto known from Bhutan (Dudgeon, 1903) and Perak, the species is being recorded from India for the first time, so that the gap in the distribution between Bhutan on one side and Perak on the other, is filled. The species is closely allied to *divisa* Walker from Borneo and Sarawak, particularly in the fore wing in which the medial line is fuscous and the terminal area marked with dark streaks. However, the medial line is strongly excurved below the lower angle of cell in *perdentata* unlike that of *divisa* in which it is slightly excurved.

In respect of genitalia, out of all the species that have been mentioned by Daniel (1954), it has some similarities with '*Systropha klapperichi* Daniel', from Fukien, particularly in the shape of valva (*vide*, Text-figs. 2D-E).

Apart from the genitalia, the species is characterised by the pale yellow wings. The fore wing is with fuscous dashes in medial area and streaks beyond postmedial line which is prominent and angled outwards at submedian fold ; R_1 anastomosed with Sc ; R_2 free ; R_3 , R_4 , R_5 stalked ; M_1 from well below the cell angle ; M_3 — Cu_{1a} stalked ; Cu_{1b} depressed at base. In hind wings the veins Rs — M_1 and M_3 — Cu_{1a} are on long stalk.

Genus **Eilema** Hübner

1827. *Eilema* Hübner, *Verz. bek. Schmett.* : 165.

Type.—*Bombyx caniola* Hübner

Remarks.—Strand (1922) recorded 252 species under this genus, with 37 from the Indian region. Out of these as many as 29 species were recorded by him from north-eastern region, mainly Sikkim and Assam. The present account extends the distribution of five species to Arunachal Pradesh, including two identified up to genus.

Hampson (1894) treated the genus *Eilema* Hübner as a synonym of *Lithosia* Fabricius, but later (1900) revalidated *Eilema* Hübner [Spelt as *Ilema*] to include not only the species treated under *Lithosia* but also those under

Prabhasa Moore and *Teulisna* Walker (Hampson, 1894), so that all the other genera viz., *Prabhasa*, *Teulisna*, *Zadadra*, *Systropha*, etc., were treated as its synonyms. The genus *Lithosia* Fabricius was separated and clearly differentiated from *Eilema* Hübner (*vide* Hampson, 1900), by the vein M_2 in fore wing being present in *Lithosia* and absent in *Eilema*, *Prabhasa*, *Teulisna*, *Zadadra* and '*Systropha*', and it included only non-Indian species like *Lithosia quadra* (Linn.) and *L. subcosteola* (Druce). Later, Seitz (1910, 1914) recognised all the species under *Lithosia* Fabr., which subsequently was also followed by Daniel (1954). Strand (1922), however, treated *Eilema* as valid and included all the other above-mentioned genera, including *Ilema* (*sensu* Hampson, 1900) and *Lithosia* Latreille (*nec.* Fabr.), as its synonyms. It is interesting to observe that although Daniel (1954) admits that some workers have given due preference to *Eilema* Hübner, he preferred to retain *Lithosia* Fabr., (*sensu str.*) simply by following Seitz (*loc. cit.*), and at the same time believed that the genera like *Prabhasa*, *Teulisna*, *Zadadra*, *Systropha*, *Dolgoma*, *Tarika*, etc., could no longer be considered as synonyms. He revalidated these to assign some of the Chinese species, with distribution in Indian region. Keeping in view the lucidity of arrangement (Seitz, 1910, 1914) adopted by Daniel (1954) and the differentiation between *Eilema* and *Lithosia*, the authors are rather constrained to retain *Eilema* to assign some of the species and follow Daniel (1954) in as far as the other genera are concerned.

The genus *Eilema* Hübner is characterised by the following features : Antennae simple ; labial palpi porrect, reaching frons, 2nd joint fringed with hair below ; frons rounded ; ocelli weakly developed ; legs slender, tibiae with the spurs rather short. Wings with or without secondary sexual character ; vein M_2 absent in both the wings. Fore wing with vein R_1 anastomosing with Sc or free ; R_2 from cell or R_3 from R_2 and anastomosing with R_4 to form an areole ; R_5 stalked with $R_2 - R_4$, rarely from cell in the male ; M_1 from well below upper angle of cell or stalked with radial veins ; $M_3 - Cu_{1a}$ either connate from cell, or on a long stalk ; Cu_{1b} from middle of cell, curved towards base. Hind wing with Sc from middle of cell, $Rs - M_1$ stalked or coincident ; $M_3 - Cu_{1a}$ on a long stalk ; Cu_{1b} from before angle of the cell. In the male genitalia the scaphium is absent ; uncus short or long ; valvae simple or sclerotised. Aedeagus with or without cornutal spines.

24. *Eilema fumidisca* (Hampson)

(Plate III, fig. 17 ♀)

1894. *Lithosia fumidisca* Hampson, *Fauna Br. India, Moths*, 2 : 80 (*Type loc.*—Sikkim).

Material examined.—Arunachal Pradesh : Tirap Dist., Deomali, 200 m., 3 ♀ ♀ , 10, 12.xi.1971 (G. S. Arora Coll.).

Wing expanse.—26 mm.

Distribution.—INDIA (Sikkim ; Arunachal Pradesh) ; BURMA (Tenasserim) ; CHINA (Sanghai) ; AMUR.

Remarks.—The species is characterised by the complete absence of secondary sexual characters (*vide*, Hampson, 1900) ; fore wings being dark brown up to a little before terminal margin ; costal fascia yellow, uniformly broad throughout from base to apex, continuing over to the terminal area but gradually narrowing towards termen ; hind wings yellow. Fore wing with R_1 anastomosing with Sc ; R_2 free ; R_3 , R_4 and R_5 stalked ; M_1 well below the angle of cell ; $M_3 - Cu_{1a}$ stalked ; Cu_{1b} from middle of cell ; hind wing with the veins $Rs - M_1$ and $M_3 - Cu_{1a}$ stalked.

25. *Eilema vicaria* (Walker) (Figs. 2 G-I)

1854. *Lithosia vicaria* Walker, *List Lep. Insects Br. Mus.*, 2 : 505 (Type loc.—Congo).

Material examined.—Arunachal Pradesh : Siang Dist., Kambang, 200 m., 1 ♀ , 14.x.1966 (S. K. Tandon and G. S. Arora Coll.) ; Lohit Dist., Namsai, 100 m., 1 ♂ , 15.iii.1969 (S. K. Tandon Coll.) ; Tirap Dist., Changlong, 540 m., 1 ♀ , 30.x.1971 (G. S. Arora Coll.).

Wing expanse.—Male, 30 mm. ; female, 32 mm.

Distribution.—INDIA (Sikkim ; Assam ; Arunachal Pradesh ; West Bengal, Calcutta ; Maharashtra, Bombay ; Andaman) ; BHUTAN ; SRI LANKA ; INDONESIA (Java and Borneo) ; MALAYSIA (Sarawak) ; and CHINA (Formosa ; Kuangtung and Ussurigebiet.)

Remarks.—This species comes very close to the preceding one in as far as the absence of secondary sexual characters on wings is concerned, but differs externally in the fore wings being laden-grey up to the terminal margin ; with the yellow fascia limited only to the costal area. The male genitalia (Text-figs. 2G-I) differs considerably ; particularly in the valva being quite broad at basal half, with sacculus-end not extending beyond the distal end of cucullus but produced apically into a well marked process ; juxta well developed, with two groups of anellar spines on dorsal side of aedeagus, which is short and broad and with a well developed cornutal tooth.

The fore wing has vein R_1 curved upwards but not touching Sc ; R_2 free ; R_3 , R_4 and R_5 stalked ; M_1 well below the angle. Other features as in *fumidisca*.

The male has the forewing cell slightly folded.

25a. **Eilema** Sp.

(Plate III, fig. 18)

Material examined.—Arunachal Pradesh : Siang Dist., Lekhabali, 200m., 1 ♂, 6.x.1966 (S. K. Tandon and G. S. Arora Coll.).

Wing expanse.—18 mm.

Distribution.—INDIA (Arunachal Pradesh).

Remarks.—The material like preceding species, is devoid of recumbent tufts of scales in cell on fore wing ; cell not folded but about three-fourth the length of cell. However, the fore wing is characterised by the presence of a large medial patch, from cell to inner margin, the outer boundry of which is produced into a point. In venation, the vein R_1 is coincident with R_2 which is free ; R_3 , R_4 and R_5 stalked ; M_1 from well below the cell angle. Hind wings with M_3 - Cu_{1a} on a long stalk. Other features as in above-mentioned species.

26. **Eilema tetragona** (Walker) [?]

(Plate III, figs. 19, 19a ; Figs. 3 A-C)

1854. *Lithosia tetragona* Walker, *List Lep. Insects Br. Mus.*, 2 : 510 (Type loc.—Sylhet).

Material examined.—Arunachal Pradesh : Siang Dist., Kambang, 200 m., 1 ♂, 16.x.1966 (S. K. Tandon & G. S. Arora Coll.).

Wing expanse.—29 mm.

Distribution.—INDIA (Arunachal Pradesh ; Assam ; Nagas ; Kerala) ; BANGLADESH (Sylhet) ; INDONESIA (Java and Borneo) ; MALAYSIA (Sarawak) ; KAMPUCHEA ; and CHINA.

Remarks.—Although Hampson (1900), Dudgeon (1903) and Seitz (1914) recorded the species from Sikkim, Assam and Nagas, Strand (1922) did not record the species from any of the above mentioned areas. The present record of the species from Arunachal Pradesh confirms its occurrence in northeastern region.

The male specimen available for study, is characterised by fore wing with the cell folded and very long, nearly extending upto five-sixths of the length of wing and covered profusely with tufts of scales in its basal one-fourth, the remaining area sparsely tufted ; R_1 anastomosing with Sc ; R_2 free ; R_3 - R_4 stalked, R_5 free and connate to the stalked R_{3+4} ; M_1 well below the angle of cell ; M_3 from close to lower angle ; Cu_{1a} - Cu_{1b} from cell angle. Hind wing with the cell a little over half the length of wing ; Rs - M_1 shortly stalked and M_3 - Cu_{1a} on a long stalk. The male genitalia is also very different, particularly in the uncus being very short and shortly

