

A Revision of the Genus *Eubaphe* (Lepidoptera: Geometridae)

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(Text-figures 1-43; Plates I & II, Figures 44-63)

IN the course of examining a number of genitalia preparations of male specimens of the larentiid genus *Eudule* it became apparent that the genus, as at present understood, contained species belonging to three distinct groups, which can be conveniently referred to the following three available genera; *Eudule*, *Eudulophasia* and *Eubaphe*. Examination of the genitalia of the females confirmed this division. The characters of the three genera are set out in the present paper, together with a revision of the species included in the genus *Eubaphe*.

EUDULE Hübner

Eudule Hübner, 1823, Zuträge z. exot. Schmett., 2:14.

Type species: *Eudule pulchricolora* Hübner.

Mennis Walker, 1854, List Lep. Ins. B. M., 2:379.

Type species: *Mennis orislinea* Walker.

Diplochroa Herrich-Schäffer, 1856, Samml. ausereurop. Schmett., 1:33, 50.

Type species: *Diplochroa bicentraria* Herrich-Schäffer.

Polyomma Staudinger, 1894, Iris, 7:98.

Type species: *Polyomma phlaearia* Staudinger.

The male genitalia of *Eudule* are characterized by a concave saccus and a strongly sclerotized arched uncus, the broad apex of which is sometimes incised; the costal margin of the valve has a strongly sclerotized arm arising from the base; the distal margin is also sclerotized and is sometimes produced beyond the apex of the valve. The aedeagus is stout and shorter in length than the valve and the vesica bears strongly sclerotized cornuti. The eighth sternum is weakly sclerotized and bears a pair of deciduous hair-tufts. In the genitalia of those females so far examined, the ostium bursae is strongly sclerotized and wrinkled and the ductus bursae is often extremely short.

Superficially *Eudule* falls into two sections. One, listed below as typical *Eudule*, has the costa

of the forewing considerably longer than the inner margin and in the male the abdomen is long, projecting beyond the anal angle of the hindwing. In the section for which the name *Polyomma* is available, the costa and the inner margin are almost equal in length and the abdomen in the male does not project beyond the anal angle of the hindwing.

SECTION *Eudule*

trichoptera Perty, 1833

hesperina Burmeister, 1878 (part)

costata Warren, 1897

schausi Dognin, 1922

venata Schaus, 1892

strigilis Druce, 1896

sororcula Schaus, 1929

allegra Schaus, 1929

una Schaus, 1892

striata Druce, 1898

amica Druce, 1898

rufithorax Warren, 1905

pulchricolora Hübner, 1823

semele Burmeister, 1878. Syn. nov.

plurinotata Warren, 1905.

orislinea Walker, 1854

bimacula Walker, 1854

bicentraria Herrich-Schäffer, 1856

aperta Warren, 1901

halia Druce, 1885

retroacta Prout, 1934

herona Druce, 1885

atrimorsa Dognin, 1902

parca Warren, 1906

hagno Druce, 1885

ficulnea Druce, 1885

f. *albifera* Prout, 1918

fidentia Druce, 1885

limbata Burmeister, 1878

cytherea Schaus, 1892

sceata Schaus, 1892

orilochia Druce, 1885

austria Maassen, 1890

ithrites Druce, 1901

malefida Warren, 1904

simulans Warren, 1904

basipuncta Warren, 1906
annuligera Warren, 1905
arctiata Warren, 1904
leopardina Druce, 1896

SECTION *Polyomma*

ficaria Druce, 1885
 f. *semirubra* Dognin, 1902
pyristacta Prout, 1929
ockendeni Warren, 1907
phlaearia Staudinger, 1894
flavinota Warren, 1904
 f. *nigrata* Warren, 1905
venitorta Dognin, 1910
lucigerata Walker, 1863
ambiguata Snellen, 1874
aluta Felder, 1875
reversa Dognin, 1913
albata Warren, 1897
costigutta Dognin, 1911
aperta Dognin, 1913
secticolor Prout, 1931

EUDULOPHASIA Warren

Eudulophasia Warren, 1897, Novit. zool., 4: 456.
 Type species: *Ameria invaria* Walker.

The genus *Eudulophasia* differs from *Eudule* in having an evenly rounded saccus and a long tapered uncus. The sclerotized arm arises from half way along the costal margin and not from the base and the distal margin of the valve is membranous. The aedeagus is slender and shorter in length than the valve and the vesica is weakly ornamented. The eighth sternum bears a pair of broad-based and apically tapered rods. In the female genitalia the ostium bursae is weak; the membranous ductus bursae is long and slender and the bursa copulatrix is ornamented with minute teeth.

The species in the genus are short bodied and in color capucine orange to orange chrome with a slender black margin to both wings, the single exception being *heterochroa* Felder, which has uniformly black hindwings. Listed below is a provisional arrangement of the species referred to *Eudulophasia*.

invaria Walker, 1854
moeschleri Kirby, 1892
aurora Burmeister, 1878
nigricosta H. Edwards, 1884
circumducta Warren, 1900
 f. *laticostata* Warren, 1905
sanguinea Butler, 1877
sicelides Druce, 1885
heterochroa Felder, 1875
seminigra Warren, 1904

EUBAPHE Hübner

Eubaphe Hübner, 1823, Zuträge z. exot. Schmett., 2:20.

Type species: *Eubaphe lobula* Hübner.

Ameria Walker, 1854, List Lep. Ins. B. M., 2:554.
 Type species: *Ameria conformis* Walker.

Euphanessa Packard, 1864, Proc. ent. Soc. Philadelphia, 3:102.

Type species: *Nudaria mendica* Walker.

Leptidule Butler, 1877, Trans. ent. Soc. Lond., 10:368, pl. 8:11.

Type species: *Ameria integra* Walker.

In *Eubaphe* the male genitalia have a broadly rounded saccus and a weak, arched uncus; socii are sometimes present. The costal margin of the valve is developed as in *Eudulophasia*; the distal margin is membranous and often incised at or about midway. The aedeagus is slender and greater in length than the valve. The seventh and eighth sterna are strongly developed; the seventh sternum consists of a pair of sclerotized rods, the anterior halves usually fused and the posterior halves angled or bowed outwards and connected by slender membranes or fused to the two processes on the eighth sternum, which are broad-based and tapered posteriorly. In most species there is a pair of hair-tufts, which are secreted within the body wall and are extrusile just beyond the posterior edge of the sixth sternum. In most of the species also, the fifth and sixth sterna each bears a slender rod-like process, which arises internally from the center of the anterior edge and extends anteriorly, that from the sixth sternum being longer.

The species included in the genus *Eubaphe* fall into three sections. In the male genitalia of Section A the distal margin of the valve is not incised, the sclerotized processes on the seventh and eighth sterna are fused, neither the fifth nor the sixth sternum bears a process on its anterior edge and the socii are wanting; in the female genitalia the ductus bursae is strongly sclerotized and is at least as long as the diameter of the bursa copulatrix, which is globular and spined but not sclerotized. To this section belong the species *rhotana*, *eulathes*, *lineata*, *helveta*, *pauper*, *bada*, *daxata* and *tripunctata*.

In Section B the males differ from those of the preceding section in the sclerotized processes of the seventh and eighth sterna, which are hinged and not fused; the distal margin of the valve may be simple or incised; socii are present in *conformis* only. The females of the section are characterized by the strongly developed processes on the ostium bursae; the bursa copulatrix is longer than broad, partially sclerotized and heavily ornamented with spines. To this section belong the species *meridiana*, *mendica*, *pumilata*, *unicolor* and *conformis*.

In the male genitalia of Section C the distal margin of the valve is incised, socii are present in all species except *weyenberghii*, the sclerotized processes on the seventh and eighth sterna are hinged, except in *orfilai*, and the anterior of the fifth and sixth sterna bear slender rod-

like processes. In the female the ductus bursae is strongly sclerotized but simple; the bursa copulatrix varies in shape, is sclerotized in part and heavily ornamented with spines. To this section belong the species *deceptata*, *fieldi*, *cupraria*, *hesperina*, *integra*, *orfilai*, *weyenberghii*, *aetes*, *medea* and *lobula*.

