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## *Euchontha* Walker and *Pareuchontha*, New Genus (Lepidoptera; Diptidae) a Revision, Including Description of Three New Species, and Discussion of a Male Forewing Modification

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### ABSTRACT

The dioptid moth genus *Euchontha* Walker is revised. In it are included six species, one of which, *E. moyobamba*, is new and one of which was described in the genus *Hadesina* Warren. They occur from central Colombia south to northern Bolivia. These taxa are arranged in two species groups, the *frigida* and *ciris* groups. *Euchontha castrona* Warren is removed from the genus and placed incertae sedis. The new genus *Pareuchontha* is described, and in it are placed *P. grandimacula* (Dognin), a Peruvian and Bolivian species formerly in *Sten-*

*oplastis* Felder in collections, and two new species, *P. albimargo* and *P. wormsi*, from Ecuador and Peru. Adults and genitalia are figured for all species. Evidence of a sister-group relationship between *Euchontha* and *Pareuchontha* is presented. A modification of the male forewing, found in these genera, is described based on scanning electron microscopy; its distribution among other diopuids is listed. Presence of the forewing modification supports monophyly of a clade that includes 95 species in 11 genera.

### INTRODUCTION

During a visit to the British Museum (Natural History) in March 1987, I found that the late Baron C.G.M. de Worms had curated the entire collection of moths in the Diopidae (Lepidoptera: Noctuoidea) during the 1940s. In addition, he had separated those taxa he thought were undescribed, usually attempting to associate each with a genus. Among this material were specimens which he considered to represent two new species in the genus *Euchontha* Walker. My interest

in those specimens led to the research described here.

My ongoing study of generic relationships among Diopidae identified a species, formerly in *Stenoplastis* Felder, that shares apomorphic characters with *Euchontha*. For this species, a new species found in material loaned by the Los Angeles County and Carnegie Museums, and a new species from the American Museum collection, I have proposed the genus *Pareuchontha*.

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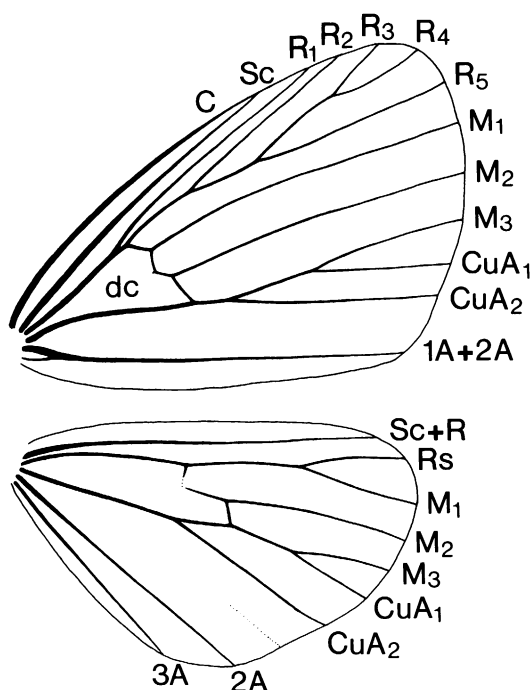


Fig. 1. Right wings of *Euchontha frigida* (Walker), female (slide # JSM-235, AMNH). A - anal veins. C - costal vein. CuA - cubital veins. dc - discal cell. M - medial veins. R - radial veins. Sc - subcostal vein.

The first part of this paper describes a male forewing modification that occurs in *Euchontha* and *Pareuchontha*. I discuss the trait's distribution among dioptids, and its phylogenetic implications. The second part of the paper includes generic revisions of *Euchontha* and *Pareuchontha*, with descriptions and keys to the species. I recognize two species groups in *Euchontha*, the *ciris* group (four species) and the *frigida* group (two species). I also present evidence that *Euchontha* and *Pareuchontha* are sister-genera.

Dioptidae has been recognized as a family since Walker (1865), but Minet (1983, 1986) has proposed that the group be considered a tribe of the Notodontinae (Notodontidae). Minet's theory was based on scanty evidence (Miller, 1987a), but may ultimately prove to be at least partially correct; data are accumulating that suggest that the Notodontidae are paraphyletic with respect to the Dioptidae (S. Weller, personal commun.; J. Miller, unpub. data). Family status for the latter is

therefore unjustified. However, the precise relationship between "dioptids" and notodontids requires further research. I will address the monophyly and phylogenetic position of dioptids in a future study, but have for this paper followed the usage of recent authors (e.g., Stehr, 1987; Holloway et al., 1987) in retaining the family name Dioptidae.

#### MATERIALS AND METHODS

Morphological terminology follows Forbes (1923), Ehrlich (1958), and Hodges (1971). For males I use the term genitalia to refer to the ninth segment and its appendages, whereas terminalia is used as a more inclusive term, referring to the genitalia plus the eighth abdominal segment, which functions to clasp the female (Miller, 1988). Genitalic terms follow Klots (1970) and Miller (1987a, 1988). Wing veins are named in accordance with the scheme of Common (1979; see also Miller, 1987a). Wing scale morphology is described using the nomenclature of Davis (1986). For descriptions of maculation, I have used the wing regions named by Forbes (1948) and Klots (1951). Dissection techniques and preparation of material for scanning electron microscopy follow previously described methods (Miller, 1987a).

Acronyms for collections are as follows: American Museum of Natural History, New York (AMNH); British Museum (Natural History), London (BMNH); California Academy of Sciences, San Francisco (CAS); Carnegie Museum of Natural History, Pittsburgh (CMNH); Cornell University Insect Collections, Ithaca (CU); Natural History Museum of Los Angeles County, Los Angeles (LACM); Museum of Comparative Zoology, Cambridge (MCZ); National Museum of Natural History, Washington (USNM); Zoologisches Museum für Naturkunde der Humboldt-Universität, Berlin (ZMH).

During the course of this study I was able to examine all holotypes for both *Euchontha* and *Pareuchontha*, including those described as subspecies and forms.

#### ACKNOWLEDGMENTS

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Watson, M. Honey, and I. Kitching (BMNH), J. Rawlins and Chen Young (CMNH), P. Arnaud and D. Wagner (CAS), J. Liebherr and R. Hoebeke (CU), J.G. Franclemont (CU), J. Donahue (LACM), D. Bowers (MCZ), B. Poole (USNM), H.J. Hannemann, and W. Mey (ZMH). It is a special pleasure to acknowledge the kindness and hospitality of Dr. Hannemann and Dr. Mey during my visit to Berlin (April 1988).

Photographs of *Euchontha* adults were taken by V. Krantz (USNM). Redescriptions of holotypes at the BMNH were aided by color photographs taken with the help of Marcus Matthews (BMNH). I thank Andrew Simon (AMNH) for assistance with scanning electron microscopy.

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## THE MODIFIED MALE FOREWING

Forbes noted that in some dioptids, the forewing discal cell is "shortened,  $M_1$  and  $M_2$  then thickened with a more or less distinct stridulatory organ" (1939: 319). The amount of discal cell reduction varies (figs. 1, 2); among those dioptids with a small cell, that of *Euchontha* is the smallest, whereas *Pareuchontha*, *Brachyglene*, and *Zunacetha* exhibit more typical reduction. The distoposterior angle of the discal cell is often acute. In males, veins  $M_1$  and  $M_2$  are thickened from just beyond the discal cell to a point approximately halfway out on the wing (fig. 2). The veins protrude from the wing's ventral surface (figs. 3, 5, 15), and in some *ciris* group species seem to form two longitudinal pockets (e.g., fig. 5).

Forbes' reference to the function of this modification was almost certainly specula-

tion; there have been no studies showing wing stridulation in the Diopitidae. He was perhaps basing his theory on the observation that wing stridulation occurs in males of some Noctuidae. The best documented occurrence, recently discussed by Matthews (1987), is in the Heliothinae. In some species, the male forewing costa beyond the discal cell is greatly swollen, forming a "blister," and the subcostal and radial veins behind it are sinuate. This modification is associated with sound production (Cook, 1930; Forbes, 1912; Hebard, 1922); *Heliocheilus* males produce a buzzing sound that attracts both sexes to mating aggregations (Matthews, 1987). A similar male forewing structure occurs in some Agastistinae (Noctuidae) (Common, 1979; Hannemann, 1956).

An alternative explanation for the function of these diopitid wing modifications is that they are involved with male pheromone production. Swollen wing veins are sometimes associated with androconia in Lepidoptera, occurring, for example, in the male hind wing anal veins of *Battus* (Papilionidae: Troidini) (Miller, 1987b), and in the hind wing alar organs of some Danainae (Nymphalidae) (Ackery and Vane-Wright, 1984). The swellings possibly serve to transport or synthesize male pheromone (Boppré, 1984), to be disseminated by the scent scales.

Until behavioral research has been done, it is impossible to determine whether the diopitid male forewing modification is stridulatory or androconial.

I term the region beyond the discal cell in which veins  $M_1$  and  $M_2$  are swollen, bordered anteriorly by  $R_{2-5}$  and posteriorly by  $CuA + M_3$ , the "forewing fascia." In *Euchontha* species, veins  $R_{2-5}$  and  $M_3$  are sinuate around the fascia (fig. 2A). Located between  $M_1$  and  $M_2$  is what I call the "forewing fold" (figs. 2A, 3-6, 8-13, 14, 24, 25). Like the vein thickenings, it extends from just beyond the discal cell to a point approximately halfway out on the wing. It is a groove on the wing's dorsal surface, and forms a well-defined, longitudinal ridge ventrally. In some species this ridge has a depression along its midline (figs. 9, 13).

The scales in the forewing fascia of *Zunacetha annulata* Guérin are closely spaced on both wing surfaces, but ventrally there is

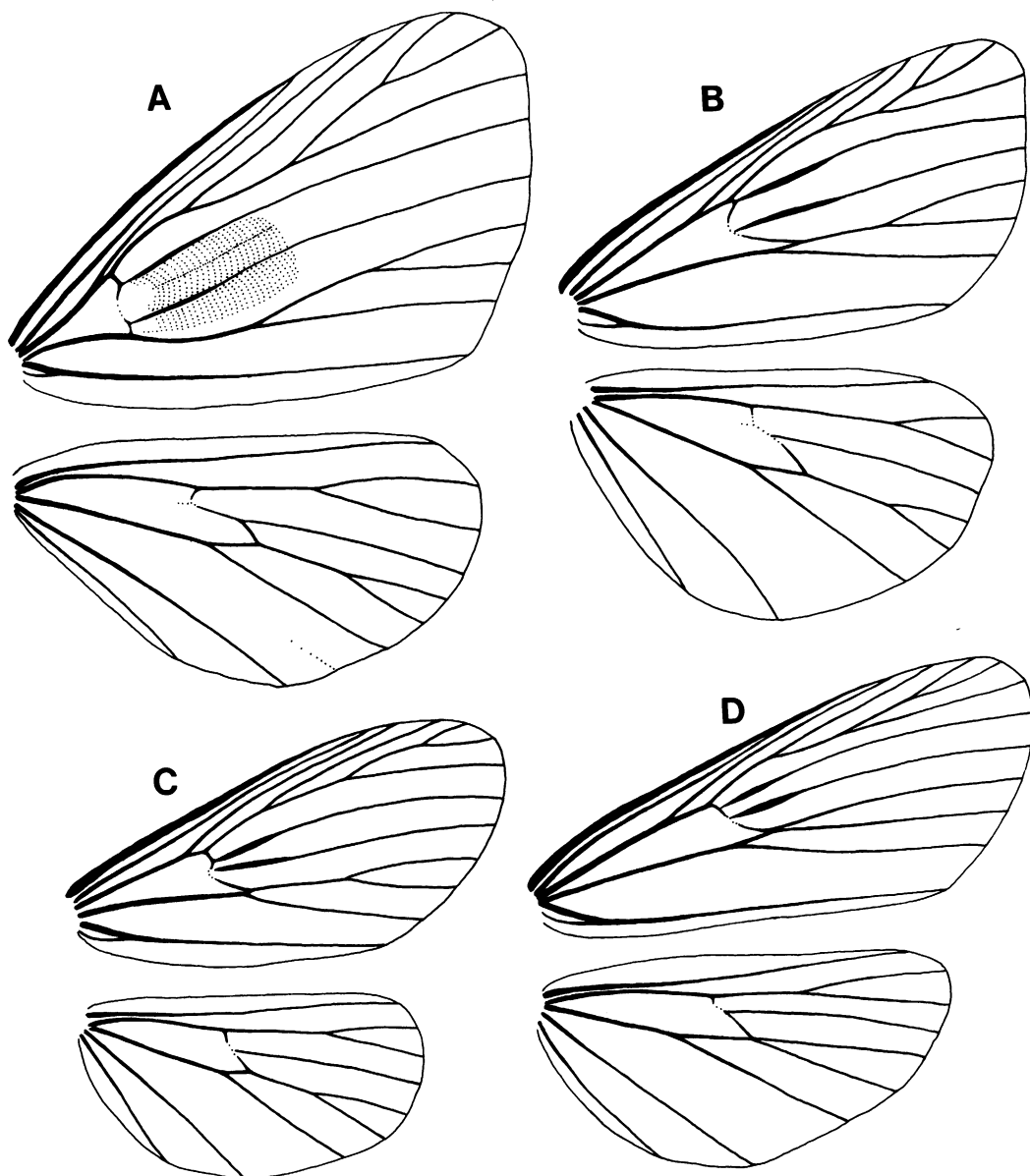
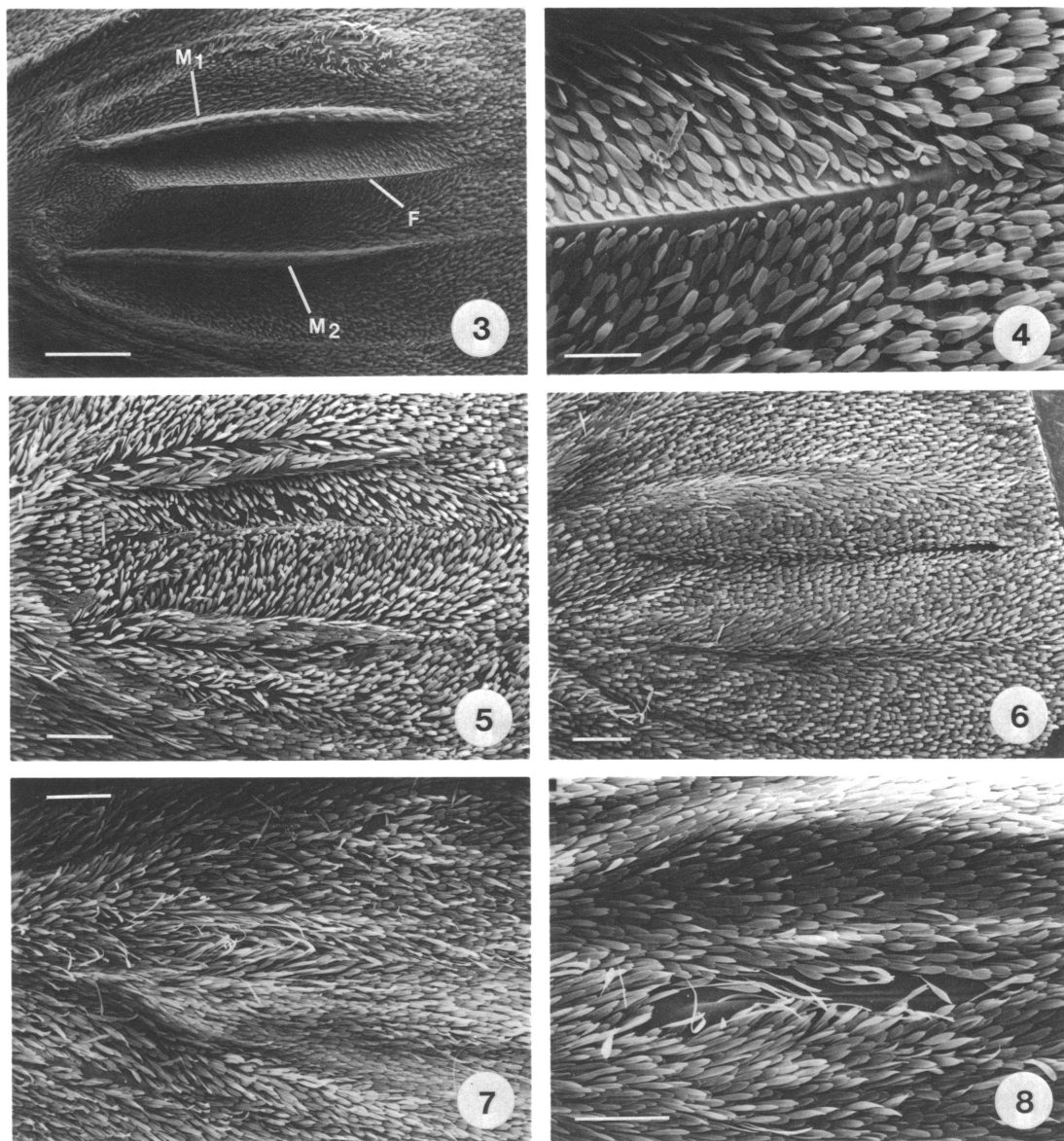


Fig. 2. Right male wings (see figure 1 for names of wing veins). **A**, *Euchontha frigida* (Walker), showing corrugated region of forewing fascia (slide # USNM-29202). **B**, *Pareuchontha grandimacula* (Dognin) (slide # USNM-29220). **C**, *Brachyglene subtilis* (Felder) (slide # USNM-29218). **D**, *Zunacetha annulata* Guérin (slide # USNM-29231).

a bare region along the fold, bordered by elongate scales (figs. 7–9). In other genera, such as *Brachyglene*, *Euchontha* and *Pareuchontha*, scales are more sparsely distributed within the fascia, especially on the wing's ventral surface (figs. 3, 5, 10–13, 15, 17, 18, 24, 25).

The fascia scales are uniquely shaped on both wing surfaces. Whereas typical wing scales are relatively flat and have three or four teeth on the distal margin (fig. 16), scales in the forewing fascia have only one or two distal teeth, or are blunt apically (figs. 9, 11, 13, 14, 17–20). There is marked intergeneric





Figs. 3, 4. Forewing of male *Euchontha frigida* (Walker), ventral surface. 3. Forewing fascia, distal margin of discal cell at left,  $M_1$  - vein  $M_1$ ,  $M_2$  - vein  $M_2$ , F - forewing fold (1 mm). 4. Forewing fold (200  $\mu$ m).

Figs. 5, 6. Forewing of *Euchontha memor* Warren, male. 5. Forewing fascia, ventral surface with distal margin of discal cell at left (0.5 mm). 6. forewing fascia, dorsal surface (0.5 mm).

Figs. 7, 8. Forewing of *Zunacetha annulata* Guérin, male. 7. Forewing fascia, dorsal surface (0.5 mm). 8. Forewing fascia, ventral surface (400  $\mu$ m). (Scale lengths in parentheses).

variation in fascia scale size and shape, and often more than one shape within a single species (e.g., fig. 18).

The scale surface in Lepidoptera is typi-

cally composed of a series of longitudinal ridges, with "windows" and roughly ladder-like cross ribs between them (Ghiradella, 1985; Miller, 1987b; Nielsen, 1988). The fas-

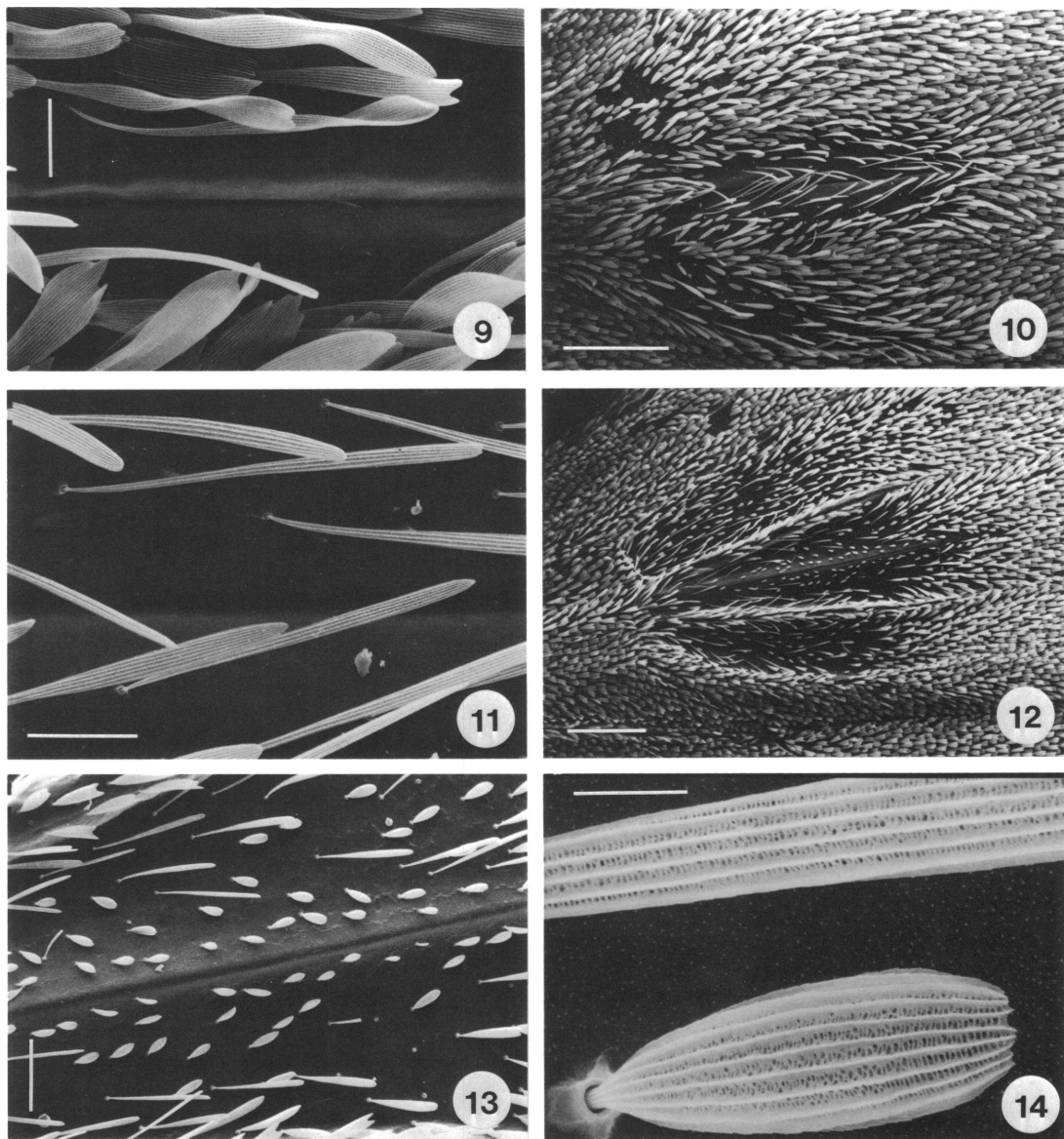


Fig. 9. Forewing of *Zunacetha annulata* Guérin male (ventral surface), showing close-up of forewing fold (50  $\mu$ m).