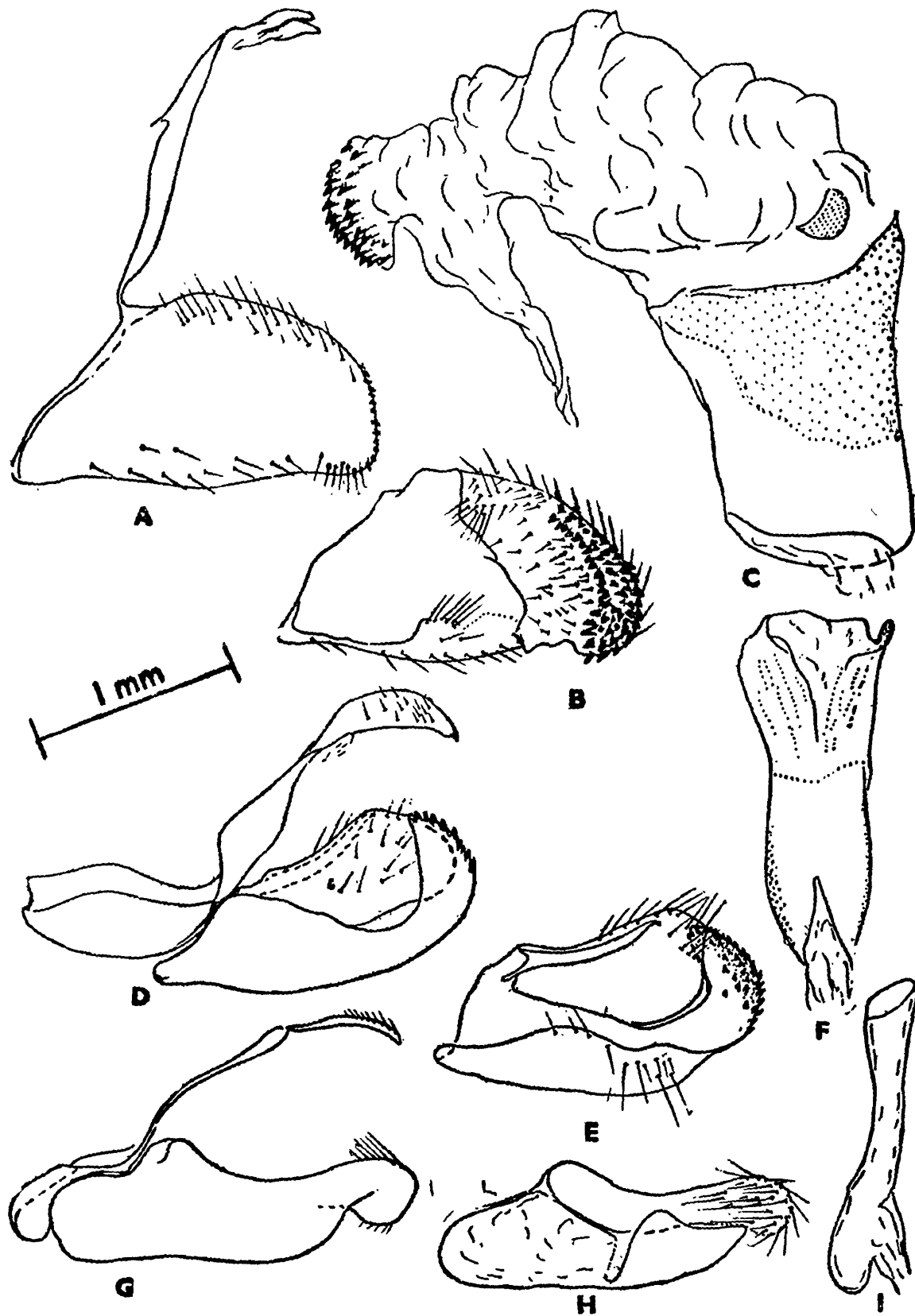


Fig. 3. 3A-C. *Eilema tetragona* (Walker) : A—lateral view of the male genitalia, with valvae ; B—inner view of a single valva ; C—Aedeagus. 3D-F *Teulisna plagiata* Walker ; D—lateral view of the male genitalia, with valvae ; E—inner view of a single valva ; F—Aedeagus. 3G-I, *Zadadra distorta* (Moore) : G—lateral view of the male genitalia with valvae ; H—inner view of a single valva ; I—Aedeagus (All genitalia figs. of same magnification).

bifid apically. Valva with the margin sclerotised ; the sacculus ending in a short tooth and the cucullus rounded, broad and beset with minute spines, those on inner side turned basad. Aedeagus short but broad and beset with several minute cornutal spines on vesica.

Daniel (1954) figured the male genitalia of the species but the structure does not tally with that of material available with us, although the species agrees in full with the description and the figure given by Hampson (1900). Moreover, this species is characterised by the presence of secondary sexual characters only on fore wing in male, a characteristic features of *venosa* and *flavicosta*, but both having been considered here under the genus *Prabhasa*, and in both these species the cell in both pair of wings is only slightly over half the length of wings, unlike in *tetragona* where it is five-sixth the length of wing.

In view of the fact that neither Daniel (1954) based his study on the type material, nor the type-material was available for study to the present authors, the species has been retained doubtfully in the genus *Eilema*.

26a. *Eilema* sp.

Material examined— Arunachal Pradesh : Siang Dist., Lekhabali, 140 m., 1 ♀ , 8.x.1966 (S.K. Tandon & G. S. Arora Coll.).

Wing expanse.—24 mm.

Distribution.—INDIA (Arunachal Pradesh).

Remarks.—The specimen comes nearest to *E. signata* Walker due to the presence of a small postmedial spot on costa and a large rounded patch from cell to inner margin, on fore wing ; and the thorax being dark. However, the species differs by the large patch on fore wing running up to the inner margin, and not up to just 'near inner margin' as in *signata* ; by the absence of areole in fore wing (vs. present in *signata*) ; and the hind wing being fuscous (vs. yellow in *signata*). Besides, in fore wing the vein R_1 is anastomosing with Sc ; R_2 free ; R_3 , R_4 and R_5 stalked ; M_1 well below the cell angle ; $M_3 - Cu_{1a}$ shortly stalked. Hind wing with $Rs - M_1$ and $M_3 - Cu_{1a}$ shortly stalked.

Genus *Teulisna* Walker

1862. *Teulisna* Walker, *J. Proc. Linn. Soc. Zool.*, 6 : 109.

Type.— *Teulisna plagiata* Walker

Remarks.— Walker (1862) erected the genus to include his two new

species *plagiata* and *chiloides* from Sarawak. Moore (1878) added *tenuisigna* from Sikkim, and Hampson (1894) added *obliquistria* and *uniplaga* from Sikkim and Assam respectively, in the genus. Later, Hampson (1900) considered *Teulisna* as a synonym of the genus *Ilema* and subsequently Strand (1922) treated it as well as *Ilema* as synonyms of the genus *Eilema*. In the light of the genitalic studies in the genus *Lithosia* (*sensu lat.*) which led Daniel (1954) to recognise some of the older names, hitherto considered as synonyms of *Eilema* (*sensu* Strand, 1922), particularly with reference to revival of *Dolgoma*, *Systropha*, *Tarika*, etc., the present authors revive *Teulisna* and redefine it on the basis of external characters as mentioned earlier (*vide* Walker, 1862, Moore, 1878 and Hampson, 1900) as well as on the basis of genitalic studies, undertaken presently. The genus is characterised by the following main features: Antennae simple; labial palpi short and porrect, the third segment slightly ascending; ocelli very poorly marked. Legs slender. Fore wing with cell, in male, folded at base and covered with tufts of recumbent scales up to half its length; cell in both pairs about half the length of wings; R_1 anastomosing with Sc; R_2 free; M_1 stalked with R_3 , R_4 and R_5 , or free in female. Hind wing with R_s - M_1 and M_3 - Cu_{1a} on long stalks. In the genitalia, uncus and valva well developed; uncus broad and acuminate at tip; valva with the sacculus produced distad into an upwardly directed sclerotised process, which extends beyond cucullus and is serrated distally; the basal costal process strongly developed, sclerotised and curved distad, running parallel to the costal margin. Aedeagus short and broad, sclerotised and with a carinal tooth apically.

The genus *Teulisna* differs from all the other genera, in the cell being half the length of wing in both the pairs; tufts on fore wings up to half the length of cell; in the stalking of M_1 with R_3 - R_5 ; and in the male genitalia, the uncus being quite broad; valva with the distal process of sacculus upwardly directed and serrated (Text-figs. 3D—F).

Presently, two species are being dealt with here, viz., *plagiata* Walker and *protuberans* (Moore).

27. *Teulisna plagiata* Walker

(Plate III, figs. 20, 20a; Figs. 3 D-F)

1862. *Teulisna plagiata* Walker, *J. Proc. Linn. Soc. Zool.*, 6: 109 (Type loc.— Sarawak).

Material examined.— Arunachal Pradesh; Siang Dist., Kambang, 200 m., 1 ♂, 15.x.1966, Tappi Dulla, 500 m., 1 ♂, 24.x.1966 (S. K. Tandon and G. S. Arora Coll.); Tirap Dist., Changlong, 540m., 1 ♂, 30.x.1971 (G. S. Arora Coll.).

Wing expanse.— 24 mm.

Distribution.— INDIA (Arunachal Pradesh) ; INDONESIA (Borneo ; Java ; Bali) ; MALAYSIA (Sarawak).

Remarks.— Hitherto reported from Sarawak, Borneo, Java and Bali, the species is being recorded from India for the first time.

The species is characterised by the presence of secondary sexual characters on both the wings i.e. fore- and hind wings. Fore wings in male, with the cell folded over at base, and overlapped by recumbent tufts of scales up to half the length. Venation as given in the genus.

The male genitalia (Text-fig. 3D-F) as given under the genus.

28. *Teulisna protuberans* (Moore)

1878. *Tegulata protuberans* Moore, *Proc. zool. Soc. Lond.* : 23, Pl. II, fig. 6 (Type loc.— Darjiling).

Material examined.— Arunachal Pradesh : Siang Dist., Kambang, 200 m., 1 ♀, 15.x.1966 (S. K. Tandon and G. S. Arora Coll.).

Wing expanse.— 25 mm.

Distribution.— INDIA (West Bengal ; Darjiling ; Sikkim ; Arunachal Pradesh) ; BHUTAN.

Remarks.—Originally described under *Tegulata*, the species was transferred to *Teulisna* by Hampson (1894). Later, Hampson (1900) treated the species under *Ilema* and dealt, for the first time, with the characters of male, particularly in respect of stalking of vein M_1 with R_3 , R_4 and R_5 ; in female the vein M_1 is free and arising well below the cell angle. The species is closely allied to *Teulisna tumida* (Walker) (*sensu* Hampson, 1894, 1900) due to the stalking of M_1 with $R_3 - R_5$ and forewing costa being lobed in both sexes, but differs in the hind wing being orange-yellow (*vs.* fuscous in *tumida*) and fore wing in male with a lunate spot at the end of cell (*vs.* rounded spot at the end of cell in *tumida*). The species is also closely allied to *T. plagiata* Walker particularly in respect of venation, but differs due to the costal lobe which is absent in *plagiata*.

Genus *Prabhasa* Moore

1878. *Prabhasa* Moore, *Proc. zool. Soc. Lond.* : 25.

Type.— *Prabhasa venosa* Moore

Remarks.— Moore (1878) erected this genus to assign his three new species, viz., *venosa*, *flavicosta* and *costalis*, from Darjiling, Cherrapunji and North China, respectively. Although Hampson (1894) treated the genus as

separate from *Lithosia* Fabricius, he synonymised it, in 1900, to the genus *Ilema*. Strand (1922), however, treated *Prabhasa* as well as *Ilema* as synonyms of the genus *Eilema* Hübner. Later, Daniel (1954) revalidated the genus and assigned to it the Chinese material referable to *Prabhasa venosa* Moore.

The genus is characterised by the following main features : Antennae simple in both sexes, with fine bristle on each segment ; labial palpi slender, long, slightly reaching beyond frons ; ocelli very weakly marked. Wings long ; fore wings narrow ; cell very long, about a little over half the length of wing, folded in male and covered with overlapping recumbent tufts of scales up to half the length of the cell ; costa very slightly arched before apex ; vein R_1 anastomosing with Sc ; R_2 free or R_3 from R_2 and anastomosing with R_4 to form a short areole ; M_1 below the angle of cell, or from areole if the latter present ; $M_3 - Cu_{1a}$ stalked ; Cu_{1b} slightly depressed near base. Hind wing produced at the apex ; cell a little over half the length of wing ; Rs - M_1 and $M_3 - Cu_{1a}$ stalked.

Daniel (1954) described the following genitalic characters of the *P. venosa* for the first time : uncus long and narrow ; valvae membranous, long and narrow ; aedeagus long and narrow.

The present account deals only with *venosa* and *flavicosta*.