In superficial appearance, too, the genus *Eubaphe* appears to form a natural group; the ground color of the wings in all but five species is orange buff to capucine orange, that of the exceptions being white to pale straw. Six species, distributed through the three sections of the genus, are patterned with hyaline spots; five species have a small amount of black marking, principally on the veins, and the remaining species are unpatterned, except the males of four species, which have sex marks on the wings.

The neuration of the species in the genus is somewhat variable and Text-fig. 1 shows that of *Eubaphe mendica*, which is common to twenty of the twenty-three species and also common to the type species of the other two genera, *Eudule* and *Eudulophasia*. The three exceptions to this pattern are *lobula*, in which vein *Sc*1 of the forewing arises from close to the distal angle of the areole, near the stalk of veins *Sc*2-5; *medea*, in which vein *Sc*2 of the forewing arises from three-quarters of the upper surface of the areole; and the third is *integra*, in which veins *Sc* and *M*1 of the hindwing arise separately from the cell.

The structure of the antennae, palpi and legs appears to be identical in all three genera.

Eubaphe is most richly represented in Central America, where over half the known species occur. The distribution of the genus extends southward to Paraguay and the Argentine, eastward to Cuba and northward into the United States and southern Canada.

The name *Eubaphe* has hitherto been widely used in the subfamily Arctiinae, but when the genus was first published it was monobasic, containing the single species *Eubaphe lobula* Hübner; *Eubaphe aurantiaca* Hübner, which is usually cited as the type species, was not added to the genus until a later date (1827-1831, Zuträge z. exot. Schmett., 3:9). The next valid name to replace *Eubaphe* in the Arctiinae appears to be *Holomelina* (Herrich-Schäffer, 1856, Samml. aussereurop. Schmett., 1:15, 17), the type species of which is *Eubaphe aurantiaca* Hübner.

The color names used are taken from Ridgway's "Color Standards and Color Nomenclature," the sole exceptions being those quoted from original descriptions.

The magnification of the figures of the terminal sterna is $\times 28$; that of the aedeagi is $\times 42$.

I should like here to express my thanks to Dr. Orfila of the Argentine Museum of Natural History for photographs of the Burmeister types and for the loan of the abdomens of the types; also to Mr. W. D. Field of the United States National Museum for his ready help in comparing British Museum material with the types of the Dognin, Schaus, Dyar and Warren species in that institution.

SECTION A

EUBAPHE RHOTANA (Druce)

(Text-figs. 5 & 11; Plate fig. 46)

Eudule rhotana Druce, 1894. Ann. Mag. nat. Hist., (6) 13:178.

Eudule rhotana Druce, 1897. Biol. Cent. Amer., Zool., Lep. Het., 2:403, pl. 78:18.

Palpi, antennae and legs, except mid and hind coxae, fuscous. Head, thorax, abdomen, mid and hind coxae pale maize yellow. Wings semi-hyaline, pale maize yellow; the costa, distal and inner margins orange buff; the veins on both wings are finely marked with fuscous.

Genitalia. Male.—Uncus evenly rounded; socii wanting. Distal edge of valve evenly curved to a rounded apex. Apex of aedeagus lightly scobinate; basal third narrowed with the extremity rounded. There are no cornuti. The seventh and eighth sterna are as shown in the figure.

Female.—Ductus bursae strongly sclerotized, the posterior edge deeply concave; it is ribbed longitudinally, narrowed anteriorly and is slightly longer than the diameter of the bursa copulatrix, which is globular and membranous with three signa, each a cluster of spines narrowly connected by a slender band of spines. The whole ornamentation extends for two-thirds of the longitudinal circumference.

The type is in the British Museum.

Distribution.—Mexico, Guerrero.

EUBAPHE EULATHES (Dyar)

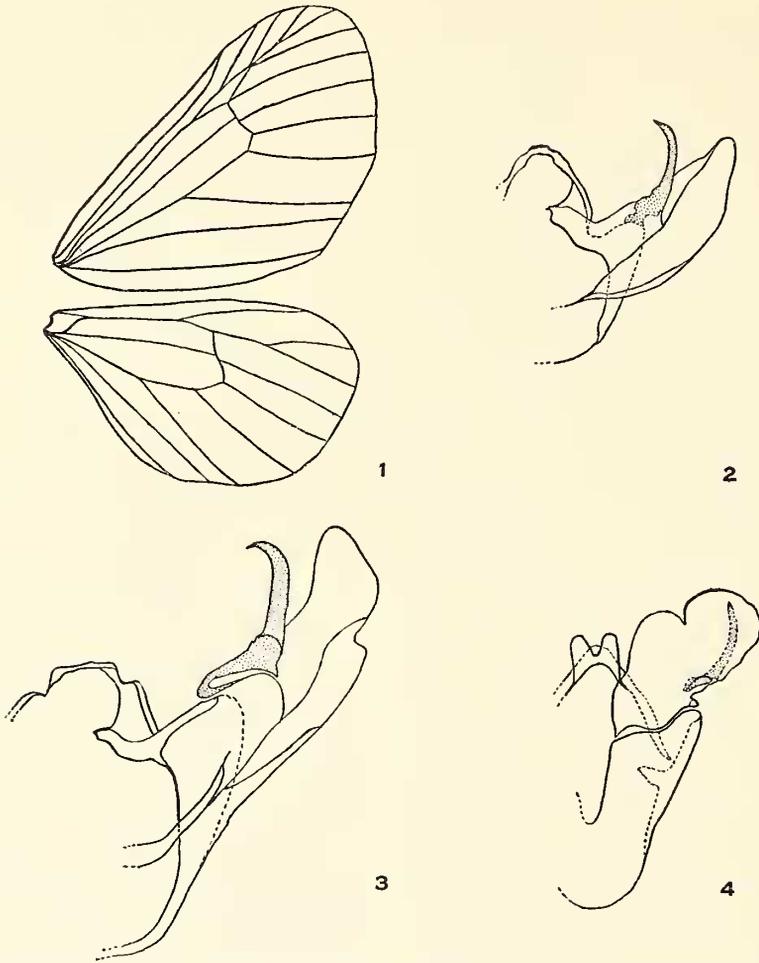
(Text-figs. 7 & 12; Plate fig. 44)

Eudule eulathes Dyar, 1920, Insec. Inscit. menstr., 8:195.

"White; costa brownish yellow from base to end of cell; veins on both wings narrowly lined in black, less distinctly on hind wings. Expanse 25 mm."

Genitalia. Male.—Differs from *rhotana*, to which it is closely related, in the shape of the seventh and eighth sterna, as will be seen from the figure; it differs also in the aedeagus, which is narrowed at one-half instead of one-third and is lightly sclerotized and ribbed apicad.

Female.—Differs from *rhotana* in the shape of the posterior edge of the ductus bursae, which is broadly and very shallowly v-shaped.



TEXT-FIGS. 1-4. 1. *Eubaphe mendica*, Neuration. 2. *E. lineata*, Valve. 3. *E. mendica*, Valve. 4. *E. cupraria*, Valve.

The type is in the U. S. National Museum.

Distribution.—Mexico, Zacualpan.

EUBAPHE LINEATA (Druce)

(Text-figs. 2, 6, 13; Plate fig. 45)

Eudule lineata Druce, 1885, Biol. Cent. Amer., Zool., Lep. Het., 1:138, pl. 13:11.

Palpi, antennae and legs fuscous. Thorax and abdomen orange buff to capucine orange. Wings capucine orange to pale pinkish-buff; on the forewing the lower median, veins *M*1-3, *Cu*1-2 and *A*2 are strongly marked in fuscous; the tips of the radial veins are sometimes similarly marked.

