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A REVIEW OF THE SKIPPERS OF THE *NARCOSIUS* GROUP OF SPECIES OF THE GENUS *ASTRAPTES* HUBNER (SENSU EVANS, 1952) AND ERECTION OF A NEW GENUS. LEPIDOPTERA: HESPERIIDAE

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INTRODUCTION

The is the second in a series of papers analyzing the taxa of the *Urbanus/Astraptes* complex of the Pyrginae. The first was a revision of the *proteus* group of species of the genus *Urbanus* Hübner [1807] (Steinhauser 1981). This and the next several to follow will analyze the remaining species of that complex and eventually expand to include the entire Section I of the American Pyrginae.

From time to time during the past three years I have been accumulating data and slowly building up a comparative data matrix for Evans' (1952) Section I of the American Pyrginae. This has been very useful in hypothesizing polarity of character states through out-group/in-group comparisons and permitting deductions to be made regarding probable phylogenetic relationships. When complete, this data matrix will include more than 160 character states (the number grows as the study advances) for the approximately 500 species and subspecies included. Although presently very incomplete, these data indicate, as would be expected, close relationships between many groups of taxa within genera considered by Evans to be closely allied. On the other hand, some groups within some of his closely allied genera are proving to be grossly different. This has been especially true in the genera *Ridens* Evans 1952, *Urbanus* and *Astraptes*. It has been pointed out (Steinhauser 1983) that two taxa, *miltas* (Godman & Salvin), 1893 and *telegonoides* (Mabille & Boullet), 1912 placed by Evans respectively in *Urbanus* and *Astraptes* actually belong in *Ridens*. Other similar examples will be included in future papers of this series.

PROCEDURES

Before setting forth procedural details, it is necessary to settle the identity of two key taxa: *Papilio aulestis* (*"aulestes"*) Cramer, [1780] and *Papilio narcosius* Stoll, [1790]. Dos Passos (1960 p. 34) writes, "*Astraptes* Hübner, "1816" [1819]. Hemming (1934, p. 158) claims that the type of this genus, *Papilio aulestis* Cramer, "1782" [1780], is a homonym of *Papilio aulestis* Cramer "1779" [1776], but that is an error. This name appears first in *De Uitlandsche Kapellen* (vol. 2, p. 47), where it is invalid, because not a binomial.

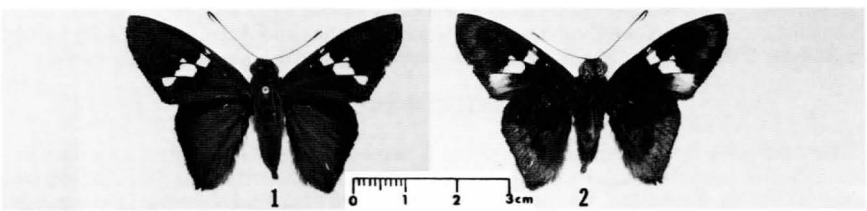
In the index to that volume (p. 147) it is written "*Pap. Pleb. ural. aulestes*" with a reference to the plate and figure (this reference applying also to the text) and is, therefore, valid but dating from 1776 when the index was published. This insect is a Lemoniinae. The next use of *aulestes* by Cramer (vol. 3, p. 161) is also invalid, because again it is not a binomial. As before, this name must be dated from the index (p. 173) where Cramer emended the name to *aulestis*, probably having in mind the prior use of *aulestes*. Here the name is written "*Pap. pleb. Urbicol. aulestis*" and is valid from the date of publication of the index, 1780. This insect is a hesperiid and the one with which the check list is concerned." I believe that this useage is probably correct but really is a matter for decision by the International Commission on Zoological Nomenclature should they deem it worthy of their attention. Meanwhile I shall follow the dos Passos treatment of the type species of *Astraptes* and use *aulestis* Cramer [1780].

Godman & Salvin (1893 pp. 315, 316), Evans (1952 p. 101) and Hemming (1967 p. 63) all considered *narcosius* Stoll [1790] to be a synonym of "*aulestes*"[*aulestis*] Cramer [1780]. Evans however, changed his mind (1952 p. 107) and decided instead that *granadensis* Möschler, 1878 as well as *janeira* Schaus, 1902 and *aulicus* Röber, 1925 were synonyms of "*aulestes*"[*aulestis*] instead of *narcosius*. Because of the then generally accepted rejection of *aulestes* Cramer [1780] as being an invalid junior homonym of *aulestes* Cramer [1777] (*sic*) [1776], Evans now (p. 107) considered *granadensis* Möschler to be the type species of *Astraptes*. He, however, had misidentified *granadensis*. I have examined the holotype from ZMHU and found it to be a male (not a female as stated by Möschler) of *colossus rhoda* Evans, 1952. *A. granadensis* Evans, 1952 *nec* Möschler, 1878 = *Papilio aulestis* Cramer, [1780].

The Cramer and Stoll figures of *aulestis* and *narcosius* do not suffice to identify absolutely these taxa and I have used Evans' determinations for identity: *aulestis* = *janeira* Schaus (figs. **1, 2, 8, 66, 78**); *narcosius* = the insect with genitalia as illustrated by Godman & Salvin 1893 Pl.78 f.15 as *aulestes*, Williams 1927 f.15 as *aulestes* and Evans 1952 Pl.19 f.C.14.17 as *narcosius* (male only). To eliminate future confusion I will designate neotypes for these two taxa, *narcosius* below and *aulestis* in a future paper re-defining the genus *Astraptes*.

Wing venation and antennal terminology used are the same as those in the revision of the *proteus* group (Steinhauser 1981). However, a few changes in genitalia terminology have been made from that paper. In the female genitalia, Dr. Reink de Jong has kindly pointed out to me that what I had referred to as "accessory glands" are, in fact, expansions of the sinus conjunctionis as described by Lorković (1953).

The lamella antevaginalis, at least in the Pyrginae, is frequently rather difficult to define. Where it occurs as a distinct, caudally produced, sclerotized plate at least partly fused to the antrum and prominently overlapping the lamella postvaginalis, there is no question as to its identity. There may, however, be uncertainty as to its origin. In some taxa it appears to be a sclerotized portion of the pleura between the 7th and 8th sternites and independent of both, or it may be variously fused to the 8th sternite which usually occurs as two lateral lobes, or appears to be missing and be replaced by the 8th sternite lobes. I use the term rather loosely, applying it to that more or less well sclerotized portion of the terminal ventral exoderm immediately ventrad and caudad of the antrum, which



Figures 1-2. *Astraptes aulestis* (Cramer), [1780]. ♂ Holotype *Telegonus janeira* Schaus, 1902 upper (1) and lower (2) surfaces (Photo nos. 820705/11,12) [Brasil]: Rio Janeiro (USNM).

term I use to define the more or less cylindrical process forming the walls of the ostium bursae. The exact homologies between these portions of the female genitalia as they occur in different taxa are very difficult to determine. I hope that I have clarified my use of these terms, whether correctly or incorrectly, so that the reader will know to what I refer.

In the male genitalia I will follow the terminology proposed for different structures and divisions of the valvae by Sibatani *et al* (1954) who state (p. 94), "A new name "anellifer" is proposed to designate the membranous region situated at the centroproximal part of the mesal surface of the valva.". They further state (p. 95), "Between the proximal costa-anellifer-sacculus and the apical cucullus-valvula, there are two regions on the mesal side of the valva, the dorsal *ampulla* and the ventral *harpe*. However, in the Rhopalocera, where the cucculus and valvula are absent, these two parts form the terminal structures of the valva.". The harpe, as used here, equals Reverdin's (1910) cuiller used by Evans.

Both of the Hübnerian genera *Urbanus* and *Astraptes* (*sensu* Evans) are polyphyletic if for no other reason than the inclusion in each of a *Ridens* species, even though one, *telegonoides*, was included because of misidentification. Additional details of polyphyly will be discussed below and in future papers insofar as they apply to the species groups being studied.

The species and subspecies included in *Astraptes* by Evans as numbers C.14.17 through 21 plus a subsequent new species, *hercules* Bell, 1956 and another to be described below form a well defined group which I shall call the *narcosius* group. It is characterized by Evans as follows: "13a. FW without apical spots - 13b (22a). F with a central band of irregularly placed hyaline spots. — 14a (part) — male with costal fold — 17a. Unf white suffusion in space 1b absent or inconspicuous. Above wing bases dull green. Unh dark brown or indigo with faint grey or ochreous markings. Uph cilia inconspicuously white chequered: upf only white in space 1b. —"

The most closely related species to the *narcosius* group, according to Evans is C.14.16, the type species of *Astraptes* now designated as *aulestis* (Cramer), [1780]. Since *Astraptes* (*sensu* Evans) has been shown to be polyphyletic, I have selected from within it a seemingly more closely related group, C.14.16 through 21 (plus two newer species) as a "Taxonomic in-group" (TIG) to compare with a similarly closely knit group, the *Urbanus proteus* group (Steinhauser 1981) as the "Taxonomic out-group" (TOG) following the useage and methods of Watrous & Wheeler 1981, and using the 15 characters shown in Table 1 and summarized in the data matrix (figure 3). By means of the Watrous & Wheeler procedure and using various broad out-group/in-group comparisons to establish probable apomorphic states, the first four characters establish a synapomorphic root for the entire TIG-TOG series. Character 5 is an autapomorphy supporting the *proteus* group as the TOG.

Characters 6 - 8 show synapomorphies shared between *aulestis* and the *narcosius* group and separating them from the TOG. Characters 9 - 13 are synapomorphic for the *narcosius* group establishing it as a monophyletic functional in-group (FIG) deserving of a separate new genus, *Narcosius*, and similarly establishing *A. aulestis* as the functional out-group (FOG). Characters 14 & 15 are autopomorphies confirming the separation of *aulestis* from both the TOG *proteus* group and the FIG *Narcosius* and further demonstrating the polyphyletic nature of *Astraptes* (*sensu* Evans).

Characters 16 - 33 described in Table 2 and summarized in Figure 4, were selected only as a basis for a theoretical phylogeny within the genus *Narcosius* and are not applicable outside this established FIG. The proposed phylogeny for the *Narcosius* species and the relationship between that genus and the genera *Urbanus* (represented by its type species, *proteus* and the closely allied species of the *proteus* group) and *Astraptes* (defined by its type species *aulestis*) are shown in the cladogram, Figure 5.

A more detailed discussion of the 33 characters of Tables 1 & 2 follows:

1. The forewing cell in the Pyrrhopyginae, considered by Evans (1951 p. 1) to be "— co-ancestral with the Old World *Coeliadinae* —" is generally longer relative to the forewing length than is the cell in part of Group B and all but the first five genera (*Proteides* through *Aguna*) of Group C of Section 1 of the Pyrginae. In the remaining genera of Group C it is two thirds or less of the costa. This somewhat shorter although still long forewing cell of the entire TIG-TOG assemblage is considered to be the apomorphic state.

2. The same reasoning for determining the polarity of character 1 applies here, thus the apiculus commencing well beyond the base of the club is the apomorphic state.

3. The positioning of forewing vein M_2 nearer to M_1 than to M_3 or midway between them in most of the Pyrginae is considered apomorphic by comparison with the more primitive Pyrrhopyginae, used as out-group, in which M_2 is closer at its origin to M_3 than to M_1.

4. In the more primitive Pyrrhopygine genera *Pyrrhopyge* and *Elbella*, the vesica is generally without a cornutus. Cornutus development is noted in *Zonia*, *Jemadia*, *Myscelus*, *Granila*, *Passova* and *Aspitha*. Some genera in Group C of the Pyrginae, notably *Ridens*, lack a cornutus as do some species of other genera, but the development of a cornutus, at least in the taxa being studied here can be considered a derived state.

Table 1. Characters used in generic analysis of Astraptes aulestis - A. narcosius group using Urbanus proteus group as the Taxonomic out-group.

("p" = plesiomorphic, "a" = apomorphic)

1p Forewing cell longer than dorsum and generally more than two thirds of the costa

1a Forewing cell equal to or longer than dorsum and generally two thirds or less of the costa

2p Antennal club stout and entirely in the apiculus

2a Antennal club more slender, bent or angled to apiculus well beyond base of club

3p Forewing vein M_2 at its origin nearer to M_3 than to M_1

3a Forewing vein M_2 nearer to M_1 than to M_3 or midway between them

4p Vesica plain, no cornutus

4a Vesica with cornutus

5p Cornutus spines separate

5a Cornutus spines basally joined

6p Corpus bursae not clearly distinct from ductus bursae, merely its widened terminus

6a Corpus bursae clearly distinct from ductus bursae

7p Corpus bursae prominently spiculose internally

7a Corpus bursae smooth or only weakly spiculose (spicules may be present but too fine to detect at 50X magnification)

8p Hind tibiae always smooth

8a Hind tibiae often spined (lack of spines may occur in individuals but is not a specific variation)

9p Mid tibiae always smooth

9a Mid tibiae usually spined (see note at 8a)

10p Forewing termen with increased convexity toward apex and usually with a straight or concave section somewhere behind that

10a Forewing termen more evenly convex

11p Hindwing vein Cu_1 at or near cell end

11a Hindwing vein Cu_1 well before cell end

12p Penis relatively straight

12a Penis more or less prominently concave ventrally, at least near midpoint or prominently sinuous

13p Ductus bursae without internal sclerotized process apart from antrum

13a Ductus bursae with internal sclerotized process or processes

14p Corpus bursae without internal sclerotized process

14a Corpus bursae with internal sclerotized process

15p Female seventh sternite more or less evenly tapered caudally

15a Female seventh sternite tapering caudally but recurved to a broadened distal margin, somewhat hour glass shaped

5. The cornutus, where present, has many forms. In the Pyrrhopyginae it is composed of one or more spines as is the case in most of Section 1 of the Pyrginae. In Section 2 of the Pyrginae it begins to show more diversity in form, not strictly limited to various types and combinations of spines and is frequently missing, perhaps a lost character. The spined cornutus varies from one or two separate spines which may be long and slender or short, stout and thorn-like, to groups of numerous small separate thorns which may be randomly scattered or arranged in various patterns, to fasces-like bundles of long slender spines joined basally. The shapes of these long spines are variable, some evenly tapered, some more or less swollen terminally or terminally shaped like a spearhead. Within the Pyrrhopyginae only the monotypic genus *Zonia* Evans, 1951 has (so far as is known) basally joined cornutus spines. It is also the only known Pyrrhopyginae with tibial spines, which suggests that it may be the most evolutionarily advanced taxa within that subfamily. The majority of taxa in the B group of Section 1 of the Pyrginae have separate spines forming the cornutus. This commonality within the supposedly more primitive group of the Hesperiidae leads me to consider separate spines as the plesiomorphic state, thus supplying a synapomorphy to support the *proteus* group as TOG.