Figs. 10–14. Forewing of *Brachyglene subtilis* (Felder) male. 10. Forewing fascia, dorsal surface (0.5 mm). 11. Close-up of forewing fold, dorsal surface (50  $\mu$ m). 12. Forewing fascia, ventral surface (0.5 mm). 13. Close-up of forewing fold, ventral surface (100  $\mu$ m). 14. One of the short scales from figure 13, with portion of a thin scale above (10  $\mu$ m). (Scale lengths in parentheses.)

cia scales of *Euchontha* and *Pareuchontha* have a single, large ridge—formed by apposition of three or four of the small ridges—running approximately along the scale midline (figs. 17, 19, 20, 22, 72). This shape has not been observed in other diptids.

Configuration of the windows and cross ribs differs between *Euchontha* and *Pareuchontha*. The cross ribs are numerous in *Euchontha*, and the windows, which are few in number, are round (fig. 21). In *Pareuchontha* the cross ribs are fewer, and the windows are

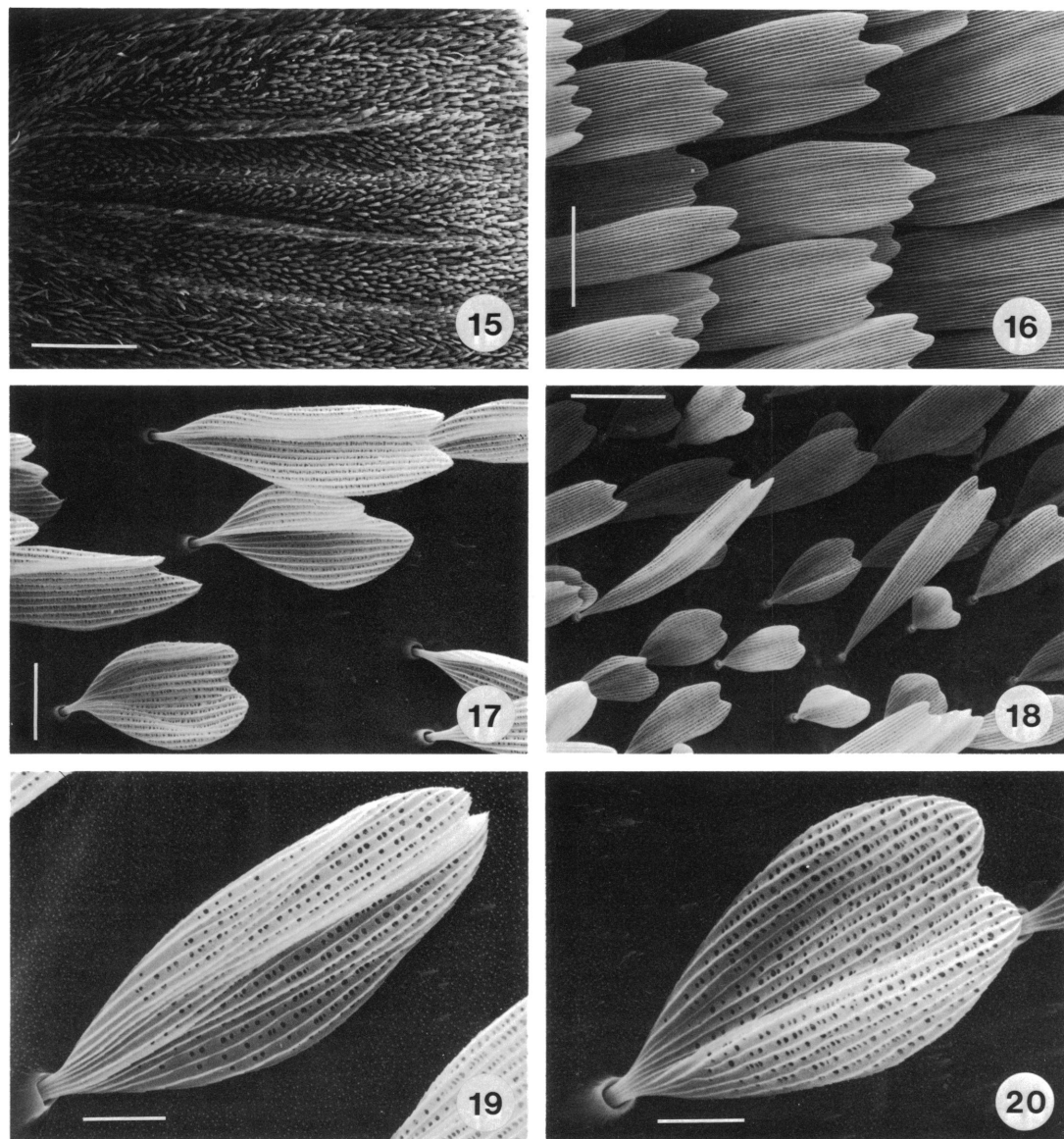


Fig. 15. Forewing fascia of *Pareuchontha grandimacula* (Dognin) male, ventral view (1 mm).  
 Fig. 16. Typical forewing scales of *Euchontha frigida* (Walker), from ventral surface (40  $\mu$ m).  
 Figs. 17, 18. Scales from forewing fascia of *Euchontha anomala* (Prout). 17. Dorsal surface (20  $\mu$ m).  
 18. Ventral surface (50  $\mu$ m).  
 Figs. 19, 20. Ridged fascia scales of *Euchontha* species (10  $\mu$ m). 19. *E. frigida* (Walker). 20. *E. anomala* (Prout). (Scale lengths in parentheses.)

transverse ovals of irregular shape (fig. 23), giving the scale surface a more reticulate appearance.

The wing cuticle in the forewing fascia of *Euchontha* species tends to have shallow, transverse lamellae, along which the scales

are arranged (figs. 2A, 24, 25). These scale rows are most distinct in the *frigida* group. The stridulatory region of heliothines exhibits a somewhat similar morphology (Matthews, 1987). The wing cuticle of all species I studied is granulate when seen under high

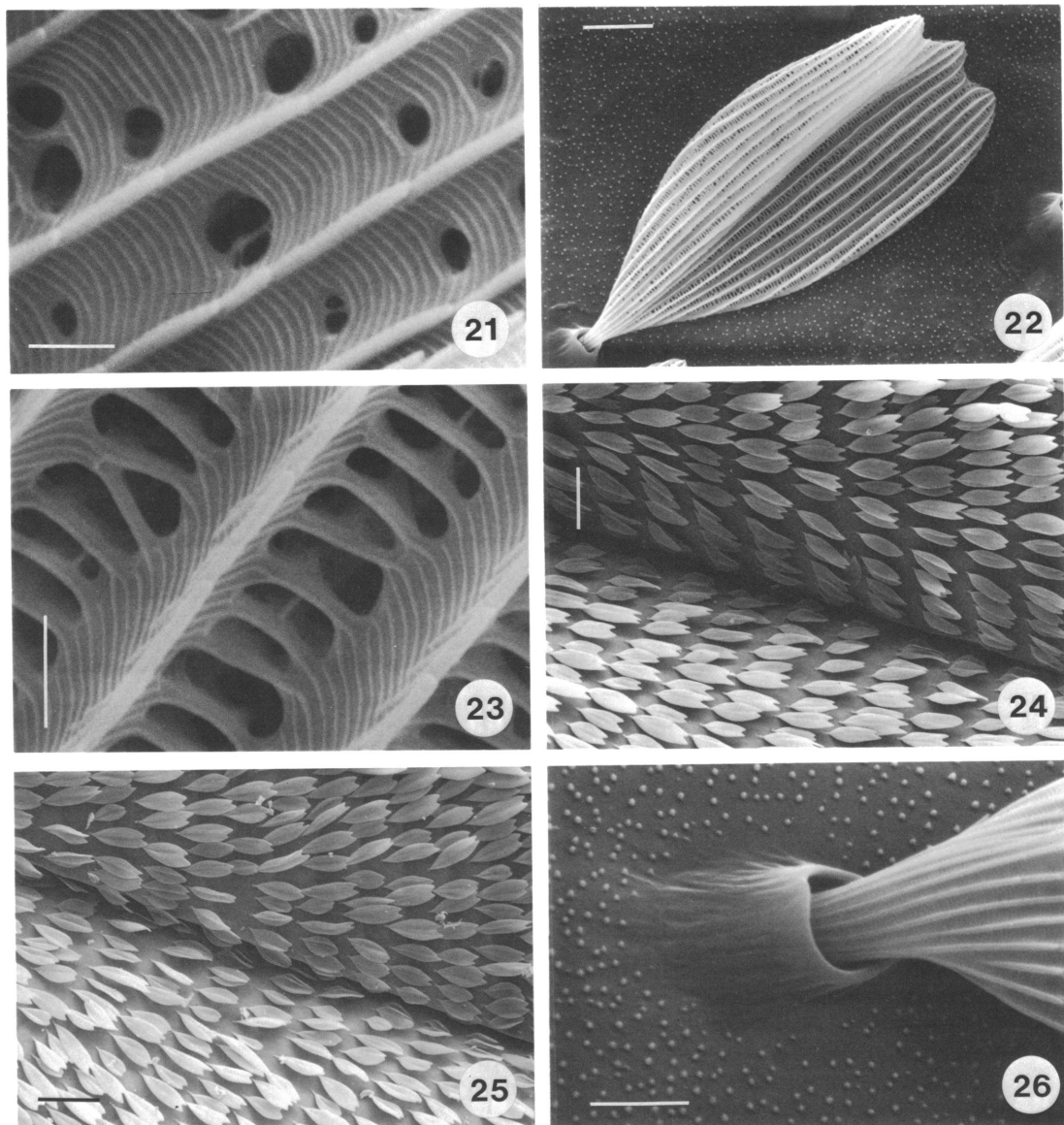


Fig. 21. Surface of scale in figure 20 (*E. anomala*) (1  $\mu$ m).

Figs. 22, 23. Ridged scent scale of *Pareuchontha grandimacula* (Dognin). 22. Single scale from forewing fascia, ventral surface (10  $\mu$ m). 23. Surface of scale in figure 22 (1  $\mu$ m).

Figs. 24–26. Forewing fold of *frigida* group species, dorsal surface. 24. *E. frigida* (Walker) (100  $\mu$ m). 25. *E. anomala* (Prout), showing corrugate cuticle between scale rows (100  $\mu$ m). 26. Base of scent scale, showing granulate surface of wing cuticle (4  $\mu$ m). (Scale lengths in parentheses).

magnification (figs. 19, 20, 22, 26). I have not looked at this trait in enough detail, or in enough taxa, to know whether it is restricted to the forewing fascia, and whether it is unique to dioptids.

These male forewing modifications do not occur in most Diptidae. Table 1 lists those genera in which veins  $M_1$  and  $M_2$  are swollen, and the discal cell is less than half the wing length. In two, swollen veins are found but

not a short discal cell, whereas the reverse does not occur. There are approximately 400 described species in the Dioptidae belonging to 40 genera (Bryk, 1930). The presence of swollen  $M_1$  and  $M_2$  veins in the male forewing supports the monophyly of a clade that includes 95 species in 11 genera.

I tentatively suggest that presence of ridged fascia scales is a synapomorphy for *Euchontha* and *Pareuchontha*, pending study of additional dioptid taxa. Variation in fascia scale size and shape provides synapomorphies for *Euchontha* species groups, and is used below to separate some species.

SYSTEMATICS

*EUCHONTHA* WALKER

- Euchontha* Walker, 1865: 383. Type species *E. sublactigera* Walker by monotypy.  
*Gnatholophia* Felder, 1868 (in Felder and Rogenhofer, 1874): 4,5, pl. 105. Type species *G. longinervis* Felder by monotypy.  
*Macroneuroides* Warren, 1900: 127. Type species *M. albimacula* Warren by monotypy.  
*Gratholophia* Prout, 1918: 414 (misspelling).

DIAGNOSIS: Male *Euchontha* species can be recognized from all other diopuids by the relatively broad wings and extremely small forewing discal cell (approximately one-fifth the wing length); in both sexes the discal cell does not extend past the fork of veins  $CuA_2$  and  $CuA_1 + M_3$  (figs. 1, 2A). Eyes small, completely surrounded by a scaleless region; male antennae doubly bipectinate; female antennae ciliate; labial palpi long, males often with scale tuft on distal segment.

REDESCRIPTION: Male. Forewing length 13.0–18.5 mm. Forewing discal cell short, veins  $Cu + M_3$  and  $R_{2-5}$  sinuate; a forewing fascia beyond discal cell, wing cuticle minutely corrugate; veins  $M_1$  and  $M_2$  swollen as they pass through fascia, protruding from ventral surface of wing (figs. 3, 5, 70); fascia white or semitransparent, veins  $M_1$  and  $M_2$  often darker as they pass through it; eyes small, surrounded by scaleless region, spiculate when seen with SEM (figs. 27–29); labial palpi porrect, segment 2 long (figs. 38, 50), segment 3 often with scale tuft (fig. 27); male antennae doubly bipectinate (figs. 30, 31); portion of epimeron dorsal to tympanum heavily sclerotized, protruding from body,

TABLE 1  
Dioptid Genera with Male Forewing Modification

Genus	No. spp. <sup>a</sup>	Discal cell small <sup>b</sup>	$M_1$ & $M_2$ swollen
<i>Brachyglene</i> Herrich-Schäffer	11	+	+
<i>Cacolyces</i> Warren	1	+	+
<i>Cleptophasia</i> Prout	1	–	+
<i>Euchontha</i> Walker	6	+	+
<i>Hadesina</i> Warren	2	+	+
<i>Isostyla</i> Prout	3	+	+
<i>Pareuchontha</i> , new genus	3	+	+
<i>Scotura</i> Walker	18	+	+
<i>Tithraustes</i> Druce	42	+	+
<i>Xenomigia</i> Warren	6	–	+
<i>Zunacetha</i> Walker	2	+	+
Total	95		

<sup>a</sup> According to Bryk (1930).  
<sup>b</sup> Less than one-half total forewing length.

forming a shelf over tympanal membrane (figs. 33, 34); tergum 8 unmodified; genitalia with valvae lacking androconia, sacculus without pleats, juxta cup-shaped, aedoeagus with dorsal and ventral tooth distally.

Female. Forewing length 15.0–19.5 mm. Forewing discal cell approximately one-third the wing length (fig. 1); labial palpi moderately long (shorter than males); antennae with four large bristlelike setae per segment (fig. 32); tympanum similar to males; tergum 8 sclerotized on posterior margin, slightly roof-like (figs. 43A, 49A, 55C, 79C); anterior and posterior apophyses present; genitalia with simple ostium; base of ductus bursae sclerotized; corpus bursae lacking a signum.

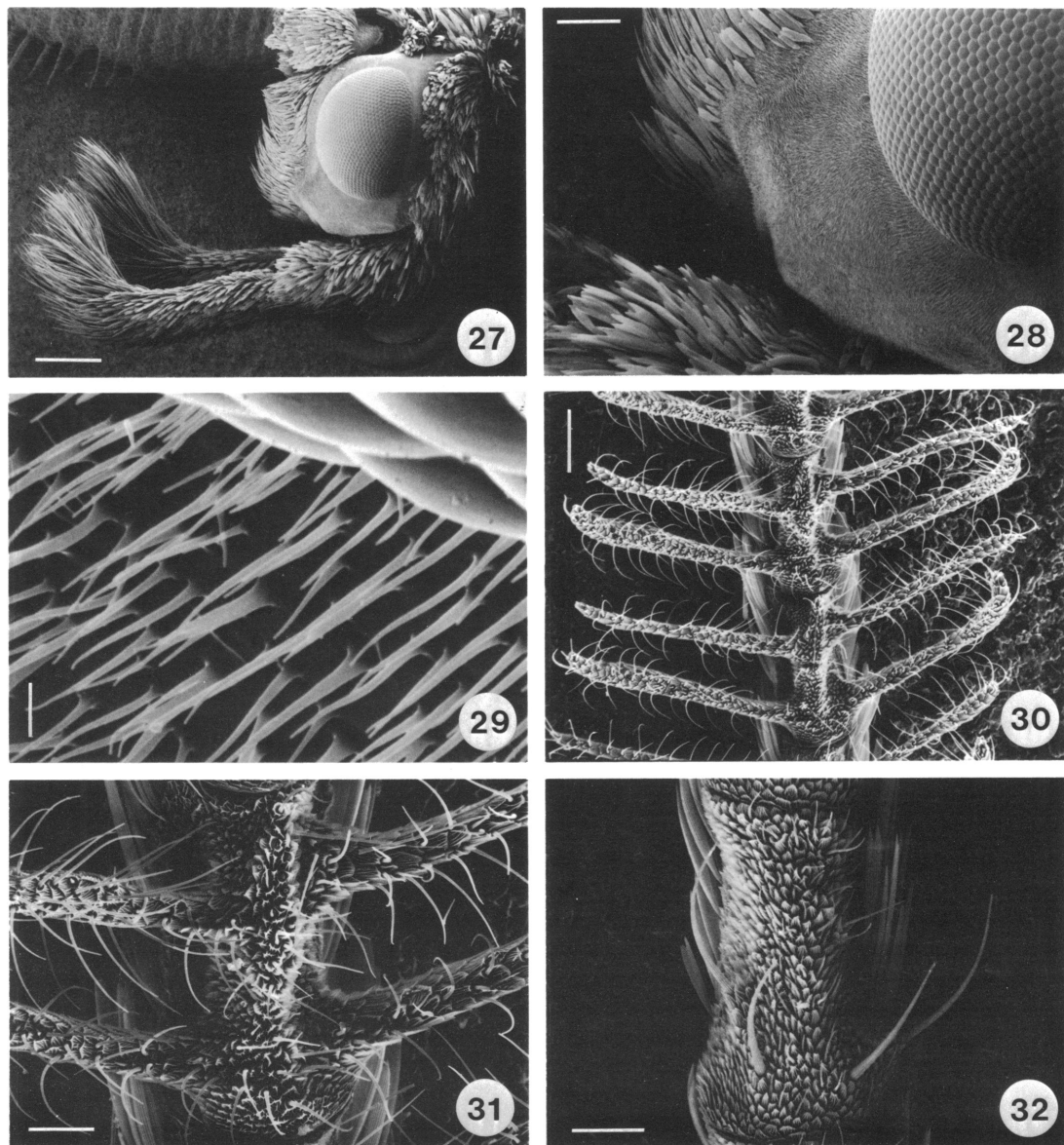
TYPE SPECIES: *Euchontha sublactigera* Walker (1865), a junior subjective synonym of *E. frigida* Walker.

DISTRIBUTION: Figures 44, 60. Known from central Colombia south to northern Bolivia.

DISCUSSION: Most of the synonymies I list were proposed by Prout (1918), Hering (1925), and Bryk (1930).

Prout claimed that females of *Euchontha* “are not certainly known and the genus may prove untenable—perhaps a secondary sexual development of *Tithraustes*” (1918: 414). Forbes (1931) concurred, speculating that the reason female specimens had not been rec-



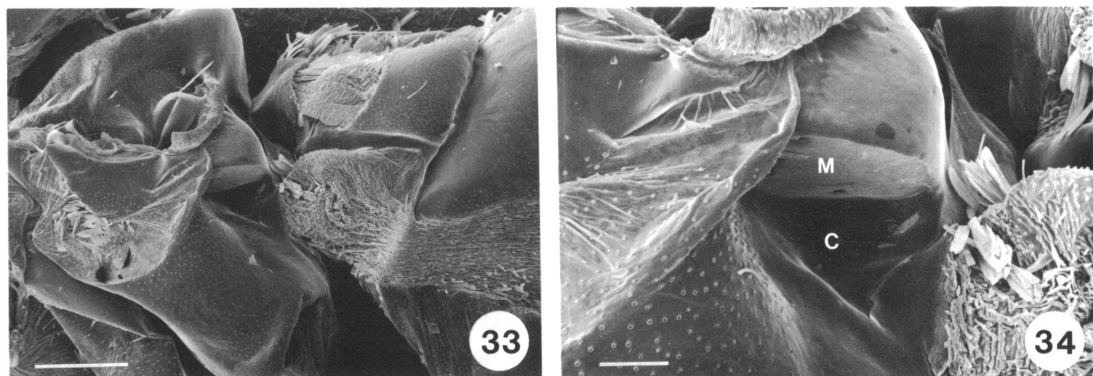


Figs. 27–29. Head of *Euchontha frigida* male. 27. Entire head (lateral view, anterior at left) with antennal flagellum removed (400  $\mu$ m). 28. Gena and lower part of eye, showing scaleless region (100  $\mu$ m). 29. Surface of scaleless region (4  $\mu$ m).

Figs. 30–32. Antenna of *Euchontha* species. 30. Male antenna of *E. anomala* (Prout) in ventral view with proximal portion at bottom (100  $\mu$ m). 31. Single segment of antenna in fig. 30 (40  $\mu$ m). 32. Female antennae of *E. frigida* (Walker) in ventral view with proximal portion at bottom (50  $\mu$ m). (Scale lengths in parentheses.)

ognized was because they look dramatically different from males. Although specimens are indeed rare, I found females of three species in the collections at the BMNH, and one at the USNM. I describe and figure all of them

in this paper. The holotype female of *Hadesina anomala* Prout (1918) is in fact a *Euchontha* species, and Dognin's (1894b) "male" holotype of *Monocreaga clareta* is, I argue below, a female of *E. ciris*. In addition,



Figs. 33, 34. Tympanum of *Euchontha frigida* Walker male. 33. Metathoracic and first two abdominal segments in lateral view, anterior at left (400  $\mu$ m). 34. Tympanal cavity "C" and tympanal membrane "M" (100  $\mu$ m). (Scale lengths in parentheses).



35



36

Figs. 35, 36. "*Euchontha*" *castrona* Warren, male. 35. Dorsal view. 36. Ventral view.

I describe females of *E. frigida* (Walker) and *E. moyobamba*, new species.