Genitalia. Male.—Uncus narrowly arched; socii wanting. Distal margin of valve evenly curved to a narrowly rounded apex. Aedeagus with two small scobinate patches, one ventrad and the other dorsad of the apex. Vesica with two cornuti; one is slender and tapered with a

fold basad and is one-half as long as the aedeagus; the second is short, stout and weakly sclerotized and equal in length to the width of the aedeagus. Seventh and eighth sterna as shown in the figure.

Female.—Ductus bursae strongly sclerotized, ribbed longitudinally and narrowed anteriorly; it is equal in length to the diameter of the bursa copulatrix, which is membranous with a band of spining, extending laterally for two-thirds of the circumference, connecting the two signa, each of which is a cluster of spines.

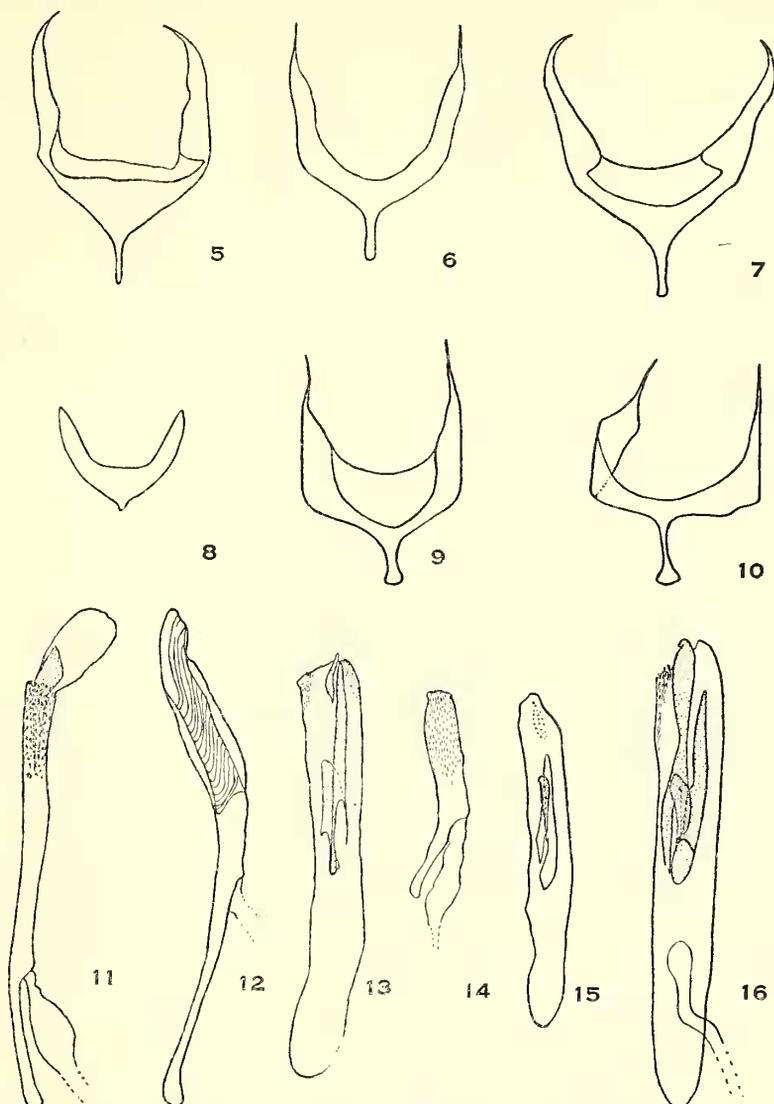
The type is in the British Museum.

Distribution.—Guatemala, Calderas, Quiche Mtns. and Totonicapam.

EUBAPHE HELVETA (Barnes & McDunnough)

(Text-figs. 8, 14)

Eudula helveta Barnes & McDunnough, 1907, Canad. Ent., 39:98.



TEXT-FIGS. 5-16. 5. *E. rhotana*, Terminal sterna. 6. *E. lineata*, Terminal sterna. 7. *E. eulathes*, Terminal sterna. 8. *E. helveta*, Terminal sterna. 9. *E. pauper*, Terminal sterna. 10. *E. tripunctata*, Terminal sterna. 11. *E. rhotana*, Aedeagus. 12. *E. eulathes*, Aedeagus. 13. *E. lineata*, Aedeagus. 14. *E. helveta*, Aedeagus. 15. *E. pauper*, Aedeagus. 16. *E. tripunctata*, Aedeagus.

Eudule helveta Barnes & McDunnough, 1912, Contrib. nat. Hist. Lep. N. Amer., 1(4):31, pl. 14:9.

Closely related to *bada* Druce but differing in the color and pattern; *bada* is capucine orange and *helveta* is orange buff; the antemedial spots and the postmedial fascia in *bada* are little broader than the width of the abdomen; in *helveta* the corresponding markings are at least twice as broad.

Genitalia. Male.—Uncus arched; socii wanting. Valve slender, not incised, the apex narrowly rounded. Costal process arising from the

valve at one-third, slender and tapered. Aedeagus lightly scobinate at apex; the width of the basal third is reduced to one-half of that of the remainder. There are no cornuti. The terminal sterna are as shown in the figure.

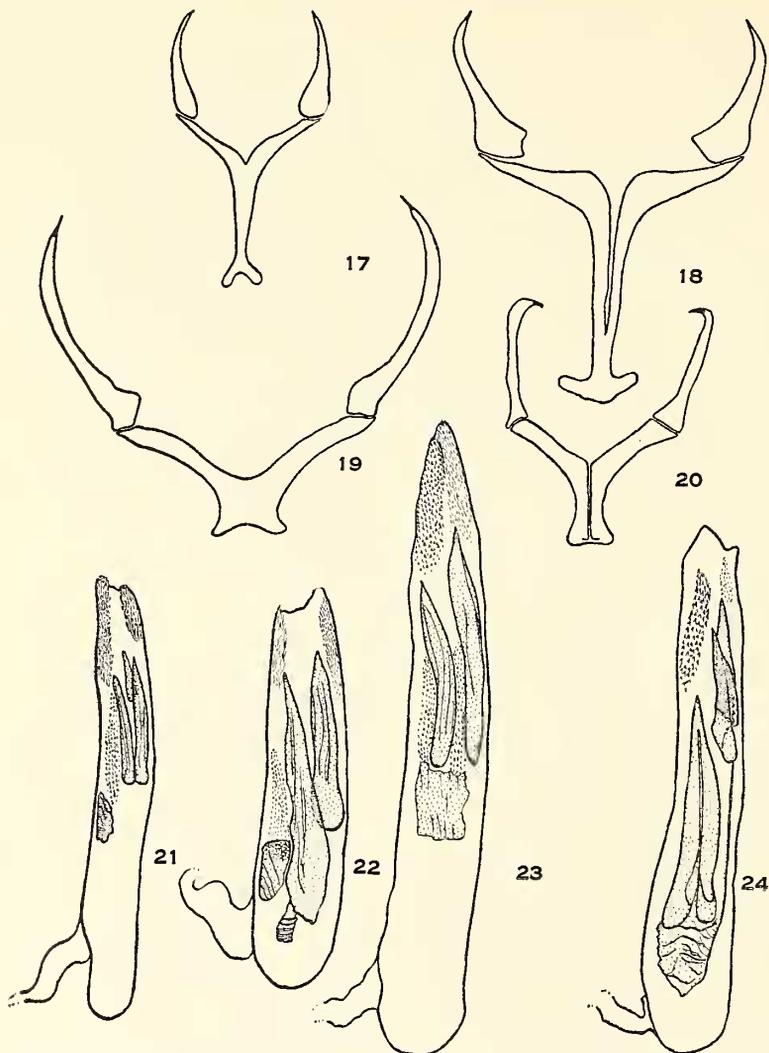
I have so far seen only males of this species. The type is in the U. S. National Museum.

Distribution.—Texas.

EUBAPHE PAUPER (Schaus)

(Text-figs. 9, 15)

Euphanessa pauper Schaus, 1889, Ent. Amer., 5:192.