29. *Prabhasa venosa* Moore

1878. *Prabhasa venosa* Moore, *Proc. zool. Soc. Lond.* : 26, pl. II, fig. 16 (Type loc. —Darjiling).

Material examined.—Arunachal Pradesh : Siang Dist., Kambang, 200m., 1 ♀, 15.x.1966, Bame, 600m., 1 ♀, 31.x.1966 (S.K. Tandon and G.S. Arora Coll.) ; Tirap Dist., Jairampur, 225m., 1 ♀, 26.x.1971 (G. S. Arora Coll.).

Wing expanse.—37 mm.

Distribution.—INDIA (West Bengal ; Assam ; Arunachal Pradesh and Sikkim). Also BHUTAN, BURMA and CHINA.

Remarks.—Referable to the genus *Prabhasa*, the species is characterised by the vein R_2 arising free from the end of cell, unlike in *flavicosta* where the vein R_3 is arising from R_2 and anastomosing with $R_4 + R_5$ to form a short areole ; M_1 well below the angle of cell, unlike in *flavicosta* where it arises from the areole ; costal fascia paler, with a black postmedial patch at costa from which arises indistinct postmedial diffused line, which is strongly excurved between subcosta and vein Cu_1 .

For genitalic studies, reference may be made to Daniel (1954).

30. **Prabhasa flavicosta** Moore

1878. *Prabhasa flavicosta* Moore, *Proc. zool. Soc. Lond.* : 26, pl. II, fig. 17 (Type loc.—Cherrapunji).

Material examined.—Arunachal Pradesh : Siang Dist., Dali Village, 300m., 1 ♀, 11.x.1966, Bame, 600 m., 1 ♀, 31.x.1966 (S. K. Tandon and G. S. Arora Coll.).

Wing expanse.—30-34 mm.

Distribution.—INDIA (Assam, Khasis ; Meghalaya ; Arunachal Pradesh).

Remarks.—The species is characterised by the presence of a prominent paler costal fascia, besides a secondary sexual character in males on upper side of fore wing (*vide* Hampson, 1900) ; the postmedial lines are indistinct. For other affinities and differences from *venosa*, see the latter.

Genus **Zadadra** Moore

1878. *Zadadra* Moore, *Proc. zool. Soc. Lond.* : 572

Type.—*Lithosia distorta* Moore

Remarks.—Only one species, viz., *Zadadra distorta* (Moore) was hitherto known, the genitalia of which was described, on the basis of Chinese material, by Daniel (1954). Moore (1878) placed the genus in the group having overlapping recumbent plumes on upperside of fore wings, along with *Teulisna* and *Prabhasa*. While Hampson (1900) treated all these three genera, besides others, as synonyms of '*Ilema*', Strand (1922) revalidated *Eilema* Hübner and transferred all the other names, including '*Ilema*' of Hampson, as its synonyms. Later, Daniel (1954) followed Seitz (1910) in as far as retention of the name *Lithosia* is concerned, but revalidated several of its synonyms (*sensu* Hampson, 1900) viz., *Prabhasa*, *Tarika*, *Dolgoma*, *Systropha*, *Zadadra*, etc.

The genus *Zadadra* is characterised by the following main features : Antennae simple in both sexes, profusely ciliated, with bristle on each segment in male ; labial palpi short ; slender with the apex long ; ocelli poorly marked. Fore wings shortened and narrowed ; crumpled at apex which is convex ; costa arched beyond middle ; cell very long, nearly two-third the length of wing, folded in male and covered with a tuft of recumbent scales, profusely on upperside for nearly two-third the length of cell, the remaining up to the end of cell sparsely tufted ; R_1 free, curved towards subcostal vein ; R_3 from R_2 and anastomosing with $R_4 + R_5$ to form a short areole ; M_1 from base of stalked R_{3+5} ; $M_3 - Cu_{1a}$ shortly stalked ; Cu_{1b} from middle of cell. Hind wing with a patch of androconia at the base of subcosta on upper side ; $Rs - M_1$ and $M_3 - Cu_{1a}$ stalked.

The male genitalia with the uncus short and slender ; tegumen slender ; vinculum broad basally ; valva broad basally, narrowed at the apex, the latter with the dorso-distal part rounded and extended beyond the ventro-distal part ; fultura weak and narrow. Aedeagus quite strong, but without any cornutal spines (Text-figs. 3 G—I)

One species from Arunachal Pradesh is dealt with here.

31. *Zadadra distorta* (Moore)

(Figs. 3 G-I)

1872. *Lithosia distorta* Moore, *Proc. zool. Soc. Lond.* : 572 (Type loc.—Darjiling).

Material examined.—Arunachal Pradesh : Subansiri Dist., Chukru, 112 m., 1 ♂, 22.v.1966 (A.N.T. Joseph Coll.) ; Siang Dist., Dali Camp, 300 m., 1 ♂, 12.x.1966 (S. K. Tandon and G. S. Arora Coll.).

Wing expanse.—26-30 mm.

Distribution.—INDIA (Sikkim ; Assam ; Naga Hills ; Arunachal Pradesh) ; NEPAL ; CHINA ; (Likiang ; Szetschwan).

Remarks.—The species is characterised by the presence of secondary sexual characters on both wings and by R_1 being curved towards Sc, but not touching or anastomosing with it. The latter character is found in *Eilema vicaria* (Walker) from amongst the species presently dealt here but *vicaria* is without any secondary sexual characters on both wings.

Genus *Hemonia* Walker

1863. *Hemonia* Walker, *List Lep. Insects Br. Mus.*, 28 : 425-426.

Type.—*Hemonia orbiferana* Walker

Remarks.—Strand (1922) reported 10 species, including *orbiferana* from India, under this genus, and treated *rotundata* Snellen from Java, Sulawesi and Singapore, independently, unlike Hampson (1900) who treated it as a synonym of *orbiferana*.

The genus is characterised by the antennae being shortly pectinate in male, with the apical part serrate ; tibiae with the spurs moderate. Fore wings short and broad ; costa highly arched ; R_1 connected with Sc by a bar ; R_2 — R_4 arising free ; R_5 and M_1 stalked ; M_2 — M_3 stalked ; Cu_{1a} from angle ; Cu_{1b} from middle of cell. Hind wings with R_s — M_1 stalked ; M_2 absent ; M_3 — Cu_{1a} stalked ; Cu_{1b} from near middle of cell.

Only one species is dealt with here.

32. *Hemonia orbiferana* Walker

1863. *Hemonia orbiferana* Walker, *List Lep. Insects Br. Mus.*, 28 : 426.

Material examined.—Arunachal Pradesh : Siang Dist., Kambang, 3 ♂♂, 11, 16.x.1966 (S. K. Tandon and G. S. Arora Coll.).

Wing expanse.—18-20 mm.

Distribution.—INDIA (Sikkim ; Arunachal Pradesh) ; BHUTAN ; INDONESIA (Borneo) ; MALAYSIA (Sarawak) ; SRI LANKA ; and INDOCHINA.

Remarks.—*Hemonia orbiferana* is characterised by the fore wings being purplish fuscous and broad, with the width being a little more than half the length of wings ; a dark line curved from costa beyond middle, to tornus, the area beyond it more purplish ; and a short discoidal spot.

Hitherto known from Sikkim in India, the record of the species now from these areas extends its distribution further eastwards.

Genus *Agylla* Walker

1854. *Agylla* Walker, *List Lep. Insects Br. Mus.*, 2 : 552.

Type.—*Agylla fasciculata* Walker

Remarks.—Strand (1922) recorded 107 species in this genus, including 16 from India. Later, Daniel (1952) added four more species, including his two new to science while dealing with East Asian fauna of Arctiidae. His study included four of the 16 Indian species (*vide* Strand, *loc. cit*), out of which the present report deals with only one species, viz., *A. divisa* (Moore). Besides, the present account also deals with *A. maculata*, *A. ramelana* and *A. alboluteola*.

The genus is distinguishable by the following main features : Antennae bipectinate or serrate in male, or ciliate in both sexes ; ocelli present, well marked ; palpi upturned, not reaching vertex of head. Fore wings with the vein R_1 arising free ; R_3 arising from R_2 and anastomosing with R_4 to form an areole ; R_5 from end of areole ; M_1 from upper angle of areole ; M_2 - M_3 arising free, or stalked, from lower angle of cell ; Cu_{1a} from well before the angle ; Cu_{1b} just before the middle of cell. Hind wing with veins Rs - M_1 stalked or arising from upper angle of cell ; M_2 - M_3 stalked, or arising from lower angle of cell ; Cu_{1a} and Cu_{1b} as in fore wing.

The four species from Arunachal Pradesh are differentiated by the following key :

- | | | | | | | |
|---|-----|-----|-----|-----|-----|---------------------------|
| 1. Antennae in male bipectinate, the branches short, the apical part serrate and fasciculate. Fore wing with the costal half pale yellowish ; inner half fuscous. Hind wing unspotted | ... | ... | ... | ... | ... | <i>divisa</i> (Moore) |
| — Antennae in male ciliate. Hind wing spotted | ... | ... | ... | ... | ... | 2 |
| 2. Wings pale yellowish ; fore wings with costal half paler, the inner half dark ; without postmedial band | ... | ... | ... | ... | ... | <i>maculata</i> (Moore) |

— Fore wings with the ground colour whitish ; costal and terminal margin black ; a broad, black postmedial band present	...	...	...	...	...	...	3
3. Hind wing whitish	...	...	...	...	...	<i>ramelana</i> (Moore)	
— Hind wing yellowish	...	...	...	...	...	<i>alboluteola</i> Rothschild	

33. *Agylla divisa* (Moore)

1878. *Hesudra divisa* Moore, *Proc. zool. Soc. Lond.* : 18, pl. I, fig. 4 (Type loc.— Sikkim)

Material examined.—Arunachal Pradesh, Khonsa, Power House, 800 m., 1 ♀, 7.xi.1971 (G. S. Arora Coll.).

Wing expanse.—40 mm.

Distribution.—INDIA (Sikkim and Arunachal Pradesh) ; CHINA (Formosa, and Kuantung) ; INDONESIA (Borneo).

Remarks.—This species stands isolated from all the other three species presently dealt with, in as far as antennal pectination is concerned. The other species dealt with here have simple antennae in both sexes. Besides, there are four more species, with pectination as in *divisa*, known to occur in north-eastern region, i.e., *apicalis* (Moore) from Sikkim (with pectination up to the tip, in male) ; *beema* (Moore) and *rufifrons* (Moore) from Sikkim ; and *semirufa* (Hampson) from Sikkim and Assam (all without any fuscous in the inner area, unlike in *divisa*).

34. *Agylla maculata* (Moore)

(Plate III, fig. 21)

1878. *Vamuna maculata* Moore, *Proc. zool. Soc. Lond.* : 10, pl. I, fig. 5 (Type loc.— Darjiling).

Material examined.— Arunachal Pradesh : Siang Dist., Tappi, 600m., 1 ♂, 23.x.1966, Bame, 600 m., 2 ♀ ♀, 31.x.1966 (S. K. Tandon and G. S. Arora Coll.).

Wing expanse.— Male, 38 mm ; female, 48-53 mm.

Distribution.— INDIA (West Bengal, Darjiling ; Sikkim ; Arunachal Pradesh) and BHUTAN.

Remarks.— This species along with the following two species, *ramelana* and *alboluteola*, form a separate group defined by the antennae being simple in both the sexes and by the presence of a black spot between M_2 and Cu_{1b} on hind wing. The species, however, differs from both by the absence of postmedial band and by the costal region being paler. The apical black spot on hind wing is present in male and absent in female,

35. *Agylla ramelana* (Moore)

1865. *Lithosia ramelana* Moore, *Proc. zool. Soc. Lond.* : 798 (Type loc.— Sikkim).