*Euchontha castrona* (figs. 35, 36) was described by Warren (1906: 411) in the geometrid subfamily Cylopodinae. The holotype (BMNH) bears these labels: "Theresopolis. 87-103"; "*Euchontha castrona* Warr., Pr. U.S. Nat. Mus. XXX. 411"; a red holotype label. The species is known from Uniao da Victoria, Elsenau (Rio Grande do Sul), and Petropolis, Brazil (ZMH, USNM, and BMNH). It exhibits none of the *Euchontha* apomorphies, and I have therefore removed it from the genus. The forewing discal cell is not short, male veins  $M_1$  and  $M_2$  are not swollen, the antennae are singly rather than doubly bipectinate, the labial palpi are not long, and the tympanum is not rooflike. The male genitalia (fig. 37) have a pleated sacculus with androconia, which is common

among notodontids (Forbes, 1939; Holloway, 1983) including diopitids (Franclemont, 1970; Miller, 1988), but is absent in *Euchontha*. The unusual vesica of the aedeagus in *castrona* suggests a relationship with the genus *Xenomigia* Warren, but the moths are superficially very different and share no other apomorphies as far as I can determine. Until further study, I consider *castrona* to be incertae sedis.

Immature stages and host plant associations are unknown for *Euchontha*. The male forewing character suggests that the genus belongs in a clade with *Scotura* and *Zunacetha* (table 1). Host records for only 2 of 95 species in the clade are known; larvae of *Scotura ovisigna* Prout feed on plants in the genus *Rinorea* (J. Rawlins, personal commun.), and *Zunacetha annulata* Guérin feeds on *Hybanthus* (Wolda and Foster, 1978). Both of these

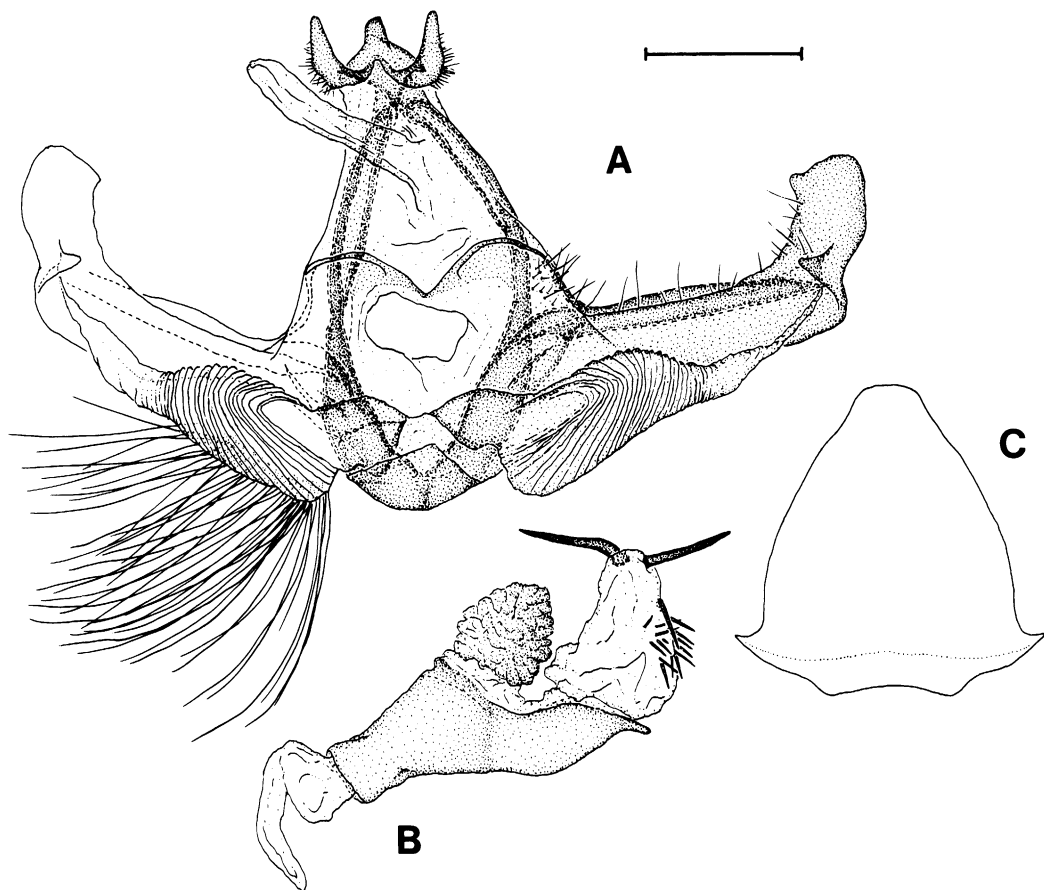


Fig. 37. Male genitalia of "*Euchontha*" *castrona* Warren (scale line = 1.0 mm; slide # JSM-275, BMNH). **A**, Genitalia in posterior view with aedeagus removed. **B**, Aedeagus in lateral view, anterior at left. **C**, Sternum 8 in dorsal view, posterior at top.

plant genera are in the Violaceae. This association may be characteristic for the lineage, but confirmation will obviously require studying life histories for many more diophtids.

The following are apomorphic for *Euchontha*: Male forewing discal cell one-fifth the total wing length, base of veins  $R_{2-5}$  and  $M_3$  + CuA sinuate; surface of cuticle in forewing fascia minutely corrugate; third segment of male labial palpus with scale tuft; vesica without cornuti; juxta cup-shaped.

#### KEY TO ADULT *EUCHONTHA* MALES

I have not included a key to females because they are known for only four of the six species.

- 1 Forewing with white transverse subapical band from  $R_1$  to  $M_3$  (figs. 39, 40, 45, 46); hind wing with white spot near upper angle lying on  $R_s$  +  $M_1$ ; forewing length 16.5–18.5 mm ..... 2 (*frigida* group)

Forewing with small white subapical spot extending at most from  $R_{3+4}$  to  $M_1$  (figs. 51, 52, 61–64, 66, 67, 75, 76); no white spot in upper angle of hind wing; forewing length 13.0–14.5 mm ..... 3 (*ciris* group)

- 2(1) Central portion of hind wing white, veins also white (figs. 39, 40); labial palpus with first segment orange in basal half, white in distal half, segment 2 longer than segment 1 (fig. 38B); abdomen buff below; forewing length 16.5–18.5 mm .. *frigida* (Walker)
- Central portion of hind wing semitransparent, veins brown (figs. 45, 46); labial palpus with first segment orange, segment 2 short-



- er than segment 1 (fig. 38C); abdomen white below; forewing length 17.0–18.0 mm ... *anomala* (Prout)
- 3(1) Subapical spot lying on vein  $R_5$  ..... 4  
 Subapical spot lying between  $R_{3+4}$  and  $R_5$ , not touching  $R_5$  (figs. 51, 52); a second postmedial spot near anal angle of forewing; base of forewing white with brown veins; first segment of labial palpus white with scattered brown scales; tegulae brown; forewing length 13.5–14.5 mm ..... *ciris* Druce
- 4(3) Anal margin of forewing brown (dorsal and ventral surfaces) ..... 5  
 Anal margin of forewing white below, white for middle third above (figs. 75, 76); a white basal dash behind discal cell merging with white medial region; first segment of labial palpus white; tegulae orange; forewing length 13.0–14.5 mm ..... *moyobamba*, n. sp.
- 5(4) Forewing with white, transverse medial band from subcosta to anal angle, not quite touching margin of wing (figs. 61–64); central portion of hind wing buff to brown; first segment of labial palpus white with scattered brown scales ... *memor* Warren  
 Dorsal surface of forewing entirely brown (except subapical spot), no white band (fig. 66); forewing fascia thinly scaled (figs. 69–71), white below (fig. 67); central portion of hind wing white; first segment of labial palpus light yellow ... *commixta* Warren

### *Frigida* Group

Characterized by the white, transverse subapical band on the forewing, and the white spot in the hind wing upper angle. The two *frigida* group species are larger than members of the *ciris* group. There is one major difference between the forewing fascia of the *ciris* and *frigida* groups: scales on the dorsal surface are arranged in neat, well-defined rows in *frigida* and *anomala* (figs. 24, 25), whereas they are more haphazard in the *ciris* group (figs. 58, 69). The male genitalia differ in that valvae of the *frigida* group have an acute (figs. 43B, 49D) rather than rounded (figs. 55A, 65A, 68B, 79A) apex, and there are coarse, spinelike setae on the lower margin (restricted to the apex in *anomala*). All of these characters are synapomorphies for the *frigida* group.

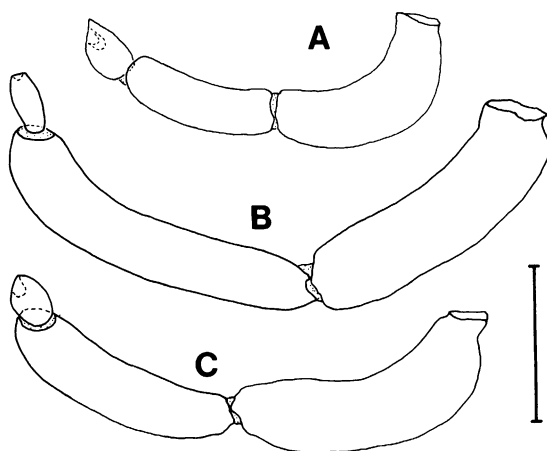


Fig. 38. Male left labial palpi, anterior at left (scale line = 0.5 mm). A, *Pareuchontha grandimacula* (Dognin). B, *Euchontha frigida* (Walker). C, *Euchontha anomala* (Prout).

### *Euchontha frigida* (Walker)

Figures 1, 2A, 3, 4, 16, 19, 24, 27–29, 32–34, 38B, 39–44

*Devara frigida* Walker, 1864: 185.

*Euchontha sublactigera* Walker, 1865: 383.

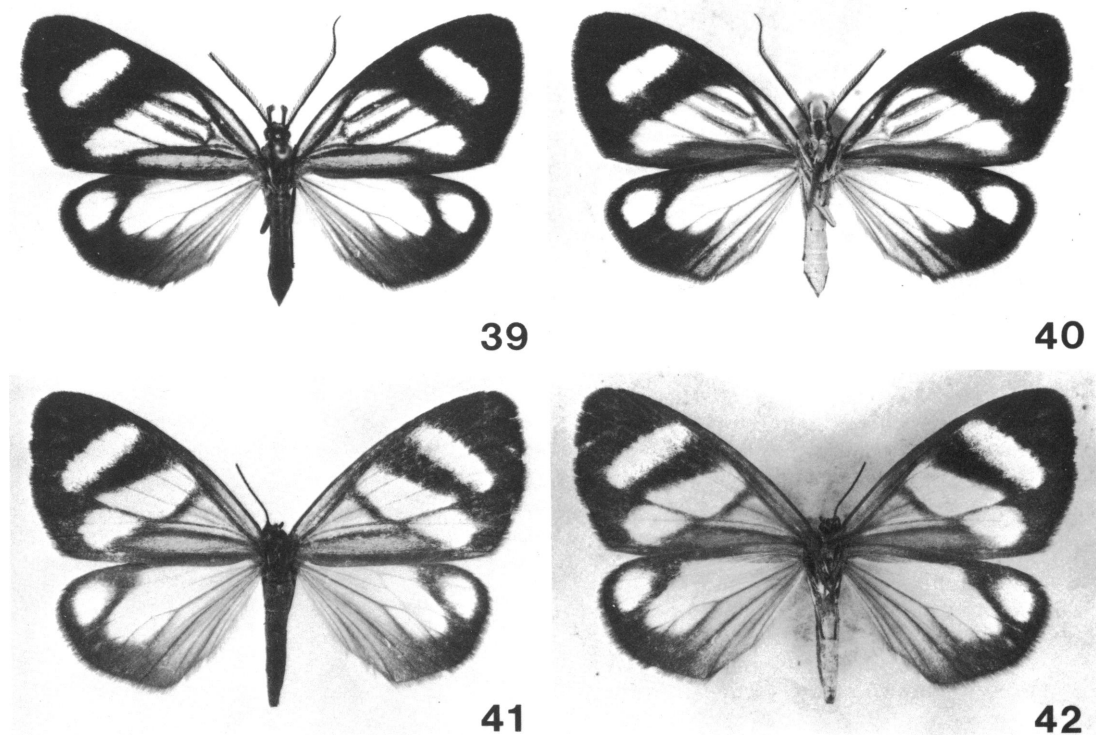
*Gnatholophia longinervis* R. Felder, 1868 (in Felder and Rogenhofer, 1874): pl. 105.

*Euchontha longicornis* [sic] Kirby, 1892: 431.

*Macroneurodes albimacula* Warren, 1900: 127.

**DIAGNOSIS:** Superficially similar to *E. anomala*, but distinguished by having more white in the forewings (the veins, especially  $M_2$ , not as dark), and white rather than brown veins in the hind wings. The two species are morphologically very different.

**REDESCRIPTION:** Male. Figures 39, 40. Forewing length 16.5–18.5 mm. **Head:** First segment of labial palpus orange in basal half and white in distal half, second and third segments brown on lateral surface, cream on mesal surface, light brown tuft on segment 3; segment 2 of labial palpus longer than segment 1, segment 3 elongate, Organ of vom Rath (1887) facing dorsally (fig. 38B); front white with brown horizontal band, scales pointing toward midline; vertex brown with white scales behind antennae and small white spot on top of head; occipital region white with brown scales dorsally; antennal scape brown, white on mesal surface; flagellum with brown scales dorsally. **Thorax:** Legs brown



Figs. 39–42. *Euchontha frigida* (Walker). 39. Male, dorsal view. 40. Male, ventral view. 41. Female, dorsal view. 42. Female, ventral view.

dorsally, cream to white ventrally, spurs white with a few brown scales; pleural region with mixture of brown and white scales (mostly white); patagia white with brown scales dorsally; tegulae orange with long brown and white scales on margins; dorsum mostly brown with white medial stripe. *Forewings* (Dorsal): White from base to distal edge of forewing fascia and near anal angle, dark chocolate-brown beyond; veins Sc, R,  $M_1$ , Cu, and A chocolate-brown from base (narrowly marked), costa light brown, anal margin brown; white transverse subapical band from  $R_2$  to  $M_3$ . (Ventral): Similar to dorsal surface except entire anal cell brown. (Forewing Fascia): Figures 2A, 3, 4 19, 24. Scales on dorsal surface arranged in neat, transverse rows, with two or three distal teeth per scale; scales on ventral surface variable in size and shape, no clearly defined size categories. *Hind wings*: Central portion white with broad, dark chocolate-brown band along outer margin;

veins white except CuA, which is brown; anterior and anal margins light brown; white spot near upper angle between Rs and  $M_1$ ; ventral surface similar except anal margin white with scattered brown scales, anal veins brown. *Abdomen*: Light brown dorsally with white stripe on midline from segment A1 to about A4; white ventrally with scattered cream-colored scales. *Terminalia*: Figure 43B–D. Valvae acute at apex, a row of coarse setae along distal margin; uncus small.

*Female*: Figures 41, 42. Forewing length 19.0–19.5 mm. Head, thorax, wing color and pattern, and abdomen similar to those of males; forewing discal cell longer, the dark veins along its distal margin forming medial line that is not apparent in males. *Genitalia*: Figure 43A. Sclerotized portion of ductus bursae short; corpus bursae oval-shaped, relatively large.

*DISTRIBUTION*: Figure 44. Central Colombia south to northern Bolivia.

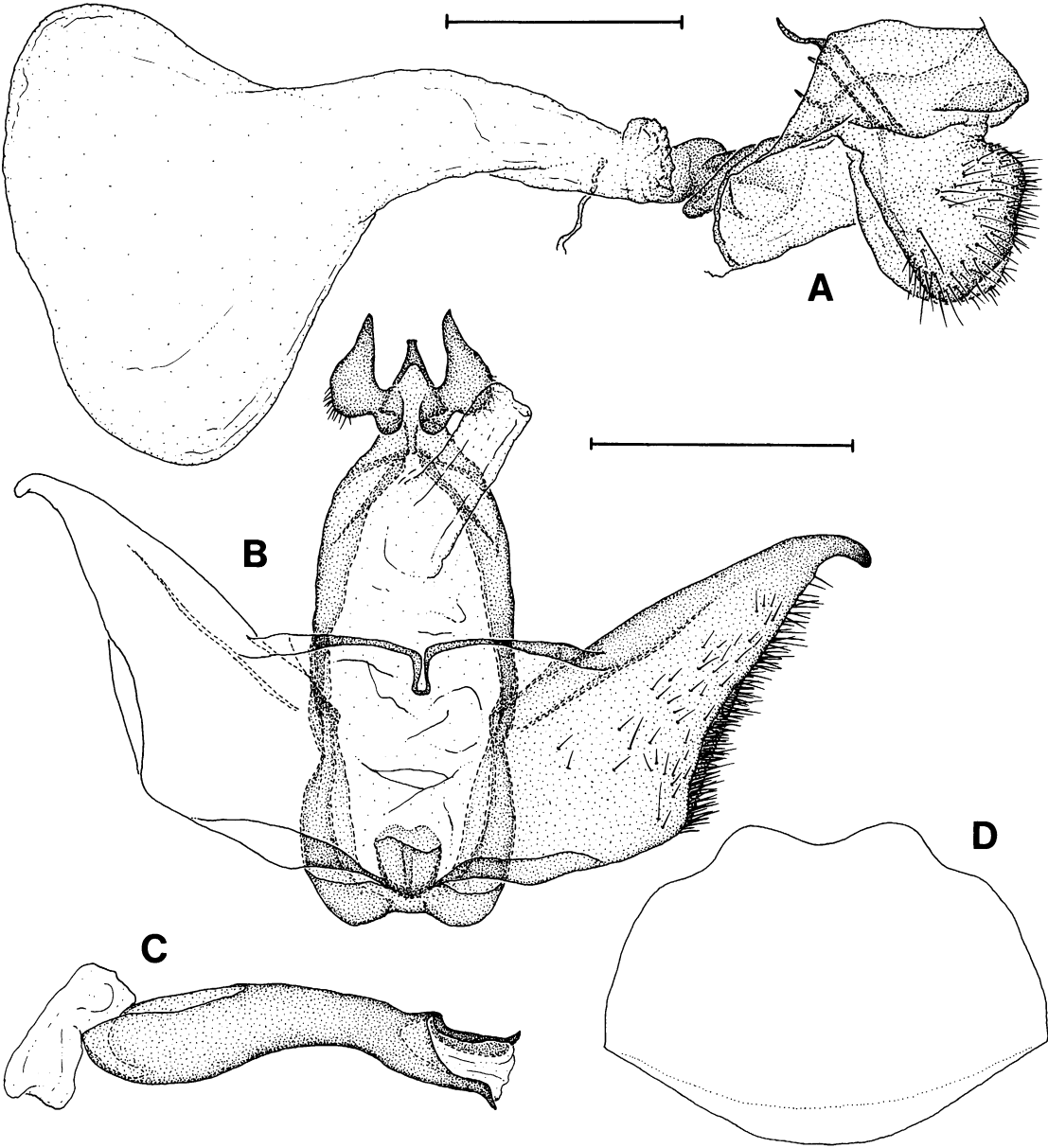


Fig. 43. Terminalia of *Euchontha frigida* (Walker) (scale lines = 1.0 mm). A, Female genitalia in lateral view, anterior at left (slide # JSM-236, AMNH). B, Male genitalia in posterior view with aedoeagus removed (slide # CU-608, JGF). C, Aedoeagus in lateral view, anterior at left. D, Sternum 8 in dorsal view, posterior at top.

DISCUSSION: This species has the broadest distribution in *Euchontha* and is the most common in collections, although female specimens are rare. Forbes (1931), recognizing this situation, searched in vain for females during the 1920 Cornell expedition to

Peru. Females are described here for the first time.

The following characters are apomorphic for *E. frigida*: Segment 1 of labial palpus orange in basal half, white in distal half; male genitalia with valve roughly triangular, a row

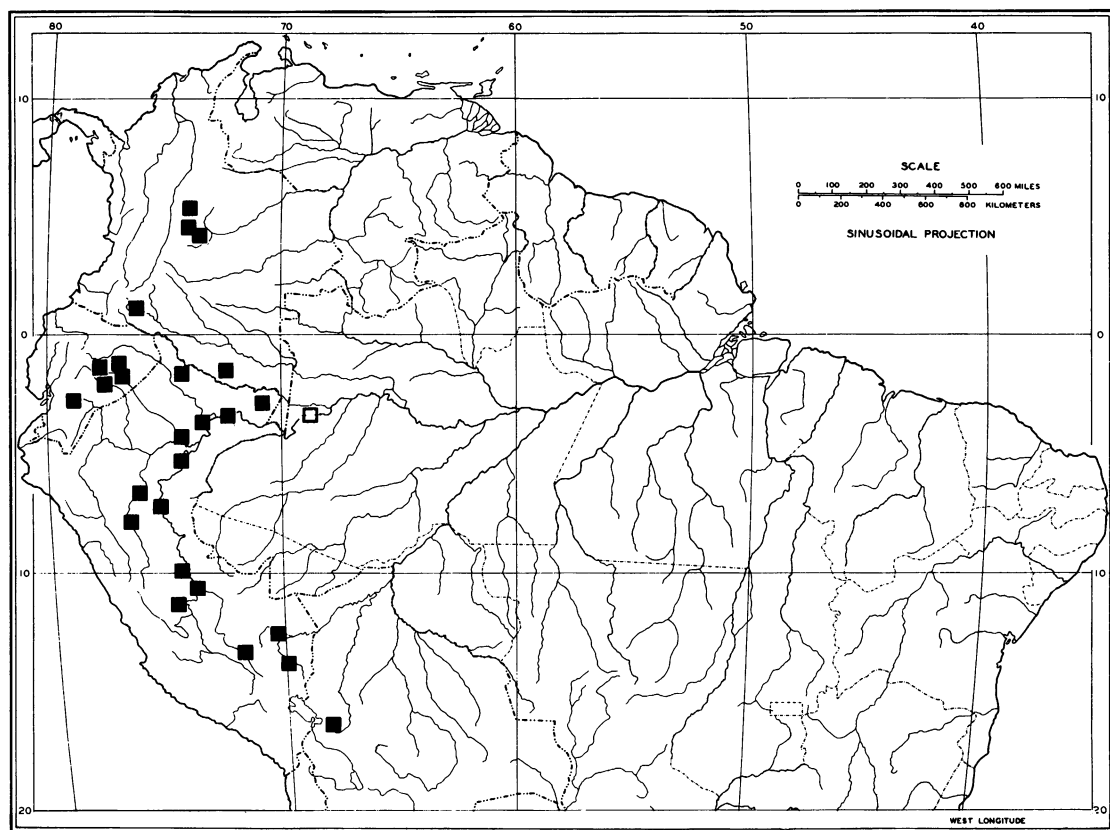


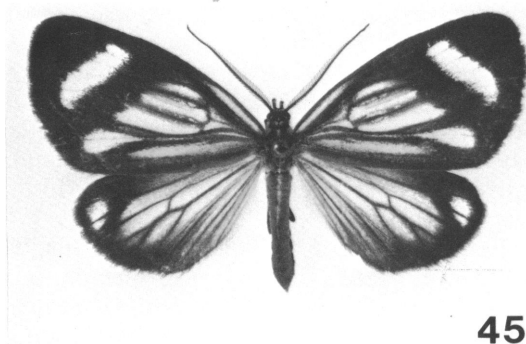
Fig. 44. Distribution of *frigida* group species. ■ *E. frigida* (Walker); □ *E. anomala* (Prout).

of stout setae along lower margin, uncus small and triangular; female genitalia with corpus bursae large.