TEXT-FIGS. 17-24. 17. *E. meridiana*, Terminal sterna. 18. *E. mendica*, Terminal sterna. 19. *E. conformis*, Terminal sterna. 20. *E. unicolor*, Terminal sterna. 21. *E. meridiana*, Aedeagus. 22. *E. unicolor*, Aedeagus. 23. *E. mendica*, Aedeagus. 24. *E. conformis*, Aedeagus.

Euphanessa pauper Druce, 1897, Biol. Cent. Amer., Zool., Lep. Het., 2:403, pl. 78:20.

♂ 28 mm. Considerably larger than *bada* Druce, which has a wingspan of only 21 mm; similar in color and pattern, but the latter is more clearly defined in *pauper* than in *bada*.

Genitalia.—Similar to those of *tripunctata* Druce but differing in the vesica, which bears three weakly sclerotized cornuti, one one-half and two one-quarter as long as the aedeagus. The seventh and eighth sterna are as shown in the figure. I have so far seen only males of this species.

In view of the extensive speciation of *Eubaphe* in Central and South America, it

might be better, until more material is available for study, to regard *pauper* and *bada* as distinct species rather than follow the synonymy of Druce.

The type is in the U. S. National Museum.

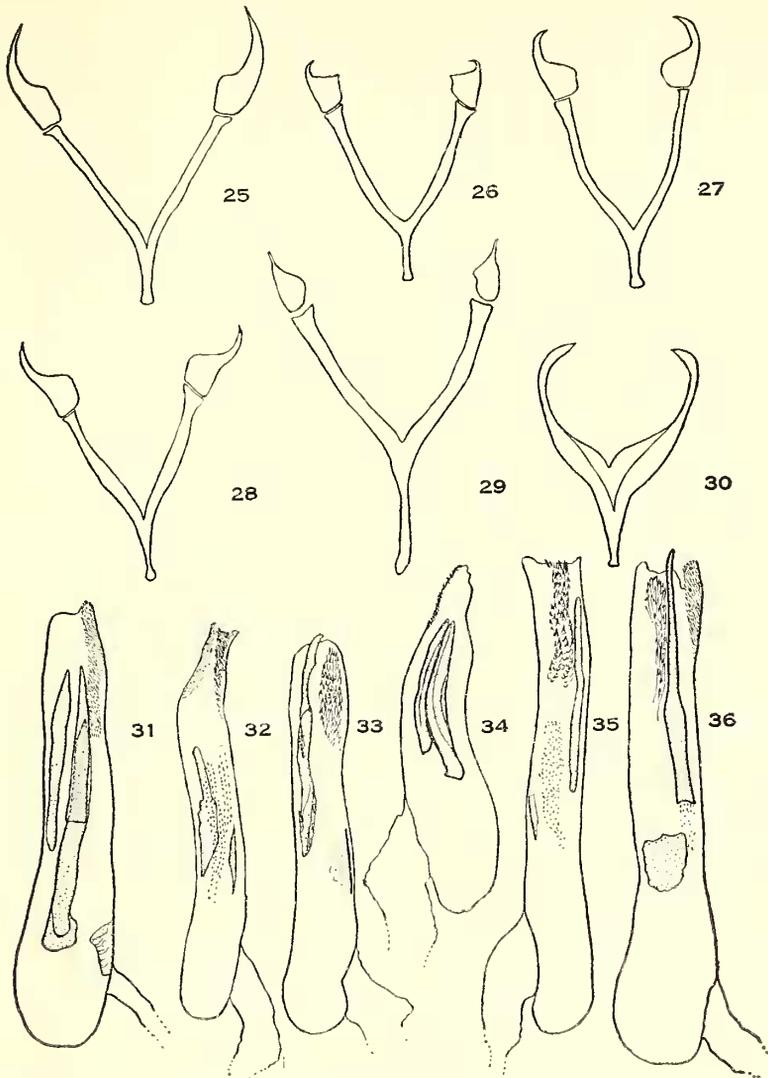
Distribution.—Mexico, Vera Cruz and Hidalgo.

EUBAPHE BADA (Druce)

(Plate fig. 50)

Eudule bada Druce, 1890, Ann. Mag. nat. Hist., (6) 5:215.

♀ 21 mm. Antennae fuscous. Head, thorax and abdomen orange buff. Wings orange buff, slightly hyaline. On the forewing there are two



TEXT-FIGS. 25-36. 25. *E. deceptata*, Terminal sterna. 26. *E. cupraria*, Terminal sterna. 27. *E. fieldi*, Terminal sterna. 28. *E. hesperina*, Terminal sterna. 29. *E. integra*, Terminal sterna. 30. *E. orfilai*, Terminal sterna. 31. *E. deceptata*, Aedeagus. 32. *E. fieldi*, Aedeagus. 33. *E. cupraria*, Aedeagus. 34. *E. orfilai*, Aedeagus. 35. *E. integra*, Aedeagus. 36. *E. hesperina*, Aedeagus.

large, dark antemedial spots, separated by the lower median vein; there is also a broad, dark postmedial fascia extending from just below the costa to vein *A*2, with two distal projections, one along vein *M*1 and the other between veins *M*3 and *Cu*1.

Genitalia.—Ductus bursae strongly sclerotized, bilobed posteriorly and tapered anteriorly to a little more than one-third of the posterior width. Bursa copulatrix ovate and membranous with a narrow band of spines extending half way round the circumference.

Of this species I have seen only the unique

female type, which is in the British Museum.

Distribution.—Mexico, V. Ixtaccihuatl.

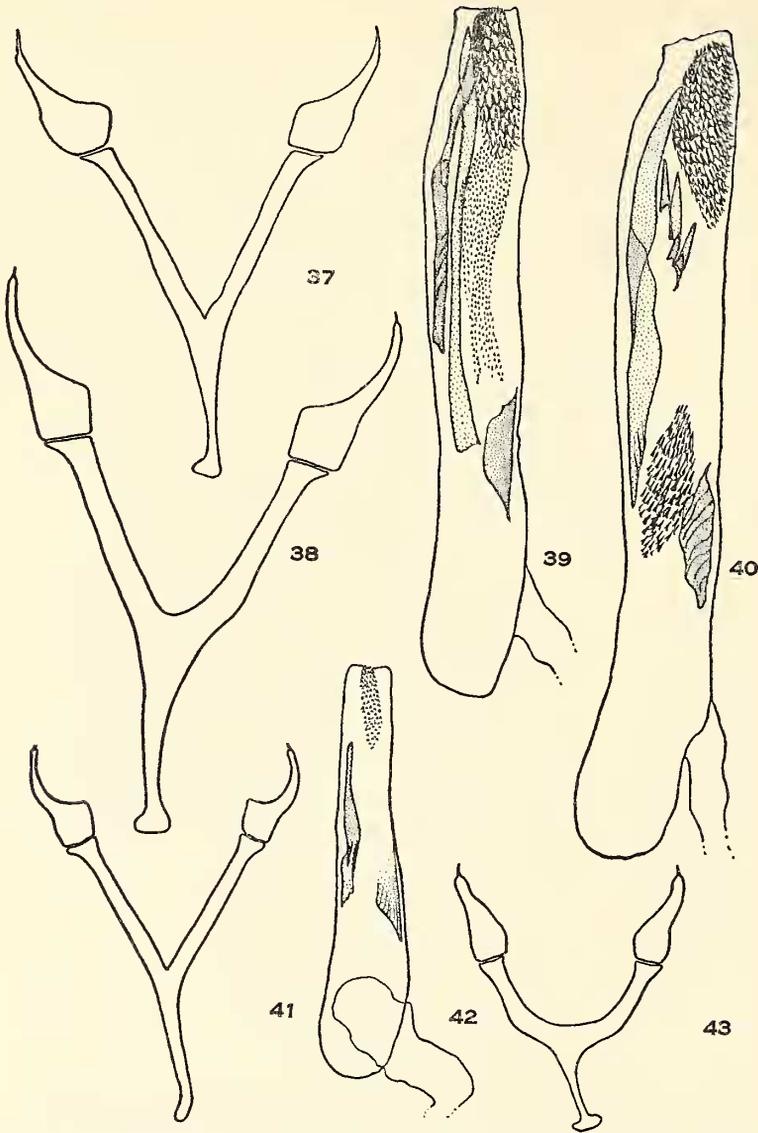
EUBAPHE DAXATA (Druce)

(Plate fig. 47)

Eudule daxata Druce, 1894, Ann. Mag. nat. Hist., (6) 13:177.