6. There seems to be no clearcut, universally applicable polarity of the two states of this character. Even in the relatively primitive Monotrysia (Dugdale, 1974 f. 14-23), the corpus bursae is more or less distinct from the ductus bursae in half of the examples shown. However, due to the fact that Dugdale's (1974 f.9-11) three figures representing Micropterigidae and Dacnonypha females all show the corpus bursae without a clearly separate ductus, I consider this to represent the plesiomorphic state and it does seem logical that a clearly separate corpus bursae should be a derived state.

7. Most examples that I have seen of female Hesperiid genitalia have relatively prominent interior spiculation in the corpus bursae. Two modifications to this basic state have been observed: (1) apparent loss or at least decrease in spiculation (at higher magnification than the 50X available to me probably some trace of spicules would be seen in even the smoothest appearing corpus) and (2) intensification of the spicules thus forming patterns or signa. The first of these derived states is the only one applicable here.

8-9. The development of tibial spines generally is a derived character. They are found in only one monotypic Pyrrhopygine genus, *Zonia* Evans, 1951, become gradually more common through Sections 1 & 2 of the Pyrginae, form the most prevalent group in the Hesperiinae and are universal in the Megathymidae. J.Y. Miller (pers. comm.) considers spined tibiae to be apomorphic in the Castniidae, occurring only in the mimetic groups; they are also very common in the relatively advanced Noctuidae. The presence of tibial spines seems to be more common on the hind than the mid tibiae, although I have not accumulated sufficient data to prove this. Within the group studied here, taxa exhibiting the plesiomorphic state of smooth tibiae do so with no individual exceptions whereas there may be individual exceptions to the apomorphic state.

10. The most common forewing shape in the Hesperiidae has the greatest termen convexity in the neighborhood of the median veins with the termen behind this point

Characters	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
proteus gp.	A	A	A	A	A	P	P	P	P	P	P	P	P	P	P
aulestis	A	A	A	A	P	A	A	A	P	P	P	P	P	A	A
narcosius gp.	A	A	A	A	P	A	A	A	A	A	A	A	A	P	P

A = apomorphies; P = plesiomorphies.

Figure 3. Data matrix for comparing *Astraptes aulestis* and the *A. narcosius* group (Taxonomic in-group) with the *Urbanus proteus* group (Taxonomic out-group).

more or less straight or with some concavity, usually just before the tornus. This commonality in broad out-group comparisons dictates the plesiomorphic state of this character. This basic wing shape has been modified in two principal ways: (1) the configuration found in *Narcosius*, a nearly evenly convex termen and (2) prominent terminal

Table 2. Characters used in species analysis of Narcosius ("p" = plesiomorphic, "a" = apomorphic).

16p Gnathos sclerotized but smooth or lightly spiculose

16a Gnathos sclerotized, prominently rough or heavily spiculose

17p Ampulla without dorsal process, harpe terminally rounded

17a Ampulla with prominent dorsal process, harpe terminally pointed

18p Ampulla process of 17a rounded

18a Ampulla process of 17a rhomboid

19p Terminally rounded harpe heavily dentate

19a Terminally rounded harpe smooth or sparsely and irregularly dentate and bearing a dorsal process

20p Dorsal harpe process of 19a a long curving spine directed dorsad

20a Dorsal harpe process broad, dentate, parallel to dorsal edge of harpe

21p Terminally dentate harpe of 19p not prominently produced dorsad at terminus

21a Terminally dentate harpe of 19p prominently produced dorsad at terminus

22p Dorsally produced harpe terminus moderately dentate, not recurved cephalad

22a Dorsally produced harpe terminus heavily dentate, prominently recurved cephalad

23p Terminally dentate harpe of 19p without dorsal process

23a Terminally dentate harpe of 19p with dentate dorsal process just distad of junction between harpe and ampulla

24p Terminally dentate harpe of 19p not dentate along its entire dorsal edge

24a Terminally dentate harpe of 19p dentate along its entire dorsal edge

25p Penis without a curved single row of heavy teeth on left side distally

25a Penis with a curved single row of heavy teeth on left side distally

26p Penis with scattered small teeth on left side distally

26a Penis teeth lost

27p Male costal fold usually well developed

27a Male costal fold very narrow, nearly lost

28p Sterigma simple; normally developed antrum flanked by lateral lobes of 8th sternite, no centrally developed lamella antevaginalis

28a Sterigma complex; either with large heavily sclerotized antrum fused to large smooth sclerotized process in ductus bursae or, if antrum normal it is covered ventrally by centrally developed lamella antevaginalis which overlaps lamella postvaginalis

29p Antrum normal, no prominent sclerotized process in ductus bursae fused to antrum

29a Antrum large, broad, heavily sclerotized and fused to large smooth sclerotized process in ductus bursae

30p Lamella antevaginalis not developed centrally

30a Lamella antevaginalis prominently developed centrally, overlaps lamella postvaginalis

31p Lamella antevaginalis terminally rounded or centrally fused nearly to terminus

31a Lamella antevaginalis broadly and deeply divided terminally

32p Lamella antevaginalis terminal division and suture symmetrical

32a Lamella antevaginalis terminal division and suture asymmetrical

33p Tibial spines always present

33a Tibial spines may be lost

production of the median vein area and a more or less truncate apex. Both modifications, only the first of which applies here, are derived states.

11. The position of vein Cu_1 of the hindwing relative to the end of the cell has been examined in randomly selected examples of Pyrrhopygine taxa and similarly selected taxa throughout Section 1 of the Pyrginae. This cannot be considered a definitive study but the positioning of Cu_1 at or near the lower discocellular vein appears to be the common scenario throughout this broad out-group, indicating its probable plesiomorphic state.

12. The relative curvature of the penis is by no means a broadly homologous character and is used here only insofar as it applies to the immediate TIG-TOG assemblage. This out-group comparison indicates the probable apomorphic state of the curved penis.

13-15. The polarity of each of these three two-state characters is based on broad out-group commonality of: (13) lack of a sclerotized process in the ductus bursae; (14) lack of a sclerotized process in the corpus bursae; (15) a simple, evenly tapered 7th female sternite, indicating these as the probable plesiomorphic states.

16-33. These characters apply only to the species of *Narcosius* and were used to determine a probable phylogeny within that genus. The polarities of the states of these characters in those taxa to which they apply were selected subjectively and then tested through reversed polarity to produce the most parsimonious tree. The final autapomorphies of the species analysis of *Narcosius* have resulted in 6 cladospecies and 3 paraspecies, using these terms in the manner employed by Ackery and Vane-Wright (1984).

For this study, 302 specimens (210 males and 92 females) of the 9 species and two subspecies that make up the *narcosius* group and 127 specimens (66 males and 61 females) of *Astraptes aulestis* were examined. This material was borrowed from the following institutions and private collections listed alphabetically: Allyn Museum of Entomology (AME); American Museum of Natural History (AMNH); Museum für Naturkunde der Humboldt-Universität zu Berlin (ZMHU); British Museum (Natural History) (BMNH); Carnegie Museum of Natural History (CM); Los Angeles County Museum (LACM); Javier de la Maza collection (JM); Milwaukee Public Museum (MPM); Stanley S. Nicolay collection (SN); Herman Strecker collection (HS); United States National Museum USNM).

Included in the material examined were the holotypes of *Telegonus janeira* Schaus, 1902;

Characters	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
parisi	P	P	--	A	P	--	--	--	--	P	P	P	P	P	P	--	--	P
hercules	P	P	--	A	A	--	--	--	--	P	P	A	P	P	P	--	--	P
aulina	A	P	--	P	--	P	--	A	P	P	P	P	P	P	P	--	--	P
narcosius	A	P	--	P	--	P	--	P	A	P	P	P	A	P	A	P	--	P
mura	A	P	--	P	--	A	P	P	P	P	A	P	A	P	A	P	--	A
colossus	A	P	--	P	--	A	P	P	P	P	P	P	A	P	A	A	P	P
dosula	A	P	--	P	--	A	A	P	P	P	P	P	A	P	A	A	A	P
samson	A	A	P	--	--	--	--	--	--	A	--	P	A	A	--	--	--	P
nazaraeus	A	A	A	--	--	--	--	--	--	A	--	P	A	A	--	--	--	P

A = apomorphies; P = plesiomorphies; -- = not applicable

Figure 4. Data matrix for analysis of the 9 species of *Narcosius*.

Astraptes colossus dosula Evans, 1952; *Telegonus granadensis* Möschler, *Astraptes colossus rhoda* Evans, 1952; *Telegonus parisi* Williams, 1927; *Astraptes parisi helen* Evans, 1952; *Astraptes louiseae* Freeman, 1969; *Astraptes hercules* Bell, 1956; *Telegonus mura* Williams, 1927; *Astraptes narcosius aulina* Evans, 1952; *Astraptes samson* Evans, 1952 and a new species described below. In addition to these, a lectotype for *Eudamus colossus* Herrich-Schaffer, 1869 and neotypes for *Papilio aulestis* Cramer, [1780] and *Papilio narcosius* Stoll, [1790] will be designated, that for *aulestis* in a future paper.

Narcosius, new genus

Type species: *Papilio narcosius* Stoll, [1790], Aanhangs. werke Uitl. Kapellen, P. Carmer: 171, pl.39, f.8.

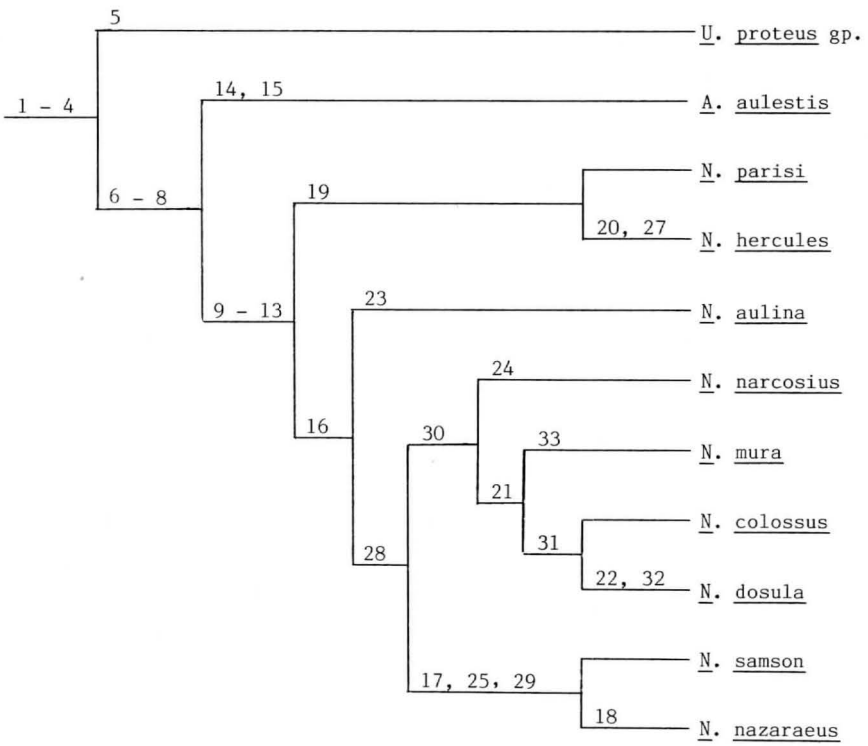


Figure 5. Proposed phylogenetic tree (cladogram) of *U. proteus* group, *A. aulestis* and the 9 species of *Narcosius*. Numbers refer to the apomorphic states of characters of the data matrices (figs. 3 & 4; tables 1 & 2).

The mid and hind tibiae are nearly always prominently spined. Of the 295 specimens examined, six had no legs; with a few exceptions noted below, the rest had prominently spined mid and hind tibiae (19 specimens lacking either hind or mid legs were prominently spined on the remaining tibiae). In the species *mura* (Williams), 1927, 11 males and 3 females were examined, of which one male had no legs, two males had no tibial spines at all, four males, including the holotype, had only hind tibial spines and the rest were normal for the genus. In the closely allied *Astraptes aulestis,* it was often impossible to determine whether or not tibiae were spined without removing them, thus leaving the tibial condition undetermined for 61 examples of hind tibiae and 40 of mid tibiae. In addition there were 17 examples of missing hind tibiae and 20 of mid tibiae. Of the total of 49 hind tibiae determinations, 29 were smooth and 20 (41%) spined; all of the 67 mid tibiae determinations were smooth.