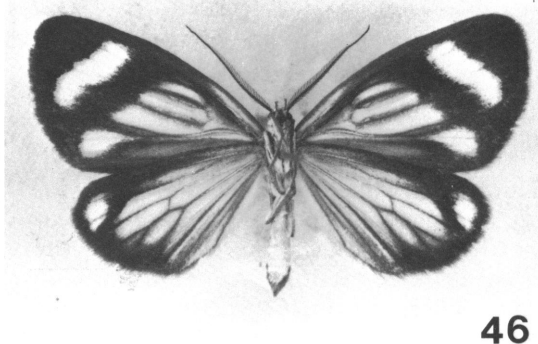
**HOLOTYPE MATERIAL:** The holotype of *frigida* (BMNH) bears these labels: "Cuenca [Ecuador]"; "Devara ? frigida."; a green holotype label. In poor condition; pinned to a small block of balsa, antennae missing.

Label data for the other types are as follows: *Sublactigera* ♂ (BMNH): Bogota, "Type" (green label), "Euchontha sublactigera Walker 1864". ♂ with these labels (BMNH), "Chambireyacú, near Yurimaquas, Juin-Août 1885, M. de Mathan, Gnatholophia longinervis. Felder. Novara - Pl. CV. Fig. 8, Ex. Musaeo Ach. Guénée," [description in French], "Ex. 1 male, Oberthür Coll., Brit. Mus. 1927-3," is probably the holotype of *longinervis* figured in Felder and Rogenhöfer (1874). *Albimacula* ♂ (BMNH): Bogota, "Albimacula, Type male, Warr."

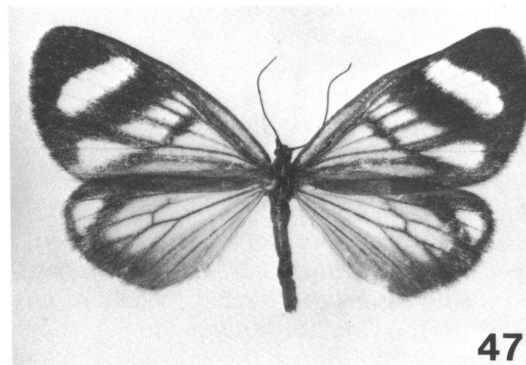
**OTHER SPECIMENS EXAMINED:** **Colombia:** 2♂ [no data], Schaus Collection (USNM); 2♂ [no data], Felipe Ovalle (AMNH); 2♂ [no data], Staudinger Collection (ZMH). **Amazonas:** 7♂, Putumayo, El Encanto, 24 Aug. 1920, Cornell Univ. Expedition (CU). **Cundinamarca:** 1♂, Muzo, (USNM); 1♂, Bogota, C.J. Paine Collection (MCZ); 1♂, Bogota, 1898 (BMNH); 1♂, Bogota, 1000 m (USNM). **Nariño:** 4♂, Mocoa, 1000 m, July 1946, K. von Sneidern (AMNH); 1♂, 550 m, 20-30 May 1922, Werner Hopp (ZMH). **Meta:** 1♂, Villavicencio, 400 m, Fassl (ZMH); 1♂, Villavicencio, 22 Oct. 1943, W. Hovanitz (CAS); 1♂, Apr. [no year], 2♂, "prés Bogota," (USNM); 1♂, "Pipiról prés Villa.," Jan. 1920, (USNM); 1♂, 400 m, Fassl (BMNH). **Ecuador:** 1♂ [no data], C. de Labonnefon (USNM). 5♂ [no data], "84.5, 80.74" (BMNH). **Napo Pastaza:** 1♂, km 25 on Puyò Napo Rd., 1200 m, 30 June 1980, M.D. Tay-



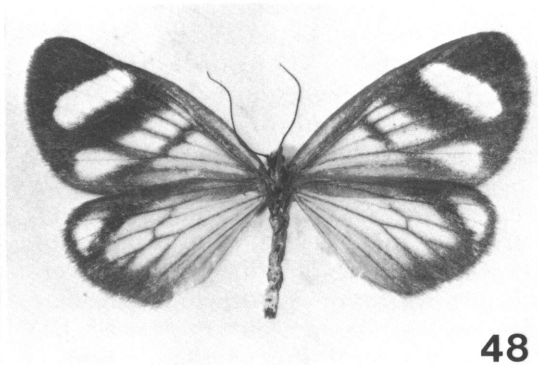
45



46



47



48

Figs. 45–48. *Euchontha anomala* (Prout). 45. Male, dorsal view. 46. Male, ventral view. 47. Female, dorsal view. 48. Female, ventral view.

lor (LACM); 1♂, 25 km SE of Puyo, 3400 ft, 28 June 1980, J.P. & K.E. Donahue (LACM); 1♂, Puyò, 1000 m, 26 Mar. 1950, William Clarke Macintyre (AMNH); 1♂, Allpayacu, Rio Pastaza, 3600 ft, M.G. Palmer (BMNH); 1♂, Sarayacu, (USNM); 5♂, Sarayacu, C. Buckley (BMNH). *Oriente*: 1♂, B. P. Clark (USNM). *Intaj*: 1♂, (BMNH). *Peru*: *Amazonas*: 3♂, R.H. Stretch Collection (CAS); 1♂, Henry Edwards Collection (AMNH); 3♂, Tarapote, 4<sup>e</sup> Trimestre 1885, M. de Mathan (BMNH); 1♂, Rio Santiago, Rio Yaupi, 31 Oct. 1924, H. Bassler (AMNH), 2♂, "Mouth of the Rio Santiago," 10–25 Oct. 1924, H. Bassler (AMNH). *Loreto*: 3♂, Yahuarmayo, 1200 ft, Mar. 1911, Feb.–Mar. 1912, H. & C. Watkins (BMNH); 1♂, Florida, Rio Putumayo, G. Klug (BMNH); 1♂, Iquitos, June 1932, 2♀, Feb. 1932, 11♂, Aug. 1932, G. Klug (BMNH); 2♂, Marañon, Upper Rio Niera, 30 Sept. 1924, H. Bassler (AMNH); 1♀, Upper Rio Niera, 23 Oct. 1929, H. Bassler (AMNH); 1♂, Yahuas (BMNH); 1♂, Rio Ucayali, 1893,

Stuart (BMNH). *San Martín*: 1♂, Achinamiza, Rio Huallaga, 28 Oct. 1927, H. Bassler (AMNH); 1♂, Shapaja, Upper Rio Huallaga, 17 Nov. 1926, H. Bassler (AMNH); 1♂, Tarapoto (ZMH); 1♂, det. M. Hering (BMNH). *Huánuco*: 1♂, Rio Huallaga, 1894 (ZMH). *Pasco*: 1♂, Rio Palcazú, Rio Umaripuñiz (BMNH). *Junín*: 4♂ and 4♀, Rio Negro, 800 m, Fassl (BMNH); 1♂, Satipo, Mar. [no year] (AMNH); 1♂, Satipo, Jan. [no year] (AMNH); 1♂, Satipo, Aug. 1948, Paprzycki (AMNH). *Madre de Dios*: 1♂, 500–1200 m, Fassl (BMNH); 1♂, 500–1200 m, Fassl (USNM); 1♂, 500–1200 m, Fassl (ZMH). *Cuzco*: 2♂, Cuzco, 1903 (USNM); 1♂, Mar. 1901, Garlepp (BMNH); 1♂, Cuzco, Cajon, Dec. 1900, Garlepp (BMNH). *Puno*: 1♂, Chinquimayo, 2500–3000 ft, May–Aug. 1910 (AMNH); 2♂, Carabaya, Rio Huacamayo, La Union, 2000 ft, Wet s., Nov. 1904, G. Ockenden (BMNH). *Bolivia*: *La Paz*: 2♂, La Paz, 1000 m, Garlepp (BMNH); 1♂, Yungas La Paz, 1904 (BMNH).

DISSECTED: 4 males, 3 females.

*Euchontha anomala* (Prout)  
 Figures 17, 18, 20, 21, 25, 26, 30,  
 31, 38C, 44-49

*Hadesina anomala* Prout, 1918: 418. New combination.

**DIAGNOSIS:** Superficially similar to *E. frigida*, but distinguished by the more translucent wings and darker veins, especially in the hind wings (figs. 45, 46). *Euchontha anomala* is very different from *E. frigida* in genitalic morphology of both sexes (fig. 49), and in color and shape of the labial palpi (fig. 38).

**REDESCRIPTION:** Male. Figures 45, 46. Forewing length 17.0-18.0 mm. *Head:* Entire first segment of labial palpus orange, second and third segments brown on lateral surface, cream on mesal surface; segment 1 of labial palpus longer than segment 2, segment 3 globose, acute at apex, Organ of vom Rath facing anteriorly (fig. 38C); front white with a pair of brown scale tufts pointing anteriorly; vertex brown with white spots behind antennae and a small white spot on top of head; occipital region white; antennal scape brown, with a few white scales on mesal surface; flagellum with light brown scales dorsally. *Thorax:* Legs light brown dorsally, cream to white ventrally, spurs white; pleural region with mixture of white and brown scales; patagia white, with patch of light brown scales; tegulae orange with long brown scales on margins, a few scattered white scales; dorsum brown with white medial stripe. *Forewings* (Dorsal): White from base to distal edge of forewing fascia and near anal angle, chocolate-brown beyond; veins Sc, R, M<sub>1</sub>, M<sub>2</sub>, Cu, and A chocolate-brown from base (widely marked), costa light brown, anal margin brown; white transverse subapical band from R<sub>2</sub> to M<sub>3</sub>. (Ventral): Similar to dorsal surface except entire anal cell brown. (Forewing Fascia): Figures 17, 18, 20, 21, 25, 26. Dorsal surface with scales quite widely distributed, arranged in rows, variable in size with two distal teeth per scale, almost all scales with longitudinal ridge; scales on ventral surface in roughly three size classes: elongate; moderately long; and short, heart shaped. *Hind wings:* White, translucent; broad chocolate-brown band along outer margin; veins chocolate-brown; anterior and anal margins light brown; white spot near upper angle between Rs and M<sub>1</sub>; ventral surface similar except anal

margin white with scattered brown scales, anal veins brown. *Abdomen:* Light brown scales dorsally with white stripe on midline from about segment A1 to A4; white ventrally with scattered cream-colored scales. *Terminalia:* Figure 49B-D. Uncus absent; socii long, acute; valve with coarse setae at apex only; aedoeagus curved.

**Female.** Figures 47, 48. Forewing length 19.5 mm. Head, thorax, wing maculation, and abdomen similar to males. *Genitalia:* Figure 49A. Sclerotized portion of ductus bursae long, thick; corpus bursae round; posterior apophyses short.

**DISTRIBUTION:** Figure 44. Sao Paulo d'Oliveira, Brazil, is the only confirmed locality for this species. The holotype female, collected by Bates, simply gives "Amazons" as the locality, which may or may not refer to Sao Paulo d'Oliveira.

**DISCUSSION:** Prout (1918) described a species in the genus *Hadesina* Warren based on a single damaged female specimen, now at the BMNH and formerly in the Felder collection. Prout regarded that species, which he named *H. anomala*, as a possible "connecting link with *Diopsis*" (1918: 418). During a visit to the BMNH (April 1988), I recognized Prout's holotype of *anomala* as a female *Euchontha*, and upon dissection, could associate it with a series of specimens at the BMNH labeled by Baron de Worms as "new species W." That series includes five males and a single female, all from Sao Paulo d'Oliveira, Brazil. I have therefore transferred *Hadesina anomala* to *Euchontha*, and describe males of the species for the first time.

This species is closely related to *E. frigida*. The following characters are apomorphic for *E. anomala*: Hind wing semitransparent with dark veins; third segment of labial palpus globose with an acute apex; male tergum 8 sclerotized on posterior margin, rooflike; male genitalia with uncus absent, socii long, apex of valve with small cluster of stout setae.

**HOLOTYPE FEMALE** (BMNH): These labels: "Bates" (handwritten); "[Brazil:] Amazonas, Bates, Felder Collection"; "Hadesina anomala Prout, ♀ type"; Rothschild Bequest, B.M. 1931-1.; a red holotype label; "genitalia slide #JSM-276." In poor condition; antennae missing, wings damaged.

**OTHER SPECIMENS EXAMINED:** **Brazil:** *Amazons:* Sao Paulo d'Oliveira, 1♀, Aug.

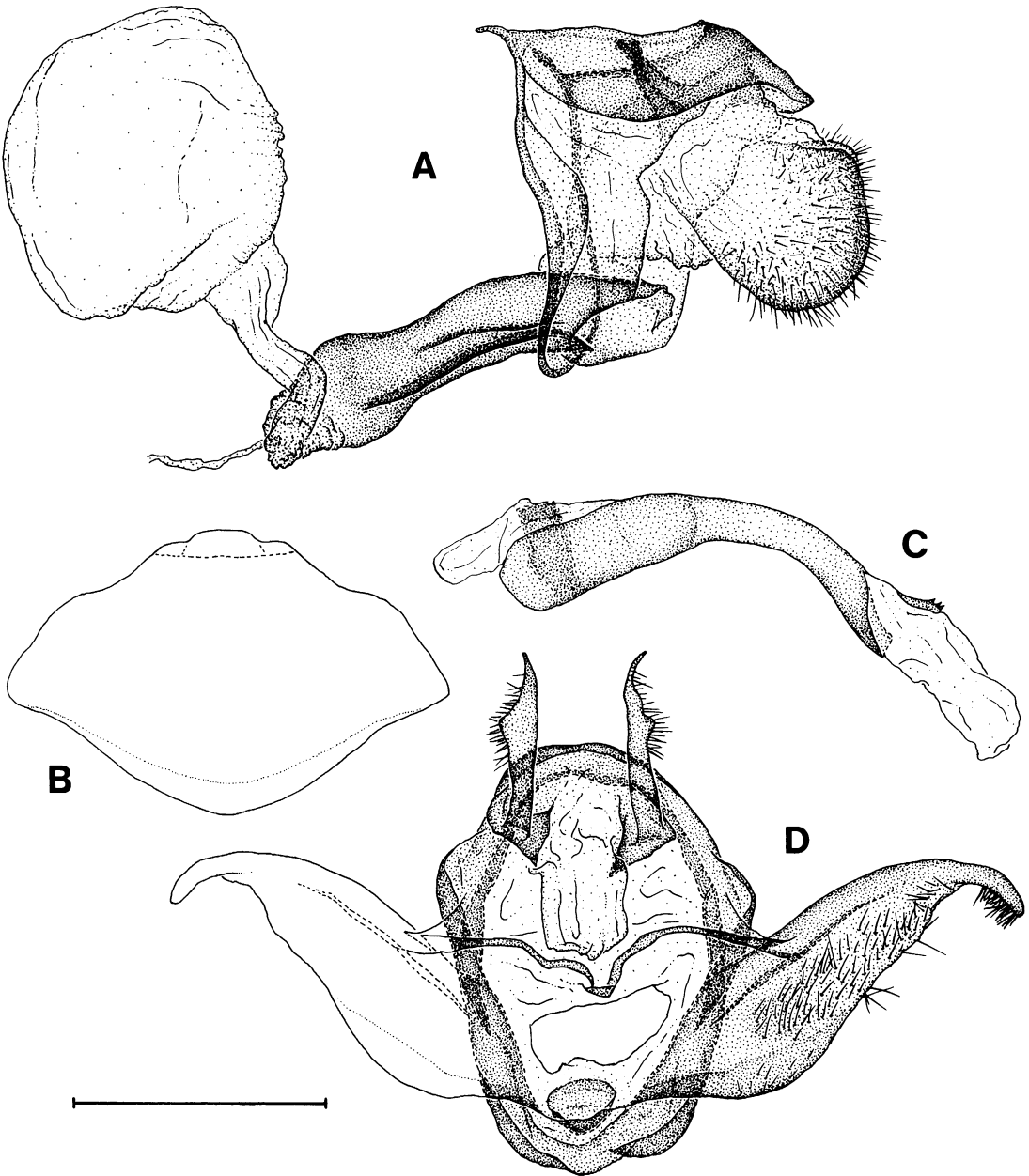


Fig. 49. Terminalia of *Euchontha anomala* (Prout) (scale line = 1.0 mm). A, Female genitalia in lateral view, anterior at left (paratype, slide # JSM-241, BMNH). B-D, Male genitalia (paratype, slide # JSM-242, BMNH). B, Male sternum 8 in dorsal view, posterior at top. C, Aedoeagus in lateral view, anterior at left. D, Male genitalia in posterior view with aedoeagus removed.

(BMNH); 1♂, Aug.-Sept. 1878, M. de Mathan (BMNH); 2♂, June-July 1883, M. de Mathan (BMNH); 1♂, M. de Mathan (BMNH); 1♂, "34. 26." (BMNH); 1♂, Michaelis (ZMH).  
 DISSECTED: 3 males, 2 females.

*Ciris* Group

The four species in the *ciris* group are very closely related. There are few differences in male genitalia. Because the number of avail-

able specimens is small, and known distributions are probably incomplete, I have not relied on genitalic differences to separate species. Labial palpus shape (fig. 50) can be used to differentiate *E. memor* from the other species. The most reliable distinguishing characters are differences in maculation of the wings, labial palpi, and tegulae. Segment 8 of the male, which often provides useful species characters for dioptids and notodontids, is unmodified. I took scanning electron micrographs of the forewing fascia for all four species; the fascia of *commixta* is unique (see below). Synapomorphies for the *ciris* group include: valve constricted in distal third and aedoeagus with beaklike distal process ventrally.

*Euchontha ciris* Druce

Figures 50B, 51–57, 60

*Euchontha ciris* Druce, 1893: 297.

*Monocreaga? ciris* Dognin, 1894a: 73.

*Monocreaga? clareta* Dognin, 1894b: 239. NEW SYNONYMY.

**DIAGNOSIS:** This is the only *Euchontha* species in which the brown portion of the male forewing has both a subapical spot, and a spot near the anal angle (figs. 51, 52). It can also be distinguished from other *ciris*-group species by the white forewing base with dark veins.

**REDESCRIPTION:** Male. Figures 51, 52. Forewing length 13.5–14.5 mm. *Head:* Scales on first segment of labial palpus white with scattered brown scales, second and third segments chocolate-brown on lateral surface, cream on mesal surface, segment 3 oval shaped (fig. 50B); front cream colored with chocolate-brown horizontal band, scales pointing toward midline; vertex brown with white bands behind antennae and a white spot on top of head; occipital region white with scattered brown scales; antennae with scape brown on lateral surface, cream on mesal surface, flagellum with brown scales dorsally. *Thorax:* Legs brown dorsally, white ventrally, spurs white; pleural region with mixture of white, cream, and brown scales; patagia with brown and white scales; tegulae brown with long, white scales on margins; dorsum white with two brown, longitudinal stripes. *Forewings* (Dorsal): Basal two-fifths

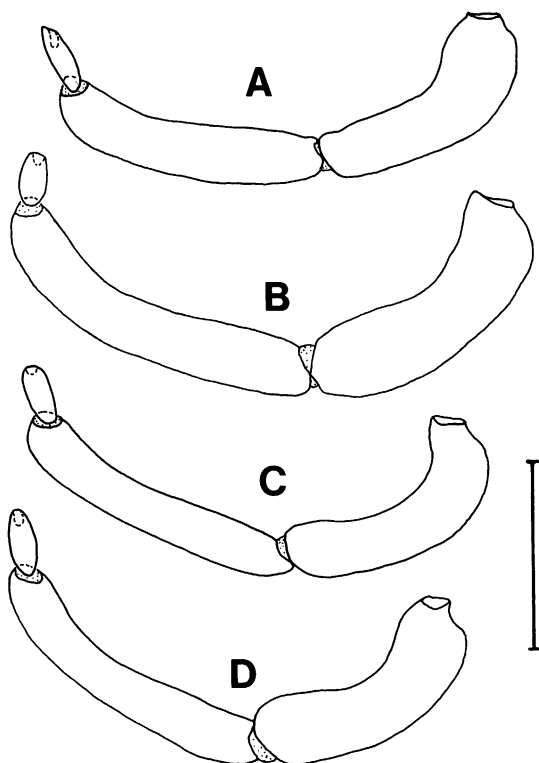
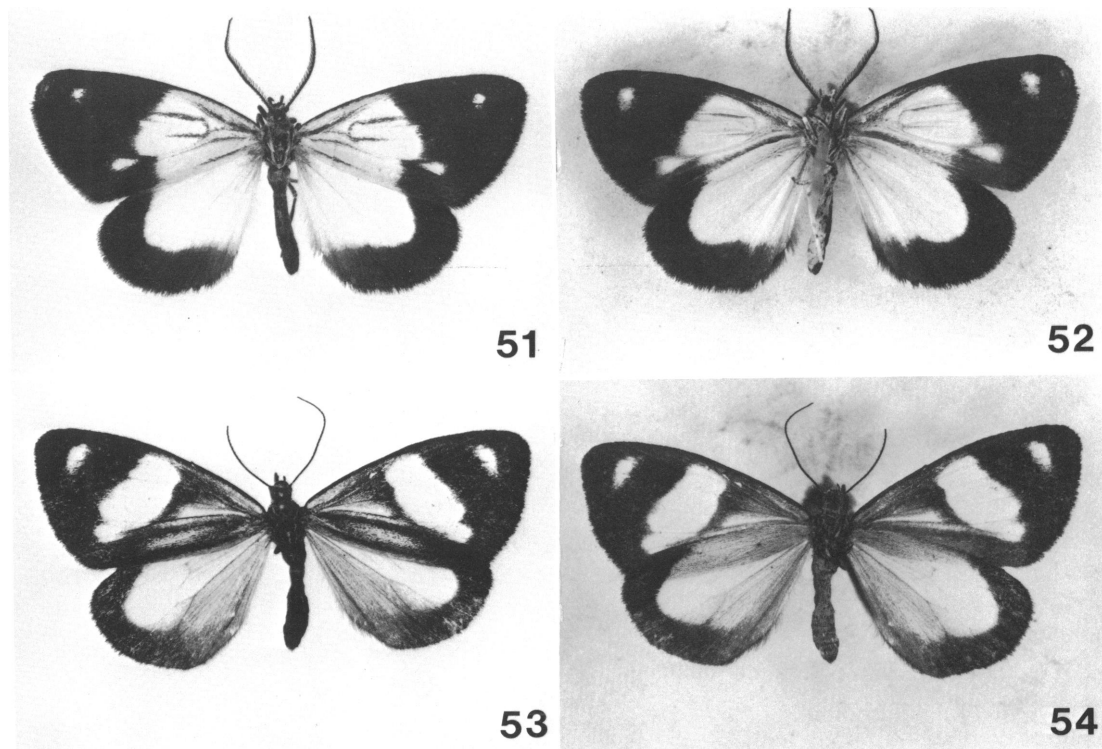


Fig. 50. Male left labial palpi of *ciris* group species, anterior at left (scale line = 0.5 mm). A, *Euchontha memor* Warren. B, *Euchontha ciris* Druce. C, *Euchontha commixta* Warren. D, *Euchontha moyobamba*, new species.

white with a suffusion of cream-colored scales, distal three-fifths dark chocolate-brown; veins Sc, R,  $M_1$ ,  $M_2$ , Cu, and A brown through white portion of wing; small white subapical spot between  $R_{3+4}$  and  $R_5$ ; small white postmedial spot near anal angle between  $M_3 + CuA_1$  and  $CuA_2$ . (Ventral): Base white with scattered brown scales; fascia area white; dark chocolate-brown from forewing fascia to outer margin; anal margin light brown; white subapical and postmedial spots corresponding with those on dorsal surface. (Forewing Fascia): Figures 56, 57. Scales on dorsal surface densely distributed (little underlying surface visible), broad, with three or four distal points; scales on ventral surface in roughly three size classes: long; moderate; and short, heart-shaped. *Hind wings:* White with broad, dark chocolate-brown band on outer margin, anal margin with scattered brown scales; ven-





Figs. 51–54. *Euchontha ciris* Druce. 51. Male, dorsal view. 52. Male, ventral view. 53. Female, dorsal view. 54. Female, ventral view.

tral surface the same. *Abdomen*: A mixture of brown and white scales dorsally, terminal segments brown; cream colored ventrally. *Genitalia*: Figure 55A, B. Valvae fairly wide, apical setae long.