Material examined.— Arunachal Pradesh : Tirap Dist., Khonsa, Power House, 800 m., 1 ♂, 3 ♀♀, 6.xi.1971 (G. S. Arora Coll.).

Wing expanse.— Male, 46 mm. ; female, 61 mm.

Distribution.— INDIA (Sikkim ; Assam ; Arunachal Pradesh) ; INDONESIA (Borneo and Java).

Remarks.— This species is characterised by the wings being white and the postmedial band well developed in both sexes and not reduced to a spot in female as reported by Hampson (1900), the band expanding between veins M_2 and Cu_{1b} in both sexes. The females differ in the underside of thorax and abdomen being yellowish unlike whitish in males.

36. *Agylla alboluteola* Rothschild

(Plate III, fig. 22)

1912. *Agylla alboluteola* Rothschild, *Novit. zool.*, 19 : 226 (Type loc.— Assam, Khasis).

Material examined.— Arunachal Pradesh ; Tirap Dist., Deomali, 200m., 3 ♂♂, 9, 11.xi.1971 (G. S. Arora Coll.).

Wing expanse.— 40-44 mm.

Distribution.— INDIA (Assam and Arunachal Pradesh) and MALAYSIA (Selangore).

Remarks.— Like the preceding species, this is also characterised by the presence of postmedial band, but the latter is expanding between M_1 and Cu_{1b} , or rarely up to the inner margin. Hind wing, underside of thorax and abdomen pale yellowish.

Genus *Agrisius* Walker

1855. *Agrisius* Walker, *List Lep. Insects Br. Mus.*, 3 : 723.

Type.— *Agrisius guttivitta* Walker

Remarks.— Hampson (1900) as well as Strand (1922) recorded only two species, viz., *guttivitta* Walker and *fuliginosus* Moore. While the former is known to occur in Sikkim, in India, the latter's occurrence in India is doubtfully reported. The material available for study is referable to *guttivitta*.

The genus *Agrisius* is characterised by the following main features : Antennae simple in both sexes ; ocelli present, well developed ; palpi upturned, long and slender, the 3rd joint reaching well above the vertex of

head. Legs with two pairs of hind tibial spurs. Fore wing with vein R_1 arising free from the cell ; $R_2 - R_3$ stalked, and anastomosing with R_4 to form a small areole ; R_5 from areole ; M_1 from upper angle of cell ; M_2 from above the lower angle ; M_3 from close to angle or from it ; Cu_{1a} just before the angle ; Cu_{1b} from cell.

The Indian species is dealt with here.

37. *Agrisius guttivitta* Walker (Plate IV, fig. 23)

1855. *Agrisius guttivitta* Walker, *List Lep. Insects Br. Mus.*, 3 : 723 (Type loc.— North India).

1952. *Agrisius guttivittata* Walker, Daniel, *Bonn. zool. Beitr.*, 3 : 316.

Material examined.— Arunachal Pradesh : Kameng Dist., Dirang Dzong, 1600 m., 1 ♀, 21.vii.1961 (S. Biswas Coll.).

Wing expanse.— 43 mm.

Distribution.— INDIA (Sikkim and Arunachal Pradesh). Also CHINA (South Shensi, Chekiang and Szetschwan).

Remarks.— This species is characterised by the wings being whitish, with veins in both wings streaked with black in the apical half, the basal half in fore wings marked with series of spots.

Daniel (1952) referred to this species as *Agrisius guttivittata* Walker which we presume was simply a case of *lapsus calami*.

Genus *Cyana* Walker

1854. *Cyana* Walker, *List Lep. Insects Br. Mus.*, 2 : 528.

Type.— *Cyana detrita* Walker from 'Silhet'.

Remarks.— Several generic names, with their respective types, have been cited by Hampson (1900) as synonyms, including *Cyana* Walker, under *Chionaema* Herrich-Schäffer. Roepke (1944), following Neave (1939), believes that the correct year of publication of *Chionaema* Herrich-Schäffer is 1856, and not 1850, whereas that of the genus *Cyana* being 1854, so that the latter genus has a priority over *Chionaema*.

The genus incorporates 153 species (vide Strand, 1922 and Daniel 1952), including some 30 species from India. Of which, as many as 25 are known to occur in north-eastern region of India, though not exclusively. Presently, the material is referable to two species, viz., *bianca* Walker and *dudgeoni* Hampson. Besides, there are a few examples of females which could not be assigned to any definite species, which have been treated here merely as *Cyana* spp.

The genus *Cyana* is characterised by the antennae being simple in both sexes ; tibiae with the spurs moderate ; abdomen covered with rough hair. Fore wings long and narrow ; males with a fringe of hair from middle of costa on upper side and lobe on under side, thus distorting the neuration ; veins $R_1 - R_2$ arising free ; $R_3 - R_4$ usually absent in male ; M_1 from angle, or below the upper angle, or stalked with vein R_5 . Hind wings with veins $Rs - M_1$ stalked ; M_2 obsolescent ; $M_3 - Cu_{1a}$ on a long stalk or rarely coincident.

Hampson (1900) placed the two species, which have been dealt with here, under the category with veins $M_2 - M_3$ in fore wing from cell angle and a single lobe in male on under side of fore wing. Due to these characters, the species come close to *bellisima* (from Mussoorie, Sikkim and Assam) ; *coccinea* (Sikkim and Andamans) ; *gelida* (N.W Himalayas, Sikkim and Assam) ; *gazella* (N. W Himalayas and Sikkim) and *harterti* (Assam). Other species like *catorhoda*, *alborosea*, *obliquilineata* and *effracta* also have a single lobe in male but the veins $M_2 - M_3$ in fore wings in females are stalked. There are some fourteen species more known from N.E. region, except Arunachal Pradesh, under the latter category, but can be further differentiated by the number of lobes in males, i. e., (i) bilobed in *arama* (Sikkim, Assam and Naga Hills), *divakara* (Sikkim and Assam), *dohertyi* (N. W Himalayas, Sikkim, and Assam), *sikkimensis* (Sikkim), *candida* (N. W Himalayas and Sikkim), *puer* (Sikkim, Assam and Manipur) and *detrita* (N. W Himalayas, Sikkim and Assam) ; and (ii) trilobed in *adita* (N. W Himalayas and Sikkim), *guttifera* (N. W Himalayas, Sikkim, Assam, Kerala and Andamans), *hasiana* (Assam), *flavicincta* (Assam), *molleri* (Sikkim and Assam) and *signa* (Assam).

The two species, viz., *bianca* and *dudgeoni* are dealt with here.

38. *Cyana bianca* (Walker)

(Plate IV, fig. 24)

1856. *Bizone bianca* Walker, *List Lep. Insects Br. Mus.*, 7 : 1684.

Material examined.—Arunachal Pradesh : Tirap Dist., Deomali, 200 m., 1 ♂, 2 ♀♀, 12.xi.1971 (G. S. Arora Coll.).

Wing expanse.— Male, 31 mm ; female, 37 mm.

Distribution.— INDIA (Assam, Cachar ; Sikkim ; Arunachal Pradesh) ; BHUTAN ; MALAY PENINSULA (Penang).

Remarks.— Both the sexes are similar to each other except in number of forewing spots being two in female and three in male ; and the terminal band narrow, with the inner edge regular in female unlike in the male where it is minutely dentate. For other differences see remarks in the genus.

39. *Cyana dudgeoni* Hampson

1895. *Cyana dudgeoni* Hampson, *Trans. ent. Soc. Lond.* : 293 (*Type loc.*—Sikkim).

Material examined.—Arunachal Pradesh : Siang Dist., Pading Village, 300 m., 1 ♂, 11.x.1966, Kambang, 200 m., 2 ♀♀, 14, 15.x.1966, New Jining, 100 m., 1 ♀, 18.x.1966 (all *S. K. Tandon* and *G. S. Arora* Coll).

Wing expanse.—Male, 21 mm. ; female, 24-30 mm.

Distribution.—INDIA (Sikkim ; Assam ; and Arunachal Pradesh) ; and BHUTAN.

Remarks.—The sexes do not differ from each other except in the lobe being large and single in male, and absent in female.

The species differs from *bianca* by the absence of black edging along medial and postmedial bands. For other remarks see under the genus.

39 (a). *Cyana* sp.

Material examined.—Arunachal Pradesh : Tirap Dist., Changlong, 540 m., 2 ♀♀, 30, 31.x.1971 (*G. S. Arora* Coll.).

Wing expanse.—28-30 mm.

Distribution.—INDIA (Arunachal Pradesh).

Remarks.—The material comes very close to *Cyana pratti* (Elwes), a Chinese species, and, like the latter, it is characterised by forewing bands being very narrow and scarlet, with the subbasal not reaching the inner margin ; antemedial band excurved below costa and incurved below cell ; postmedial angled inwards just above vein M_2 ; terminal band not reaching costa and termen ; fore wings with three black spots. Hind wings crimson except on costa ; the cilia white. Abdomen dorsally tinged with scarlet.

In respect of venation too, it is close to *C. pratti*, particularly in the veins M_2 - M_3 being free in fore wings and veins M_3 stalked with Cu_{1a} in hind wings.

39 (b). *Cyana* sp.

Material examined.—Arunachal Pradesh : Tirap Dist., Khonsa, Power House, 800 m., 1 ♀, 6.xi.1971 (*G. S. Arora* Coll.).

Wing expanse.—60 mm.

Distribution.—INDIA (Arunachal Pradesh).

Remarks.—The species is characterised by the fore wings being whitish, except along inner area which is pale brown ; the bands scarlet ; the subbasal band from costa but not reaching inner margin ; postmedial excurved and

pointed inwards just above M_2 ; terminal scarlet band wanting, instead a diffused subterminal pale-yellowish band present, but is not touching either costa or termen ; three black spots present on fore wing. Hind wings scarlet throughout except at costa which is paler. Abdomen brown.

The material comes very close to *C. adita* (Moore) from Himachal Pradesh and Sikkim in India, particularly due to the presence of three spots and by the absence of terminal scarlet band on hind wings.

39 (c). *Cyana* sp.

Material examined.—Arunachal Pradesh : Siang Dist., New Jining, 1 ♀, 20.x.1966 (S.K. Tandon and G.S. Arora Coll.) ; Tirap Dist., Changlong, 540 mm., 1 ♀, 31.x.1971 (G.S. Arora Coll.).

Wing expanse.—25-26 mm.

Distribution.—INDIA (Arunachal Pradesh).

Remarks.—The material comes very close to *C. alborosea* (Walker) from Assam and Khasis in India, in respect of forewing venation, particularly in veins M_2 - M_8 being stalked and M_1 stalked with R_4 - R_5 ; by the presence of one black spot ; the bands narrow and pale scarlet ; the subbasal band expanding at costa. Hind wing pale scarlet except at costa which is whitish.

Genus *Asura* Walker

1854. *Asura* Walker, *List Lep. Insects Br. Mus.*, 2 : 484.

Type.—*Asura cervicalis* Walker

Remarks.—Strand (1922) recorded as many as 195 species under the genus, to which one more new species was added from Eastern Asia by Daniel (1952). However, only 42 species are hitherto known from India, including 26 from northeastern region, mainly Sikkim and Assam. The present account deals with seven species, thus extending their distribution to Arunachal Pradesh.