The forewing has a prominent costal fold in the males except for *mura* in which the fold is somewhat less prominent in some specimens and *hercules* (Bell), 1956 which has a very narrow costal fold. The ratio of forewing length to width (length measured from base of wing to end of fringe at apex; width measured normal to costa from costa to end

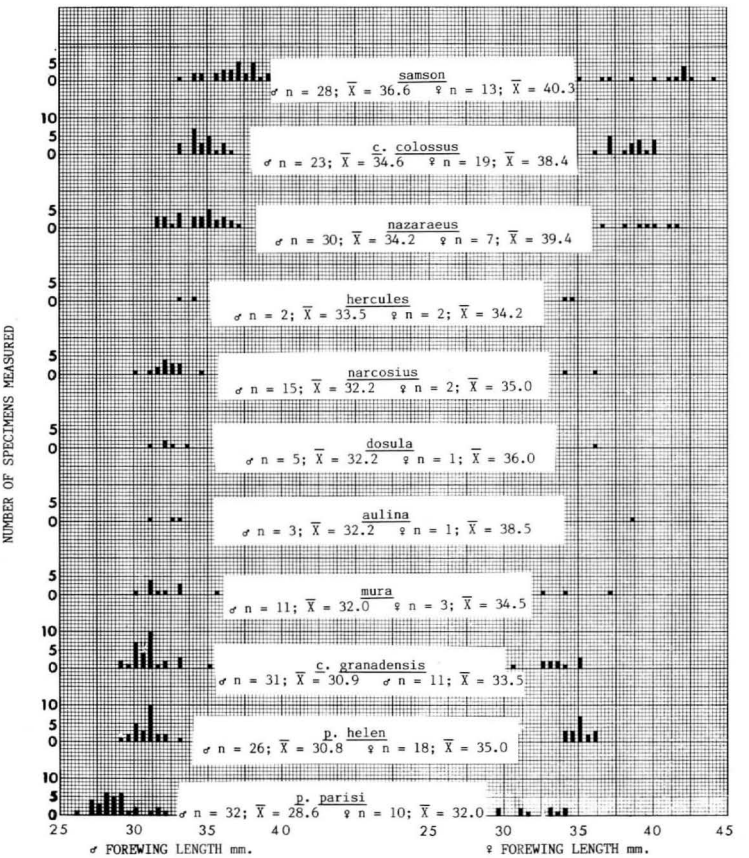
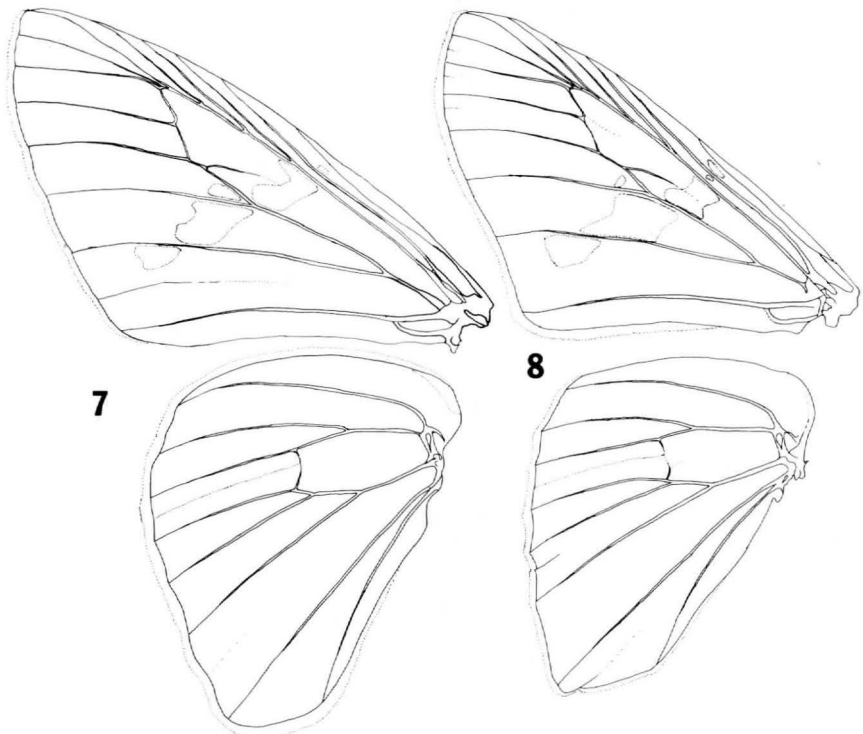


Figure 6. Histogram of forewing lengths, ♂ and ♀, of the 11 species and subspecies of *Narcosius* arranged in order of increasing ♂ forewing length.

of fringe at tornus) varies from extremes of 2.15 to 1.88 in 293 specimens measured. The mean ($\overline{X}$) of these ratios is 2.014; the standard deviation (S_X) is 0.0399; at 95% degree of certainty the population mean (μ) will fall between 2.009 and 2.019. This contrasts with *A. aulestis* in which n = 49; $\overline{X}$ = 1.934; S_X = 0.05799 and μ at 95% degree of certainty can be expected to fall between 1.917 and 1.951. The forewing length varies between species and subspecies and also between sexes within these taxa as illustrated in the histogram, figure 6. The recurrent vein in the forewing cell joins the cubitus usually well before the lower discocellular vein. The forewing bears a central band of more or less well separated hyaline spots (that in M_3-Cu_1 may be missing) but no subapical spots. Generally the spots of this band in *aulestis* are more conjoined although in individuals including Cramer's figures the spots may be well separated. The forewing termen is nearly evenly convex in contrast to *aulestis* with a more nearly straight central section and usually some concavity near the tornus. The forewing cell is longer than the dorsum and about two thirds of the costa and forewing vein M_2 is nearer to M_1 than to M_3 at their origins or midway between them. The relative lengths of forewing veins m_3-cu_1 and m_2-m_3 show probably significant generic differences, at least between *Narcosius* and *A. aulestis*. The measurements involved require use of a measuring reticule in the microscope and are very tedious and time consuming. As yet I have insufficient data concerning the *proteus* group and other allied groups and therefore did not include this as a character for use in the cladistic analysis. 102 measurements were made of *Narcosius* species resulting in ratios of m_3-cu_1/m_2-m_3 that varied between extremes of 1.73 and 3.06; $\overline{X}$ = 2.389; S_X =



Figures 7-8. Wing venation: 7 *Narcosius parisi helen* (Evans), 1952 ♂, Mexico: Michoacan, Coahuayona (AME). 8 *Astraptes aulestis* (Cramer), [1780] ♂, Mexico: Oaxaca, Chimalapa (AME).

0.2419; at 95% certainty μ can be expected to fall between 2.341 and 2.437. There is some slight variation between species but of doubtful significance. 32 such measurements were made for *aulestis* resulting in $\overline{X} = 1.897$; $S_{\overline{X}} = 0.1402$ and at 95% certainty μ can be expected to fall between 1.855 and 1.939. The measurements varied between extremes of 1.63 and 2.20.

The hindwing is without a tail; vein Cu_1 arises usually well before the lower discocellular vein in contrast with *aulestis* in which it is at or near the cell end. Cu_2 and Rs of the hindwing arise from the cell approximately opposite each other, whereas in *aulestis* Cu_2 arises more basad than Rs. In *Narcosius* Rs is nearer to the cell center, being approximately 0.44 times the cell length from the cell end, than in *aulestis* where it is approximately 0.30 times the cell length from the cell end.

Wing venation is illustrated in figure **7** *N. parisi helen* (Evans), 1952 and can be compared to *A. aulestis,* figure **8.**

The antennae in carefully spread specimens reach nearly to mid costa at the point of apiculus flexure. The apiculus is sharply bent or hooked, usually at or just beyond mid club. The nudum varies from a total of 25 to 41 segments arranged with between 2 and 12 segments on the club and between 19 and 29 on the apiculus. The nudum varies between species and, to some extent, between sexes, the females in general having a slightly longer nudum than the males. The number of nudum segments is shown in figure **9** where the species are arranged from bottom to top in order of increasing total nudum segments. Details of the slight differences encountered in nudum count between subspecies is given in their descriptions. 12 examples of *A. aulestis* (7 males, 5 female) indicated no significant sexual difference in nudum count which varied from 25 to 28, arranged with 7 or 8 segments on the club and 18 to 21 on the apiculus; $\overline{X} = 26.25$ (7.25/19.00); $S_{\overline{X}} = 0.965$.

Narcosius species are large, heavy-bodied, dark blue-black skippers with rather dull green clothing of thorax and wing bases above, all species appearing very similar. The legs, thorax and abdomen are very densely hairy.

The male genitalia have a short, broad tegumen, bifurcate uncus with either short stout divergent arms or long, nearly parallel arms; the undivided gnathos may be strongly spiculose or merely slightly rough; the saccus is broad and moderately long. The penis is long, relatively slender, terminally tapered, variously curved and contains, in the vesica, a cornutus of one or two separate long slender, relatively straight spines. It is usually more or less dentate along the left side distally, more or less following the left side of the dorsal vesica opening. In one species these teeth appear to be missing; in another, occasionally missing and in two species they form a single curving row of very coarse teeth bordering a vesica opening that is somewhat dorso-sinistral. Most specific characters for diagnosis are found in the shape of the valvae and penis, spiculosity of the gnathos and the form of the uncus arms.

The female genitalia have a centrally indented, well sclerotized lamella postvaginalis, the shape of which differs between some species. The lamella antevaginalis is variously developed: it may consist of merely the two lateral lobes of the 8th sternite more or less narrowly fused to a small antrum, heavily sclerotized 8th sternite lobes fused to a very prominent large antrum or be a centrally developed and caudally produced sclerotized plate overlapping the lamella postvaginalis. The ductus bursae is long and slender and contains a long sclerotized strip, more or less a half tube, running most of its length and ending in a well sclerotized spiral at the cervical end. In addition to this half tube some species have a more or less well sclerotized interior process between the half tube and the antrum and often fused to the antrum. This caudal portion of the ductus bursae is somewhat swollen in comparison with the slender anterior portion. The ductus seminalis is connected dorsally either immediately cephalad of the antrum or more or less central to this sclerotized process. The corpus bursae is smooth or weakly spiculose and more or less spherical, or more prominently spiculose and more or less cylindrical and often somewhat constricted in two or three places. There is no signum.

Narcosius species are very difficult and often impossible to differentiate on the basis of superficial characters alone. There are some minor differences in size, shape and arrangement of the forewing hyaline spots between species and subspecies, but only

applying in a general way to the averages of the taxa involved, as noted by Evans (1952 p. 108). One species, *dosula* (Evans), 1952 can usually be determined through its distinctive underside pattern, but generally a genitalic examination is required, which often may be accomplised without dissection in females as well as males. Due to this great superficial similarity between species, the matching of female to male was difficult. In the case of *dosula* it was clearcut due to the distinctive underside pattern in both sexes. In some species, considerable detective work was necessary to make a match, based on size, geographic distribution and slight differences in maculation. For example, the distribution of *colossus* (Herrich-Schäffer), 1869 and *parisi* (Williams), 1927 is from Mexico to southern Brasil and Paraguay. In the southern part of it range, *colossus* occurs as the subspecies *granadensis* and *parisi* occurs in Mexico as the subspecies *helen;* male *colossus* in Mexico

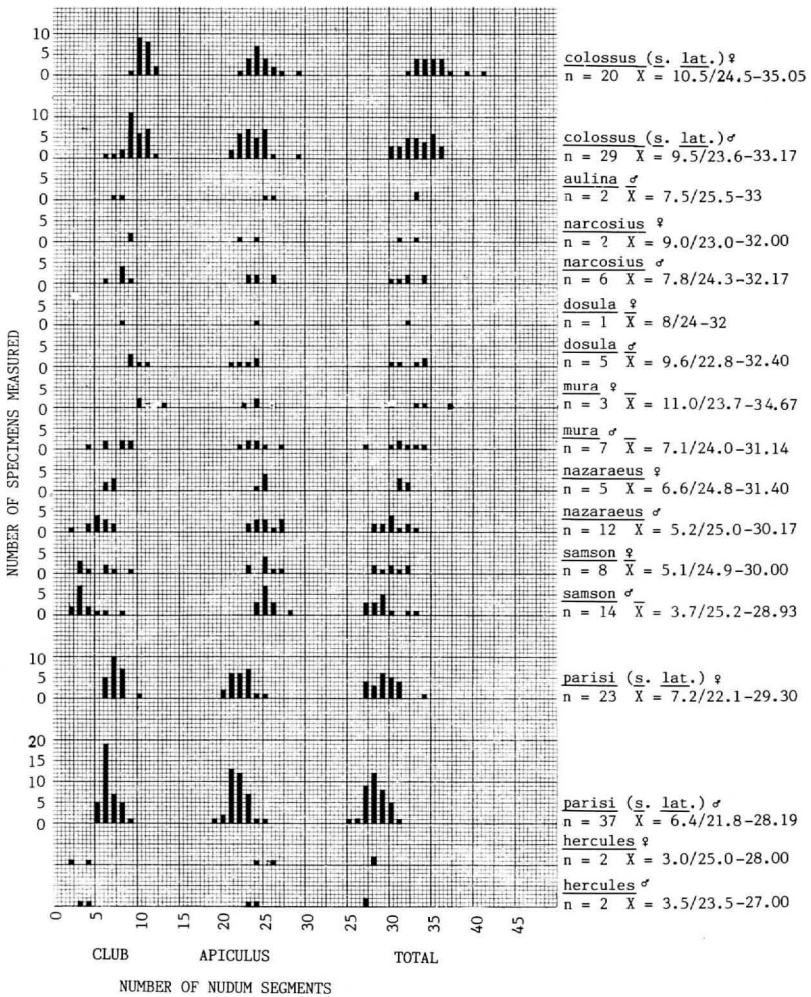


Figure 9. Histogram of the number of antennal nudum segments, ♂ and ♀, of the 9 species of *Narcosius* showing, left to right, nudum segments on club, apiculus and total number of nudum segments; species arranged in order of increasing total in ♂.

is a much larger insect than male *helen* and it is a reasonable assumption that the distinctively smaller Mexican female must be *helen*. Since there are other very large species found in Mexico, there is no assurance which of these large females is *colossus*. However, in southern Brasil the two smallest male taxa are *parisi* and *granadensis*, therefore the female with genitalia like the Mexican *helen* must be *parisi* and the other small female *granadensis*, thereby establishing also the identity of *colossus* in Mexico. Similar detective work has established the identity of the other females, but only by rearing can the true relationships be established absolutely. Suffice to say that there are 9 different forms of female genitalia that had to be matched with the 9 known male species and I am reasonably certain that this has been done correctly. In additon to these 9 species, the genus contains two subspecies; one of the species is new and two were raised from subspecific rank. One former species is placed in synonymy along with one subspecific name replaced by an older available name.