Female: Figures 53, 54. Forewing length 15.0 mm. All features of the head and thorax are similar to those of males. *Forewings* (Dorsal): From base to end of discal cell a mixture of white and brown scales; veins brown, more diffuse than in male; broad white transverse medial band from subcosta to  $CuA_2$  (post-medial spot found in males is incorporated into this band), brown beyond; white subapical spot. (Ventral): Similar to dorsal surface except anal margin light brown. *Hind wings*: White with broad, brown band on outer margin; anal margin light brown; ventral surface the same. *Abdomen*: Cream and brown scales dorsally, cream colored ventrally. *Genitalia*: Figure 55C. Tergum 8 relatively narrow; papillae anales slightly emarginate.

**DISTRIBUTION**: Figure 60. Known only from Intaj, Loja, and Sarayacu, Ecuador. Other *cir-*

*is* group species have more southerly distributions (Peru and Bolivia).

**DISCUSSION**: *Monocreaga clareta* was described by Dognin (1894b), and placed by Prout (1918) in *Euchontha*. Dognin's holotype (USNM), which he misidentified as a male, is a female (see also Forbes, 1931: 69). On the basis of wing maculation, body pigmentation, and locality (Loja, Ecuador), I believe it to be the only known female specimen of *E. ciris*. Except for the size of the subapical spot, it can be identified as *ciris* using the key. In *Euchontha*, female wing pattern differs markedly from that of males, largely because of the sexually dimorphic wing venation.

Apomorphies for *E. ciris* males are the white postmedial forewing spot near the anal angle, and the long setae on the valval apex.

**HOLOTYPE MALE** (BMNH): These labels: "Ecuador [Pichincha] Intaj, C. Buckley"; a red holotype label; an identification label as "*Euchontha ciris* ♂ Druce"; and a label stating "Presented by J.J. Joicey Esq., Brit. Mus. 1931-444." In good condition.

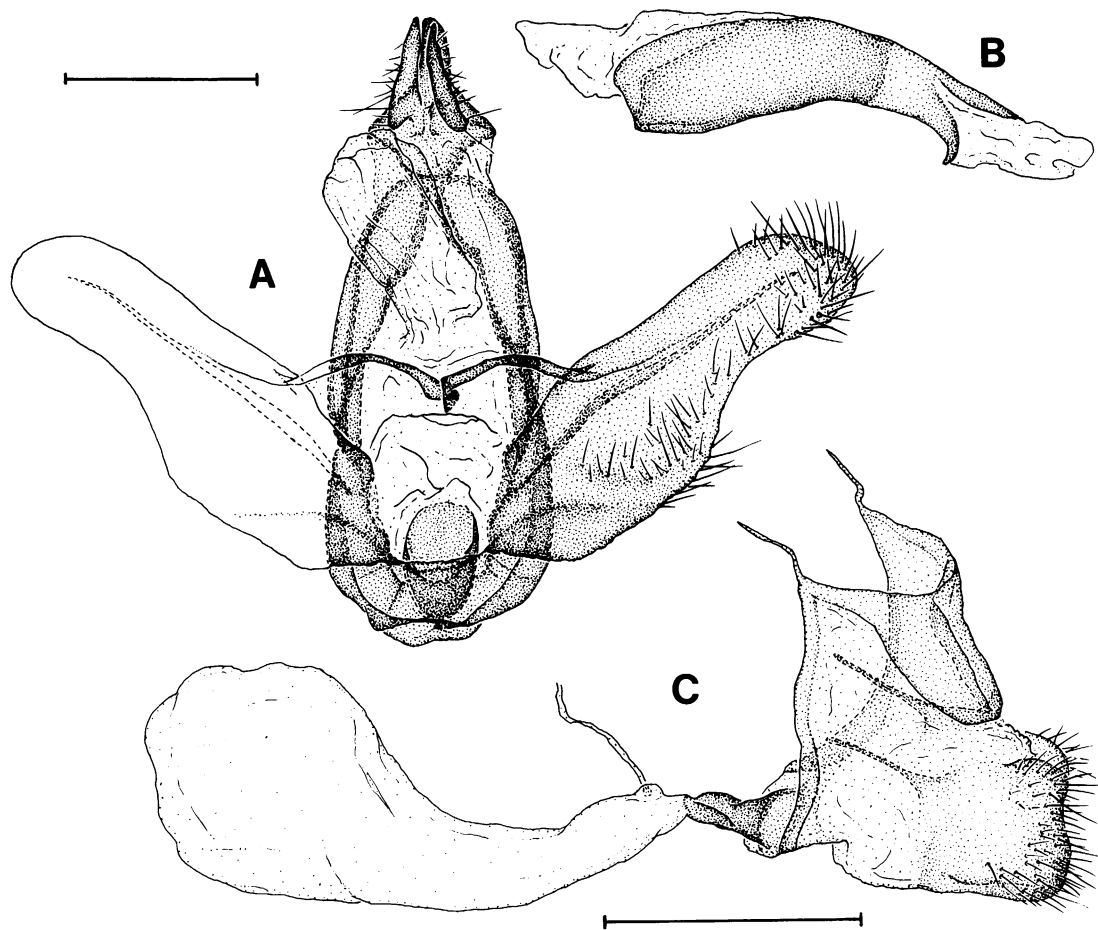


Fig. 55. Genitalia of *Euchontha ciris* Druce. **A, B**, Male genitalia (scale line = 0.5 mm; slide # JSM-242, BMNH). **A**, Genitalia in posterior view with aedeagus removed. **B**, Aedeagus in lateral view, anterior at left. **C**, Female genitalia in lateral view, anterior at left (scale line = 1.0 mm).

The label data for the two other types are as follows: *Clareta* female Dognin (USNM): “**Ecuador** [*Loja*], San-Francisco, aout [18]86 ♂; Dognin Collection, type figure aout 96”; two red holotype labels, Type No. 30949 U.S.N.M., and Type No. 30965 U.S.N.M. There are two additional handwritten labels, “*Monocreaga? clareta* type ♂ Dgn., c’et une erreur, c’et une ♀,” and “nicht im Berlin, Mar. 1891.” The ♂ type of *ciris* Dognin may be a specimen at the USNM with these labels: “[**Ecuador: Santiago-Zamora**] Zamora, Equateur, mars [18]86; 34.; nicht im Berlin, Mar. 1891.”

OTHER SPECIMENS EXAMINED: **Ecuador**: *Napo Pastaza*: 1♂, Sarayacu, C. Buckley (ZMH); 6♂, C. Buckley (BMNH). *Pichincha*: 3♂, Intaj, C. Buckley (BMNH). *Santiago-Za-*

*mora*: 1♂, Zamora, Mar. 1986, “34.”, (USNM).

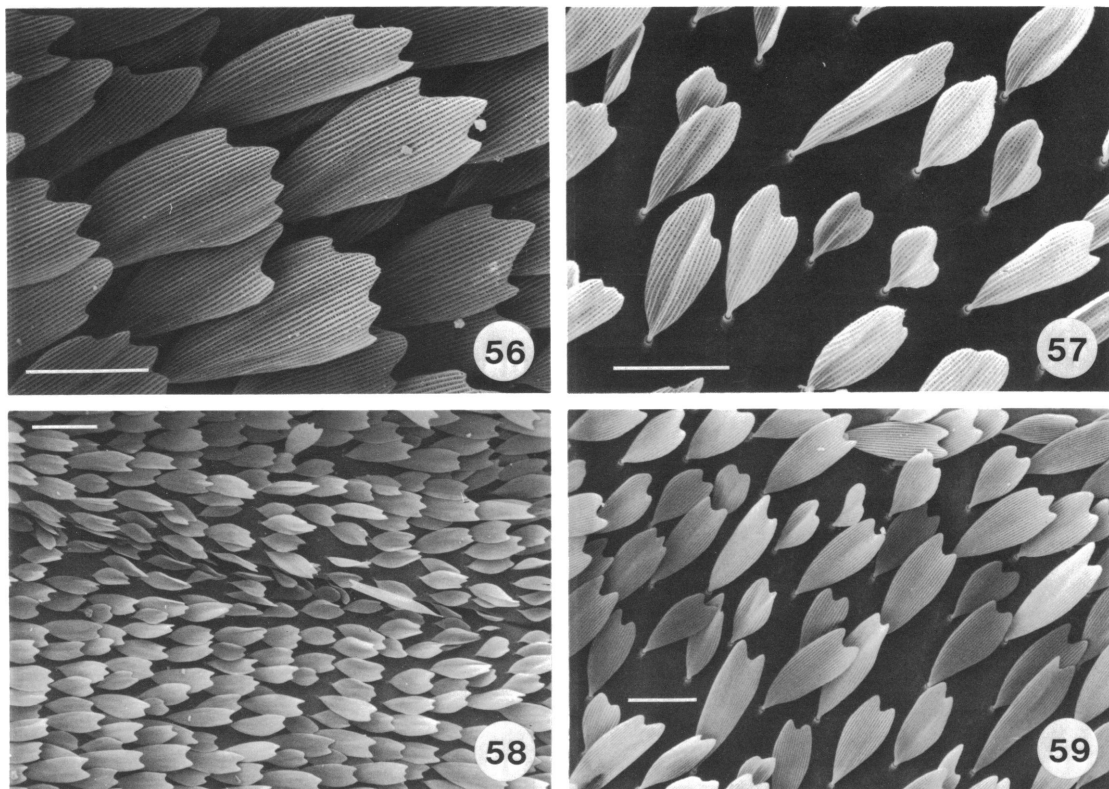
DISSECTED: 3 males, 1 female.

*Euchontha memor* Warren  
Figures 5, 6, 50A, 58–65

*Euchontha memor* Warren, 1904: 16.

DIAGNOSIS: *Euchontha memor* can easily be distinguished from other members of the genus by the brown forewing base with cream-colored veins, and the broad, white transverse medial band (figs. 61–64).

REDESCRIPTION: Male. Figures 61–64. Forewing length 13.0–14.0 mm. *Head*: First segment of labial palpus white with scattered brown scales, second and third segments chocolate-brown on lateral surface, cream on



Figs. 56, 57. Forewing fascia of *Euchontha ciris* Druce, male (50  $\mu$ m). 56. Dorsal surface near fold. 57. Ventral surface near fold.

Figs. 58, 59. Forewing fascia of *Euchontha memor* Warren, male. 58. Fold, dorsal surface (100  $\mu$ m). 59. Ventral surface, near fold (50  $\mu$ m). (Scale lengths in parentheses.)

mesal surface, segment 3 elongate, acute at apex (fig. 50A); front cream colored (a mixture of cream and brown scales in clypeal region), chocolate-brown horizontal band, scales pointing toward midline; vertex brown with white spots behind antennae and small white spot on top of head; occipital region white with a few brown scales; antennal scape brown with cream on mesal surface, flagellum with brown scales dorsally. *Thorax*: Legs brown dorsally, cream to white ventrally, spurs white; pleural region with a mixture of white and brown scales; patagia with brown and white scales; tegulae orange with long brown and cream scales on margins; dorsum brown with white medial stripe. *Forewings* (Dorsal): Brown from base to just beyond discal cell and to near anal angle; broad, white transverse medial band from subcosta to just short of anal margin, chocolate brown beyond medial band; veins Sc, R, M<sub>1</sub>, M<sub>2</sub>, Cu,

and A cream colored at base, light brown beyond medial band; white subapical spot between R<sub>3+4</sub> and M<sub>3</sub>, R<sub>5</sub> brown through it. (Ventral): Base brown with scattered white and cream scales; fascia area white; chocolate-brown from fascia to outer margin. (Forewing Fascia): Figures 58, 59. Dorsal surface with densely distributed, relatively broad scales; ventral surface with scales in roughly three size classes: moderately long; broad; and short, almost heart-shaped. *Hind wings*: Buff to brown, veins often cream colored, a brown band on outer margin (not distinguishable in Tingo Maria specimens, figs. 61, 62); upper angle darker brown, anterior margin white; anal margin with scattered brown scales; ventral surface with similar markings but lighter. *Abdomen*: Brown dorsally, with a few buff and cream scales; buff and cream scales ventrally. *Terminalia*: Figure 65. Valvae relatively narrow; ring constricted.

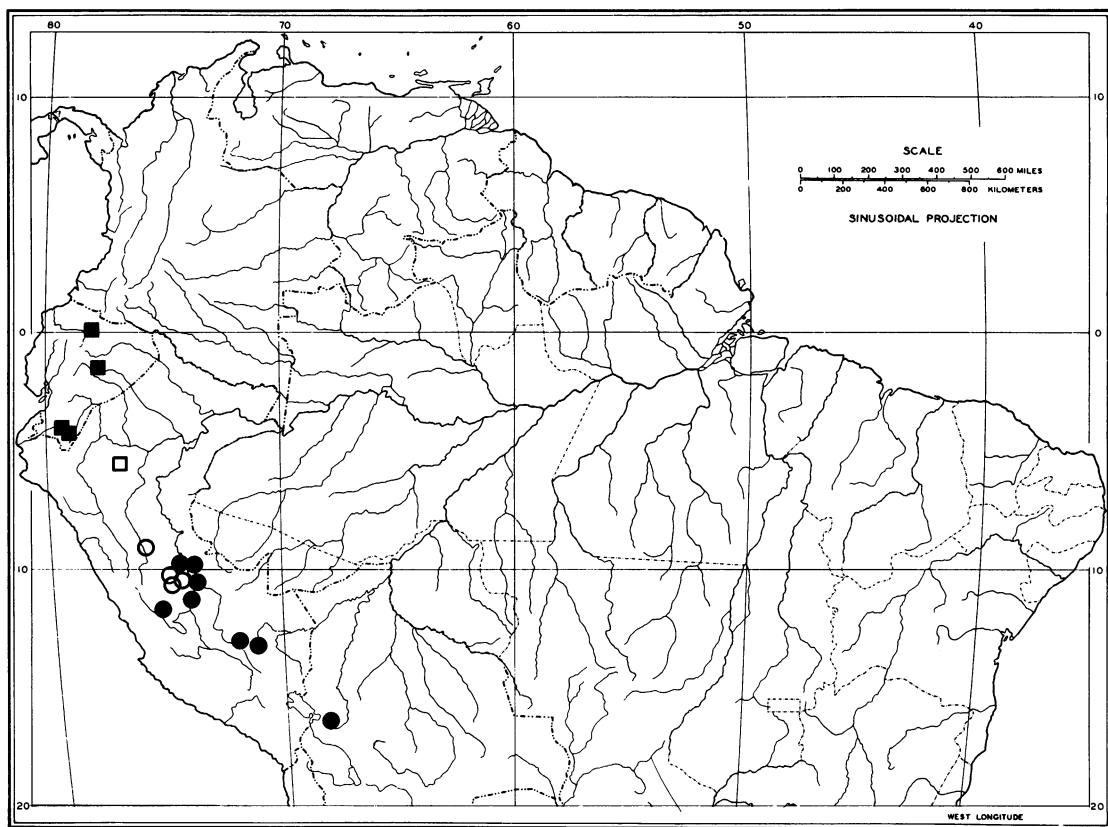


Fig. 60. Distribution of *ciris* group species. ■ *E. ciris* Druce; □ *E. moyobamba*, new species; ○ *E. memor* Warren; ● *E. commixta* Warren.

Female: No specimens known.

**DISTRIBUTION:** Figure 60. Found only in central Peru at elevations between 780 and 1400 m.

**DISCUSSION:** This species has been called *E. clareta* in collections and in Hering (1925). Because I have synonymized *Monocreaga clareta* Dognin with *E. ciris* Druce, the name *memor* Warren becomes available.

Two USNM specimens from Tingo Maria (figs. 61, 62) are darker than others I have seen, but do not differ in genitalic morphology.

The following are apomorphic for *E. memor*: Upper angle of hind wing ventral surface with dark spot; central portion of hind wing dorsal surface brown to buff; segment 3 of labial palpus acute.

**HOLOTYPE MALE** (BMNH): These labels: "[Peru: Junín] Chanchamayo, I.-VIII. 01., (Hofmann); *Euchontha memor*, Type ♂ Warr." (handwritten); "Rothschild Bequest

B.M. 1939-1."; a red type label. In fair condition; right hind wing damaged.

**OTHER SPECIMENS EXAMINED:** Peru: Junín: 1♂, Rio Chanchamayo, July 1930 (CU); 2♂, La Merced, 2500–3500 ft, 10 Nov. 1919, 1♂, 3000–4500 ft, 1 Feb. 1920, C. Watkins (BMNH); 1♂, Colonia del Perené, Hacienda No. 2, 8 June 1920, Cornell Univ. Expedition, det. W.T.M. Forbes (CU); 1♂, Upper Rio Toro, 8 Sept. 1901, Simons (BMNH). Huánuco: 2♂, Tingo Maria, 12 Dec. 1949, H.A. Allard (USNM).

**DISSECTED:** 6 males.

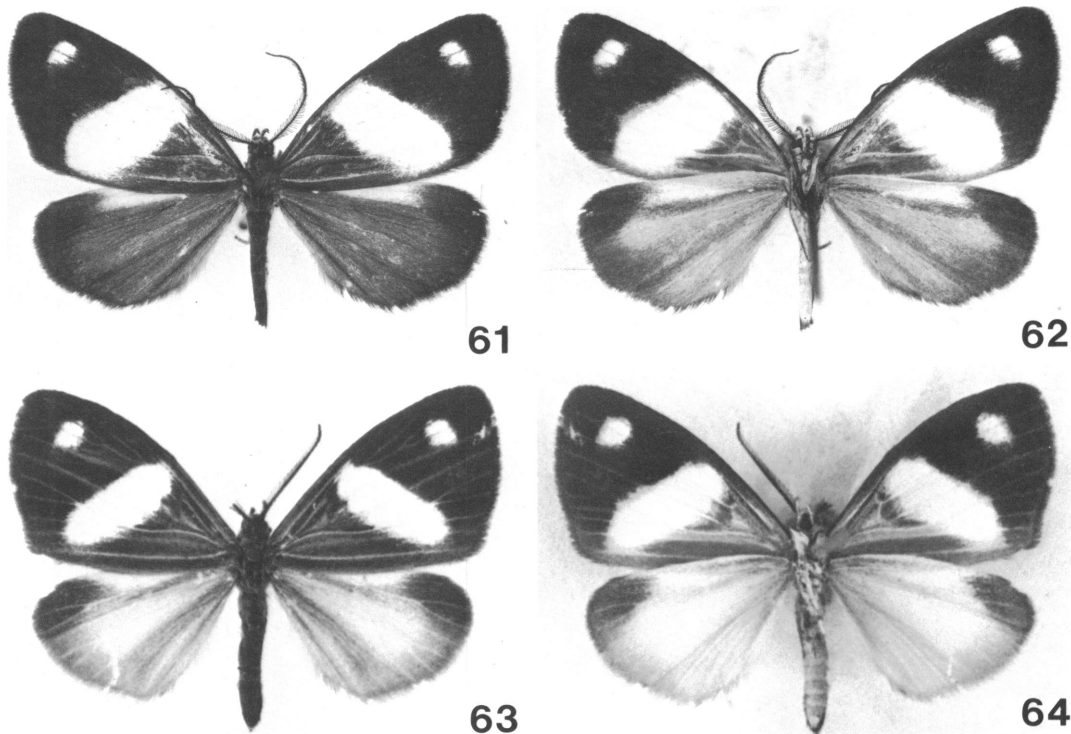
*Euchontha commixta* Warren

Figures 50C, 60, 66–72

*Euchontha commixta* Warren, 1904: 16.

*Devara chilion* Druce, 1907: 303.

**DIAGNOSIS:** Recognized by a mostly brown forewing with a translucent forewing fascia and a translucent subapical spot, both of which are white below.



Figs. 61–64. *Euchontha memor* Warren. 61. Male (Tingo Maria), dorsal view. 62. Male (Tingo Maria), ventral view. 63. Male (La Merced), dorsal view. 64. Male (La Merced), ventral view.