The genus is mainly characterised by the following features : Antennae in male either bipectinate, with rami short, or simple and ciliate in both sexes ; palpi slender and porrect, not reaching beyond the hairy frons. Legs with the tibial spurs short. Fore wings generally yellowish, yellowish-white, orange, orange-red, or greyish-brown. Fore wing with vein R_1 anastomosing with Sc ; R_2 free ; R_3 , R_4 , R_5 stalked ; M_1 from below the upper angle of cell ; M_2 from above the lower angle ; M_3 from angle ; Cu_{1a} from before angle ; and Cu_{1b} from near the middle of cell. Hind wing with vein Rs- M_1 stalked ; M_2 from above the lower angle, angle or stalked with M_3 ; Cu_{1a} - Cu_{1b} as in fore wing.

All the seven species that are available from Arunachal Pradesh, besides one male identified up to genus, fall in the group of those species with the antennae simple and ciliate in both sexes, and are identified by the following key.

Key to the identification of species of *Asura*

- | | | | |
|---|-----|---------------------------------|---|
| 1. Fore wing with the postmedial line highly and irregularly dentate | ... | ... | 2 |
| — Fore wing with the postmedial line not highly dentate, rarely absent | ... | ... | 3 |
| 2. Fore wing with subterminal and terminal series of black points ; medial line either straight from costa to inner margin, or slightly angled inwards in submedian fold | ... | <i>undulosa</i> (Walker) | |
| — Fore wing with only subterminal series of black points ; terminal series wanting ; with medial point at costa, medial line excurved below cell and incurved in submedian fold | ... | <i>obsoleta</i> (Moore) | |
| 3. Fore wing without distinct postmedial line | ... | ... | 4 |
| — Fore wing with distinct postmedial line, spots or streaks | ... | ... | 5 |
| 4. Wings white. Fore wings with nearly whole of the area brown ; the subbasal, antemedial and the postmedial area with a series of white points on it | ... | <i>frigida</i> (Walker) | |
| — Wings yellow. Fore wings without any markings or lines at subbasal, antemedial, medial and postmedial areas ; a small discoidal black spot present | ... | <i>calamaria</i> (Moore) | |
| 5. Fore wings with postmedial series of streaks conjoined into an irregular band ; medial line more or less straight or oblique but prominent antemedial spots well separate. Hind wing tinged with crimson towards apex in male, and uniform in female | ... | <i>strigipennis</i> (Her.-Sch.) | |
| — Fore wings with distinct postmedial line ; medial line strongly incurved | ... | ... | 6 |
| 6. Fore wing with the medial line connected to postmedial line by streaks ; postmedial line also connected to antemedial line by streaks ; submarginal line parallel to postmedial line and separate from it, sending streaks towards terminal margin | ... | <i>euprepioides</i> (Walker) | |
| — Fore wing with the medial line not connected to postmedial line by streaks ; submarginal line conjoined with postmedial line, sending streaks towards terminal margin | ... | <i>conjunctana</i> (Walker) | |

40. *Asura undulosa* (Walker)

1854. *Cyllene undulosa* Walker, *List Lep. Insects Br. Mus.*, 2 : 545 (Type loc.—East India).

Material examined.—Arunachal Pradesh : Kameng Dist., Bomdilla, 2620 m., 1 ♀, 4.vii.1961 (S. Biswas Coll.), Dunn Bridge, 1524 m., 1 ♀, 22.iv.1966 (A. N. T. Joseph Coll.) ; Siang Dist., Kambang, 200 m., 1 ♂, 19.x.1966 (S. K. Tandon and G. S. Arora Coll.) ; Lohit Dist., Chowkham, 244 m., 1 ♀, 26.xi.1969 (J.M. Julka Coll.) ; Tirap Dist., Changlong, 540 m., 1 ♀, 1.xi.1971, Khonsa Power House, 800 m., 2 ♂♂, 3 ♀♀, 6, 7. xi.1971, Deomali, 200 m., 1 ♀, 9.xi.1971 (all G. S. Arora Coll.).

Wing expanse.—Male and female, 23 mm.

Distribution.—INDIA (Sikkim ; Assam ; Arunachal Pradesh). Also BHUTAN and BURMA.

Remarks.—It is very close to the following species, *A. obsoleta* (Moore), in general facies and the wing pattern particularly in postmedial line being highly dentate but differs in respect of the terminal series of spots which are absent in *obsoleta*.

41. *Asura obsoleta* (Moore)

1878. *Lyclene obsoleta* Moore, *Proc. zool. Soc. Lond.* : 32, pl. 3, fig 7 (Type loc.—Darjiling).

Material examined.—Arunachal Pradesh : Siang Dist., Kambang, 200m., 6 ♂♂, 3 ♀♀, 14,15,16, 19.x.1966, New Jining, 100 m., 3 ♂♂, 2 ♀♀, 18.19.x.1966 (S. K. Tandon and G. S. Arora Coll.) ; Lohit Dist., Santipur, 100 m., 1 ♂, 2.iii.1969 (S. K. Tandon Coll.) ; Tirap Dist., Deomali, 200 m., 1 ♀, 9.xi.1971 (G. S. Arora Coll.).

Wing expanse.—Male, 15-17 mm. ; female, 21-23 mm.

Distribution.—INDIA (S. India ; W B. ; Sikkim ; Assam ; Arunachal Pradesh). Also BHUTAN and S. CHINA (Formosa).

Remarks.—The species is very close to the preceding species, as mentioned already in its remarks. The material shows expanse ranging between 15 and 23 mm., as compared with the earlier record of only 22 mm. (*vide* Hampson, 1900).

42. *Asura frigida* (Walker)

1854. *Doliche frigida* Walker, *List Lep. Insects Br. Mus.*, 2 : 530 (Type loc.—S. W. Borneo).

Material examined.—Arunachal Pradesh : Siang Dist., Perying Village,

200 m., 1 ♀, 15.x.1966, Bame, 600 m., 1 ♂, 27.x.1966 (S. K. Tandon and G. S. Arora Coll.).

Wing expanse.—20 mm.

Distribution.—INDIA (Sikkim ; Assam ; Arunachal Pradesh) ; BURMA ; INDONESIA (Java and Borneo) ; and MALAYSIA (Sarawak).

Remarks.—The species differs from all the other species of *Asura*, presently collected from these areas, in the wings being white and nearly the whole of fore wing occupied by a large and broad patch, with a series of white points on it in postmedial area.

43. *Asura calamaria* (Moore)

1888. *Setina calamaria* Moore, *Proc. zool. Soc. Lond.* : 392.

Material examined.—Arunachal Pradesh : Siang Dist., Likhabali river-bank, 1 ♀, 3.x. 1966 (S. K. Tandon and G. S. Arora Coll.).

Wing expanse.—24 mm.

Distribution.—INDIA (Sikkim ; Assam, Khasi Hills ; Arunachal Pradesh ; N. W. Himalayas) ; BURMA ; INDONESIA (Borneo ; Sumatra ; Java).

Remarks.—Like the preceding species, this is also characterised by the absence of distinct postmedial line. Besides, the wings are yellowish and devoid of any markings, except that a small, black discoidal spot, on forewing, is present.

44. *Asura strigipennis* (Herrich-Schäffer)

1855. *Paidia strigipennis* Herrich-Schäffer, *Aussereur. Schmett.* : 21, pl. 437.

Material examined.—Arunachal Pradesh : Siang Dist., Dali village, 200 m., 1 ♂, 10.x.1966, Kambang, 200 m., 1 ♂, 16.x.1966, New Jining, 100 m., 1 ♂, 1 ♀, 18, 20.x.1966, Tappi Dulla, 500 m., 2 ♂ ♂, 4 ♀ ♀, 22, 24.x. 1966, Bame, 600 m., 1 ♂, 1 ♀, 31.x.1966 (all S. K. Tandon and G. S. Arora Coll.).

Wing expanse.—Male, 15-16 mm ; female, 18-20 mm.

Distribution.—INDIA (Sikkim ; Assam, Khasis ; Arunachal Pradesh) ; CHINA (Formosa) ; BHUTAN ; BURMA (Tenasserim) ; and INDONESIA (Borneo and Java).

Remarks.—This species is distinguishable by the presence of streaks in the postmedial area instead of a regular postmedial line and the medial line nearly straight or slightly oblique.

45. *Asura euprepioides* (Walker)

(Plate IV, fig. 25)

1862. *Hypropia euprepioides* Walker, *J. Proc. Linn. Soc. Zool.*, 6 : 102 (*Type loc.* —Sarawak).

Material examined.—Arunachal Pradesh : Siang Dist., Kambang, 200 m., 1 ♀, 16.x.1966, New Jining, 100 m., 2 ♂♂, 19.x.1966 (*S. K. Tandon and G. S. Arora Coll.*) ; Tirap Dist., Jairampur, 225m., 2 ♂♂, 26.x.1971, Changlong, 540 m., 1 ♀, 1.xi.1971, Deomali, 200 m., 4 ♂♂, 1 ♀, 11.xi.1971 (*G. S. Arora Coll.*).

Distribution.—INDIA (Sikkim ; Assam ; Nagas) ; BURMA ; INDONESIA (Sumalia and Borneo) ; MALAYSIA (Sarawak) ; PHILIPPINES.

Remarks.—This species is characterised by the wings being yellowish ; fore wings with the medial and postmedial lines connected to each other by streaks ; postmedial line also connected by a streak in submedian area ; postmedial and submarginal lines are separate from each other and the latter sending streaks to the terminal margin. Hind wing also unmarked.

46. *Asura conjunctana* (Walker)

1866. *Conchylis conjunctana* Walker, *List Lep. Insects Br. Mus.*, 35 : 1788 (*Type loc.* —North Hindustan).

Material examined.—Arunachal Pradesh : Siang Dist., Dapporijo, 150 m., 1 ♀, 28.x.1966 (*S. K. Tandon and G. S. Arora Coll.*) ; Tirap Dist., Changlong, 540 m., 2 ♂♂, 30.x.1971, 1.xi.1971 (*G. S. Arora Coll.*).

Wing expanse.—Male, 16 mm. ; female, 18 mm.

Distribution.—INDIA (Sikkim ; Assam ; Nagas ; Arunachal Pradesh) and BHUTAN.

Remarks.—This species is very close to the preceding in general facies and markings on fore wings except that the postmedial and medial lines are not connected by streaks ; submarginal line is conjoined with the postmedial line ; and subterminal area is marked with streaks of the same colour as of other markings.

46 (a). *Asura* sp.

Material examined.—Arunachal Pradesh : Siang Dist., Bame, 600 m., 1 ♂, 27.x.1966 (*S. K. Tandon and G. S. Arora Coll.*).

Wing expanse.—21 mm.

Distribution.—INDIA : Arunachal Pradesh.

Remarks.—The material of this species comes very close to *A. semifascia* (Walker) from Sri Lanka Burma and India (Nilgiris), particularly in postmedial line being highly angulated ; medial line angled ; subbasal, antemedial and sumarginal areas with a series of spots ; a discoidal spot present. Hind wing unspotted except for some black apical suffusion.

Genus *Miltochrista* Hübner

1816. *Miltochrista* Hübner, *Verz. bek. Schmett.* : 166.

Type.—*Noctua rubicunda* Denis & Schiffermüller, 1775 (= *Geometra miniata* Forster, 1771)

Remarks.—Strand (1922) recorded 90 species under this genus. Later, Daniel (1951, 1952) while dealing with East Asian fauna of Arctiidae referred in all to 27 species, including eight species as new, in this genus. He revived the subgenus *Barsine* Walker and assigned *gratiosa* (Guérin-Méneville), *delicia* (Swinhoe), *perpalida* Hampson and *spilosomoides* (Moore), of which only *M. gratiosa* is being dealt with here. Seven more species are also recorded here from north-eastern India.