Narcosius is half a tautonym based on the name of the type species and is to be considered masculine in gender.

The following keys and species descriptions are based mostly on genitalia; 42 male and 37 female genitalia preparations were made and an additional 36 male genitalia preparations from other sources were studied in detail. It was necessary to remove some genitalia from fixed slides in order to provide different views. One genitalia vial from AMNH had no accompanying specimen and the genitalia were missing from one specimen. No genitalia slides were found for four specimens from CM, including the holotypes of the Williams species *mura* and *parisi*, but the genitalia of these specimens were illustrated quite adequately by Williams (1927). The genitalia of 178 specimens were partially examined either *in situ* or on cards prepared by Evans.

Key to the Species and Subspecies of Male *Narcosius*

1. Gnathos sclerotized but smooth or only lightly spiculose 2
1'. Gnathos sclerotized, prominently rough or heavily spiculose 4
2. Dorsal process of harpe from near distal end, a simple long spine projecting dorsad, variously dentate 3
2'. Dorsal process of harpe from near center of harpe, projecting fore and aft parallel to dorsal margin of harpe, dentate ..... *hercules*
3. Distal end of harpe usually not projecting caudad of dorsal process; forewing usually less than 30 mm ..... *parisi*
3'. Distal end of harpe usually not projecting caudad beyond dorsal process; forewing usually more than 30 mm ..... *p. helen*
4. Ampulla with prominent dorsal process, harpe terminally pointed; penis with curved single row of very prominent teeth on left side extending distally to ventral side at terminus 5
4'. Ampulla without dorsal process, harpe terminally rounded; penis with scattered fine teeth left side distally or may be smooth 6
5. Dorsal process of ampulla more or less circular, not projecting very far caudad ..... *samson*
5'. Dorsal process of ampulla more or less rhomboid, projecting prominently caudad ..... *nazaraeus*
6. Terminally rounded harpe prominently produced dorsad, dentate only on produced portion 7
6'. Terminally rounded harpe not prominently produced dorsad, dentate along its entire dorsal edge ..... *narcosius*
7. Harpe produced dorsad only at distal end 8
7'. Harpe with additional dorsal process near its juncture with ampulla ..... *aulina*
8. Terminal portion of harpe may be very coarsely dentate, but not recurved cephalad 9
8'. Terminal portion of harpe prominently recurved, projecting cephalad, dentation very coarse and prominent ..... *dosula*

9. Harpe long and slender 10
9'. Harpe short and broad ..... *mura*
10. Forewing length generally more than 33 mm; hyaline costal spot usually offset basad from center of cell spot ..... *colossus*
10'. Forewing length generally less than 33 mm; hyaline costal spot usually centered over cell spot ..... *c. granadensis*

Key to the Species and Subspecies of Female *Narcosius*

1. Ductus bursae with large, smooth, internal sclerotized process fused to very large antrum and more or less centered over ductus seminalis connection 2
1'. Ductus bursae without such process; antrum not enlarged 3
2. Lamella postvaginalis narrow longitudinally with small central caudal indentation, distal margin rather straight or sloping laterally ..... *nazaraeus*
2'. Lamella postvaginalis broader longitudinally, more deeply indented; terminally rounded ..... *samson*
3. Lamella antevaginalis not centrally developed and not overlapping lamella postvaginalis, formed by the lobes of the 8th sternite 4
3'. Lamella antevaginalis centrally developed as a single plate or two lateral lobes fused centrally and overlapping the lamella postvaginalis 7
4. Distal margin of lamella postvaginalis more or less a straight line, central indentation shallow 5
4'. Distal margin of lamella postvaginalis strongly convex, central indentation deep 6
5. Forewing usually less than 34 mm ..... *parisi*
5'. Forewing usually more than 34 mm ..... *p. helen*
6. When flattened, distal margin of lobes of 8th sternite convex caudally ..... *aulina*
6'. Distal margin of 8th sternite lobes concave caudally ..... *hercules*
7. Lamella antevaginalis deeply indented centrally on caudal margin dividing it into two connected lateral lobes 8
7'. Lamella antevaginalis not or very slightly indented centrally on caudal margin 10
8. Lamella antevaginalis lobes terminate in narrow points, central groove cephalad of their junction straight, regular 9
8'. Lamella antevaginalis lobes terminally broad, central groove very irregular ..... *dosula*
9. Forewing 36 mm or more ..... *colossus*
9'. Forewing 35 mm or less ..... *c. granadensis*
10. Caudal margin of lamella postvaginalis smoothly convex, sloping steeply on either side of shallow central indentation; caudal margin of lamella antevaginalis strongly convex, nearly reaches or overlaps central indentation of lamella postvaginalis ..... *narcosius*
10'. Caudal margin of lamella postvaginalis more flatly convex and more irregular laterally, central indentation deep; caudal margin of lamella antevaginalis more flatly convex, well cephalad of indentation of lamella postvaginalis ..... *mura*

Narcosius parisi (Williams), 1927, new combination

MALE: Upperside, ground color blue-black with a dark blue gloss; body and wing bases covered with dull bluish green hair scales with a more or less bronze gloss, very restricted on the forewing, limited on the hindwing to the area caudad of M_1, extending from about cell end at M_1 to the inner margin where it nearly reaches the tornus. Forewing with hyaline spots in cell, costal cell (usually more or less centered over cell spot but may be offset basad and may be missing), sometimes a narrow dash in Sc-R_1, M_3-Cu_1 (usually small and not reaching base of that space, but may be large, triangular and filling the basal space),

Cu_1-Cu_2 (the largest, more or less quadrate, usually more or less excavate distally, more so than proximally, forward edge nearly always equal to rear edge, completely overlaps spot in M_3-Cu_1), Cu_2-1A (a very variable spot often nearly completely overlapped by spot in Cu_1-Cu_2 but sometimes not overlapped at all). Fringe concolorous except in 1A-2A where it is white. Hindwing unmarked, fringe checkered, dark at vein ends, white between.

Underside, ground color as above, becoming slightly more purple and a bit paler in anal cell of forewing. Forewing: very vague darker spot distad of cell end, similarly darker basad of hyaline spots in cell and Cu_1-Cu_2; hyaline spots as above, that in Cu_2-1A may have some surrounding opaque white scaling, usually distad; may be white streak in Sc-R_1 in those specimens lacking this spot on the upper surface; blue-white overscaling in distal area and buff-brown in discal area, very variable in intensity but never as strongly marked as *dosula* or a well marked *colossus;* this overscaling may result in a pale marginal band and a narrow buff streak along the discocellular veins, or may be nearly unmarked. Fringe as above but with less white.

Hindwing: vague patterns, very variable in intensity and formed by overscaling, as follows: a poorly defined pale blue-white distal border more or less from Rs to the tornus and sometimes continued along inner margin, a very irregular pale buff-brown discal band and some very irregular and obscure pale buff-brown sub-basal markings (this patterning is best developed in *dosula*, of which, a strongly marked ♂ is illustrated in figure 44). The intensity and definition of the pattern varies between species as well as individually and is often nearly lost. Fringes as above but with less white. Palpi and eye fringes usually with some white scaling but very variable. Forelegs with vague outer white stripe; mid and hind tibiae strongly spined. Anal tuft of abdomen (see description of *narcosius*) usually concolorous but may be white or pale grey.

FEMALE: As ♂ except forewing hyaline spots larger, spot in Cu_1-Cu_2 usually partly overlaps spot in Cu_2-1A; costal spot generally offset slightly basad of center of cell spot. Underside superscaling pattern tends to be slightly stronger, often forming a wide fore and hindwing distal pale border; discal hindwing markings equally vague as in ♂ but may be a bit stronger.

The ♂ genitalia have relatively narrow, slender, parallel uncus arms, deeply divided; gnathos not spiculose, often smooth but may be somewhat rough; penis equal in length or slightly longer than valva, rather stout and somewhat widened terminally in dorsal view, relatively straight but still sinuous in lateral view, dentate distally on left side and bearing a single, slender thorn-like spine as cornutus in the vesica, the opening for which is dorsal; valvae long and slender, harpe with prominent hooked and variously dentate dorsal process.

The ♀ genitalia are characterized by a relatively narrow sterigma longitudinally; caudal margin of lamella postvaginalis generally straight or somewhat sinuous, not convex and with rather square corners, central indentation relatively shallow but prominent; lamella antevaginalis consists of two separate narrow lobes sloping cephalad away from the ostium bursae; antrum moderately broad but not prominently developed as in *samson* and *nazaraeus*; sinus conjunctionis prominently produced cephalad; no internal sclerotization other than the antrum in the caudal portion of the ductus bursae; ductus seminalis connected dorsally to somewhat swollen portion of ductus bursae just cephalad of antrum; corpus bursae large, more or less cylindrical, prominently constricted in several places and usually not or very weakly spiculose; papillae anales moderately concave on their distal margins.

N. partisi most closely resembles *colossus granadensis* from which it differs as discussed under the description of that subspecies. Other similar species are *narcosius, mura, hercules* and *aulina* from which it differs superficially by its smaller size and by the position of the forewing spot in M_3-Cu_1 which is completely overlapped by the spot in Cu_1-Cu_2 in *parisi* but not completely overlapped in the others. The only positive means of identification is in the genitalia; the shape of the ♂ valva with its long dorsal process of the harpe immediately separates *parisi* from the others and the more or less straight caudal margin of the lamella postvaginalis with its relatively shallow indentation distinguishes ♀ *parisi* from the others with convex caudal margins. In both sexes, these features can often be observed without dissection.

N. *parisi* is divided into two subspecies described below insofar as they differ from each other.

Narcosius parisi parisi (Williams), 1927, new combination

Figures **10**, **11**, (♂); **12**, **13** (♀); **55** (♂ genitalia); **67** (♀ genitalia)

Telegonus parisi Williams, 1927: 277, f.18; pl.25 f.6. Type locality: Brasil; Matto Grosso. Holotype in CM.

MALE: Upperside, forewing often a hyaline spot in Sc-R_1; underside forewing with white dash in Sc-R_1.

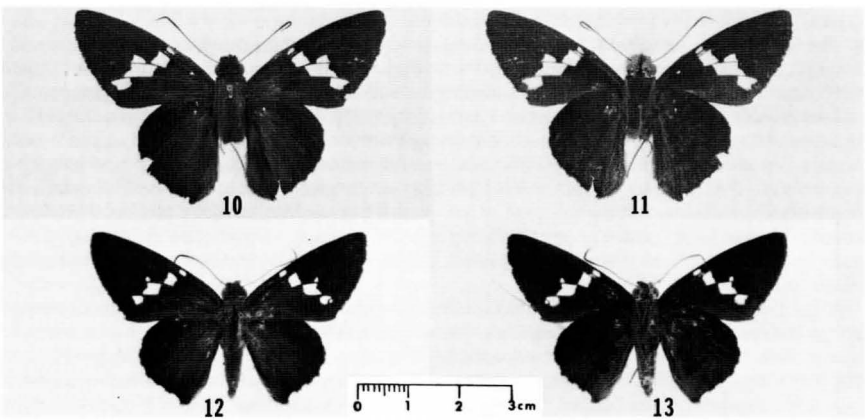
FEMALE: As ♂ except underside forewing white dash in Sc-R_1 may be missing; differs in wing size and antennal nudum as outlined below.

Wing measurements: ♂ forewing averaged 28.6 mm from base to apex and 14.2 from costa to tornus in 32 specimens measured, varying from 26 x 13.5 to 32 x 16 (holotype 29.5 x 14.5); ♀ forewing averaged 32.0 x 16.0 in 10 specimens measured, varying from 29.5 x 14.5 to 34 x 17.

Antennal nudum: ♂ averaged 28.61 (6.8/21.8) in 16 specimens measured, varying from 5/21 to 6/25 (holotype 9/19); ♀ averaged 30.32 (7.8/22.5) in 6 specimens measured, varying from 7/21 to 10/24.

In the ♂ genitalia the distal end of the harpe usually does not or only slightly projects caudad beyond the dorsal process, thus differing slightly from *p. helen* in which it usually does project. There is no discernible difference in the ♀ genitalia between the two subspecies.