**REDESCRIPTION:** Male. Figures 66, 67. Forewing length 13.0–14.0 mm. *Head:* Scales on first segment of labial palpus light yellow, second and third segments brown on lateral surface, white on mesal surface; segment 2 of labial palpus longer than segment 1, segment 3 oval-shaped and blunt apically (fig. 50C); front mostly brown, with cream and brown scales in clypeal region and white scales below antennae; vertex brown with white spots behind antennae and white spot on top of head; occipital region white with small brown patch dorsally; antennal scape brown with white scales on mesal surface; flagellum with light brown scales dorsally. *Thorax:* Legs light brown dorsally, white ventrally, spurs white; pleural region mostly white, with a few brown scales; patagia white with patch of brown scales; tegulae orange with long brown and white scales on margins; dorsum mostly brown with buff to light yellow medial stripe. *Forewings (Dorsal):* Chocolate-brown, somewhat lighter at base; veins light brown to buff; fascia semitransparent; a semitransparent

subapical spot from  $R_{3+4}$  to between  $M_1$  and  $M_2$ . (*Ventral:*) Similar to dorsal surface except discal cell, fascia and subapical spot with white scales, anal margin light brown. (*Forewing Fascia:*) Figures 69–72. Dorsal scales elongate, widely separated, especially above  $M_1$  and in fold; scales on ventral surface widely separated, in roughly three size categories: elongate; broad; and short, paddle-shaped, the latter without dentations. *Hind wings:* White, with broad chocolate-brown band along outer margin; anterior margin white, anal margin with white and light brown scales; ventral surface similar to dorsal surface. *Abdomen:* Brown scales dorsally with white stripe on midline from segment A1 to about segment A3; cream scales ventrally. *Genitalia:* Figure 68. There is considerable variation in shape of the uncus, socii, and valve among the specimens dissected. Ring constricted at junction of tegumen and vinculum; juxta elongate; ventral tooth on aedeagus long.

Female: No specimens known.

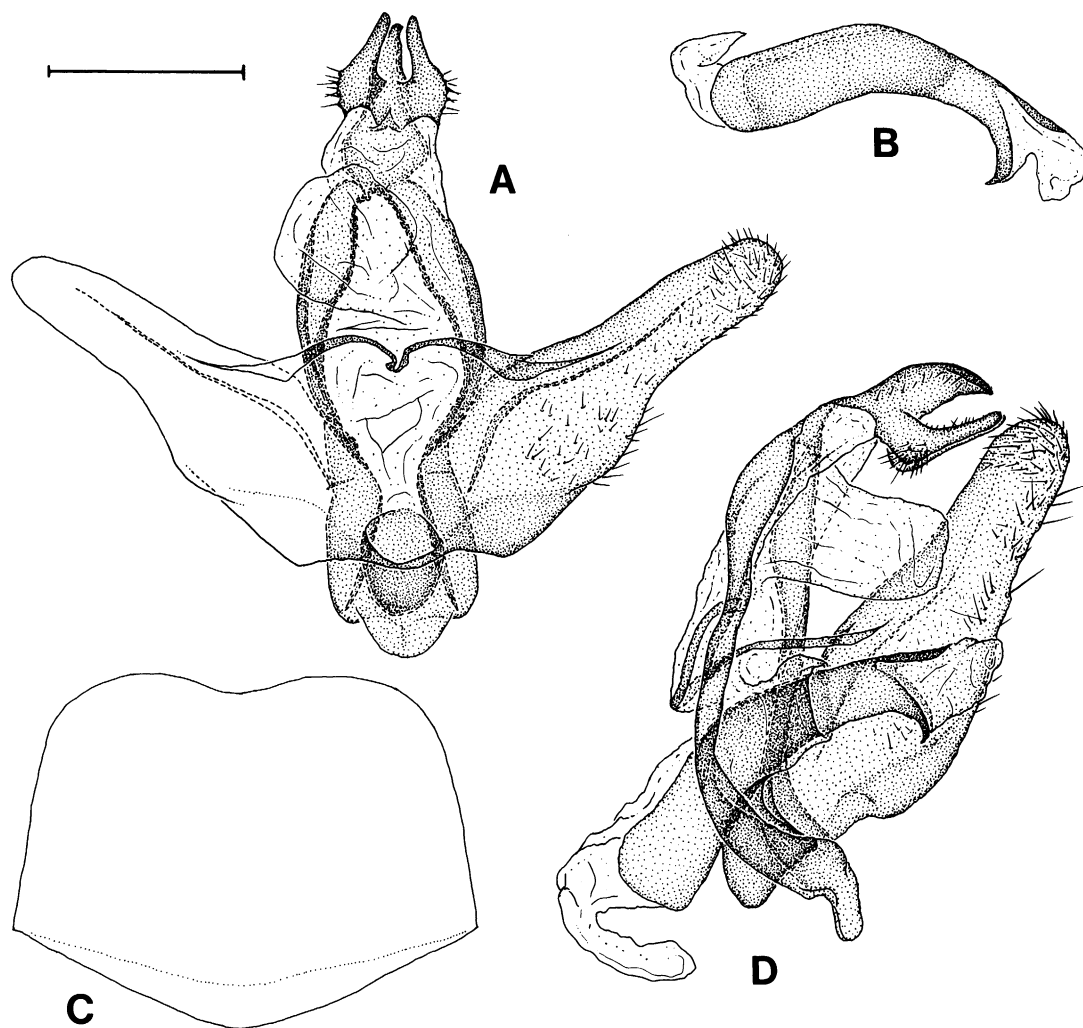
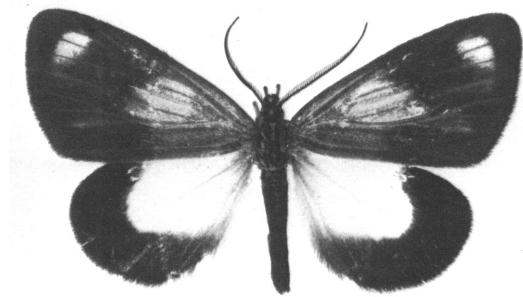
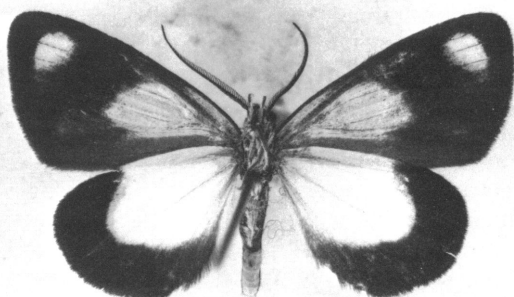


Fig. 65. Male terminalia of *Euchontha memor* Warren (scale line = 1.0 mm; slide # JSM-254, CU). A, Genitalia in posterior view with aedeagus removed. B, Aedeagus in lateral view, anterior at left. C, Sternum 8 in dorsal view, posterior at top. D, Genitalia in lateral view, anterior at left.



66



67

Figs. 66, 67. *Euchontha commixta* Warren, male. 66. Dorsal view. 67. Ventral view.

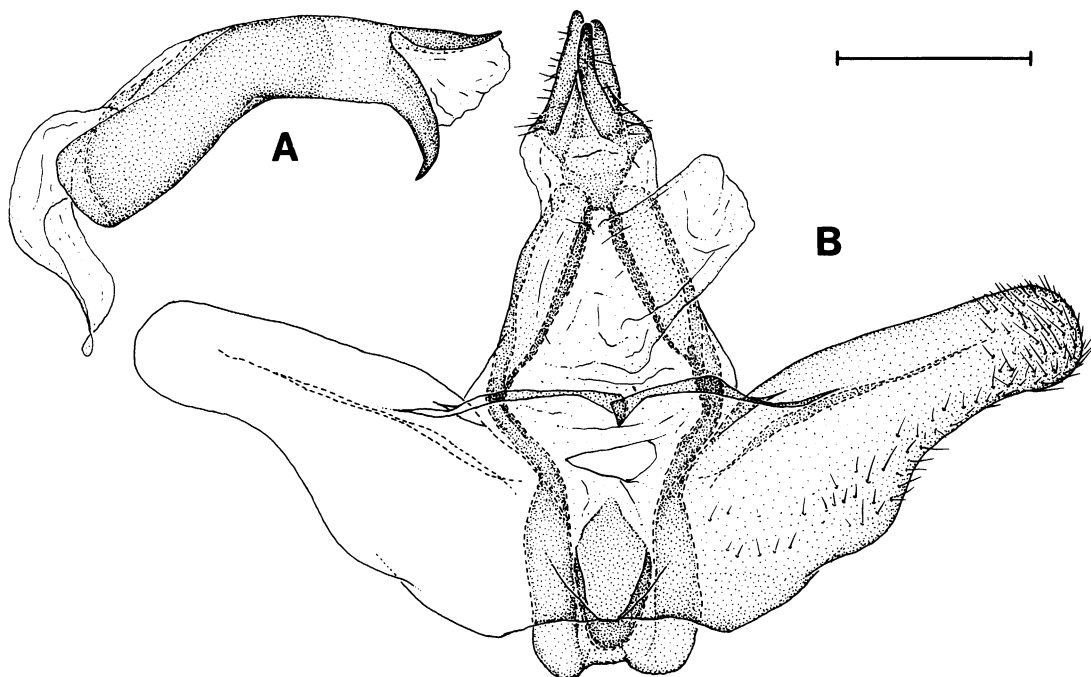


Fig. 68. Male genitalia of *Euchontha commixta* Warren (scale line = 0.5 mm; slide # JSM-261, CU). **A**, Aedeagus in lateral view, anterior at left. **B**, Genitalia in posterior view with aedeagus removed.

**DISTRIBUTION:** Figure 60. Peru and Bolivia.

**DISCUSSION:** The following are apomorphic for *E. commixta*: The entirely brown forewing with semitransparent forewing fascia; the widely spaced, elongate scales on the dorsal and ventral surfaces of the forewing fascia, and the short, paddle-shaped scales on its ventral surface.

**HOLOTYPE MALE** (BMNH): These labels: "[Peru: Junín] Upp. R. Toro, viii. ix. 01., 3000 m (Simons)"; "*Euchontha commixta*, type Warr"; a red holotype label. In excellent condition.

The male type of *Devara chilion* Druce (BMNH) has the following labels: "Watkins"; a holotype label.

**OTHER SPECIMENS EXAMINED:** **Peru:** *Junín*: 1♂, La Merced, 2500–3500 ft, 10 Dec. 1919, C. Watkins (BMNH); 1♂, Upper Rio Toro, 3000 m, 8 Sept. 1901, Simons (BMNH); 1♂, Satipo, Aug. [no year] (AMNH); 1♂, Satipo, Mar. [no year] (AMNH); 1♂, Satipo, June 1948, Paprzycki (AMNH); 1♂, Satipo, July 1948, Paprzycki (AMNH); 1♂, Rio Perené, "85. 20" (BMNH); 1♂, Carabaya, La Oroya,

3100 ft, Sept. 1905, G.R. Ockenden (BMNH); 3♂, Cam. del Pichis, Tambo Eneñas, 4 July 1920, Cornell Univ. Expedition, det. W.T.M. Forbes (CU). *Huánuco*: 1♂, Pachitea, det. Martin Hering (BMNH). *Cuzco*: 1♂, Marcapata, det. Martin Hering (BMNH); 1♂, Marcapata, det. Martin Hering (ZMH); 2♂, Rio Colorado, 2500 ft, 7 Aug. 1903, Watkins & Tomlinson (BMNH). **Bolivia:** *La Paz*: 1♂, La Paz, 1000 m, Garlepp (BMNH).

**DISSECTED:** 5 males.

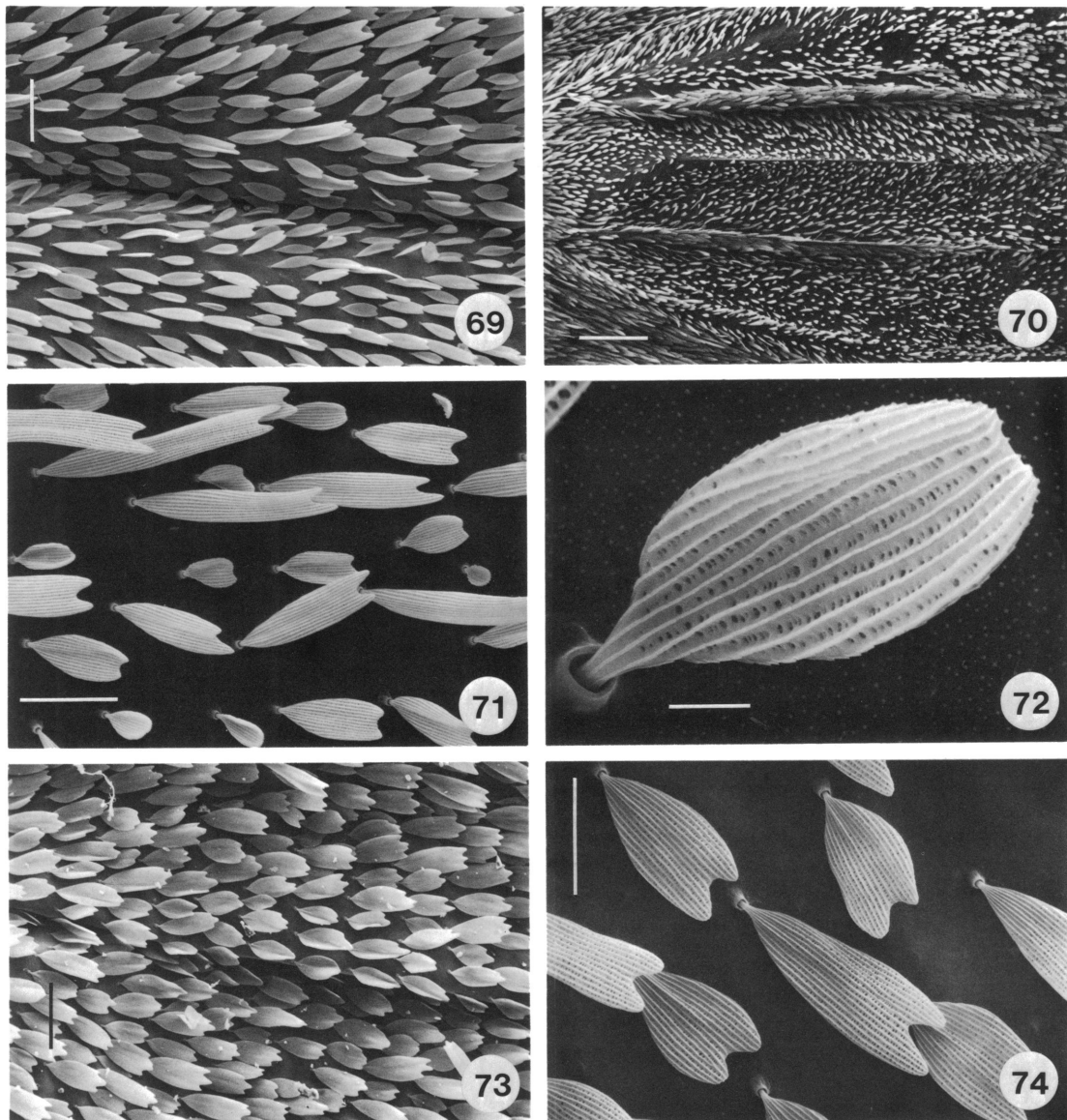
***Euchontha moyobamba*, new species**

Figures 50D, 60, 73–79

**DIAGNOSIS:** The wing pattern of this species is most similar to that of *E. ciris*, from which it can be distinguished by lack of a white spot near the forewing anal angle, a brown base in the forewing, and a brown anal margin on the forewing ventral surface. In *E. ciris* veins  $M_1$  and  $M_2$  are brown through the white forewing fascia, whereas the veins are white in *E. moyobamba*.

**DESCRIPTION:** Male. Figures 74, 76. Forewing length 13.0–14.5 mm. **Head:** First seg-





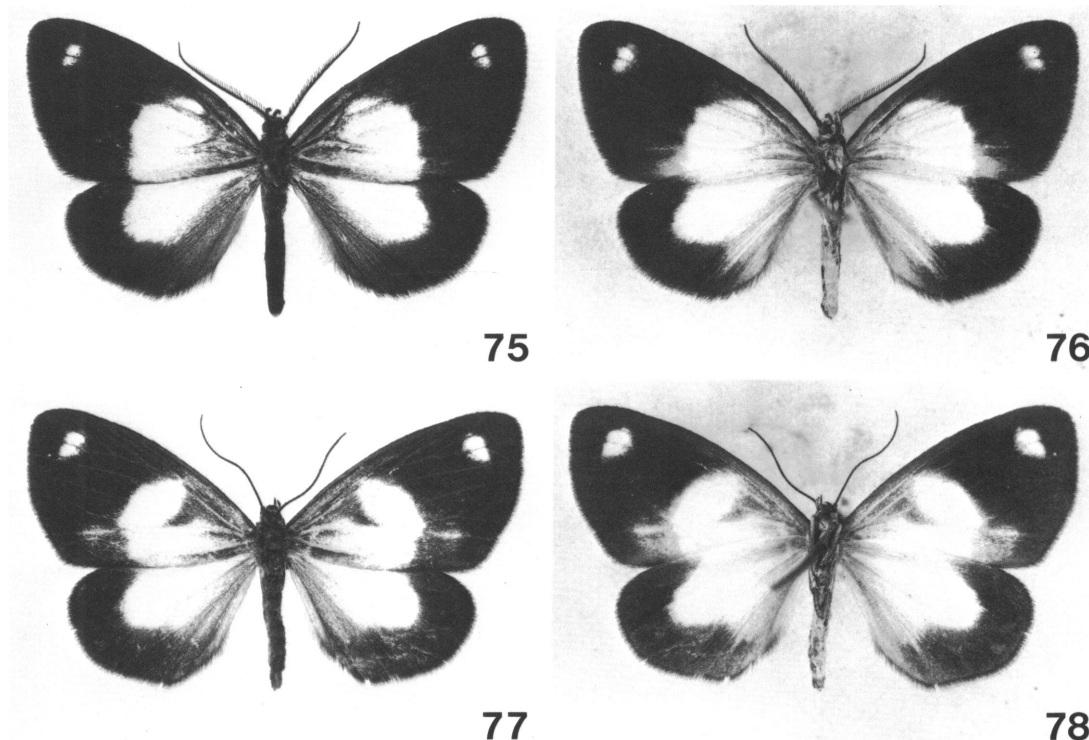
Figs. 69–72. Forewing fascia of *Euchontha commixta* Warren, male. 69. Fold, dorsal surface (100  $\mu$ m). 70. Entire fascia, ventral surface (0.5 mm). 71. Ventral surface near fold (50  $\mu$ m). 72. Single paddle-shaped scale from fascia, ventral surface (5  $\mu$ m).

Figs. 73, 74. Forewing fascia of *Euchontha moyobamba*, new species, male. 73. Fold, dorsal surface (100  $\mu$ m). 74. Near fold, ventral surface (40  $\mu$ m). (Scale lengths in parentheses.)

ment of labial palpus white, second and third segments brown on lateral surface, white on mesal surface; segment 2 of labial palpus narrow, segment 3 oval shaped, slightly elongate (fig. 50D); front with mixture of cream and brown scales above clypeus, brown horizontal band, white above that, scales pointing

toward midline; vertex brown with white spots behind antennae, small white spot on top of head; occipital region white with a few brown scales; antennal scape brown with a few white scales on mesal surface, flagellum with brown scales dorsally. *Thorax*: Legs light brown dorsally, white to cream ventrally,





Figs. 75–78. *Euchontha moyobamba*, new species. 75. Holotype male, dorsal view. 76. Male, ventral view. 77. Female, dorsal view. 78. Female, ventral view.

spurs with white and light brown scales; pleural region with a mixture of white and light brown scales; patagia white and brown; tegulae orange with long brown and cream scales on margins; dorsum brown with white medial stripe. *Forewings* (Dorsal): Brown from base to just beyond discal cell; area behind discal cell (extending two-thirds along anal margin) and fascia white, chocolate-brown beyond; veins light brown at base (lighter than ground color); small white subapical spot between  $R_{3+4}$  and  $M_1$ ,  $R_5$  brown through it. (Ventral): Base white with a few scattered brown scales, anal margin (extending almost to anal angle) and fascia white, chocolate-brown beyond; small white subapical spot corresponding to the one on dorsal surface. (Forewing Fascia): Figures 73, 74. Scales on dorsal surface quite densely distributed, with two or three distal points per scale; ventral surface with scales in approximately two size classes, these not markedly different. *Hind wings*: White, with broad chocolate-brown band along outer

margin; anterior margin white, anal margin brown (lighter than outer margin); ventral surface similar but anal margin white with a few scattered brown scales. *Abdomen*: Brown scales dorsally; buff and cream scales ventrally. *Genitalia*: Figure 79A, B. Valvae relatively narrow distally.

Female: Figures 77, 78. Forewing length 15.5 mm. As with other members of the genus, the female forewing discal cell is not reduced as much as in males; the brown discal region therefore extends further out on the wing. It is also better defined. Head, thorax, wings, and abdomen similar to those of male, except female with faint white dash near forewing anal angle (above and below). *Genitalia*: Figure 79C. Compared to the only other *ciris* group species for which female genitalia are known, *E. ciris*, tergum 8 in *E. moyobamba* is more broad, and the papillae anales are smaller.