The genus is distinguishable by the following main features : Antennae simple in both sexes, or minutely serrate in males ; palpi porrect, extending to just beyond the frons. Fore wings with vein R_1 and R_2 free, R_1 curved and approximated to vein Sc , rarely anastomosing with it ; R_3 , R_4 and R_5 stalked ; M_1 from below the upper angle ; M_2 from above the lower angle ; M_3 from angle ; Cu_{1a} from behind the angle ; Cu_{1b} from near the middle of cell. Hind wings with veins $Rs-M_1$ stalked ; M_2 from above the angle or stalked with M_3 ; Cu_{1a} and Cu_{1b} as in fore wings.

Key to the identification of species of *Miltochrista*

- | | | | |
|---|-----|---------------------------|---|
| 1. Fore wing with the cilia dark fuscous | ... | ... | 2 |
| — Fore wing with the cilia not dark fuscous | ... | ... | 6 |
| 2. Fore wing with the cilia dark fuscous near the middle of margin in continuation with a dark fuscous fascia along vein M_3 and lower angle up to Cu_{1b} ; under side dark fuscous from beyond discocellulars nearly to margin. Hind wing, except at costa towards base and abdomen, dark fuscous | ... | <i>cardinalis</i> Hampson | |
| — Fore wing with the cilia dark fuscous or paler throughout the terminal margin ; several streaks from beyond post-medial line ; under side with some suffusion near the apex only | ... | ... | 3 |

- | | | | |
|---|-----|------------------------------------|---|
| 3. Fore wing with some of the streaks beyond postmedial line reaching only halfway. Hind wing with or without suffusion | ... | ... | 4 |
| — Fore wing with all the streaks beyond postmedial line touching margin or just short of it. Hind wing without suffusion | ... | ... | 5 |
| 4. Fore wing with the dark fuscous costal margin interrupted on medial area. Hind wing with dark suffusion from beyond submarginal area. Abdomen dark | ... | <i>punicea</i> (Moore) | |
| — Fore wing with the dark fuscous costal margin uninterrupted. Hind wing without any suffusion on upperside. Abdomen yellowish | ... | <i>cruciata</i> (Walker) | |
| 5. Fore wing with prominent streaks beyond postmedial area extending nearly up to terminal margin ; costal margin dark fuscous, interrupted at medial area | ... | <i>cuneonotata</i> (Walker) | |
| — Fore wing with faint streaks beyond postmedial area and touching terminal margin ; costal margin black and uninterrupted | ... | <i>inflexa</i> (Moore) | |
| 6. Fore wing orange or yellow, marked with black and crimson spots and streaks ; antemedial, medial and post-medial lines complete, or reduced to series of points | ... | <i>gratiosa</i> (Guérin-Méneville) | |
| — Fore wing yellow or sulphur yellow, marked with black spots or streaks | ... | ... | 7 |
| 7. Fore wing with the medial line complete ; veins streaked prominently with black from beyond postmedial area. Hind wing with veins streaked prominently with black from beyond submarginal area | ... | <i>prominens</i> (Moore) | |
| — Fore wing without any complete lines ; veins streaked faintly with black from beyond postmedial area. Hind wing without streaks | ... | <i>magna</i> Hampson | |

47 *Miltochrista cardinalis* Hampson

1900. *Miltochrista cardinalis* Hampson, *Cat. Lep. Phal. Br. Mus.*, 2 : 480, pl. 32, fig. 8 (*Type loc.*—Sikkim).

Material examined.—Arunachal Pradesh : Siang Dist., Dali camp, 300 m., 1 ♂, 1 ♀, 11, 12.x.1966 (S. K. Tandon and G. S. Arora Coll.).

Wing expanse.—Male, 22 mm. ; female, 20 mm.

Distribution.—INDIA (Assam ; Sikkim ; and Arunachal Pradesh).

Remarks.—The species is characterised by the fore wing being brightly crimson, with a dark fuscous fascia from base of Cu_{1b} expanding towards outer margin ; cilia dark fuscous corresponding to the area of fascia.

Hind wing dark fuscous, except at costa towards the base which is pale crimson. Underside fore wing is dark-fuscous in the entire area beyond discocellular from below costa to just above inner margin but interrupted at vein M_3 by crimson ; hind wing as on upper side.

48. *Miltochrista punicea* (Moore)

1878. *Barsine punicea* Moore, *Proc. zool. Soc. Lond.* : 29 (*Type loc.*—Darjiling).

Material examined.—Arunachal Pradesh : Siang Dist., Dapporijo, 150 m., 1 ♀, 28.vi.1966 (S. K. Tandon and G. S. Arora Coll.) ; Kameng Dist., Dirang, 3 ♀ ♀, 10.iii.1973 (S. K. Tandon Coll.).

Wing expanse.—19 mm.

Distribution.—INDIA (Assam ; Sikkim ; and Arunachal Pradesh) ; BHUTAN ; and BURMA.

Remarks.—Dudgeon (1903) reports that the male is unknown but is of the opinion that "*M. postnigra* Hampson will be found that sex of the species" The present account also neither reports males of *punicea* (Moore), nor there is any material referable to *postnigra* Hampson. This species, by their cilia being dark-fuscous, together with the preceding *cardinalis* and the following *cruciata*, *cuneonotata* and *inflexa* from a group of their own. However, while in *cardinalis* the dark fuscous cilia are restricted to the area corresponding to fascia, in the other three species the cilia are dark-fuscous or black, on whole of terminal margin, extending on to costal margin. This species is further close to *cruciata* in that all the postmedial streaks do not reach the terminal margin, but are ending half way. The two species differ from each other by the characters as given in the key, particularly in the colouration of abdomen and terminal part of hind wing.

This species is characterised by the antemedial line being strongly excurved and medial incurved, thus both meeting in the cell ; medial slightly excurved in submedian fold ; postmedial line almost arising from the same place as the medial line, strongly excurved below costa and submedian fold and incurved below vein M_1 up to submedian fold, so as to come closer to medial in submedian fold, so as to come closer to medial in submedian fold.

49. *Miltochrista cruciata* (Walker)

(Plate IV, fig. 26)

1862. *Hypoprepia cruciata* Walker, *J. Proc. Linn. Soc. Zool.*, 6 : 101 (*Type loc.* Sarawak).

Material examined.—Arunachal Pradesh : Siang Dist., Kambang, 200m., 1 ♀, 16.x.1966 (S. K. Tandon and G. S. Arora Coll.).

Distribution.—INDIA (Sikkim ; Assam ; Khasis ; and Arunachal Pradesh) ; INDONESIA (Borneo and Sumatra) ; MALAYSIA (Sarawak).

Remarks.—This species is close to *punicea* in as far as postmedial streaks are concerned, but the costal margin is entirely dark fuscous and not interrupted at medial area ; the medial line incurved below costa in the cell to meet excurved antemedial line, beyond which it is excurved to inner margin ; postmedial line excurved from below costa to M_1 and incurved up to inner margin, ending close to medial line, but neither touching nor bent in submedian fold. For other differences see *punicea*.

50. *Miltochrista cuneonotata* (Walker)

(Plate IV, fig. 27)

1855. *Ammatho cuneonotata* Walker, *List Lep. Insects Br. Mus.*, 3 : 759 (*Type loc.* —Ceylon).

Material examined.—Arunachal Pradesh : Tirap Dist., Changlong, 540 m., 1 ♀, 1.xi.1971 (G. S. Arora Coll.).

Wing expanse.—37 mm.

Distribution.—INDIA (Sikkim ; Naga Hills ; and Arunachal Pradesh) ; SRI LANKA ; MALAYSIA (Malaya, Singapore) ; INDONESIA (Nias ; Borneo ; and Sumatra) ; and Philippines.

Remarks.—This species, along with the following, viz., *inflexa*, belongs to the group with hind wing without suffusion and the streaks in postmedial area complete and equal in length, but mostly broad and not touching the terminal border with dark-fuscous cilia (vs. narrow streaks touching the terminal border in *inflexa*). Besides, the discocellular area, before postmedial line, yellowish and not orange red, as is the rest of the ground colour of fore wing (vs. uniform ground colour in *inflexa*) ; costal margin dark-fuscous, interrupted at medial area (vs. black in *inflexa*) ; spots present on vertex, patagia, tegulae and thorax (vs. spots absent in *inflexa*).

51. *Miltochrista inflexa* (Moore)

(Plate IV, fig. 28)

1878. *Barsine inflexa* Moore, *Proc. zool. Soc. Lond.* : 29, pl. III, fig. 17 (*Type loc.* —Darjiling).

Material examined.—Arunachal Pradesh : Tirap Dist., Changlong, 540 m., 1 ♀, 1.xi.1971 (G. S. Arora Coll.).

Wing expanse.—32 mm. (in lit. : 28 mm.).

Distribution.—INDIA (Sikkim ; Assam, Khasis ; and Arunachal Pradesh).

Remarks.—This species is close to *cuneonotata*. For affinities and differences see *cuneonotata*.

52. *Miltochrista* (*Barsine*) *gratiosa* (Guérin-Méneville)

1843. *Euchelia gratiosa* Guérin-Méneville, *In : Deless Souvo Inde.*, 2 : 90, pl. 26, fig. 1
(*Type loc.*—Nilgiris).

Material examined.—Arunachal Pradesh : Kameng Dist., Kalaktang, 690 m., 1 ♂, 7 ♀ ♀, 11, 14, 27.ix.1961, 3.x.1966 (*S. Biswas* Coll.) ; Siang Dist., Lekhabali, 1 ♂, 7.x.1966 (*S. K. Tandon* and *G. S. Arora* Coll.) ; Tirap Dist., Changlong, 540 m., 1 ♂, 31.x.1971, Khonsa, Power House, 800 m., 1 ♂, 6.xi. 1971 (*G. S. Arora* Coll.).

Wing expanse.—Male, 34 mm. ; female, 37 mm.

Distribution.—INDIA (Assam ; Sikkim ; Arunachal Pradesh) ; INDONESIA (Borneo) ; BURMA ; SRI LANKA ; BHUTAN ; CHINA ; E. Asia ; and JAPAN.

Remarks.—A very common species throughout the hilly tracts of north-eastern region, it is characterised by the head, thorax and fore wings being orange, yellow or orange-yellow ; with the lines either entire or reduced to series of dark points or spots ; series of crimson spots present before ante-medial line, and before and after medial line ; the series of crimson streaks present in the interspaces after the postmedial series of dark spots ; costal and terminal margin not dark. Hind wing pale orange-yellow or yellowish and without any suffusion.

Daniel (1951, 1952) revalidated *M. striata* (Bremer) from North China and *M. pulchra* Butler from Nikkō (Japan) which were treated by Hampson (1900) and Strand (1922) as synonyms of *M. gratiosa*, and placed them under *Miltochrista* (*Barsine*). He also studied the male genitalia of *gratiosa* and gave characters, and compared with those of other species, viz., *orientalis* Daniel (1951), *obsoleta* Reich, *striata* (Bremer) and *pulchra* (Butler). For further details a reference be made to Daniel (1951 and 1952).

53. *Miltochrista prominens* (Moore)

1878. *Lyclene prominens* Moore, *Proc. zool. Soc. Lond.* : 31, pl. III, fig. 3 (*Type loc.*—Cherrapunji)

Material examined.—Arunachal Pradesh : Siang Dist., Kambang, 200m., 1 ♀, 15.x.1966 (*S. K. Tandon* and *G. S. Arora* Coll.).