34 ♂ and 12 ♀ specimens were examined from the following countries: Trinidad 6 ♂ (BMNH), 1 ♀ (AMNH); Fr. Guiana 2 ♂ (AMNH); Brasil 12 ♂, 3 ♀ (5 ♂, 2 ♀ BMNH; 2 ♂, 1 ♀ AMNH; 3 ♂ including HT, CM; 2 ♂ MPM); Ecuador 1 ♂ (AMNH), 2 ♀ (1 BMNH; 1 LACM); Peru 2 ♂, 2 ♀ (2 ♂, 1 ♀ BMNH; 1 ♀ USNM); Bolivia 4 ♂ (2 BMNH; 2 CM); Paraguay 6 ♂, 3 ♀ (4 ♂, 3 ♀ BMNH; 2 ♂ CM); no data 1 ♂ (BMNH), 1 ♀ (USNM). Williams (1927 p. 277) mentions a ♂ paratype from Muzo, Colombia, but this specimen was not found at CM. 6 ♂ and 5 ♀ genitalia preparations were made; genitalia of the other specimens were examined either *in situ* or on cards on slides prepared by others. The genitalia slide for the holotype was not found but Williams' figure shows no significant



Figures **10-13**, *Narcosius parisi parisi* (Williams), 1927. **10, 11** ♂ Holotype upper (**10**) and under (**11**) surfaces (Photo nos. 820630/5,6) Brasil: Matto Grosso, Chapada (CM). **12,13** ♀ upper (**12**) and under (**13**) surfaces (Photo nos. 860404/0,1) [Brasil: Para], Obidos (BMNH).

difference from the other ♂ studied.

Evans' count of *parisi* specimens in the BMNH differs slightly from the above because 3 ♀ from Venezuela that he had determined as *parisi* are actually *A. aulestis* and his ♂ from Ecuador is a ♀.

Narcosius parisi helen (Evans), new combination

Figures **14, 15** (♂); **16, 17** (♀); **56** (♂ genitalia); **68** (♀ genitalia)

Astraptes parisi helen Evans, 1952: 110. Type locality: Honduras; San Pedro Sula. Holotype ♂ in BMNH.

= *Astraptes louiseae* Freeman, 1969: 6-7. Type locality: Mexico; Veracruz. Holotype ♂ in AMNH (not USNM).

MALE: Upperside, forewing no hyaline spot in Sc-R_1; underside forewing no white dash in Sc-R_1; the genitalia differ slightly as described under *N. p. parisi*.

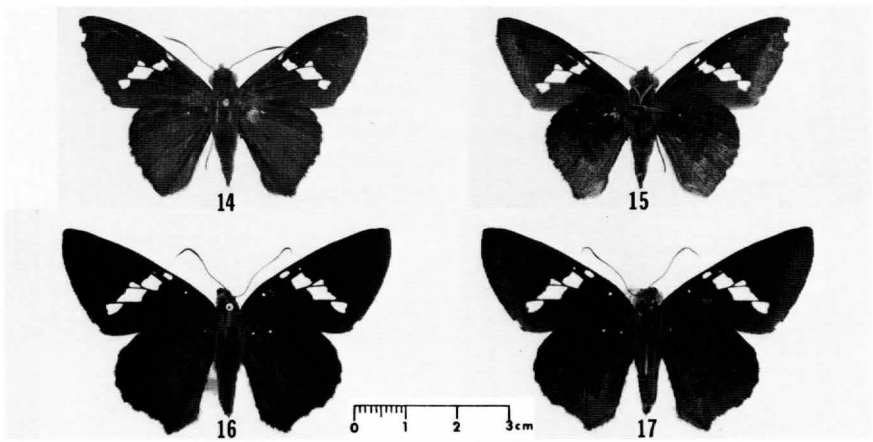
FEMALE: As ♂ except as noted in description of *parisi* (*sensu latu*); differs in wing size and antennal nudum as outlined below.

Wing measurements; ♂ forewing averaged 30.8 mm from base to apex and 15.3 from costa to tornus in 26 specimens measured, varying from 29.5 x 14.5 to 33 x 16 (holotype 30 x 14.5, holotype of *louiseae* 31 x 15.5); ♀ forewing averaged 35.0 x 17.4 in 18 specimens measured, varying from 34 x 17 to 36 x 18.

Antennal nudum: ♂ averaged 27.87 (6.1/21.8) in 21 specimens measured, varying from 5/20 to 6/24 in holotype (holotype of *louiseae* 6/21); ♀ averaged 28.94 (7.0/21.9) in 17 specimens measured, varying from 6/21 to 8/23.

28 ♂ and 19 ♀ specimens were examined from the following countries: Mexico 16 ♂ 9 ♀ (10 ♂ 7 ♀ AME; 5 ♂, including *louiseae* HT, 2 ♀ AMNH; 1 ♂ USNM); Guatemala 2 ♂ 4 ♀ (1 ♀ AME; 1 ♂ 1 ♀ AMNH; 1 ♀ USNM; 1 ♂ 1 ♀ CM); Belize 1 ♂ (BMNH); Honduras 5 ♂ 3 ♀ (4 ♂, including HT, 3 ♀ BMNH; 1 ♂ AMNH); Nicaragua 1 ♀ (BMNH); Costa Rica 2 ♂ 1 ♀ (USNM); Panama 1 ♂ (BMNH); no data 1 ♂ (BMNH), 1 ♀ (USNM). 8 ♂ and 4 ♀ genitalic preparations were made; genitalia of the other specimens were examined either *in situ* or on cards, slides or in vials prepared by others.

N. p. helen differs from *parisi* in the slight difference in the ♂ genitalia noted under



Figures **14-17**. *Narcosius parisi helen* (Evans), 1952. **14,15** ♂ Holotype upper (**14**) and under (**15**) surfaces (Photo nos. 830406D/16,17) Honduras: San Pedro Sula (BMNH). **16,17** ♀ upper (**16**) and under (**17**) surfaces (Photo nos. 860324B/6,7) Mexico: Veracruz, Catemaco (AME).

the description of *N. p. parisi*, in the lack of a forewing spot in Sc-R_1 (both surfaces) of *helen* which is usually present in *parisi*, and in the slightly smaller size of *parisi*. I have examined the holotype of *louiseae* and its genitalia and find that it falls well within the normal variation range of *helen*. *Helen* appears to be restricted to Panama, Central America and Mexico, whereas *parisi* is known only from Trinidad and South America.

Narcosius hercules (Bell), 1956, new combination

Figures **18**, **19** (♂); **20**, **21** (♀); **57** (♂ genitalia); **69** (♀ genitalia)

Astraptes hercules Bell, 1956: 6-7, f.1,2,19. Type locality: Bolivia: Santa Cruz. Holotype in AMNH.

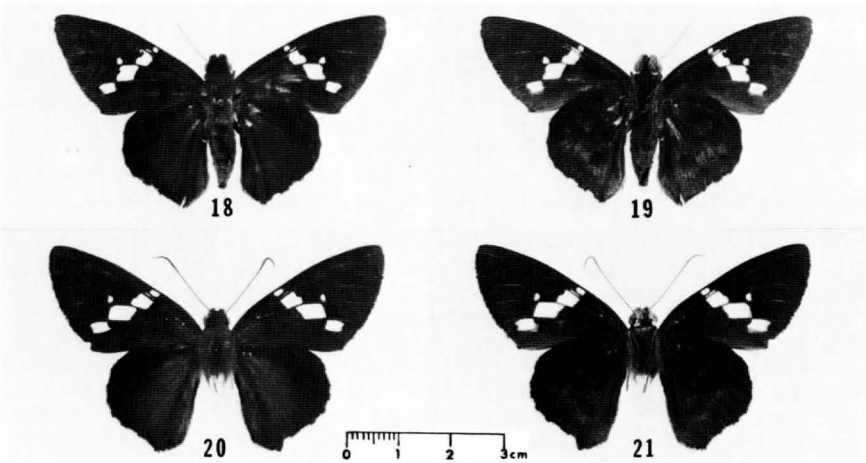
MALE: Upperside, as *narcosius* except: forewing costal fold very narrow; hyaline spots generally larger; hyaline costal spot may be offset basad from center of cell spot; spot in Cu_1-Cu_2 partially overlaps cell spot, its forward and rear margins are about equal, outer edge not as excavate; spot in M_3-Cu_1 more rounded; may be a hyaline spot in Sc-R_1.

Underside, as *narcosius* but hindwing has more extensive and bluer distal pale superscaling leaving vague dark spots of ground color postdiscally from Sc+R_1 to M_3 and in Cu_2-2A, and discally in cell and Cu_2-2A. Abdominal anal tuft white.

FEMALE: As ♂ but forewing hyaline spots larger, that in Cu_2-1A may be overlapped by spot in Cu_1-Cu_2. One specimen from Ecuador (SN) has a prominently white-barred abdomen beneath and prominent white scaling in the anal region, not restricted to the anal tuft; the other specimen from Bolivia (AMNH) has lost its anal tuft through removal of scales to examine the genitalia which were also damaged; its abdomen is not white-barred.

Wing measurements: ♂ forewing averaged 33.5 mm from base to apex and 17.0 from costa to tornus in two specimens measured, varying from 33 x 17 (holotype) to 34 x 17 (paratype); ♀ forewing averaged 34.25 x 17.0 in two specimens measured, varying from 34 x 17 to 34.5 x 17.

Antennal nudum: ♂ averaged 27.00 (3.5/23.5) in two specimens measured, varying from 3/24 (holotype) to 4/23 (paratype); ♀ averaged 28.00 (3.0/25.0) in two specimens measured,



Figures **18-21**. *Narcosius hercules* (Bell), 1956. **18,19** ♂ Holotype upper (**18**) and under (**19**) surfaces (Photo nos. 860324A/11,12) Bolivia: Santa Cruz (AMNH). **20,21** ♀ upper (**20**) and under (**21**) surfaces (Photo nos. 860324A/13,14) Ecuador: Limoncocha, Rio Napo (SN).

varying from 2/26 to 4/24. This is the shortest nudum average of all *Narcosius* species and has most of the nudum on the apiculus.

The ♂ genitalia have relatively slender parallel uncus arms, deeply divided; gnathos only slightly spiculose; penis long, slender and relatively straight as *parisi* but less widened terminally, about as long as valva, very lightly and finely dentate on left side distally and bearing a single slender, thorn-like spine as cornutus in the dorsally extruded vesica; valvae slender with peculiar, prominently dentate dorsal process of harpe from about its mid dorsal edge and extending prominently fore and aft parallel to that dorsal edge; a glance at the illustration (fig. **57**) is better than any description.

The ♀ genitalia have a deeply indented lamella postvaginalis with convex caudal margin; lamella antevaginalis not centrally developed and consists of the two lateral sclerotized lobes of the 8th sternite whose lateral ends extend caudally resulting in an overall convex cephalad margin, these lobes covered ventrally by a more or less strongly sclerotized pleural membrane with a pronounced "Cupid's bow" shaped cephalad margin and strongly wrinkled parallel to this margin; sinus conjunctionis prominently produced cephalad; no internal sclerotized process in the caudal portion of the doctus bursae other than the antrum which appears not to be fused to the lobes of the lamella antevaginalis; ductus seminalis connection normal, located dorsally shortly cephalad of antrum; corpus bursae large, cylindrical and constricted in several places, weakly spiculose.

Two ♂ and two ♀ specimens were examined from the following countries: Ecuador 1 ♂ (AMNH), 1 ♀ (SN); Bolivia 1 ♂, (HT), 1 ♀ (AMNH). Two ♀ genitalia preparations were made; the genitalia of the ♂ holotype and paratype were on slides, those of the holotype were removed and placed in a vial in order to examine ventral and dorsal aspects.

Superficially *hercules* is closest to *mura* and *narcosius* from which it differs in the shape of the forewing hyaline spot in M_3-Cu_1, rounded in *hercules*, triangular in *mura* and quadrate in *narcosius*. It differs from other similar taxa as follows: *parisi* is smaller and its spot in M_3-Cu_1 is wholly overlapped by that in Cu_1-Cu_2 as in *colossus* and *nazaraeus; samson* is so similar that genitalic examination is needed.

Narcosius aulina (Evans), 1952, new combination

Figures **22, 23** (♂); **24, 25** (♀); **58** (♂ genitalia); **70** (♀ genitalia)

Astraptes narcosius aulina Evans, 1952: 108. Type locality: Fr. Guiana. Holotype in BMNH.

MALE: Upperside, as *narcosius* except: forewing hyaline spots reduced; costal spot may be a mere trace; spot in Cu_1-Cu_2 very deeply excavate on outer edge, may be divided into two separate spots, upper and lower; spot in Cu_2-1A tends to be somewhat excavate on outer edge; spot in M_3-Cu_1 may be quadrate or triangular.

Underside, as *narcosius* but with more white scaling around hyaline spots; opaque white dash in Sc-R_1 missing; hindwing overscaling maculation very vague or missing; abdominal anal tuft white in one specimen, missing in the other two, including the holotype.

FEMALE: Upperside, as ♂ except forewing hyaline spots larger; spot in M_3-Cu_1 quadrate, almost completely overlapped by spot in Cu_1-Cu_2; costal spot offset slightly basad from center of cell spot; outer edge of spot in Cu_1-Cu_2 not as deeply excavate. Underside as ♂ but there is an opaque white dash in Sc-R_1; abdominal anal tuft greyish white.

Wing measurements: ♂ forewing averaged 33.2 mm from base to apex and 16.2 from costa to tornus in three specimens measured, varying from 31 x 15.5 (holotype) to 33 x 17; the one ♀ measured 38.5 x 19.

Antennal nudum: ♂ averaged 33.00 (7.5/25.5) in two specimens measured, varying from 7/26 (holotype) to 8/25; the one ♀ has no antennae.

The ♂ genitalia have relatively short, stout, divergent uncus arms, but longer and more slender than *colossus*; gnathos prominently spiculose; tegumen, viewed ventrally, very broad; penis long and slender, slightly longer than valva, prominently curved, in lateral view concave ventrally, with fine teeth on left side distally, in dorsal view only slightly

widened terminally, cephalad end widened and squarely blunt, cornutus a single long thin spine in the dorsally extruded vesica; valvae rather broad, harpe dentate distally and more or less projecting dorsally at terminus, prominent rounded, dentate dorsally projecting process just distad of junction of harpe with ampulla; dorsal edge of harpe between these dorsal projections mostly smooth, not dentate.