Eudule daxata Druce, 1897, Biol. Cent. Amer., Zool., Lep. Het., 2:403, pl. 78:17.

Similar in coloration to *tripunctata* Druce but differing in the black pattern of the forewing and in having the face black. The basal quarter of the costa is narrowly black with a small dot



TEXT-FIGS. 37-43. 37. *E. weyenberghii*, Terminal sterna. 38. *E. medea*, Terminal sterna. 39. *E. weyenberghii*, Aedeagus. 40. *E. medea*, Aedeagus. 41. *E. aetes*, Terminal sterna. 42. *E. lobula*, Aedeagus. 43. *E. lobula*, Terminal sterna.

at the inner extremity. A slender postmedial fascia extends from two-thirds of the costa to just beyond vein *Cu*2; it is outwardly bowed at the middle; the apical margin is similar to that of *tripunctata*. Vein *M*3 from the distal margin to the postmedial, the middle of the lower median vein and the basal half of vein *A*2 are broadly black.

Genitalia. Female.—Ductus bursae strongly sclerotized, almost twice as long as broad, anteriorly a little narrower than posteriorly; the posterior edge of the dorsal surface is bilobed.

The bursa copulatrix is almost globular and is membranous with three signa, each a cluster of small spines, along the lateral circumference connected by a band of minute spines.

Of this species I have seen only the unique female type, which is in the British Museum.

Distribution.—Mexico, Guerrero.

EUBAPHE TRIPUNCTATA (Druce)

(Text-figs. 10, 16; Plate fig. 49)

Eudule tripunctata Druce, 1885, Biol. Cent. Amer., Zool., Lep. Het., 1:138, pl. 13:10.

Palpi and antennae fuscous black; tibiae and tarsi fuscous. Head, thorax, abdomen and hindwing capucine orange. Forewing capucine orange with black markings. There is a minute black spot at the base of the costa and two larger costal spots, one at one-third and the other at two-thirds; there is a narrow marginal line from three-quarters costa round the apex to vein *M1*; vein *M3* is broadly outlined, the markings sometimes extending along the median.

Genitalia. Male.—Similar to *lineata* but differs in the aedeagus and the seventh and eighth sterna. The vesica bears two cornuti, each one-half as long as the aedeagus; one is tapered with a fold basad; the second has a hooked apex. The terminal sterna are as shown in the figure.

Female.—Ductus bursae strongly sclerotized, the dorsal surface produced as two lobes, their posterior edges truncate; it is two-and-a-half times as broad posteriorly as anteriorly and a little longer than the diameter of the bursa copulatrix, which is ovate and membranous with two signa, each a cluster of spines narrowly connected by a band of similar spines.

The type is in the British Museum.

Distribution.—Mexico, Jalapa and Las Vigas.

SECTION B

EUBAPHE MENDICA (Walker)

(Text-figs. 1, 3, 18, 23; Plate fig. 51)

Nudaria mendica Walker, 1854, List Lep. Ins. B. M., 2:576.

Eudule biseriata Herrich-Schäffer, 1855, Samml. aussereurop. Schmett., 1, pl. 76:441.

Antennae, head, thorax and abdomen straw yellow. Legs straw yellow, the femur of the foreleg and the fore- and mid-tibiae are striped longitudinally with fuscous. Wings slightly hyaline, usually straw yellow but sometimes rather paler and sometimes the margins are darkened to orange buff. The forewings are crossed by two transverse fasciae, which extend from just below the costa to the inner margin, an antemedial and a postmedial, each consisting of irregularly shaped fuscous spots lying between the veins. There is an additional fuscous subterminal spot between veins *M3* and *Cu1*.

Genitalia. Male.—Uncus broad and truncate; socii wanting. The apical quarter of the valve is two-thirds as broad as the remainder. The aedeagus has two lightly scobinate patches, one ventrad and one dorsad of the apex. The vesica bears two slender, tapered cornuti, each one-third as long as the aedeagus, and a small sclerotized patch basad of them. Terminal sterna as shown in the figure.

Female.—From the ostium bursae there

arise two large, weakly sclerotized processes, posteriorly as broad as the bursa copulatrix, the anterior two-thirds sharply tapered. Bursa copulatrix lightly sclerotized with considerable spining, as shown in the figure.

Of the early stages Forbes writes "larva on violet, also reared by McDunnough on maple; very slender, taking odd positions in life; smooth, green, dusted lightly with brown and marked on sides with red and white."

The type of *mendica* is in the British Museum; that of *biseriata* is not in the Herrich-Schäffer collection in the Zoological Museum, Berlin, and has not yet been located.

Distribution.—Canada, Br. Columbia and Ontario to Nova Scotia; United States of America.

EUBAPHE MERIDIANA (Slosson)

(Text-figs. 17, 21; Plate fig. 48)

Euphanessa meridiana Slosson, 1889, Ent. Amer., 5:7.

Similar in pattern to *mendica*; the spots comprising the transverse fasciae are much smaller and the extra subterminal spot is wanting. In coloration rather deeper toned than *mendica* and much smaller in size, the average wingspan being 20 mm whilst that of *mendica* is 30 mm.

Genitalia. Male.—Uncus broadly rounded. Valve much narrowed and tapered in apical third; apex narrowly rounded. Aedeagus with two lightly scobinate patches, one ventrad and one dorsad of the apex. The vesica bears three cornuti, all tapered spines; two are one-third and one is one-tenth as long as the aedeagus; in addition there is a small sclerotized patch midway along one side. The terminal sterna are as shown in the figure.

Female.—Ostium bursae bearing structures similar to those of *mendica* but they are less distended posteriorly and are evenly tapered anteriorly. The differences in the spining can be seen from the figures.

The holotype ♀ and the two paratypes ♂, labelled Florida, are in the American Museum of Natural History, New York.

Distribution.—Atlantic Coast of the United States of America, from New York to Florida.

EUBAPHE ROTUNDATA (Cassino & Swett)

Eudule rotundata Cassino & Swett, 1922, The Lepidopterist, 3:150.

"This new *Eudule* is readily distinguished from *helveta* Barnes and *meridiana* Slosson. The color of the superiors is gamboge, like the two species mentioned, being slightly darker on the costa. The inferiors are concolorous with the superiors. The superiors are rounded at the apex. The distance from the center of the costa

to the outer angle is much longer than in *helveta* and *meridiana*, giving the wings a short, stubby, rounded appearance. On the inferiors the length from the base to the center of the outer margin is about one-third more than from the outer angle to the middle of the costal edge. Thus the inferiors are more nearly rounded than in the other species in the genus.

"Head, thorax and antennae are concolorous with the base of the superiors; abdomen lighter. There are three small spots between the veins one-fourth in from the outer edge and one slightly larger spot in the cell. There is a small spot near the inner margin and nearer the base. There are slight indications of a fourth spot near the costa in line with the three spots parallel with the outer margin. The short rotundate appearance of the wings, as compared with the other species, easily distinguishes it.

"Expanse 20 mm."

The original description is quoted, for the species is not represented in the British Museum. The type, from St. George, Utah, is in the Museum of Comparative Zoology, Cambridge, Massachusetts.

EUBAPHE PUMILATA sp. nov.

(Plate fig. 54)

♀ 17-24 mm. Antennae, except basal segment, fore and mid-tibiae and tarsi fuscous; the remainder of the insect is uniformly orange buff.