Wing expanse.—24 mm.

Distribution.—INDIA (Sikkim ; Meghalaya, Cherrapunji ; and Arunachal Pradesh).

Remarks.—This species is characterised by the wings being pale yellow, unlike all the other preceding species hitherto referred, and is closer to *M. magna* Hampson where the wings are, however, sulphur yellow ; the veins beyond postmedial area in fore wings and subterminal area in hind wing streaked with black (vs. not streaked with black in *magna*) ; a spot present at base, a few spots in a series at subbasal and antemedial areas ; medial line complete (vs. not complete in *magna*) ; a series of points at postmedial line (vs. well developed spots in *magna*).

54. **Miltochrista magna** Hampson
(Plate IV, fig. 29)

1894. *Miltochrista magna* Hampson, *Fauna Br. India, Moths*, 2 : 112 (*Type loc.* —Manipur)

Material examined.—Arunachal Pradesh : Subansiri Dist., Didi Camp, 1128 m., 1 ♀, 22.v.1966 (A. N. T. Joseph Coll.) ; Siang Dist., Kambang, 200 m., 2 ♀ ♀, 15.x.1966 (S. K. Tandon and G. S. Arora Coll.).

Wing expanse.—44—46 mm.

Distribution.—INDIA (Manipur ; and Arunachal Pradesh).

Remarks.—Like preceding species, this is devoid of any orange or reddish tinge on body and wings ; fore wings sulphur-yellow and hind wings pale-yellowish ; abdomen pale yellow at base, dark at the distal end. For other affinities and differences see *prominens* (Moore).

Genus **Oeonistis** Hübner

1827. *Oeonistis* Hübner, *Verz. bek. Schmett.* : 165.

Type.—*Phalaena entella* Cramer

Remarks.—Strand (1922) recorded four species under this genus, out of which only one, i.e., *entella* (Cramer) was hitherto known to occur in India, and also in Sri Lanka, Java and S. China (Formosa). To this, Daniel (1952) added two more species, viz., *quadra* (Linn.) and *subcosteola* Druce, but Strand (*loc. cit.*) treated these under the genus *Lithosia* Fabr.

The genus is characterised by the antennae, in male, being shortly pectinate, the tip serrate ; tibiae with the spurs moderate. Ocelli present. Fore wing long and narrow ; veins R_1 - R_2 arising free ; R_3 - R_5 stalked ; M_1 from upper angle ; M_2 - M_3 from angle ; Cu_{1a} from before angle ; Cu_{1b} from near

middle of cell. Hind wing with veins Rs-M₁ connate or slightly stalked ; M₂-M₃ slightly stalked ; Cu_{1a} close to angle ; Cu_{1b} before the angle.

Only one species is dealt with here.

55. *Oeonistis entella* (Cramer)

(Plate IV, figs. 30, 30a)

1779. *Phalaena entella* Cramer, *Pap. Exot.*, 3 : 27, pl. 208, fig. D.

Material examined.—Arunachal Pradesh : Tirap Dist., Deomali, 1 ♂, 1 ♀, 9,12.xi.1971 (G. S. Arora Coll.).

Wing expanse.—Male, 38 mm ; female, 44 mm.

Distribution.—INDIA (Arunachal Pradesh ; Maharashtra, Bombay ; Tamil Nadu, Nilgiris) ; S. CHINA (Formosa) ; SRI LANKA ; and INDONESIA (Java).

Remarks.—Hampson (1900) referred to two subspecies, viz., *delic* Fabr. with distribution in Borneo, Sarawak, New Hebrides, N. Australia, Queensland, etc., and *ceramensis* from Ceram. The present material is referable to the nominate form which is known to occur in Bombay and Tamil Nadu in India. The present record from N. E. India is of zoogeographic interest.

The species is characterised by the costa, the medial and postmedial bands being metallic green, the medial band expanding below cell towards base and the postmedial expanding below M₁ towards the terminal margin.

III. SUMMARY

The paper deals with 55 species of 26 genera in six subfamilies of Arctiidae collected mainly from Arunachal Pradesh. Besides being the first specific account of the family Arctiidae from this State, the studies propose a new name *Strysopha* to replace '*Systropha* Hübner' (a junior homonym of *Systropha* Illiger 1906), bring to light four species, viz., *Garudinia biplagiata* Hampson ; *Tigrioides leucanioides* (Walker) ; *Strysopha perdentata* (Druce) ; and *Teulisna plagiata* Walker as new to India ; and two, viz., *Rhodogastria astreus* (Drury) and *Oeonistis entella* (Cramer) as new to the north-eastern region as a whole. *Teulisna* Walker is re-established to include two species from Arunachal Pradesh ; and *tortricoides* (Walker) and *perdentata* (Druce) are newly combined with *Strysopha*.

The studies also reveal the presence of ocelli in certain Lithosiinae species where these were believed to be completely absent, particularly in the following genera ; *Tigrioides*, *Chrysorabdia*, *Oeonistis*, *Agylla* and *Agrisius*,

Daniel (1943, 1951, 1952, and 1954) while working on the eastern Asian fauna of Arctiidae, dealt with genitalic structures that proved to be useful in identifying the Indian fauna. The genitalic characters particularly in *Eilema* and allied genera, have been given here to clear certain doubts in identity of species as well as genera.

Keys to species as well as genera have been adapted mainly from Hampson (1900, 1901) to facilitate their identification.

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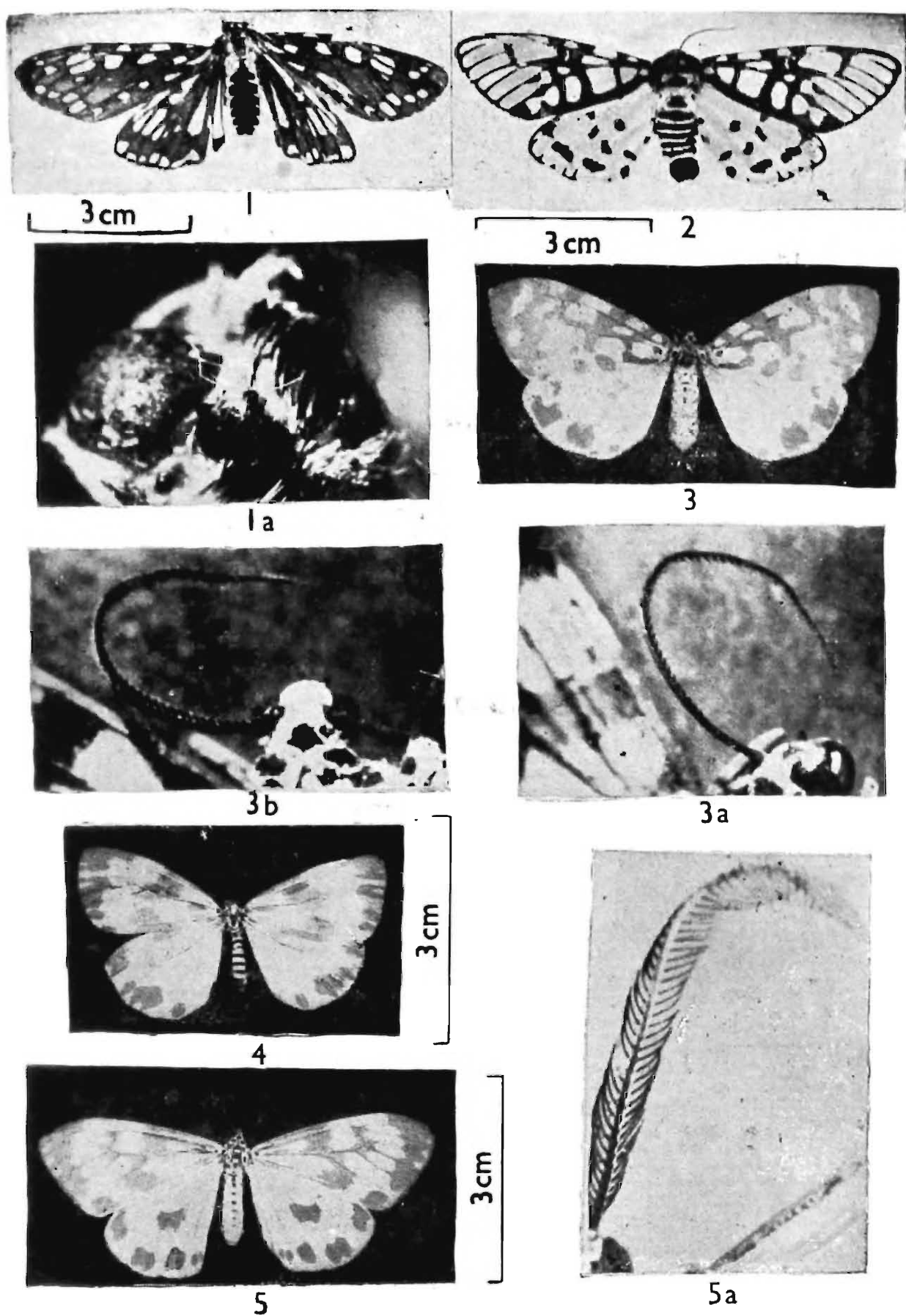


Plate I

1. *Callimorpha principalis* (Kollar) : Female. 1a. Head of the same enlarged to show an ocellus. 2. *Callimorpha plagiata* (Walker) : Female. 3. *Nyctemera varians* Walker : Female. 3a. Head of the same enlarged to show antennae. 3b. Head of the male of *N. varians* enlarged to show antennal pectination. 4. *N. cenis* (Cramer) : Female. 5. *N. adversata* (Schaller) : Female. 5a. Antennae of the male of *N. adversata*, enlarged.