The ♀ genitalia have a very deeply indented, terminally convex lamella postvaginalis; lamella anteveginalis not centrally developed, the two separate lateral lobes of the 8th sternite not fused to antrum, sloping somewhat cephalad unlike *hercules*; ductus seminalis connection normal, connected dorsally just cephalad of antrum where there is very weak internal sclerotization producing a twist in the ductus bursae; half tube of ductus bursae heavily sclerotized; corpus bursae was lost in dissection; papillae anales terminally concave.

Three ♂ and one ♀ specimens were examined from the following countries: Venezuela 1 ♂, 1 ♀ (AME); Surinam 1 ♂ (BMNH); Fr. Guiana 1 ♂ (holotype — BMNH). Two ♂ and one ♀ genitalia preparations were made; the other ♂ was examined from a dry dissection by Evans.

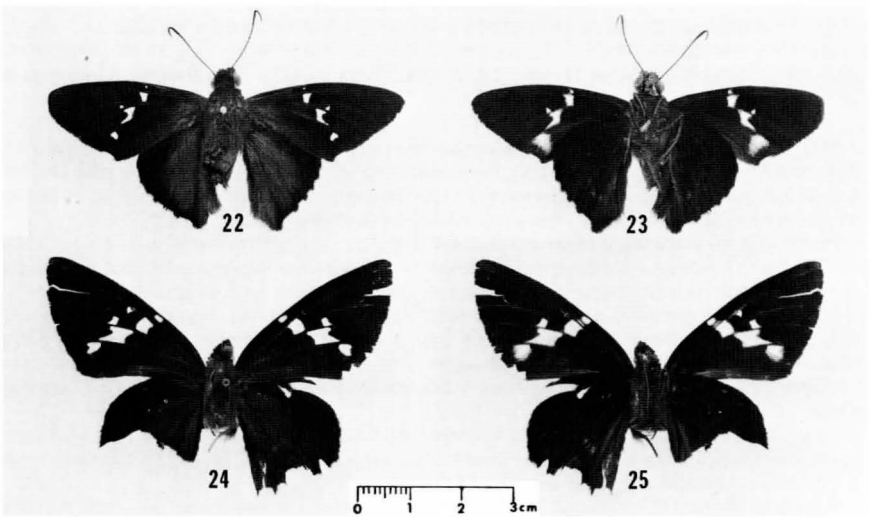
As in all *Narcosius* species, the genitalia provide the only positive means of identification. However, *aulina* can usually be distinguished superfically by the very deeply excavate forewing hyaline spot in Cu_1-Cu_2 not found in any other species except for a few specimens of *parisi*, which is a much smaller insect. It also differs from *parisi* in having the forewing hyaline spot in M_3-Cu_1 only partly or not at all overlapped by that in Cu_1-Cu_2 whereas the overlap is usually complete in *parisi*.

I consider the two ♀ from Fr. Guiana in the BMNH determined by Evans as *aulina* to be *mura*.

Narcosius narcosius (Stoll), [1790], new combination

Figures **26**, **27** (♂); **28**, **29** (♀); **59** (♂ genitalia); **71** (♀ genitalia)

Papilio narcosius Stoll, [1790]: 171, pl.39 f.8. Type locality: Surinam; type lost, neotype



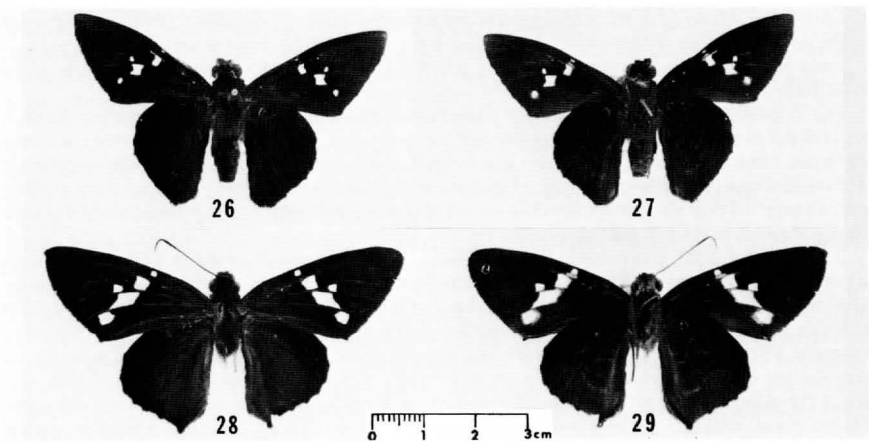
Figures 22-25. *Narcosius aulina* (Evans), 1952. **22,23** ♂ Holotype upper (**22**) and under (**23**) surfaces (Photo nos. 830406D/12,13) Fr. Guiana (BMNH). **24,25** ♀ upper (**24**) and under (**25**) surfaces (Photo nos. 860324B/8,9) Venezuela: Delta Amacuro, Tucupita (AME).

designated below.

Godman & Salvin (1893 p. 316) synonymized *narcosius* and *colossus* to *"aulestes"* Cramer, [1780] (see under "Procedures" my note on *aulestis*) and illustrated the ♂ genitalia of what we now consider to be *narcosius*. Draudt (1922 p. 866) also synonymized it to *"aulestes"* and added *granadensis* to the synonymy but illustrated as *"aulestes"* what is probably *colossus* or perhaps *samson*. Both placed *"aulestes"* in the genus *Thymele* Fabricius, 1807, an invalid junior objective synonym of *Erynnis* Schrank, 1801, (Hemming, 1967 p. 442). Williams (1927 p. 274) also synonymized *narcosius* with *"aulestes"*, placing it in the genus *Telegonus* Hübner, [1819] and correctly illustrating as *"aulestes"* the ♂ genitalia of *narcosius*. Evans (1952 p. 107) was the first to recognize *narcosius* as a valid species and correctly illustrated the ♂ genitalia.

It is impossible to absolutely identify the insect described and illustrated by Stoll as *P. narcosius*. His figure shows only the upper surface and although the hyaline markings shown are smaller than for some other species, his figure could equally well represent any of several species. Godman & Salvin, Williams and Evans all concurred on ♂ *narcosius* genitalia and it would be presumptuous of me to select any other identity for *narcosius*. I have selected as the *narcosius* neotype the only Surinam ♂ in the BMNH determined by Evans as *narcosius*. This neotype has forewing length x width of 30 x 14.5 mm, compared to 32 x 16.5 for Stoll's figure. The antennae are missing; mid and hind tibiae are prominently spined; the pin bears the following labels: a printed green label, "Surinam *ex* coll. Fruhstorfer"; a printed white label, "Crowley Bequest. 1901-78."; a white card with hand drawn pencil sketch of the valva, "Surinam" written on reverse side; a printed and handwritten white label, "Genit. Prep. SRS-1140"; a printed and handwritten red label, "Neotype ♂ Papilio narcosius Stoll, [1790] designated by S. R. Steinhauser Aug. 1983". It is deposited in the British Museum (Natural History), London.

MALE: Upperside, ground color blue-black with a dark blue gloss; body and wing bases covered with dull bluish green hair scales with a more or less bronze gloss, very restricted on the forewing, limited on the hindwing to the area caudad of M_1, extending from about cell end at M_1 to the inner margin where it nearly reaches the tornus. Forewing with hyaline spots in the cell, costal cell (approximately centered over the cell spot), M_3-Cu_1 (usually very small, more or less quadrate and situated over the outer corner of spot in Cu_1-Cu_2), Cu_1-Cu_2 (the largest, not overlapping the cell spot and usually with its distal edge excavate and the edge along Cu_2 tending to be longer than that along Cu_1) and Cu_2-1A (nearly as



Figures 26-29. *Narcosius narcosius* (Stoll), [1790]. 26, 27 ♂ Neotype upper (26) and under (27) surfaces (Photo nos. 860324A/3,4) Surinam (BMNH). 28,29 ♀ upper (28) and under (29) surfaces (Photo nos. 860324A/5,6) no data, Holland Colln. (CM).

small as M_3-Cu_1); there is no spot in Sc-R_1; the spots are generally small and well separated. Fringe concolorous except in 1A-2A where it is white.

Hindwing unmarked; fringe checkered, ground color at vein ends, white between.

Underside, ground color as above but blue gloss much reduced on hindwing. Forewing as above with very vague darker patch distad of cell end; anal cell (2A to inner margin) slightly paler; hyaline spots as above with additional opaque white dash in Sc-R_1 between cell spot and costal spot; usually some white scaling around spot in Cu_2-1A; a very few scattered blue-white scales in distal half of wing. Hindwing more or less weakly overlaid distally with blue-white scales forming a vague broad pale distal border from Rs to 2A, and pale buff scales scattered unevenly over the discal area to outline a very vague, dark post-discal band from about Rs to 2A, a vague dark spot at the cell end and an equally vague pre-discal dark spot in Cu_2-2A (these marking may be lost entirely in some individuals). Fringe as above but white is very restricted.

Palpi and eye fringes with more or less white scaling; forelegs with vague outer white stripe; mid and hind tibiae prominently spined. Abdomen with a white hair scale tuft, hereafter referred to as the anal tuft, just cephalad of the genital opening. In eight of the 14 ♂ examined, the anal tuft was white; it has been lost during genitalia preparation in the other 6 and the color could not be checked. The anal tuft of *Narcosius* species occurs in both sexes and may be either white, black or grey. It is a possibly significant character in the genus but unfortunately it has been destroyed in many specimens during genitalic dissection or inspection.

FEMALE: as ♂ but forewing hyaline spots are larger and tend to overlap. Spot in M_3-Cu_1 larger than in ♂, rhomboid, centered over the outer corner of large spot in Cu_1-Cu_2, which spot has its inner edge proximad of the center of the cell spot. The costal spot is somewhat offset basad from the center of the cell spot. Bearing in mind the normal individual variation in spots, it is difficult to say whether these small details are significant, especially considering the very small sample size. They are, however, the basis for selecting these two ♀ to be *narcosius* rather than the three selected as *mura* or the other two selected as *hercules*. The anal tuft of one ♀ *narcosius* was black, the other grey.

Wing measurements: ♂ forewing averaged 32.2 mm from base to apex and 16.1 from costa to tornus in 15 specimens measured including Stoll's figure (32 x 16.5), varying from 30 x 14.5 (neotype) to 34.5 x 17.5; ♀ forewing averaged 35.0 x 17.5 in two specimens measured, varying from 34 x 17 to 36 x 18. Since there was no significant specific variation found in either forewing length/width ratios or the ratios between m_3-cu_1 and m_2-m_3 of the forewing, these data will not be given for each separate species. The specific and sexual differences in wing length are adequately presented in the histogram, figure 4.

Antennal nudum: ♂ averaged 32.17 (7.8/24.3) in 6 specimens measured, varying from 6/24 to 8/26; ♀ averaged 32.0 (9.0/23.0) varying from 9/22 to 9/24.

The ♂ genitalia have rather slender uncus arms, more or less parallel and deeply divided in ventral view; gnathos prominently spiculose; penis slender and long, nearly as long as valva, sinuously curved in lateral view, with fine teeth on left side distally, vesica opening dorsal and vesica bearing a single, slightly curved, slender spine as cornutus; valvae long and slender with a slender harpe that is not produced dorsally but is prominently dentate along its entire dorsal margin.

In the ♀ genitalia the lamella postvaginalis is evenly convex on its caudal margin with a rather shallow central identation; the lamella antevaginalis is a single sclerotized plate, the result of complete fusion of the two lateral lobes of the 8th sternite, overlapping the lamella postvaginalis, strongly convex caudally and deeply excavate on its cephalad margin, with a central ventral groove, the suture; there is a strongly wrinkled, sclerotized membrane cephalad of the lamella anteveginalis which nearly conceals the small, sac-like extensions of the sinus conjunctionis; no internal sclerotized process other than the rather small antrum in the caudal, slightly swollen portion of the ductus bursae, whose sclerotized half tube starts at a relatively long distance cephalad of the antrum; papillae anales moderately concave on their distal margins; corpus bursae small, spherical and weakly spiculose.

14 ♂ and 2 ♀ specimens were examined from the following countries: Surinam 1 ♂

(neotype, BMNH); Brasil 6 ♂ (3 BMNH, 1 AMNH, 1 CM, 1 MPM); Peru 6 ♂ (5 BMNH, 1 AMNH); Bolivia 1 ♂, 1 ♀ (1 ♂ BMNH, 1 ♀ CM); no data 1 ♀ (CM). One ♂ and two ♀ genitalia preparations were made. The slide used by Williams for his figure of *"aulestes"* (1927 f.15) could not be found at CM; the genitalia of the remaining 12 ♂ specimens were examined either from slides, Evans' dry dissections or *in situ*.

Superficially, *narcosius* is very difficult to separate from *mura*, *hercules* and *samson*; usually it can be distinguished from *colossus*, *nazaraeus* and *parisi* by the incomplete overlap of the spot in M_3-Cu_1 by that in Cu_1-Cu_2 in *narcosius*, whereas the overlap is usually complete in the others. It is distinguished from *aulina* by the much reduced forewing spots of *aulina* which shows a deeper excavation of the outer edge of the spot in Cu_1-Cu_2, and from *dosula* which has a much larger spot in M_3-Cu_1, filling the base of that space, as well as by the distinctive underside pattern of *dosula*. It differs on the average from *mura*, *hercules* and *samson* by its smaller, more separated spots; the spot in Cu_1-Cu_2 of *narcosius* tends to be more elongate along Cu_2 than Cu_1, more nearly equal in the others; the spot in M_3-Cu_1 is more or less quadrate in *narcosius*, rounded in *hercules* and triangular in *mura*; it is entirely variable in *samson*. The only positive way to distinguish between these four species is through examination of the genitalia which are abundantly distinct, especially in the ♂. The form of the valva, which usually can be seen without dissection, is the most useful diagnostic tool: *hercules* has a very distinctive dorsal process of the harpe parallel to its dorsal edge, *narcosius* has no projecting process from the harpe, the dorsal edge of which is dentate over its entire length, *mura* has a short harpe, prominently dentate and projecting dorsally, and *samson* has a long thin, curved and terminally pointed harpe and a very prominent round dorsal process on the ampulla.