**DISTRIBUTION:** Figure 60. Known only from the type locality.

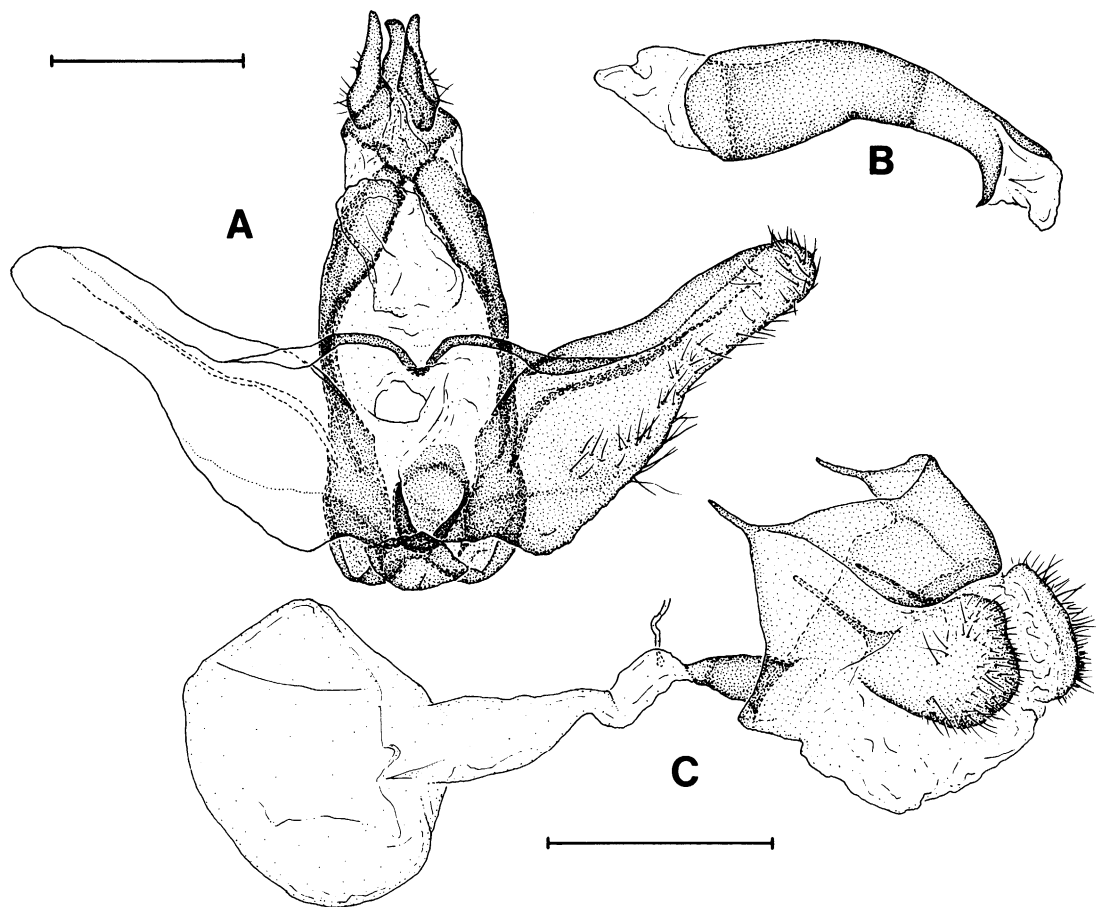


Fig. 79. Genitalia of *Euchontha moyobamba*, new species. **A, B**, Male genitalia (scale line = 1.0 mm; slide # JSM-267, BMNH). **A**, Genitalia in posterior view with aedeagus removed. **B**, Aedeagus in lateral view, anterior at left. **C**, Female genitalia in lateral view, anterior at left (scale line = 1.0 mm).

**ETYMOLOGY:** A noun in apposition; the name comes from the type locality.

**DISCUSSION:** The only specimens I have seen are in the BMNH. The shape of the white medial area in the forewing is apomorphic for *E. moyobamba*.

**HOLOTYPE MALE** (figs. 75, 76): These labels: "Pérou [San Martin], Moyobamba, M. de Mathan, 1<sup>er</sup> Sem. 1887"; "Ex. Oberthür Coll. Brit. Mus. 1927-3."; a red holotype label; det. label J.S. Miller. In excellent condition; deposited in the British Museum (Natural History).

**PARATYPES** (BMNH): 1♂ with same data as holotype; 1♂, 1♀ with same data as holotype except date given as 1888 [no day or month].

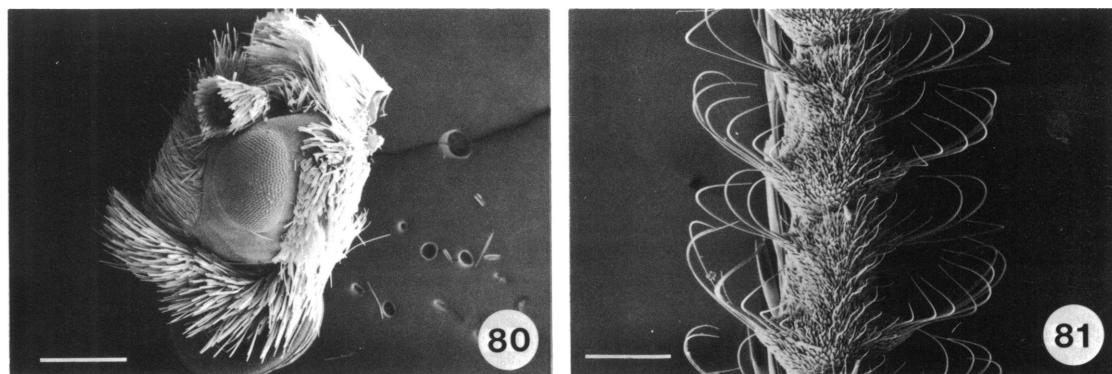
**OTHER SPECIMENS EXAMINED:** **Peru:** 7♂ [no date], M. de Mathan (BMNH). *San Mar-*

*tin:* 10♂, Moyobamba, 1st Semester 1887, M. de Mathan (BMNH); 8♂ and 1♀, Moyobamba 1888, M. de Mathan (BMNH).

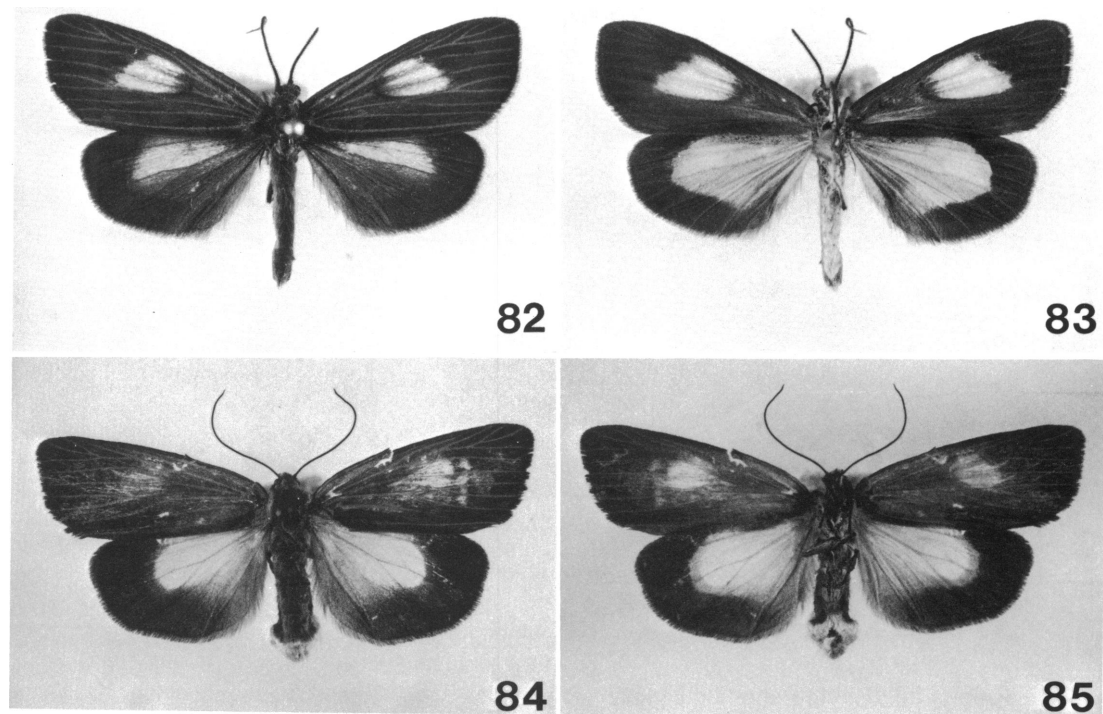
**DISSECTED:** 3 males, 1 female.

### *Pareuchontha*, new genus

**DIAGNOSIS:** *Pareuchontha* can be distinguished from *Euchontha* by the shape of the forewings; in *Pareuchontha* they are elongate and somewhat square at the upper and lower angles (figs. 82–85, 88, 89, 91, 92). Unlike the forewings of *Euchontha* species, there are no subapical spots, and the male discal cell is one-third the wing length rather than one-fifth (fig. 2). The male antennae in *Pareuchontha* are doubly bipectinate with very short pectinations, and setae forming a transverse



Figs. 80, 81. *Pareuchontha grandimacula* (Dognin) male. 80. Head in lateral view (anterior at left) with antennal flagellum removed (scale line = 0.5 mm). 81. Two segments of antenna in ventral view, proximal at bottom (scale line = 100  $\mu$ m).



Figs. 82-85. *Pareuchontha grandimacula* (Dognin). 82. Male, dorsal view. 83. Male, ventral view. 84. Female, dorsal view. 85. Female, ventral view.

whorl (fig. 81). The labial palpi are of only moderate length (fig. 80); segment 2 is shorter than segment 1 (fig. 38A). As in *Euchontha*, there is a scaleless region surrounding the relatively small eyes (fig. 80). The male vesica of *Pareuchontha* possesses long spines (figs.

86B, 90D, 93D), whereas that of *Euchontha* is spineless.

**DESCRIPTION:** Male. Forewing length 12.5–15.5 mm. Scales on coxae, thorax, and abdomen relatively long; forewing discal cell short, extending to fork of veins  $CuA_2$  and

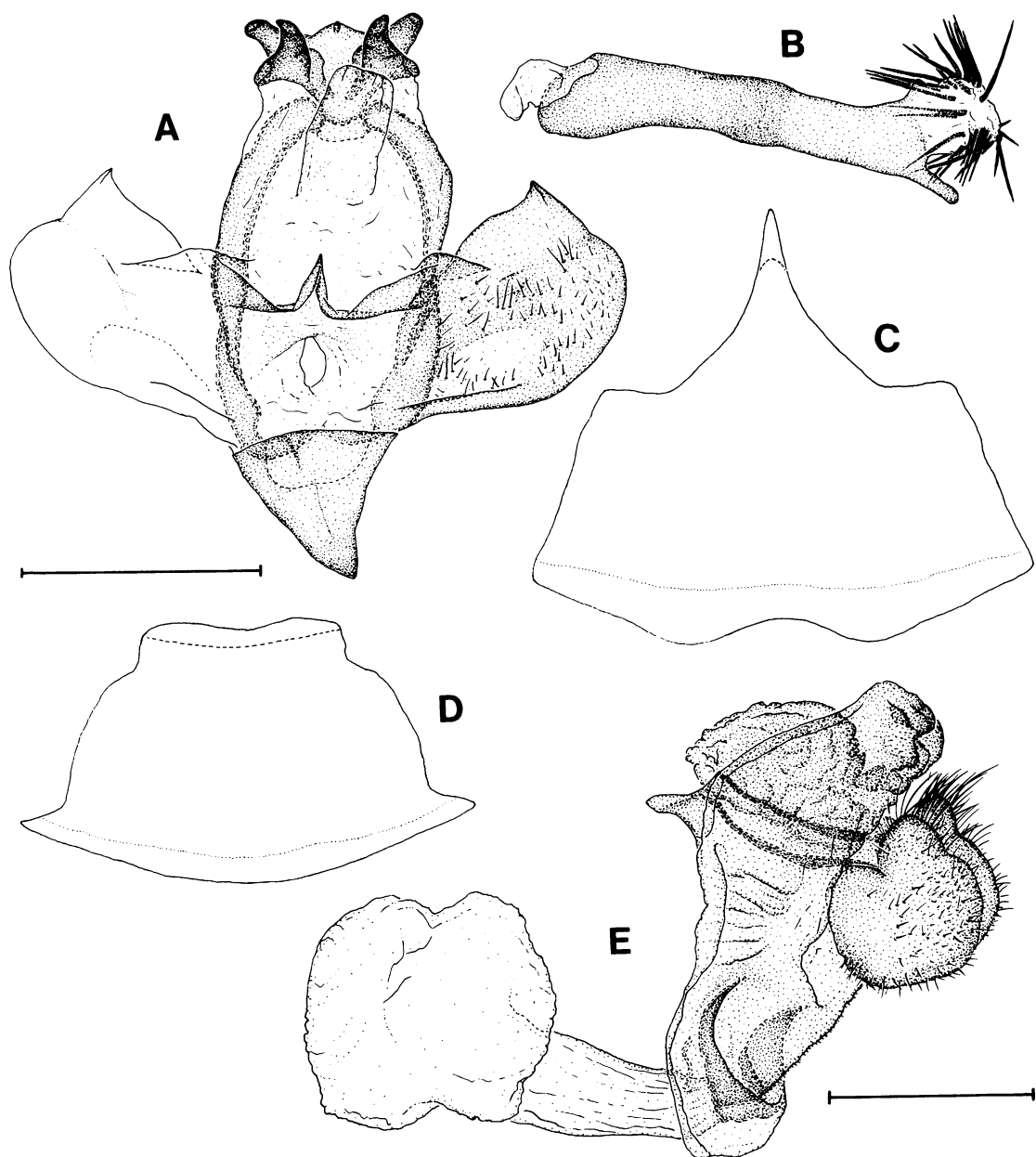


Fig. 86. Terminalia of *Pareuchontha grandimacula* (Dognin) (scale lines = 1.0 mm). A-D, Male (slide # JSM-272, BMNH). A, Genitalia in posterior view with aedeagus removed. B, Aedeagus in lateral view, anterior at left. C, Tergum 8, posterior at top. D, Sternum 8, posterior at top. E, Female genitalia in lateral view, anterior at left (slide # JSM-271, BMNH).

CuA<sub>1</sub> + M<sub>3</sub>, acute at posterior angle (fig. 2B); forewing fascia present, veins M<sub>1</sub> and M<sub>2</sub> swollen where they pass through it, protruding from wing ventral surface (fig. 15); eyes small (fig. 80), surrounded by scaleless region which is spiculate when seen with SEM; labial

palpi moderate in length, curved upward, segment 1 longer than segment 2 (fig. 38A); male antennae with two pairs of short pectinations on each segment, and setae in a whorl (fig. 81); portion of epimeron dorsal to tympanum heavily sclerotized, protruding

from body, forming a shelf over tympanal membrane (as in figs. 33, 34); tergum 8 with short scale tuft dorsally, sometimes with posterior spine (figs. 86D, 90B). Male genitalia with valvae broad, short; juxta absent; saccus elongate; transtilla robust; uncus bifid with small medial projection; blunt ventral projection on distal portion of aedoeagus; cornuti long.

Female: Figures 84, 85. Forewing length 18.0–19.0 mm. Maculation similar to that of males but lighter in color; forewing discal cell not as small, wings broader; antennae ciliate; large tuft of deciduous scales covering terga 7 and 8. Tergum 7 large, membranous; terminalia (fig. 86E) with glandular invagination in tergum 8; papillae anales emarginate; os-tium sclerotized; signum absent.

ETYMOLOGY: From the Greek "para," indicating a close relationship with *Euchontha*.

DISTRIBUTION: Figure 87. Bolivia, Peru, and Ecuador.

TYPE SPECIES: *Stenoplastis grandimacula* (Dognin).

DISCUSSION: *Pareuchontha grandimacula* was originally described by Dognin (1902) in the genus *Stenoplastis*, the type species of which is *Stenoplastis satyroides* Felder. *Stenoplastis* appears to be polyphyletic (J. Miller, unpubl.), and *grandimacula* does not share apomorphic characters with *S. satyroides*, or any other diophtid genus. For those reasons, I have placed it in the new genus *Pareuchontha* with the two new species described below.

Females were not previously described. I found a specimen of a female diophtid in the BMNH collection labeled as a possible new species by Baron de Worms. He did not associate it with a genus. A female diophtid in the collection at the USNM was labeled *Stenoplastis unifascia* Hering. Having examined the holotype of *S. unifascia* in the ZMH, I have determined that the USNM specimen does not belong to that species, and is not congeneric with it. Comparison of these female specimens with males of *P. grandimacula* leads me to believe that they are conspecific.

Apomorphies for *Pareuchontha* include the following: shape of the male valve, shape of the uncus, aedoeagus shape, and the elongate saccus. The abdominal scale tuft and glandular invagination in the female eighth ter-

gum of *P. grandimacula* may be characteristic of the genus, but confirmation will have to await discovery of female specimens representing the other two species. The character is not unique to the genus, however; deciduous scales on the female terminal segments occur in a few other diophtid genera (J. Miller, unpubl.), and in members of the Thaumetopoeinae (Notodontidae) (Common, 1979).

Judging from male genitalic morphology, *Pareuchontha grandimacula* and *P. albimargo* are more closely related than either is to *P. wormsii*. The first two species also share presence of a medial projection on the posterior margin of male eighth tergum (figs. 86D, 90B).

#### KEY TO ADULT *Pareuchontha* MALES

- 1 Forewing dorsal surface with white dash running between CuA and 1A + 2A from base to fascia (figs. 91); hind wing with central portion white or brown above, anal margin brown with scattered white scales ..... *wormsii*, n. sp.
- Forewing dorsal surface without white basal dash ..... 2
- 2(1) Hind wing with anal margin light (white or light yellow) above and below; hind wing dorsal surface with large, light-colored central region (figs. 88, 89) ..... *albimargo*, n. sp.
- Hind wing with anal margin brown above and below; hind wing dorsal surface with relatively small light-colored central region (figs. 82, 83) ..... *grandimacula* (Dognin)

#### *Pareuchontha grandimacula* (Dognin) new combination

Figures 2B, 15, 22, 23, 38A, 80–87

*Stenoplastis grandimacula* Dognin, 1902: 474.

var. *occlusa* Dognin, 1916: 18.

var. *inversa* Dognin, 1916: 18.

*Momonipta grandimacula* Prout, 1918: 413.

*Momonipta euchonthoides* Prout, 1918: 413. NEW

#### SYNONYMY.

subsp. *lactigera* Hering (*Stenoplastis*), 1925: 518.

DIAGNOSIS: Distinguished from *Pareuchontha wormsii* by the lighter forewing ground color and lack of a basal dash in the forewing. *Pareuchontha albimargo* has a white hind wing anal margin, whereas that of *P. grandimacula* is brown.

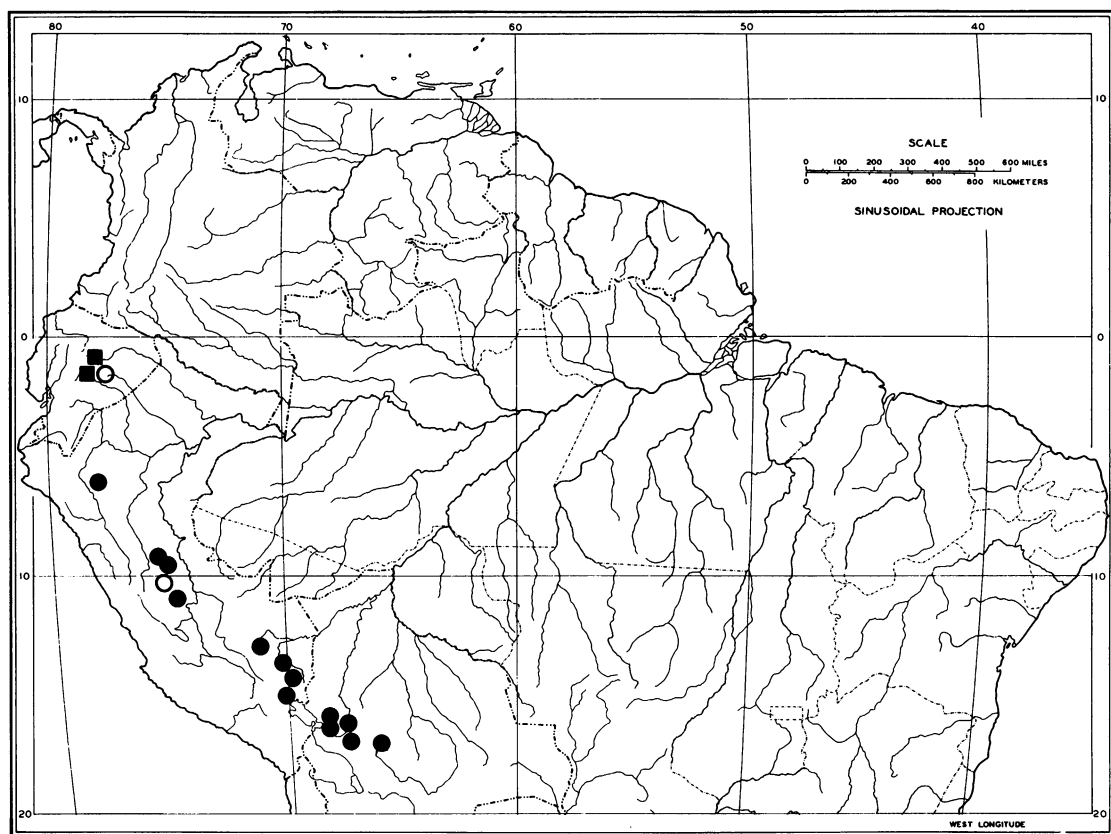


Fig. 87. Distribution of *Pareuchontha* species. ■ *P. worms*, new species; ○ *P. albimargo*, new species; ● *P. grandimacula* (Dognin).

**REDESCRIPTION:** Male. Figures 82, 83. Forewing length 12.5–15.0 mm. *Head:* Scales on first segment of labial palpus yellow, second and third segments brown on lateral surface, cream on mesal surface; front brown with two vertical buff-colored bands, scales pointing toward midline; vertex brown with a few buff scales behind antennae; occipital region brown with cream scales along margin of eye; antennal scape and dorsal surface of flagellum brown. *Thorax:* Legs brown dorsally, cream to buff ventrally, spurs and coxae cream colored; pleural region mostly brown, with a few cream scales; patagia brown with a few cream scales; tegulae orange with long brown and buff scales on margins; dorsum brown with two yellow-brown bands along midline. *Forewings (Dorsal):* Chocolate-brown, veins light brown to buff; darker patch just beyond discal cell; forewing fascia cream to light yellow, with brown scales scattered

along veins  $M_1$  and  $M_2$ . (Ventral): Brown, lighter than dorsal surface; diffuse, light yellow dash along veins Cu and A from base to end of discal cell; some light yellow scales in cell; large, light yellow spot in fascia (more extensive than on dorsal surface). *Hind wings:* Dorsal surface chocolate-brown, central portion buff to light yellow with scattered brown scales; ventral surface similar except light yellow area more extensive; anterior margin brown to light brown, anal margin buff to light yellow. *Abdomen:* Brown dorsally with tuft of long scales on terminal segment; buff to cream ventrally. *Terminalia:* Figures 86A–D. Tergum 8 with long medial projection; uncus bifid, wide; valve rounded with apical projection; saccus conical; aedoeagus with fingerlike distal projection below, cornuti pointing anteriorly.

Female: Figures 84, 85. Forewing length 18.0–19.0 mm. Head and thorax similar to

those of males; wings broad, maculation similar to that of males except dorsal surface of forewings with light, poorly defined spot beyond discal cell, spot white below; hind wings with central region white to light yellow; abdomen with large tuft of short, cream-colored, deciduous scales on segments 7 and 8. *Terminalia*: Figure 86E. Tergum 8 with glandular invagination; corpus bursae without a signum; ostium simple, sclerotized; papillae anales emarginate dorsally.