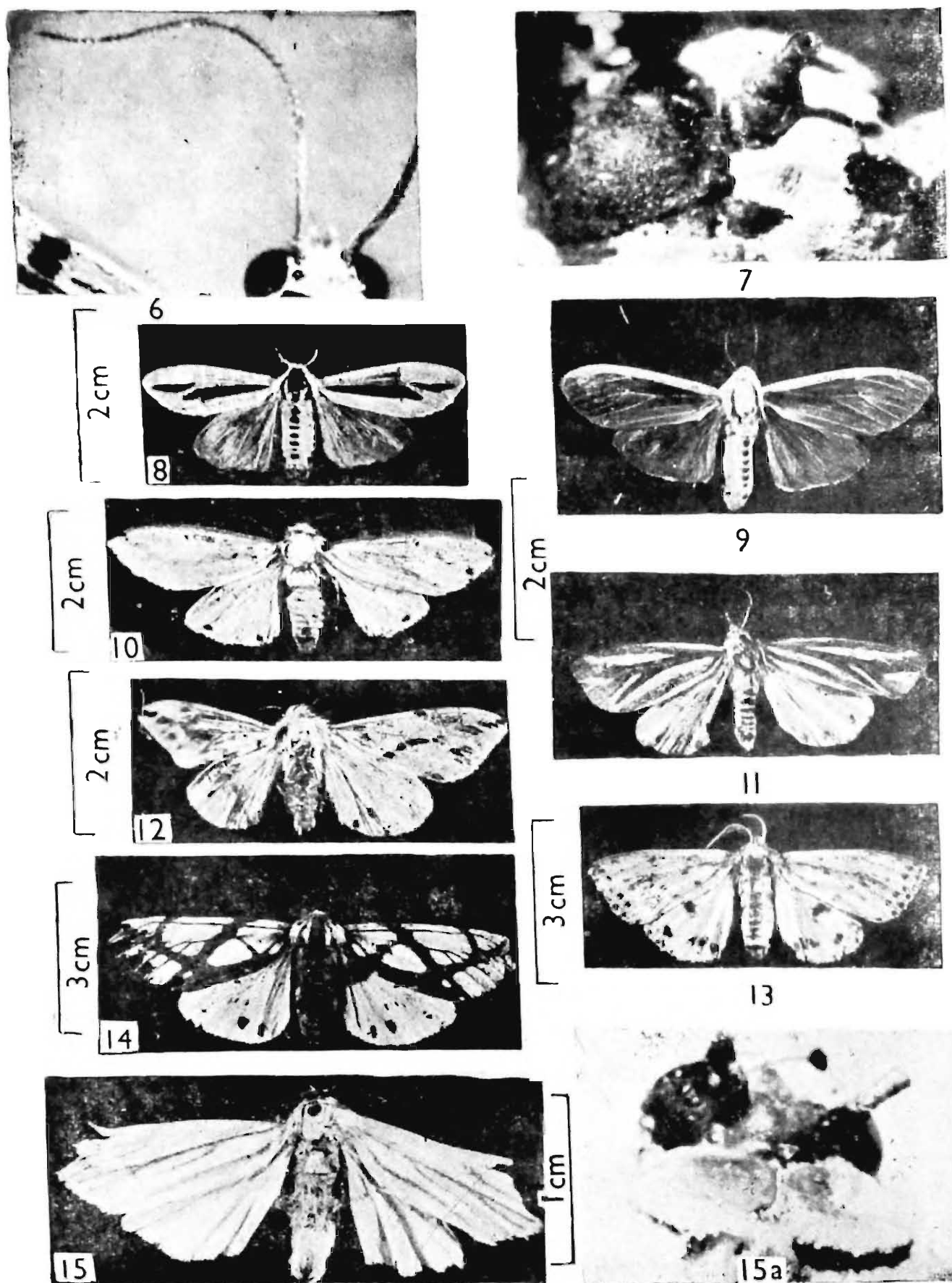


Plate II

6. Head of the male of *Argina cribraria* (Clerck) enlarged to show antennae and ocellus. 7. Head of the male of *Rhodogastria astreus* (Drury) enlarged to show ocellus. 8. *Cretonotos gangis* (Linn.): Male. 9. *Phissamu transiens* (Walker): Male. 10. *Aloa lactinea* (Cramer): Male. 11. *Alphaea quadriramosa* (Kollar): Male. 12. *Spilarctia obliqua* (Walker): Male. 13. *Spilarctia casigneta* (Kollar): Male. 14. *Area galactina* (Hoeven): Male. 15. *Tigrioides lencanioides* (Walker): Male. 15a. Head of the same species (15) enlarged, showing ocellus.

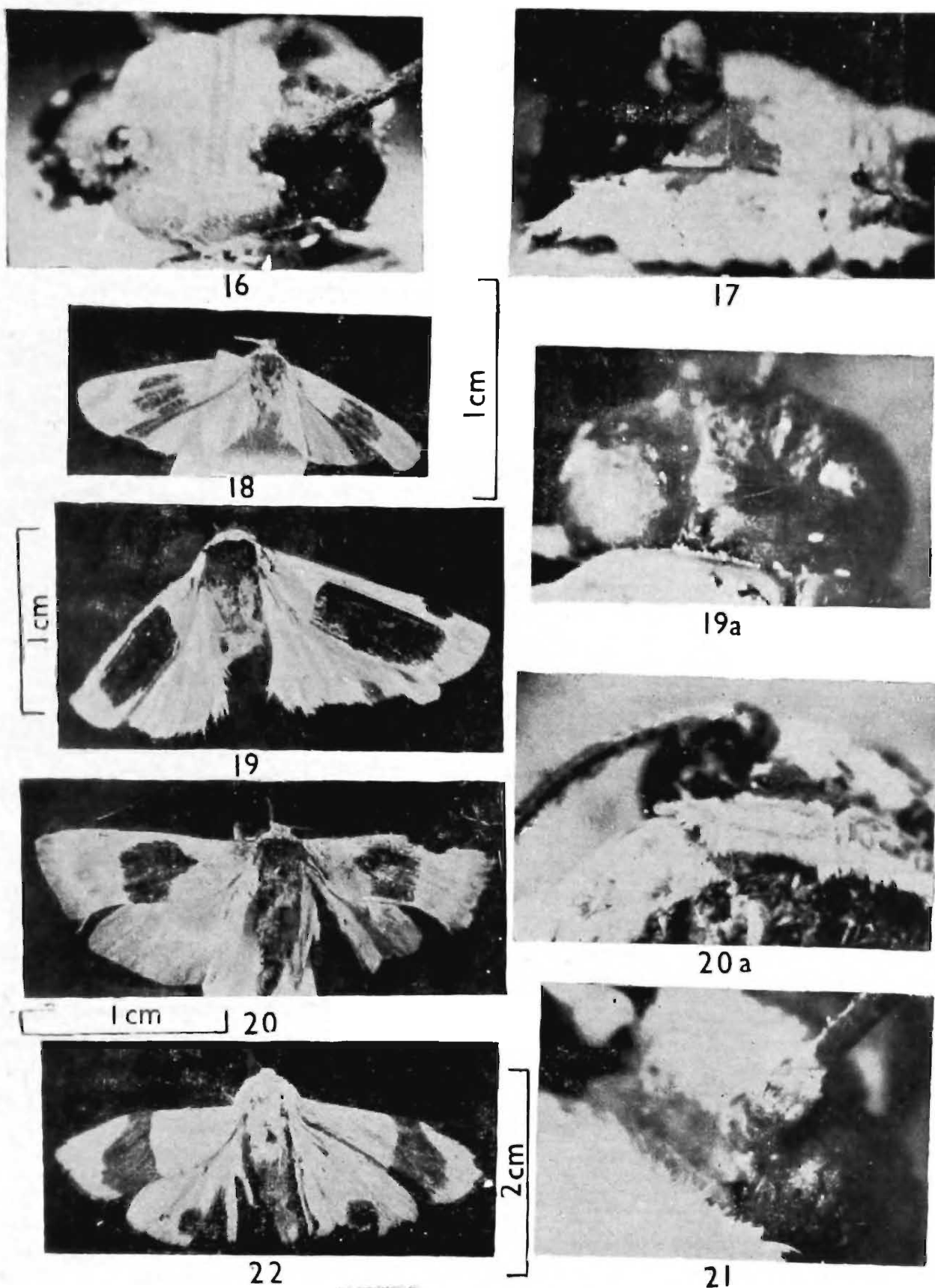


Plate III

16. Head of the female of *Chrysorabdia viridata* (Walker) enlarged to show ocellus. 17. Head of the female of *Eilema fumidisca* (Hampson) enlarged to show an ocellus. 18. *Eilema* sp. : Male. 19. *Eilema tetragona* (Walker) : Male. 19a. Head of the same enlarged to show ocellus. 20. *Teulisna plagiata* Walker : Male. 20a. Head of another ex. of the same species enlarged to show an ocellus. 21. Head of the male of *Agylla maculata* (Moore) enlarged to show ocellus. 22. *Agylla alboluteola* Rothschild : Male

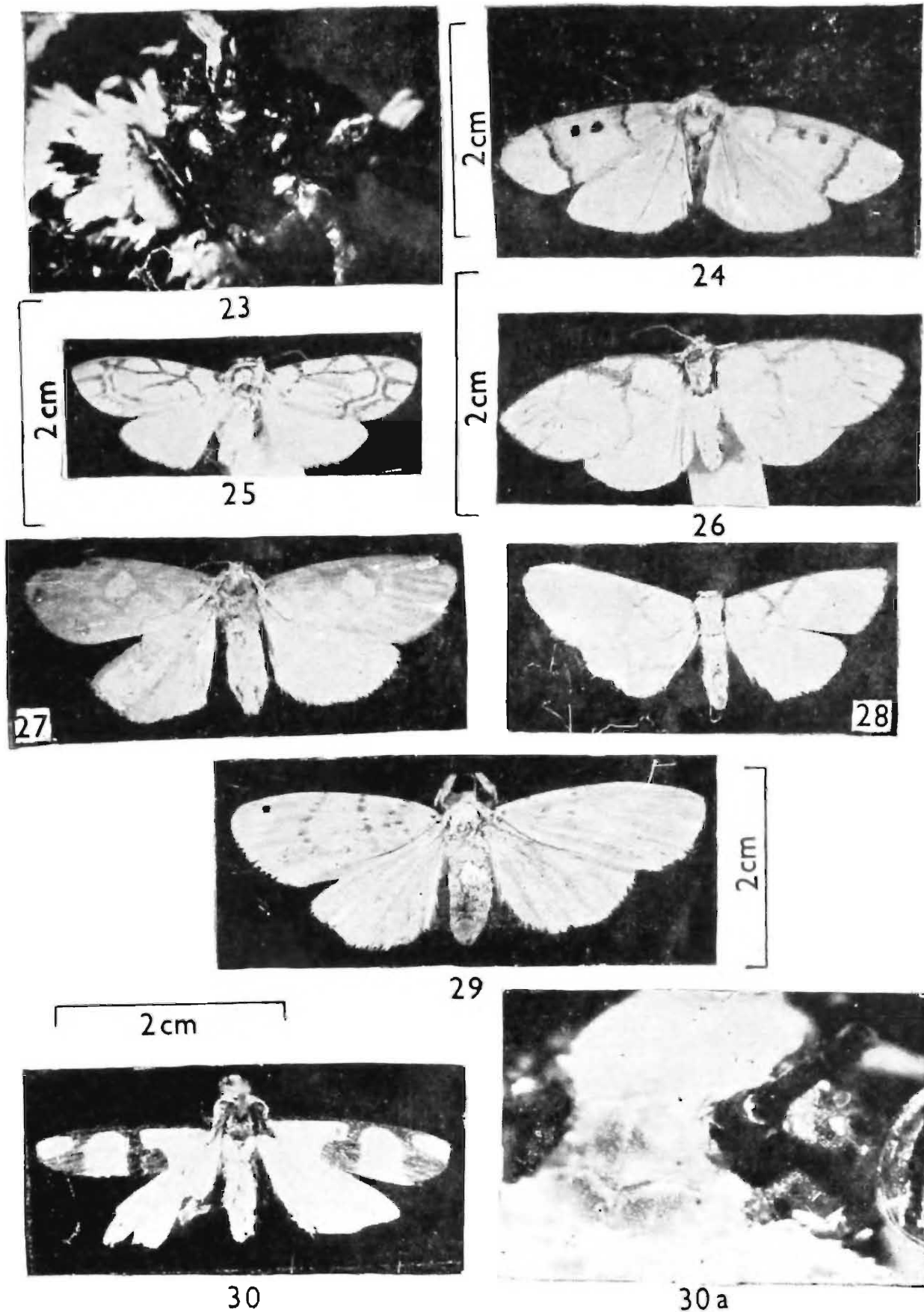


Plate IV

23. Head of the female of *Agrisius guttivitta* (Walker) enlarged to show an ocellus. 24. *Cyana bianca* (Walker) : Female. 25. *Asura euprepoides* (Walker) : Male. 26. *Mitochrista cruciata* (Walker) : Female. 27. *Mitochrista cuneonotata* (Walker) : Female. 28. *Mitochrista inflexa* (Moore) : Female. 29. *Mitochrista magna* Hampson : Female. 30. *Oeonistis entella* (Cramer) ; Male. 30a. Head of the same enlarged to show ocellus.