When all the ♀ that could not be determined as species other than these four very similar ones were examined genitalically, it was seen that there were four different genitalia forms of which the form very close to *nazaraeus* was common to all the specimens with forewing length in excess of 40 mm. Since the average forewing length of *samson* ♂ is 3.5 to 5 mm more than the other three species and since *samson* ♂ is very similar genitalically to *nazaraeus*, it is reasonable to infer that these very large ♀ are *samson*, as well, of course as those somewhat smaller ♀ specimens with the same genitalia, thus narrowing the undetermined field to three species: *mura*, *hercules* and *narcosius*. I have used the shape of the forewing hyaline spot in M_3-Cu_1 more than any other character for matching ♀ to ♂ in these three species. The spot tends to be shaped approximately as in the ♂, quadrate in *narcosius*, triangular in *mura* and rounded in *hercules*.

The genitalia of ♀ *narcosius* are very similar to those of *mura*, both of which are very different from *hercules* and *samson*, in which the lamella antevaginalis is in the form of two separate lobes and the corpus bursae is large and cylindrical rather than small and sub-spherical. The ♀ from Peru is the BMNH determined by Evans as *narcosius*, I consider to be *mura*.

Narcosius mura (Williams). 1927, new combination

Figures **30**, **31** (♂); **32**, **33** (♀); **60** (♂ genitalia); **72** (♀ genitalia)

Telegonus mura Williams, 1927: 276-277, f. 17, pl.25 f.1. Type locality: Brasil; Manicore. Holotype in CM.

MALE: Upperside as *narcosius* except forewing costal fold may be rather narrow; hyaline costal spot may be slightly offset basad from center of cell spot; spot in Sc-R_1 sometimes present; spot in Cu_1-Cu_2 may partly overlap cell spot, its forward and rear edges are about equal; spot in M_3-Cu_1 tends to be triangular (in the holotype it is a barely discernible pin point); in some specimens the spots are small and separate as in *narcosius*, in others they are much larger and somewhat overlapping.

Underside as *narcosius* except white scaling may be extensive caudad of spot in Cu_2-1A; spines may be missing on mid and hind tibiae. Of 11 ♂ and 3 ♀ examined, all had spined mid and hind tibiae except one ♂ with no legs, one ♂ with no hind legs and smooth mid

tibiae; 3 ♂ (including holotype) with smooth mid tibiae and spined hind tibiae and 2 ♂ with no tibial spines at all. Abdominal anal tuft usually white but may be black.

FEMALE: As ♂ but forewing hyaline spots larger, that in Cu_2-1A may be overlapped by that in Cu_1-Cu_2; underside forewing hyaline spot in Cu_2-1A with entensive white scaling caudad, reaching 2A in two specimens and nearly so in the third; abdominal anal tuft destroyed in all three specimens.

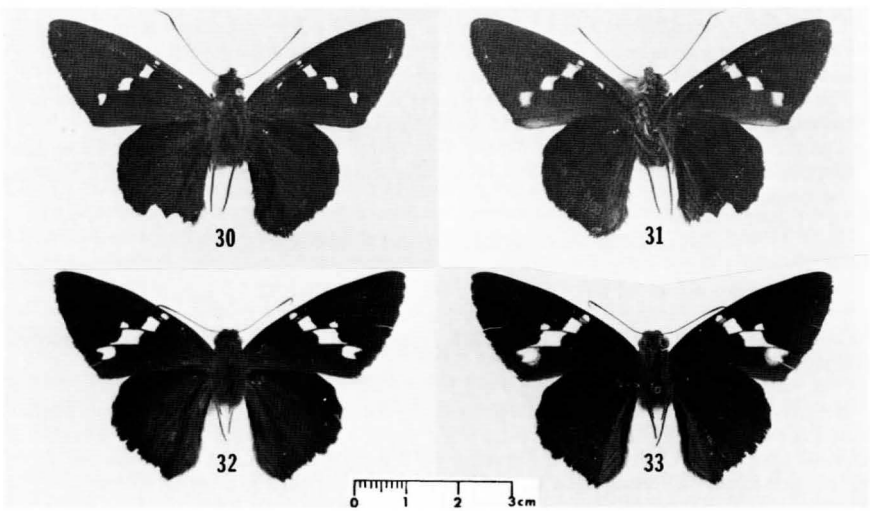
Wing measurements: ♂ forewing averaged 32.0 mm from base to apex and 16.1 from costa to tornus in 11 specimens measured, varying from 30 x 15 to 35.5 x 18 (holotype 33 x 16.5); ♀ forewing averaged 34.5 x 17.2 in three specimens measured, varying from 32.5 x 16 to 37 x 18.5.

Antennal nudum: ♂ averaged 31.10 (7.1/24.0) in 7 specimens measured, varying from 4/23 to 9/25 (holotype 6/24); ♀ averaged 34.67 (11.0/23.7) in three specimens measured, varying from 10/23 to 13/24.

The ♂ genitalia have short, stout, divergent uncus arms; gnathos prominently spiculose; penis long, relatively slender, longer than valva, evenly curved (concave ventrally in lateral view) not widened terminally in dorsal view, evenly rounded at forward end, not dentate and bearing a cornutus of one or two long slender spines in the dorsally extruded vesica; valvae rather broad, harpe very short and wide, prominently and more or less coarsely dentate, but not recurved as in *dosula*.

In the ♀ genitalia the caudal margin of the lamella postvaginalis is rather flatly convex and somewhat irregular laterally, the central indentation deep; lamella antevaginalis consists of two fused lateral plates with a narrow, grooved central suture, its caudal margin flatly convex, overlaps lamella postvaginalis but not reaching its central indentation; no sclerotized process other than the antrum in caudal portion of ductus bursae; sclerotized half tube in ductus bursae starts nearer to antrum than in *narcosius*; ductus seminalis connected dorsally to ductus bursae cephalad of antrum as usual; corpus bursae small, spherical, spiculose; papillae anales very shallowly concave distally.

11 ♂ and 3 ♀ specimens were examined from the following countries: Fr. Guiana 1 ♀ (BMNH); Brasil 6 ♂ (4 BMNH, 1 AME, 1, HT, CM); Peru 3 ♂, 1 ♀ (2 ♂, 1 ♀ BMNH, 1 ♂ AMNH); no data 2 ♂, 1 ♀ (1 ♀ BMNH, 1 ♂ AME, 1 ♂ CM). Three ♂ and three



Figures 30-33. *Narcosius mura* (Williams), 1927. **30,31** ♂ Holotype upper (**30**) and under (**31**) surfaces (Photo nos. 820629B/15,16) Brasil: Amazonas, Manicore (CM). **32,33** ♀ upper (**32**) and under (**33**) surfaces (Photo nos. 860324B/10,11) Peru: Mayobamba (BMNH).

♀ genitalia preparations were made; the rest, except for the holotype, the slide for which was not found (Williams' figure does not vary significantly from the others), were examined either *in situ*, on slides or on cards.

As with all *Narcosius* species, the only sure means of identification is by genitalic examination. Superficial differences between *mura* and the already described species have been given earlier. It differs from *samson* in which the forewing hyaline spot in M_3-Cu_1 is slightly more overlapped by that in Cu_1-Cu_2 than in *mura*, and from *nazaraeus* in which the overlap is usually complete.

Narcosius colossus (Herrich-Schäffer), 1869, new combination

Superficially *colossus* and its subspecies *granadensis* are very variable with respect of the forewing hyaline spots and the underside superscaling maculation.

MALE: Upperside, ground color and hair scaling as *narcosius*. Forewing hyaline spots in cell, costal cell, occasionally in Sc-R_1 as a narrow dash, M_3-Cu_1 where it may or may not reach base of that space, Cu_1-Cu_2 (largest spot, more or less quadrate, usually with fore and rear edges about equal, may or may not be excavate distally, nearly always completely overlaps spot in M_3-Cu_1), Cu_2-1A (a variable spot rarely overlapped by spot in Cu_1-Cu_2); the spots are generally more overlapping than in *narcosius*, but much less so than in *dosula*. Fringe concolorous except in 1A-2A where it is white. Hindwing unmarked; fringe checkered, dark at vein ends, white between.

Underside, ground color as above, becoming more purple in anal cell of forewing, but only slightly paler. Forewing: hyaline spots as above, with or without additional opaque white scaling; lavender-blue overscaling in distal area and pale buff mixed with dark brown in discal area, but very variable in intensity, ranging from almost completely unmarked to a few specimens approaching *dosula*, on the average producing very vague markings. Fringe as above. Hindwing: overscaling as in *dosula* but very variable in intensity producing generally much less distinct markings; in those few individuals with strong markings the discal buff-brown band is much narrower and more irregular than *dosula*. Fringe as above.

Palpi and eye fringes with some white scaling, more than in *narcosius* or *dosula*; forelegs with vague outer white stripe; mid and hind tibiae strongly spined. Abdominal anal tuft may be white black or grey.

FEMALE: As ♂ except forewing hyaline spots larger; spot in Cu_2-1A often at least slightly overlapped by spot in Cu_1-Cu_2; underside brown maculation tends to be more distinct, outlining on the forewing a dark streak distad of cell end, and on the hindwing, pre- and post-discal dark bands (ground color).

The ♂ genitalia have short stout, divergent uncus arms; gnathos prominently spiculose; penis long and slender, slightly shorter than valva, less sinuously curved than *narcosius*, in dorsal view not widened at either end, distally dentate on left side, bearing a single long thin spine as cornutus in the dorsally everted vesica; valvae long and slender, harpe narrow, dorsally produced terminally where it is prominently but not coarsely dentate and not recurved cephalad.

In the ♀ genitalia the lamella postvaginalis is very deeply indented on its caudal margin; lamella antevaginalis a single strongly sclerotized setose plate, probably formed by fusion of the two lateral lobes of the 8th sternite, deeply divided on its caudal margin to form two narrow, bluntly pointed caudal projections which overlap the lamella postvaginalis nearly to its caudal margin, cephalad of this central division the lamella antevaginalis is strongly grooved ventrally, this groove or suture quite straight and regular; sinus conjunctionis projections very small, completely hidden by a sclerotized membrane cephalad of lamella antevaginalis; no internal sclerotized process other than the antrum in caudal portion of ductus bursae; ductus seminalis connected dorsally as usual; corpus bursae small, spherical, weakly spiculose; papillae anales moderately concave on their distal margins.

N. colossus is divided into two subspecies described below insofar as they differ from each other; there is no discernible difference in the genitalia.

Narcosius colossus colossus (Herrich-Schäffer), 1869, new combination

Figures **34**, **35** (♂); **36**, **37** (♀); **61** (♂ genitalia); **73** (♀ genitalia)

Eudamus colossus Herrich-Schäffer, 1869: 172. Type locality: Venezuela, lectotype designated (see discussion following *c. granadensis*).

MALE: Upperside, forewing hyaline spot in costal cell usually offset basad from center of cell spot; spot in Sc-R_1 missing; spot in Cu_1-Cu_2 completely overlaps spot in M_3-Cu_1. Underside, forewing hyaline spot in Cu_2-1A usually without surrounding opaque white scales (lectotype has a few); opaque white spot in Sc-R_1 usually missing or only a trace; forewing and hindwing overscaling maculation usually very vague and indistinct.

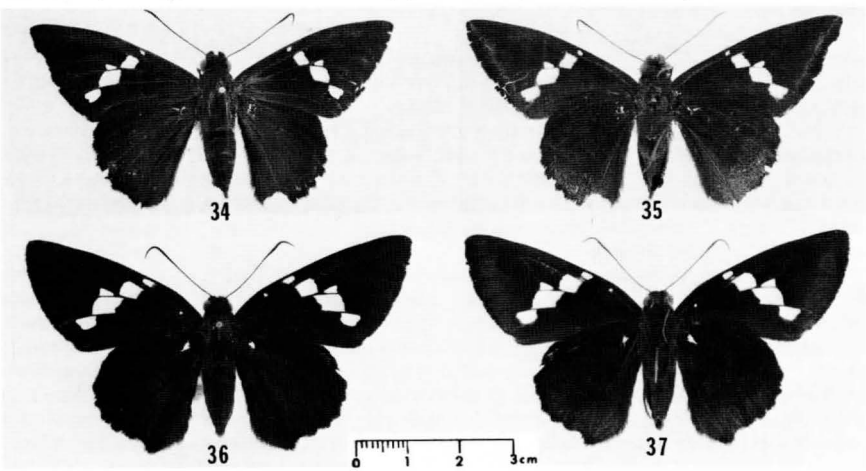
FEMALE: As ♂ but forewing hyaline spots larger, spot in Cu_2-1A very seldom overlapped by spot in Cu_1-Cu_2; differs in wing size and antennal nudum as outlined below.

Wing measurements: ♂ forewing averaged 34.6 mm from base to apex and 17.2 from costa to tornus in 23 specimens measured, varying from 33 x 16.5 to 36.5 x 18 (lectotype); ♀ forewing averaged 38.4 x 19.3 in 19 specimens measured, varying from 36 x 18 to 40 x 20.5.