Genitalia.—Ostium bursae with two serrated, tapered processes projecting posteriorly, each two-thirds as long as the bursa copulatrix, which is ovate with the spining as shown in the figure.

Holotype and 5 Paratypes, all ♀ and in the British Museum: Cuba, Holguin, (*H.S. Parish*).

EUBAPHE UNICOLOR (Robinson)

(Text-figs. 20, 22; Plate fig. 52)

Euphanessa unicolor Robinson, 1869, Ann. N. Yk. Lyceum nat. Hist., 9:153, pl. 1:2.

Eudule hyalina Hulst, 1898, Canad. Ent., 30:114.

♂♀ 22-28 mm. Larger in size than the preceding species but identical in coloration.

Genitalia. *Male*.—Uncus broad and truncate. Valve almost rectangular, three times as long as broad; a slender, tapered and apically incurved process arises from one-third of the costal margin and extends almost to the apex of the valve. Juxta one-and-one-half times as broad as the valve, slightly longer than broad. Aedeagus one-and-one-half times as long as the distal margin of the valve, with two small, scobinate patches, one dorsad and the other ventrad of the apex. The vesica bears two cornuti, each a stout, tapered spine, one two-thirds and one one-half as long as the aedeagus; basad

of the cornuti is a small sclerotized patch. The terminal sterna are as shown in the figure.

Female.—Ostium bursae with two smooth, tapered processes projecting posteriorly, each equal in length to two-thirds of the width of the bursa copulatrix, the posterior third of which is globular, sclerotized and spined half way round the circumference; the anterior two-thirds of the bursa copulatrix is a membranous sack with a sclerotized fold in the right side; the spining is as shown in the figure.

The type of *hyalina* is in the collection of Rutgers University, New Brunswick, New Jersey; that of *unicolor* has not yet been located.

Distribution.—Southern states of the United States of America; Mexico.

EUBAPHE UNICOLOR VENUSTATA subsp. nov.

♂♀ 30 mm. Larger than the nominotypical race and deeper in color, capucine orange replacing the orange buff. The depth and extent of the sclerotized fold in the bursa copulatrix in the female genitalia is one-half that of the nominotypical race; in other respects the genitalia of both sexes appear to be identical.

Holotype ♂ and Allotype ♀, both in the British Museum: Guatemala, Calderas, (*Champion*).

EUBAPHE CONFORMIS (Walker)

(Text-figs. 19, 24; Plate fig. 53)

Ameria conformis Walker, 1854, List Lep. Ins. B. M., 2:555.

Leptidule sulcifera Warren, 1906, Proc. U. S. Nat. Mus., 30:467. Syn. nov.

Leptidule dulcifera Forbes, 1917, J. N. Yk. ent. Soc., 25:57.

♂ 25-26 mm.; ♀ 26-30 mm. Antennae, except basal segment, and legs, except coxae, fuscous.

Male.—On the underside of the forewing, in the anterior distal quarter of the cell, is a fold, the inner surfaces covered with a dense pad of tawny scales. Remainder of insect orange buff. The upperside of the hindwing has several long hairs arising from the base of the wing and extending half way to the discocellulars. *Female*.—On the forewing there is a narrow fuscous marginal band commencing just distad of midcosta and extending round the apex to the tornus; the remainder of the insect is capucine orange.

Genitalia. *Male*.—The apex of the uncus is lunulate and broad; the socii are slender and equal in length to the width of the aedeagus. The valve is narrowed from both margins to form a waist at one-third; two processes arise from the costa; one from the base, which is short, stout and tipped with a cluster of spines and the second, which is slender, incurved and

tapered and arises just apicad of the first. The aedeagus has two scobinate patches, one ventrad and one dorsad of the apex. The vesica bears three cornuti, each a tapered spine; one is broad and stout and one-half as long as the aedeagus, the two others are more slender, one one-quarter and one one-fifth as long as the aedeagus; there is also a small sclerotized patch basad of the cornuti. The terminal sterna are as shown in the figure.

Female.—The ostium bursae bears two sclerotized processes, serrate-edged, tapered posteriorly and rounded anteriorly; two further processes, slender and tapered, project posteriorly, each one-half as long as the bursa copulatrix, which is almost rectangular, having the anterior fifth membranous and the remainder sclerotized. The spining is as shown in the figure.

The type of *conformis* is in the British Museum; that of *sulcifera* is in the United States National Museum.

Distribution.—Mexico, Jalapa, Orizaba and Vera Cruz; Guatemala, San Geronimo.

SECTION C

EUBAPHE DECEPTATA SP. NOV.

(Text-figs. 25, 31; Plate fig. 55)

♂♀ 24-37 mm. Antennae, except basal segment, and legs, except coxae, fuscous; remainder of insect orange buff to capucine orange. In a few specimens the apex of the forewing is narrowly edged with fuscous.

Genitalia. Male.—Uncus arched with a minute pointed apex; socii equal in length to the width of the aedeagus, slightly broadened apically. Valve arc-shaped with a v-shaped incision midway along the distal margin extending for one-third of the width. A slender, tapered and incurved process arises from the costa at one-half. Aedeagus with a scobinate patch dorsad of the apex. There are three or four cornuti, each a stout sclerotized spine; one is one-half and the remainder one-third as long as the aedeagus; in addition there is a small sclerotized patch on the ventral side near the base. The terminal sterna are as shown in the figure.

Female.—Ventral surface of the ductus bursae as broad as long, shallowly bilobed posteriorly and broadly rounded anteriorly, strongly sclerotized. Bursa copulatrix twice as long as broad, membranous anteriorly, the remainder sclerotized; the spining is as shown in the figure.

Holotype ♂ and Allotype ♀: Mexico, Orizaba, xii. 1887, (*H. Salvin & F. D. Godman*).

Paratypes: 1 ♂, 1 ♀, Mexico; 2 ♂, 13 ♀, type locality; 3 ♀, Jalapa; 1 ♀, Ventanas, 2,000 ft.; 1 ♀, Atoyac; 1 ♀, Colima; 1 ♂, Guaymas; 1 ♀,

Durango City; 2 ♀, Temax; 1 ♀, Coatepec; 1 ♀, Presidio; 1 ♂, Guatemala; 2 ♂, 3 ♀, San Geronimo; 1 ♂, 1 ♀, Barberena; 1 ♂, Honduras, La Cambre; 1 ♂, Nicaragua, Jinotega, 1,400 ft.; 1 ♂, Costa Rica, San Jose; 2 ♂, 1 ♀, Venezuela; 3 ♂, 2 ♀, Caracas; 2 ♀, Merida; 3 ♀, Peru; 4 ♀, Chanchamayo; 5 ♀, La Merced; 3 ♀, Chachapoyas; 1 ♀, Tabaconas; 1 ♂, 1 ♀, Pozuzu; 1 ♀, Cuzco; 4 ♀, Rio Colorado; 2 ♀, Bolivia, Chiquitos, S. Julian; 2 ♂, 1 ♀, Cochabamba; 2 ♀, La Paz; 2 ♀, Yungas de Corvico. All specimens are in the British Museum.

EUBAPHE FIELDI SP. NOV.

(Text-figs. 27, 32; Plate fig. 57)

Superficially indistinguishable from the preceding species, *deceptata*.

Genitalia. Male.—The uncus is arched with the apex narrowly rounded; the socii are stout, twice as long as broad and separated by a distance equal to their length. Valve similar to *deceptata*. Manica very strongly spined, distinguishing this species at a glance from its allies. The aedeagus has two scobinate patches, one ventrad and one dorsad of the apex. The vesica has scobinate ridges extending lengthwise at the center and one cornutus, one-third as long as the aedeagus; in addition there is a slender sclerotized patch midway along one side.

Female.—Posterior edge of the ductus bursae twice as broad as the anterior one. The arrangement of the spining in the bursa copulatrix, as will be seen from the figure, is quite distinctive.

Holotype ♂ and Allotype ♀: Venezuela, San Esteban, vi. 1909, (*S.M. Klages*).