**DISTRIBUTION**: Figure 87. Peru and Bolivia.

**DISCUSSION**: Two "varieties" of *P. grandimacula* (the types of which are in the USNM) were described by Dognin (1916), *occlusa* and *inversa*. A second species, *Stenoplastis euchonthoides* Prout (1918), and a subspecies of it, *lactigera* Hering (1925), have also been named. After studying the holotypes of these taxa, including their genitalic morphology, I have determined that all are conspecific with *grandimacula*, and have therefore synonymized them under that name.

Perhaps the best apomorphic character for *P. grandimacula* is the relatively small vesica of the aedoeagus.

**HOLOTYPE MALE** (USNM): These labels: "**Bolivia** [*La Paz*] Rio Songo"; "*Stenoplastis grandimacula* type ♂ Dgn." (handwritten); Dognin Collection; two other handwritten labels: "*Stenoplastis* n. sp., Warren 6/02," and "*Stenoplastis* (*grandimacula*) sp. nov."; a red holotype label: "Type No. 30950 U.S.N.M..". In good condition.

**PARATYPES**: 1♂ (USNM) with same locality data as the holotype, and these additional handwritten labels: "*Stenoplastis grandimacula*, cotype ♂, Dgn."; and "*Stenoplastis* n. sp., 6/02, Warren"; "has (connue?) de (Dibs?), 24/6/01."

The two varieties described by Dognin (1916) are also associated with *grandimacula*. *Occlusa* male (USNM): "*Stenoplastis grandimacula occlusa* Dogn. type ♂" (handwritten); "Chaquimayo, S. Peru, 2500–3000 ft., 6.7.10, H. & C. Watkins"; two handwritten identification labels; Dognin Collection; a red holotype label: "Type No. 30951 U.S.N.M.". *Inversa* male (USNM): "*Stenoplastis grandimacula inversa* Dogn. type ♂" (handwritten); "Yungas de la Paz, Bolivie, 1000 mètres"; a handwritten identification

label; "Dognin Collection"; a red holotype label: "Type No. 30952 U.S.N.M.."

Label data for the male holotype of *P. euchonthoides* Prout (BMNH) is as follows: Red holotype label; "*La Paz, Bolivia*, 1000 m, Garlepp"; "*Stenoplastis euchonthoides*, ♂, Prout, Type" (handwritten); "Presented by J.J. Joicey, Esq., Brit. Mus. 1931-444." Label data for the male holotype of *P. euchonthoides* subspecies *lactigera* Hering (ZMH) is as follows: a red type label; "[**Peru: Junín**] Chanchamayo [18]85, Tram"; a Hering determination label.

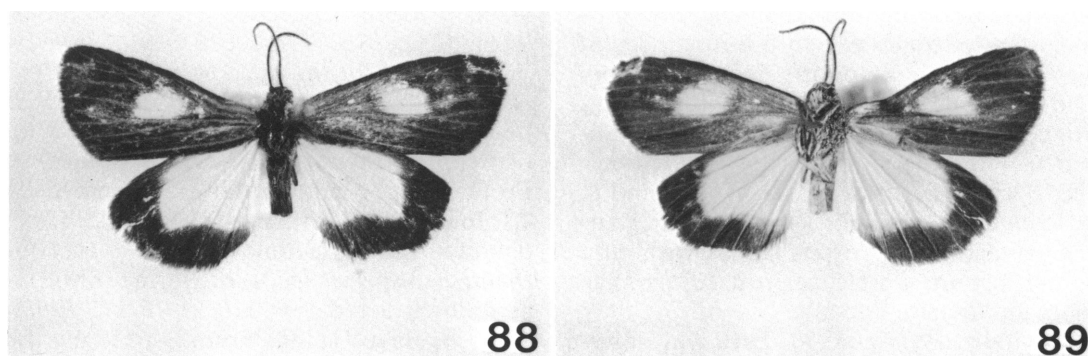
**OTHER SPECIMENS EXAMINED**: **Peru**: *Loreto*: 1♂, Chachapoyas, 1889, M. de Mathan (BMNH). *Huánuco*: 1♂, Rio Pachitea, Tessmann (ZMH). *Pasco*: 1♂, Oxapampa, 6,400 ft (BMNH). *Cuzco*: 1♂, Cajon, Nov. 1901, Garlepp (BMNH); 4♂, Marcapata (ZMH); 1♂, Marcapata, Mar. 1905 (USNM). *Junín*: 1♂, Satipo, Jan. [no year] AMNH; 1♂, 1♀, Piches & Perené, 625–940 m, Soc Geog de Lima (USNM). *Puno*: 5♂, La Oroya, R. Inambari, Carabaya, Sept. 1905, 3100 ft, Ockenden (BMNH); 2♂, La Oroya, R. Inambari, Carabaya, Nov.-Dec. 1905, 3100 ft, Ockenden (BMNH); 2♂, La Oroya, R. Inambari, May 1905, 3000 ft, Ockenden (BMNH); 1♂, Chaquimayo, 780–940 m, 6 July 1910, H. & C. Watkins (USNM). **Bolivia**: *La Paz*: 2♂ (USNM); 1♂, 1000 m, Garlepp (BMNH); 5♂, 1♀, "ex Germain." (BMNH); 3♂, Coroico, 1800 m (USNM); 1♂, Coroico, 1800 m, Garlepp (BMNH); 1♂, Rio Songo, 1200 m, 1895–96, Garlepp (ZMH); 2♂, Rio Songo, 750 m, Fassl (BMNH); 1♂, Rio Songo, 750 m, Fassl (USNM); 3♂, Yungas de la Paz, 1904–5 (BMNH); 2♂, 1000 m (USNM). *Cochabamba*: 6♂, Yungas del Espiritu Santo, 1888–1889, P. Germain (BMNH).

**DISSECTED**: 4 males, 1 female.

### *Pareuchontha albimargo*, new species

Figures 87–90

**DIAGNOSIS**: Like *Pareuchontha grandimacula*, this species lacks the forewing basal dash of *P. wormsii*, but can be distinguished from *grandimacula* by an entirely white hind wing anal margin, and by a white, rather than brown, anterior margin on the hind wing ventral surface. The male genitalia differ slightly in shape of the uncus and valve. The best



Figs. 88, 89. *Pareuchontha albimargo*, new species, holotype male. 88. Dorsal view. 89. Ventral view.

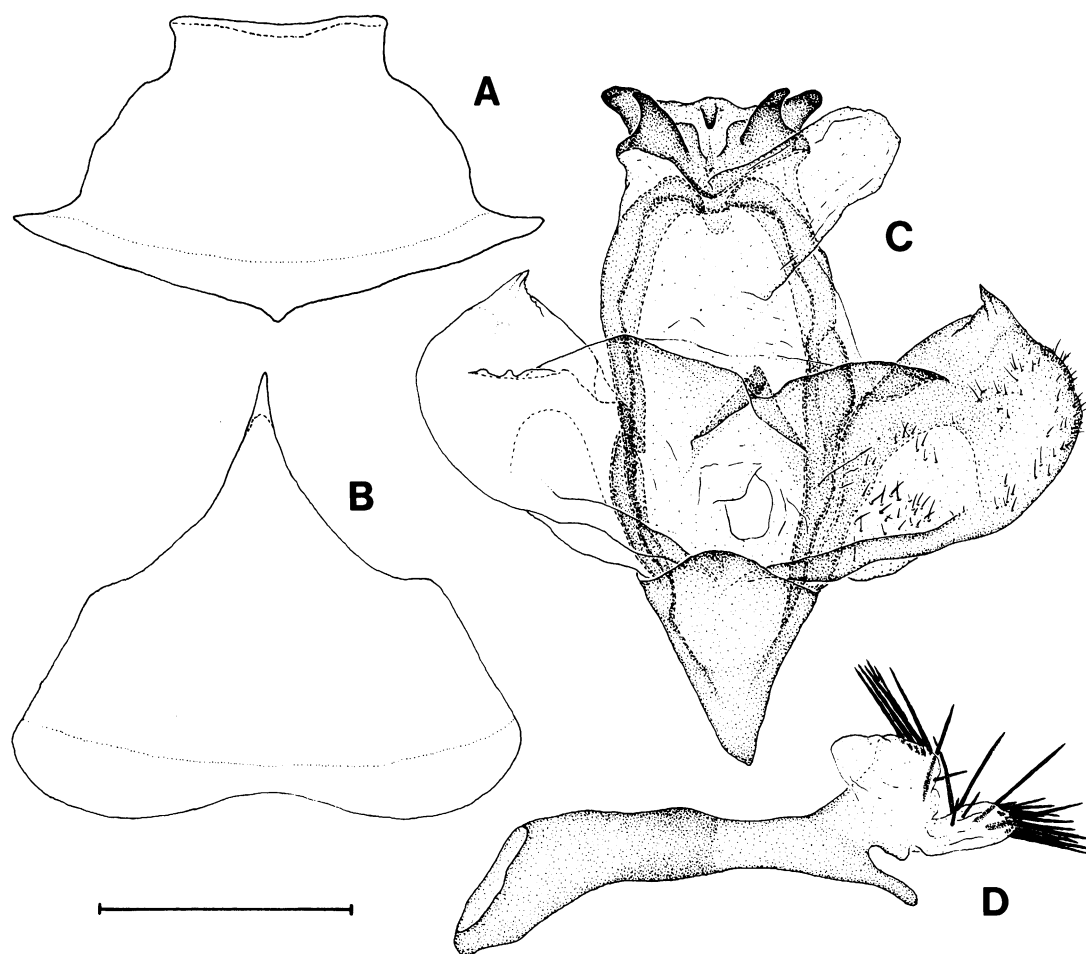


Fig. 90. Male terminalia of *Pareuchontha albimargo*, new species holotype (scale line = 1.0 mm; slide # JSM-274, AMNH). A, Sternum 8, posterior at top. B, Tergum 8, posterior at top. C, Genitalia in posterior view with aedoeagus removed. D, Aedoeagus in lateral view, anterior at left.



genitalic character for separating the two species is shape of the vesica.

**DESCRIPTION:** Male. Figures 88, 89. Forewing length 13.5–14.5 mm. *Head:* Scales on first segment of labial palpus yellow, second and third segments brown on lateral surface, buff on mesal surface; front brown with two vertical buff-colored bands (scales pointing toward midline); vertex brown; occipital region brown with cream scales ventrally; antennal scape brown with a few buff scales on lateral and mesal surfaces, dorsal surface of flagellum brown. *Thorax:* Legs brown dorsally, cream to buff ventrally, coxae cream colored; pleural region brown with scattered cream scales; patagia brown; tegulae orange with a mixture of brown and cream scales on margins; dorsum brown. *Forewings* (Dorsal): Dark brown, veins light brown; forewing fascia white with veins  $M_1$  and  $M_2$  buff; costa dark brown. (Ventral): Brown, with diffuse white basal dash and white fascia; mixture of white and brown scales in cell. *Hind wings:* Dorsal surface dark chocolate-brown with white central region; anterior margin white to light brown, posterior margin entirely white; ventral surface the same except white central region slightly more extensive. *Abdomen:* Brown dorsally, with white scales scattered on pleuron of first two abdominal segments, cream below; tuft of brown scales on terminal segment. *Terminalia:* Figure 90. Sternum 8 with small apophysis on anterior margin; base of aedoeagus wide; vesica relatively large, with a distal appendix bearing cornuti which point distally.

Female: Unknown.

**ETYMOLOGY:** From the Latin, *albus* (white) and *margo* (margin), referring to the white hind wing anal margin in this species.

**DISTRIBUTION:** Figure 87. Known from the type locality in Ecuador, and from Satipo, Peru. Collecting along the eastern side of the Andes between these localities will likely provide additional specimens.

**DISCUSSION:** This description is based on two specimens from the AMNH. The species differs from *P. wormsii* in both maculation and morphology. It is most closely related to *P. grandimacula*, but differs in wing coloration, and in vesica shape. Both specimens of *P. albimargo* were dissected, and the male

terminalia (fig. 90) were morphologically identical. Synapomorphies for *grandimacula* and *albimargo* include: the presence of a prong on the posterior margin of tergum 8; and shape of the valve, uncus/socii complex, and distal portion of the aedoeagus. Apomorphies for *albimargo* are: Sternum 8 with a small anterior apophysis; aedoeagus wide at base; vesica with thumblike distal appendix bearing distally pointing cornuti.

**HOLOTYPE MALE** (FIGS. 88–90): These labels: “Ecuador [Napo-Pastaza] Puyo - 1000 mtrs., 25-III-51, Wm-M.”; a red holotype label. The collector is most likely William Clarke Macintyre, who collected in the Pastaza and Napo Basins starting in the early 1930s (Brown, 1941). Specimen in fair condition; at the AMNH.

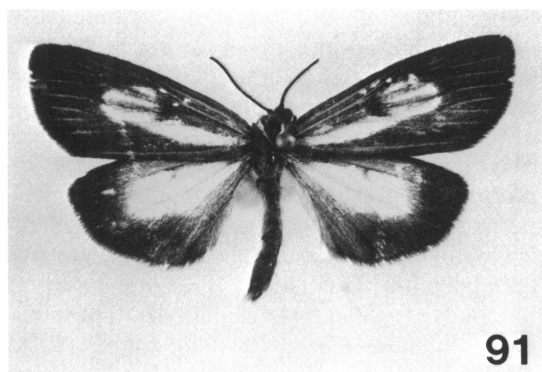
**OTHER SPECIMENS EXAMINED:** Peru: Junín: 1♂, Satipo, Mar. 1948, Paprzycki (AMNH); slide no. JSM-280.

### *Pareuchontha wormsii*, new species

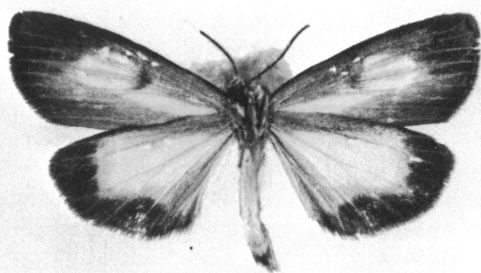
Figures 87, 91–93

**DIAGNOSIS:** Easily distinguished from *Pareuchontha grandimacula* and *P. albimargo* by the large white basal dash between veins CuA and A on the forewing dorsal surface. The male genitalia (fig. 93) are very different from those of other *Pareuchontha* species.

**DESCRIPTION:** Male. Figures 91, 92. Forewing length 15.0–15.5 mm. *Head:* Scales on first segment of labial palpus orange, second and third segments dark brown on lateral surface, buff on mesal surface; front brown with two vertical buff-colored bands (scales pointing toward midline), buff below antennae; vertex brown; occipital region brown with a few cream scales ventrally; antennal scape brown with a few buff scales on lateral and mesal surfaces, dorsal surface of flagellum dark brown. *Thorax:* Legs brown dorsally, cream to buff ventrally, spurs and coxae cream colored; pleural region brown with scattered cream scales; patagia a mixture of brown and buff scales; tegulae orange with a mixture of long brown and white scales on margins; dorsum dark brown with lighter patches posteriorly. *Forewings* (Dorsal): Dark chocolate-brown, veins light brown to buff; darker spot on distal margin of discal cell; fascia white,



91



92

Figs. 91, 92. *Pareuchontha wormsi*, new species, holotype male. 91. Dorsal view. 92. Ventral view.

with brown scales scattered along veins  $M_1$  and  $M_2$ ; large white dash from base to posterior angle of discal cell. (Ventral): Brown, with dash and fascia white (more extensive than on dorsal surface); white and scattered brown scales in discal cell. *Hind wings*: Dark chocolate-brown with white central fascia; small, comma-shaped, brown spot on anterior margin of fascia; one specimen (LACM) with entire fascia brown; anal margin with brown and white scales; ventral surface of hind wing with fascia more extensive, to anal margin and almost to anterior margin. *Abdomen*: Dark chocolate-brown dorsally, with tuft of long scales on terminal segment; buff ventrally. *Terminalia*: Figure 93. *P. wormsi* lacks the medial projection on tergum 8. The shape of the valve, saccus, and uncus is unique in the genus, and the aedoeagus is wider than in the other two species.

Female: Unknown.

**ETYMOLOGY**: Named for the Baron de Worms (1903–1976), an amateur lepidopterist with an interest in dioptids, who worked at the British Museum (Natural History) during the late 1940s and early 1950s.

**DISTRIBUTION**: Figure 87. Known only from the Pastaza region of Ecuador between 1250 and 1400 m.

**DISCUSSION**: Although only three specimens have so far been collected, all are from Ecuador. In addition to maculation characters, apomorphies for *P. wormsi* include: shape of sternum 8; shape of the valve; and shape of the aedoeagus.

**HOLOTYPE MALE (FIGS. 91–92)**: These labels: “[Ecuador: Tungurahua] Hacienda La Mascota, Rio Topo, Ecuador, Alt. 4500 ft”;

“W.J. Coxey, IV 3 1931, A.N.S. Lot 315”; “Exch. A.N.S.P., C.M. Acc. 20359”; red holotype label; det. label, J.S. Miller. In good condition. Deposited at the Carnegie Museum of Natural History.

**PARATYPES**: **Ecuador**: Pastaza: 2♂, Topo, Río Suña, 1250 m, 29 June 1980, J.P. & K.E. Donahue (LACM).

**DISSECTED**: 1 male; slide no. JSM-273, LACM.

## CONCLUSIONS

Three characters indicate a sister-group relationship between *Euchontha* and *Pareuchontha*. In both genera, the eyes are extremely small and are entirely surrounded by a scaleless region (figs. 27–29, 80). In most dioptids the area around the eye, including the gena, is entirely scaled. In others, only the gena is scaleless. Having the eyes completely surrounded by a scaleless region appears to be a synapomorphy for *Euchontha* and *Pareuchontha*.

These two genera also exhibit a unique tympanal morphology. The tympanal membrane, located above a deep depression in the metepimeron, is oriented horizontally (figs. 33, 34). This orientation is characteristic of notodontids and dioptids (Richards, 1932; Sick, 1940; Kiriakoff, 1950, 1963). Above the tympanal membrane is a dorsal extension of the metepimeron (Richards, 1932), found in all dioptids, and termed the “Schwellenleiste” (swollen ridge?) by Sick (1940). In *Euchontha* and *Pareuchontha* this portion of the metepimeron is round—almost a half-bowl—and it protrudes, forming a shelf above the

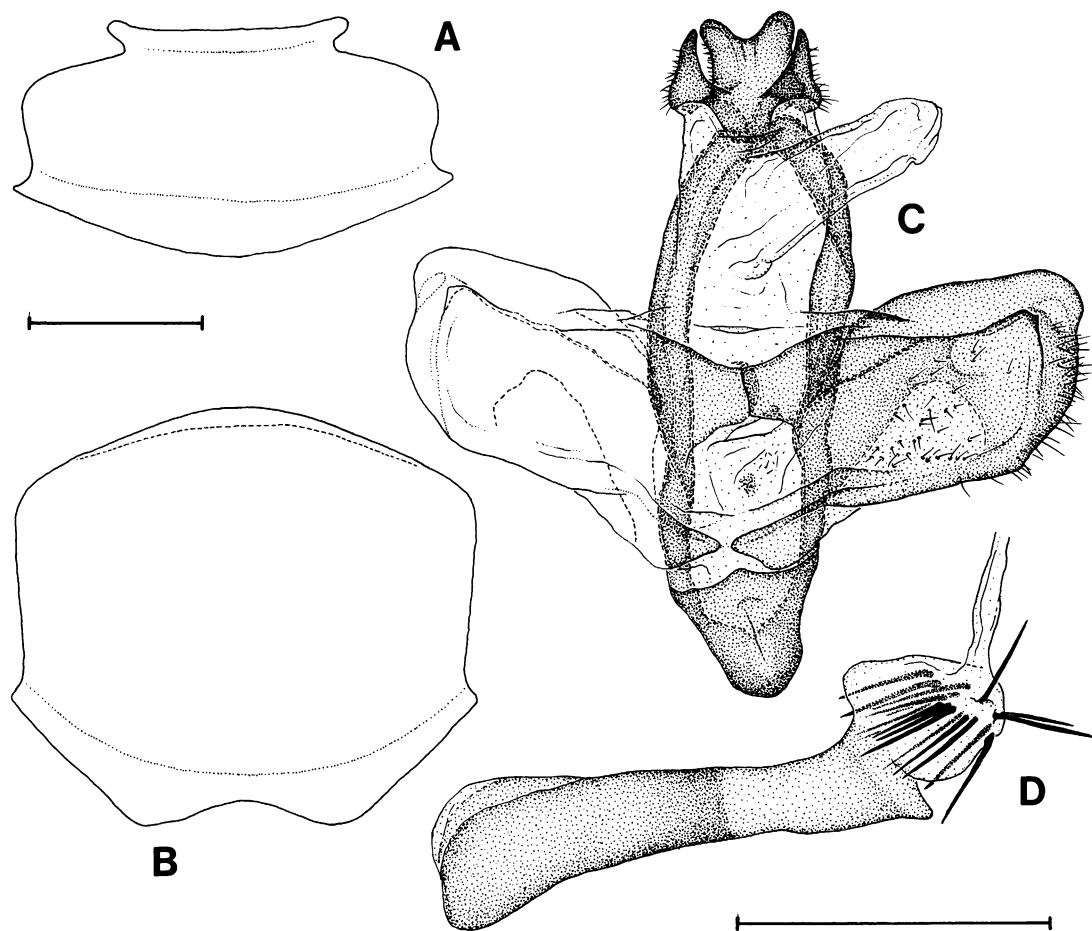


Fig. 93. Male terminalia of *Pareuchontha worms*, new species, paratype (scale line = 1.0 mm; slide # JSM-273, LACM). A, Sternum 8, posterior at top. B, Tergum 8, posterior at top. C, Genitalia in posterior view with aedeagus removed. D, Aedeagus in lateral view, anterior at left.

tympanal membrane. No other dioptid genera exhibit this configuration.

The third synapomorphy is presence of a large longitudinal ridge on the male forewing fascia scales (figs. 17, 19, 20, 22). Although this character has been studied with SEM in only a few dioptid genera (see discussion of the modified male forewing), ridged fascia scales have so far been observed only in *Euchontha* and *Pareuchontha*.

The presence of doubly bipectinate male antennae is a derived condition within the Diopitidae (J. Miller, unpub. data). The pectinations of *Euchontha* are long (fig. 30), whereas they are short in *Pareuchontha*, almost appearing to be absent except when seen with SEM (fig. 81). The antennae of *Clepto-*

*phasia* and *Xenomigia* are doubly bipectinate as well, some with reduced pectinations similar to those of *Pareuchontha*. The character perhaps defines a smaller clade within the group of genera listed in table 1. More precise conclusions regarding relationships among these diopitid taxa will have to await a comprehensive generic review.

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