Paratypes: 2 ♀, Venezuela; 2 ♂, 2 ♀, type locality; 2 ♂, Ciudad Bolivar; 1 ♂, 6 ♀, Colombia, Santa Maria. All specimens are in the British Museum.

EUBAPHE CUPRARIA (Walker)

(Text-figs. 4, 26, 33; Plate fig. 56)

Crocota cupraria Walker, 1854, List Lep. Ins. B. M., 2:536.

Eudule cupraria, Prout, 1910, Trans. ent. Soc. Lond., 43:231.

♂♀ 23-28 mm. Identical in coloration with *deceptata*. Previously thought to be widely distributed in Central and South America, but appears to be confined to the northern provinces of Brazil. Prout in his paper, "The Geometridae of the Argentine Republic," in 1910 states that "the specimen which bears Walker's type label was from Peru"; this specimen must certainly have been erroneously labelled, for Peru is not mentioned in the localities listed by Walker; further, the specimen bearing the type label is one of the two specimens from Brazil presented by E. Doubleday, a male. This is hereby designated

lectotype. Of the remaining specimens, which together with the lectotype made up Walker's original series, only one other specimen remains in the British Museum. It is a male, one of the specimens presented by W. F. Evans, the locality of which is unknown; it is in fact a different species from the type, being *E. hesperina* Burmeister, and probably came from S. Brazil.

Genitalia. Male.—Apex of uncus narrowly rounded; socii stout, a little longer than broad. Valve arc-shaped with a V-shaped incision at two-thirds of the distal margin, extending for one-third of the width. A slender, tapered and incurved process arises from one-half of the costa. The aedeagus has a strongly scobinate patch dorsad of the apex; the vesica bears one cornutus two-thirds as long as the aedeagus and in addition there is a small sclerotized patch about half-way along one side. The seventh sternum is similar to that of *deceptata*; the eighth differs in being broader based and having the apices sharply incurved.

Female.—Ductus bursae sclerotized, almost square and smooth. Bursa copulatrix twice as long as broad, almost rectangular with a slight membranous projection posteriorly at the right side; the spining is as shown in the figure.

Distribution.—Brazil, Amazons, Gran Pará, Maranhao, Pernambuco and Minas Geraes.

EUBAPHE HESPERINA (Burmeister)

(Text-figs. 28, 36; Plate fig. 58)

Eudule hesperina Burmeister, 1878, Descr. Phys. Rep. Argentina, 5(1):428.

Eudule nanora Schaus, Proc. ent. Soc. Washington, 31:52, pl. 3:4. Syn. nov.

The fine blackening of the distal half of the costal margin of the forewing distinguishes many specimens of *hesperina* at a glance from the closely related *deceptata*, *fieldi* and *cupraria*. Unfortunately not all specimens of *hesperina* are so marked, but on the other hand no specimen of the other three species has yet been noted with a blackened costa; in other respects *hesperina* is indistinguishable from them.

Burmeister described the species from several examples from Buenos Aires and Cordoba; of the four original specimens in the collection of the Argentine Museum of Natural History in Buenos Aires, I designate as lectotype the specimen labelled "Buenos Aires, Pergamino." The specimens from Cordoba are *Eudule trichoptera* Perty.

Genitalia. Male.—*E. hesperina* differs principally from its closest relatives in the aedeagus. The vesica bears two cornuti; one is tapered and strongly sclerotized and one-half as long as the aedeagus; the second, one-quarter as long

as the aedeagus, is coarsely scobinate. The terminal sterna are as shown in the figure.

Female.—Ductus bursae strongly sclerotized, broadened posteriorly. Bursa copulatrix three times as long as broad with narrow ridges of spining at the right side; at the right side posteriorly is a heavily spined and sclerotized projection, larger than and overlapping the ductus bursae.

The type of *hesperina* is in the Argentine Museum of Natural History; that of *nanora* is in the United States National Museum.

Distribution.—Brazil, Sao Paulo, Parana and Sta. Catharina; Bolivia; Argentine; Paraguay.

EUBAPHE INTEGRATA (Walker)

(Text-figs. 29, 35; Plate fig. 59)

Ameria integra Walker, 1866, List Lep. Ins. B. M., 35:1893.

Leptidule antithesis Dyar, 1914, Proc. U. S. Nat. Mus., 47:228. Syn. nov.

♀ 30-34 mm. Antennae, except basal segment, fore- and mid-tibiae and tarsi fuscous; head, thorax and abdomen orange buff to capucine orange. The male has two dense patches of olive lake scaling on the otherwise orange buff wings; one is on the mid-underside of the forewing, bounded anteriorly by the upper median and posteriorly by vein *M*1. The second on the mid-upperside of the hindwing is bounded anteriorly by the costal vein and posteriorly by the lower median. Both wings of the female are uniformly orange buff to capucine orange. Both sexes of this species may be recognized by the neuration of the hindwing, in which the vein *Sc* and *M*1 arise separately from the cell; in all the other species so far known in the genus these veins are long-stalked.

Genitalia. Male.—Uncus broadly arched; socii rather longer than broad, close together, almost fusing basad. Distal margin of the valve shallowly incised at one-half. Aedeagus with a scobinate patch dorsad of the apex. Vesica lightly scobinate in middle with one slender, tapered cornutus, rather less than one-half as long as the aedeagus, and a small sclerotized patch midway along one side. The terminal sterna are as shown in the figure.

Female.—Ductus bursae twice as broad posteriorly as anteriorly, sclerotized and ribbed. Bursa copulatrix three times as long as broad, strongly sclerotized posteriorly, membranous anteriorly; the spining is as shown in the figure.

The type of *integra* is in the British Museum; that of *antithesis* is in the United States National Museum.

Distribution.—Honduras; Panama; Colombia; Venezuela; French and Dutch Guiana; Brazil, Amazons and Para.

EUBAPHE ORFILAI sp. nov.

(Text-figs. 30, 34; Plate fig. 60)

♂ 22-23 mm.; ♀ 30 mm. Similar in coloration to the preceding species, except for the antennae which are concolorous with the wings.

Genitalia. Male.—Uncus narrowly arched; socii fused basad then outwardly curved, half as long as the aedeagus. Valve with a V-shaped incision at two-thirds of the distal margin, extending one-half of the way across its width. A curved, slender process arises from one-half of the costal margin and extends beyond the apex of the valve. Aedeagus slightly bowed with a scobinate patch dorsad of the apex. The vesica has two stout, tapered cornuti, each about one-half as long as the aedeagus. The seventh and eighth sterna are fused and shaped as shown in the figure.

Female.—Ductus bursae rather broader than long, sclerotized and ribbed. Bursa copulatrix pyriform; the anterior quarter is membranous, the remainder strongly sclerotized and spined.

Holotype ♂: Brazil, Matto Grosso, 1886, (*P. Germain*).

Allotype ♀: Brazil, Parana, Ignassa, x-xii. 1922.

Paratypes: 1 ♂, Brazil; 1 ♂, Matto Grosso; 1 ♀, Sao Paulo, Anhangahay; 2 ♂, C. Paraguay; 4 ♀, Sapucay. All specimens are in the British Museum.

EUBAPHE WEYENBERGHII (Snellen)

(Text-figs. 37, 39; Plate fig. 62)

Eudule weyenberghii Snellen, 1878, Bol. Acad. Nat. Cien. Cordoba, 2(4):390.

Eudule sombreata Dognin, 1893, Ann. Soc. ent. Belg., 37:424. Syn. nov.

Eudule weyenberghii, Prout, 1910, Trans. ent. Soc. Lond., 43:232.

The antennae, except for the basal segment, the tibiae and the tarsi are fuscous. In the female the remainder of the insect is capucine orange. The male is conspicuous in having both surfaces of both wings shaded with fuscous; the shading extends over the whole of the forewing, almost to the distal margin; on the hindwing the shading is more intense and extends across the whole width of the wing from the costa to vein *M*₂.

Genitalia. Male.—Uncus narrowly arched; socii wanting. Valve incised for one-third of its width at one-half of the distal margin, which is straight-edged in the anterior half and curved in the posterior half. Aedeagus with a strongly scobinate patch dorsad of the apex. Vesica scobinate in longitudinal ridges with two cornuti, one one-half and one two-thirds as long as the aedeagus; in addition there is a small sclerotized patch midway along one side. The terminal sterna are as shown in the figure.

Female.—Ductus bursae almost twice as long as broad, strongly sclerotized and smooth. Bursa copulatrix long and slender, five times as long as broad; the posterior half is strongly sclerotized with a cluster of spines at the right side posteriorly; the anterior half is lightly sclerotized, ribbed and thickly spined.

The type of *weyenberghii* is in the Leiden Museum; that of *sombreata* is in the United States National Museum.

Distribution.—Argentine; Paraguay; Brazil; Bolivia; Peru; Ecuador.

EUBAPHE MEDEA (Druce)

(Text-figs. 38, 40; Plate fig. 63)

Leptidule medea Druce, 1885, Biol. Cent. Amer., Zool., Lep. Het., 1:139, pl. 13:12.

Leptidule medea Druce, 1897, Biol. Cent. Amer., Zool., Lep. Het., 2:403.

In the male the wings are slightly hyaline, a pale maize yellow with a patch of dense scaling the color of raw sienna in the middle of the forewing, bounded anteriorly by the upper median and posteriorly by vein *A*₂. There is also a narrow fold at mid-costa enclosing similarly colored dense scales. The female is identical in coloration with the preceding species but recognizable by the neuration of the forewing, in which vein *Sc*₂ arises from three-quarters of the upper margin of the areole, midway between the point of origin of *Sc*₁ and the stalk of *Sc*₃₋₅.

Genitalia. Male.—Uncus broadly rounded; socii short, stout and almost square, separated by a distance equal to their width. Valve incised for one-third of its width just beyond one-half of the distal margin. Aedeagus with a strong scobinate patch dorsad of the apex. Vesica with a cluster of one long and five short spines apicad and a dense cluster of small spines at the middle; in addition there is a small sclerotized patch at about half-way along one side. The terminal sterna, which differ from those of *weyenberghii* only in their larger size, are figured.

Female.—Ductus bursae strongly sclerotized, slightly tapered anteriorly, two-and-a-half times as long as broad; there is a U-shaped depression in the posterior edge. Bursa copulatrix slender, as long as the ductus bursae, tapered anteriorly and strongly sclerotized; the spining is as shown in the figure.

The type is in the British Museum.

Distribution.—Guatemala; Honduras; Costa Rica; Panama.

EUBAPHE AEETES (Schaus)

(Text-fig. 41)

Leptidule aeetes Schaus, 1889, Ent. Amer., 5:191.

Leptidule aeetes Druce, 1897, Biol. Cent. Amer., Zool., Lep. Het., 2:403.

"Primaries ochreous, darkest on the margins and with a darker band crossing the wing from the costal margin near the apex to the middle of the inner margin. Secondaries ochreous, slightly hyaline, darkest around the outer margins. Head, thorax and abdomen ochreous. Antennae black. Expanse 21 mm."

Closely related to the preceding species but not synonymous with it as suggested by Druce. Mr. Field, who has kindly examined the genitalia of the unique male type, tells me that the principal difference between the two species is to be found in the aedeagus; the dense cluster of spines at the middle in *medea* is completely wanting in *aetes*; the cluster of six spines at the apex in *medea* is represented by a cluster of about twenty-five in *aetes*. The figure of the seventh and eighth sterna is from an outline supplied by Mr. Field.

The type is in the United States National Museum.

Distribution.—Mexico, Vera Cruz.

EUBAPHE LOBULA Hübner

(Text-figs. 42, 43; Plate fig. 61)

Eubaphe lobula Hübner, 1823, *Zuträge z. exot. Schmett.*, 2:20, pl. 52:299, 300.

Eudule lobiformis Druce, 1899, *Ann. Mag. nat. Hist.*, (7) 3:294.

Eudule lobiformis Prout, 1910, *Trans. ent. Soc. Lond.*, 43:232.

The males are at once recognizable by the fold on the forewing commencing at one-half and extending to three-quarters of the costa. The females, too, may be distinguished by the position of vein *Sc*1 in the forewing, which arises close to the distal angle of the areole near to the stalk of veins *Sc*2-5. The antennae, except for the basal segment, are fuscous; the remainder of the insect is uniformly capucine orange.

Genitalia. Male.—Valve with a V-shaped incision in the distal margin, extending for one-half of the width. The socii are stout and as broad as long. The aedeagus has a scobinate patch dorsad of the apex. The vesica is sclerotized in the posterior half with one cornutus, similar in shape to that of *cupraria*, but slightly less than one-half as long as the aedeagus; in addition there is a small sclerotized patch midway along one side. The terminal sterna are as shown in the figure.

Female.—Ductus bursae twice as broad as long, sclerotized and ribbed. Bursa copulatrix ovate, twice as long as broad, sclerotized and with spining as shown in the figure.

The type of *lobula* is not in the Hübner collection in the Hofmuseum in Vienna and it may prove to be lost; that of *lobiformis* is in the British Museum.

Distribution.—Costa Rica; Panama; Colombia; Venezuela; Brazil as far south as Sao Paulo; Paraguay.

EUBAPHE TRITONIA (Druce)

Eudule tritonia Druce, 1885, *Proc. zool. Soc. Lond.*, 1885:524, pl. 32:9.

Three specimens of the original series of four females of this species are without abdomens and the genitalia dissected from the fourth proved to be imperfect. The ductus bursae is well sclerotized, twice as long as broad, slightly narrowed anteriorly and truncate posteriorly; the bursa copulatrix is membranous with a narrow band of spines close to the neck. The sack is unfortunately shrivelled, but the genitalia appear to show relationship with the *rhodiana-tripunctata* section of the genus.

The type is in the British Museum.

Distribution.—Ecuador.

The following species, similar in appearance to *cupraria* Walker and usually associated with that species, has been transferred to the genus *Eudule* on the basis of the structure of the genitalia:

EUDULE TRICHOPTERA (Perty)

Lithosia trichoptera Perty, 1833, *in Spix, Delectus. Anim. arcticul. Brazil*, (3):161, pl. 32:5.

Eudule costata Warren, 1897, *Novit. zool.*, 4:456. *Syn. nov.*

Eudule aurata Schaus (1892, *Proc. Zool. Soc. Lond.*, 1892:284) has been found to be synonymous with *Oncopus citrosa* Geyer (1832, *Zuträge z. exot. Schmett.*, 4:18, pl. 114:661, 662) and has been transferred to the subfamily Sterrhinae.

EXPLANATION OF THE PLATES

PLATE I

- FIG. 44. *E. eulathes*, Female genitalia.
 FIG. 45. *E. lineata*, Female genitalia.
 FIG. 46. *E. rhodiana*, Female genitalia.
 FIG. 47. *E. daxata*, Female genitalia.
 FIG. 48. *E. meridiana*, Female genitalia.
 FIG. 49. *E. tripunctata*, Female genitalia.
 FIG. 50. *E. bada*, Female genitalia.
 FIG. 51. *E. mendica*, Female genitalia.
 FIG. 52. *E. unicolor*, Female genitalia.
 FIG. 53. *E. conformis*, Female genitalia.
 FIG. 54. *E. pumilata*, Female genitalia.

PLATE II

- FIG. 55. *E. deceptata*, Female genitalia.
 FIG. 56. *E. cupraria*, Female genitalia.
 FIG. 57. *E. fieldi*, Female genitalia.
 FIG. 58. *E. hesperina*, Female genitalia.
 FIG. 59. *E. integra*, Female genitalia.
 FIG. 60. *E. orfilai*, Female genitalia.
 FIG. 61. *E. lobula*, Female genitalia.
 FIG. 62. *E. weyenberghii*, Female genitalia.
 FIG. 63. *E. medea*, Female genitalia.