Antennal nudum: ♂ averaged 32.68 (9.5/23.2) in 15 specimens measured, varying from 9/21 to 11/25 (lectotype); ♀ averaged 34.52 (10.3/24.2) in 13 specimens measured, varying from 10/22 to 11/26.

24 ♂ and 19 ♀ specimens were examined from the following countries: Mexico 14 ♂, 7 ♀ (9 ♂, 7 ♀ AME, 4 ♂ AMNH, 1 ♂ CM); Guatemala 1 ♂ (BMNH); Honduras 1 ♂ (BMNH); Costa Rica 1 ♀ (AME); Colombia 6 ♂, 7 ♀ (2 ♂, 2 ♀ BMNH, 4 ♂, 5 ♀ CM); Venezuela 2 ♂, 1 ♀ (1 ♂, lectotype, 1 ♀ BMNH, 1 ♂ CM); U. Amazons (?) 1 ♀ (BMNH, misidentified by Evans as *samson*); no data 2 ♀ (BMNH). Five ♂ and six ♀ genitalia preparations were made; genitalia of other specimens were examined either *in situ* or on cards, slides and in vials prepared by others.

Superficially *colossus* is closest to *samson*, *nazaraeus* and *hercules*, from which there is no reliable way to distinguish it except genitalic examination. The forewing spot in M_3-Cu_1 is completely overlapped by the spot in Cu_1-Cu_2 in *colossus*, almost always in *nazaraeus*, usually in *samson* and never (?) in *hercules*, but this is a very uncertain means



Figures **34-37**. *Narcosius colossus colossus* (Herrich-Schäffer), 1869. **34,35** ♂ Lectotype upper (**34**) and under (**35**) surfaces (Photo nos. 830406D/4,5) Venezuela (BMNH). **36,37** ♀ upper (**36**) and under (**37**) surfaces (Photo nos. 860324B/1,2) Mexico: Veracruz, Catemaco (AME).

of distinguishing species.

I have selected a specimen from Venezuela believed to have been part of the original type series, and considered by Evans to be the holotype, as the lectotype of *colossus* as will be discussed following the description of *c. granadensis.*

Narcosius colossus granadensis (Möschler), 1878, new combination

Figures **38**, **39** (♂); **40**, **41** (♀); **62** (♂ genitalia); **74** (♀ genitalia)

Telegonus granadensis Möschler, 1878: 204. Type locality: Venezuela; Puerto de Cabello, holotype in ZMHU.

= *Astraptes colossus rhoda* Evans, 1952: 109. Type locality: Peru: Tarapote, holotype in BMNH.

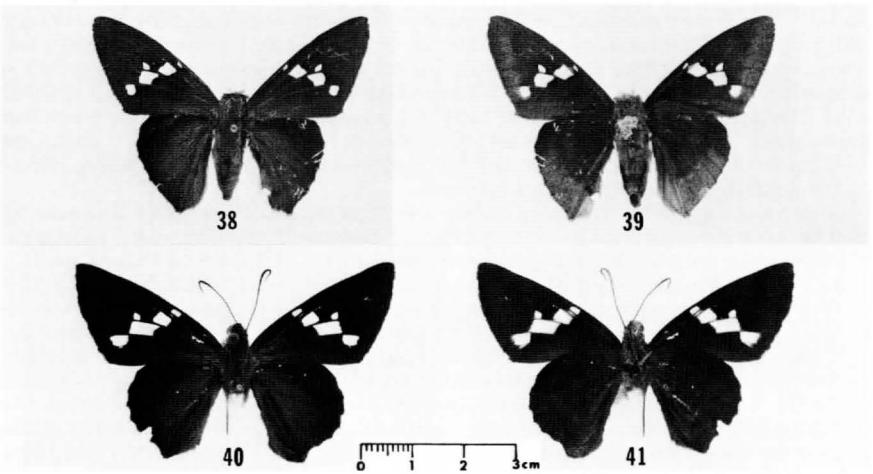
MALE: Upperside, forewing hyaline spot in costal cell usually more or less centered over cell spot (slightly offset basad in holotype); spot in Sc-R_1 usually present; spot in Cu_1-Cu_2 may not always completely overlap spot in M_3-Cu_1, but usually does.

Underside, forewing hyaline spot in Cu_2-1A usually with some surrounding opaque white scales (very few in holotype); opaque white spot in Sc-R_1 present and fairly well developed; forewing and hindwing superscaling maculation often distinct and prominent, but the hindwing buff-brown discal band never as distinct and well defined as in *dosula.*

FEMALE: As ♂ but forewing hyaline spots larger, spot in Cu_2-1A often partly overlapped by spot in Cu_1-Cu_2; differs in wing size and antennal nudum as outlined below.

Wing measurements: ♂ forewing averaged 30.9 mm from base to apex and 15.2 from costa to tornus in 31 specimens measured, varying from 29 x 14 to 35 x 17.5 (holotype 29.5 x 14.5; *rhoda* holotype 31 x 15.5); ♀ forewing averaged 33.5 x 16.4 in 12 specimens measured (one was measured after construction of the histogram, figure 4, and is not included), varying from 30.5 x 15 to 35 x 17.5.

Antennal nudum: ♂ averaged 33.67 (9.6/24.1) in 14 specimens measured, varying from 8/22 to 11/25 (antennae missing in holotype; *rhoda* holotype 11/24); ♀ averaged 36.08 (11.0/25.1) in 7 specimens measured, varying from 10/23 to 12/29.



Figures **38-41.** *Narcosius colossus granadensis* (Möschler), 1878. **38,39** ♂ Holotype upper (**38**) and under (**39**) surfaces (Photo nos. 830113/1,2) [Venezuela: Carabobo], Puerto Cabello (ZMHU). **40,41** ♀ upper (**40**) and under (**41**) surfaces (Photo nos. 860324B/4,5) Ecuador (AMNH).

30 ♂ and 12 ♀ specimens were examined from the following countries: Venezuela 1 ♂ HT (ZMHU); Guyana 1 ♀ (BMNH); Fr. Guiana 2 ♀ (BMNH); Brasil 14 ♂, 6 ♀ (5 ♂, 3 ♀ BMNH, 1 ♂ AME, 2 ♂ AMNH, 1 ♂, 1 ♀ USNM, 1 ♂, 1 ♀ CM, 1 ♂, 1 ♀ MPM, 3 ♂ SN); Ecuador 1 ♀ (AMNH); Peru 10 ♂, 1 ♀ (5 ♂, including HT *rhoda*, 1 ♀ BMNH, 1 ♂ AME, 2 ♂ AMNH, 1 ♂ USNM, 1 ♂ CM); Bolivia 3 ♂, 1 ♀ (2 ♂ BMNH, 1 ♂, 1 ♀ CM); no data 1 ♂ (BMNH). Six ♂ and two ♀ genitalia preparations were made; genitalia of the remaining specimens were examined either *in situ*, on slides or cards prepared by others.

N. granadensis is a much smaller insect than *colossus*; of the 43 specimens measured, 3 ♂ were equal in size to the smallest ♂ *colossus* and only one ♂ was larger; all ♀ *granadensis* were smaller than the smallest ♀ *colossus*. *N. granadensis* also differs somewhat in the forewing hyaline spots as pointed out in the descriptions. There is, however, some question as to the validity of the subspeciation because of a seemingly broad overlap in their geographic distribution.

The supposed "holotype" of *colossus* in the BMNH is almost certainly not the true holotype. Godman & Salvin (1893 p.316) state that "--- *colossus* ----, which appears to have been founded upon a female (a specimen purporting to be the type is before us) ---", thus indicating some doubt as to its validity as the type. I did not find this ♀ in the BMNH; however, if the type label had been removed or was never affixed, there would be no way to identify it. It seems unlikely that Godman & Salvin would have mistaken the sex of a species in which the ♂ has a prominent costal fold (although Möschler apparently did with *granadensis*). I doubt that the supposed "holotype", a ♂ to which Evans attached type labels, is the same specimen. This ♂ "holotype" is from Venezuela (no specific locality) and bears the following labels: a black-bordered green label, handwritten, "Gonilobus [*sic*] Colossus mz [? not clear] Venz."; a printed and handwritten white label, "Compared with Plotz's drawing of colossus HS"; a printed white label, "Druce Coll. ex Kaden Coll."; an uninscribed long, narrow blue label; two round, red-ringed white labels printed, "Type"; a printed white label, "Venezuela. Druce Coll,"; a printed white label, "B.C.A. Lep. Rhop. Thymele aulestes, Cram,"; a printed white label, "Godman-Salvin Coll. 1912-23."; a white card with genitalia affixed.

Horn (1936: 6) and Horn and Kahle (1937: 520) indicate that Herrich-Schäffer holotypes bear violet labels printed "Orig." Comparison of the handwriting on the green label with the sample handwriting given by Horn and Kahle (1935: pl.9 f.25) was inconclusive. In view of these facts I am sure that this specimen is not the holotype of *colossus*. It very well could be one of a series upon which Herrich-Schäffer based his description and hence a syntype and I therefore designate it as the lectotype of *Eudamus colossus* since the true holotype could not be found at ZMHU and is presumed lost, if it ever was designated at all. Herrich-Schäffer did not specify locality, sex nor size in his description. In addition to the labels described above I have sent a red label, printed and handwritten, "Lectotype ♂ Eudamus colossus Herrich-Schäffer, 1869 Designated by S.R. Steinhauser Aug. 1983" to the BMNH to be affixed to this specimen.

Both the holotype of *granadensis* and the lectotype of *colossus* are from Venezuela as well as one additional ♂ *granadensis* and one ♂ and one ♀ *colossus*, that I have seen. There is one ♀ *colossus* in the BMNH from the Saunders Coll. labelled, "U. Amazons", a rather broad geographic concept. This indicates what appears to be a fairly wide area of overlap in the ranges of these two taxa, but since *granadensis* alone occurs to the south of this blend zone and only *colossus* to the north, I am treating them as subspecies.

N. granadensis most nearly resembles *parisi* and *p. helen* superficially. The ♂ can usually be distinguished by the general absence of overlap of the forewing spot in Cu_2-1A by that in Cu_1-Cu_2 in *granadensis* whereas both forms of *parisi* frequently have an overlap; the ♀ more often have these spots overlapping in both) but can be separated easily on the basis of the readily observed lamella antevaginalis with its two prominent projecting points in *granadensis*. There is little chance of confusion with *helen* as it is not known south of Panama, but the same characters serve as for *parisi*. The other species which might be confused with *granadensis* are separable on the basis of size and the usual overlap of the spot in M_3-Cu_1 by that in Cu_1-Cu_2 in *granadensis* not found in *narcosius, hercules*

or *mura*. As with all species of *Narcosius*, the most reliable means of identification is the genitalia.

Narcosius dosula (Evans), 1952, new combination

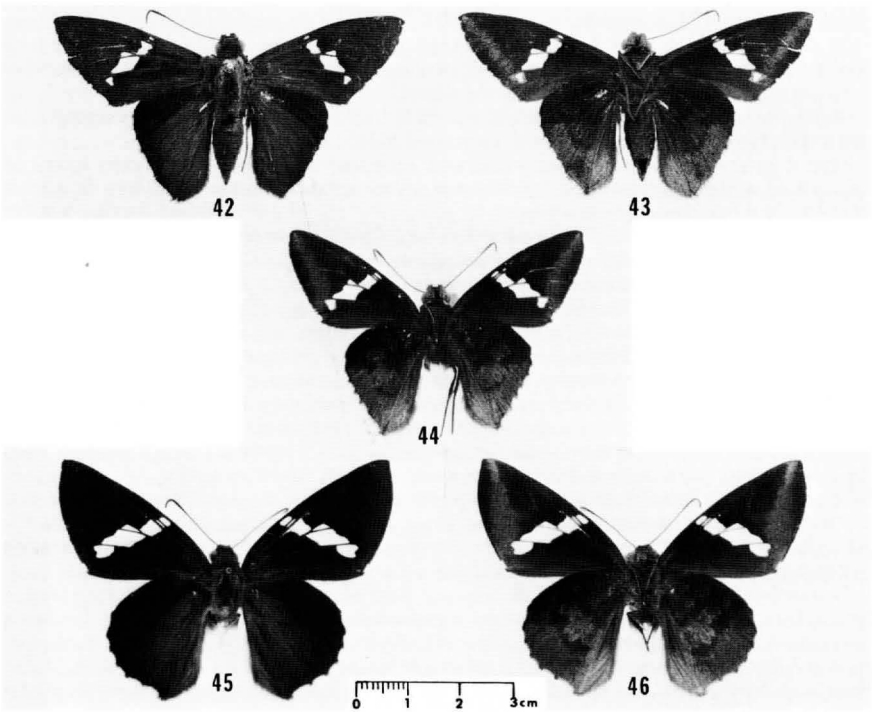
Figures **42**, **43**, **44** (♂); **45**, **46** (♀); **63** (♂ genitalia); **75** (♀ genitalia)

Astraptes colossus dosula Evans, 1952: 109. Type locality: Brasil; Rio Grande do Sul. Holotype in BMNH.

MALE: Upperside, ground color and hair scaling as *narcosius*. Forewing hyaline spots in cell, costal cell (more or less centered over cell spot), Sc-R_1 (a narrow dash), M_3-Cu_1 (an elongated triangular spot filling the base of the space), Cu_1-Cu_2 (largest spot, rhomboid, slightly excavate on inner and outer margins, tends to be longer on Cu_2 than Cu_1, completely overlapping spot in M_3-Cu_1), Cu_2-1A (a variable spot, may be small and separate as in holotype or large and more or less overlapped by spot in Cu_1-Cu_2); the spots are generally overlapping unlike *narcosius*. Fringe concolorous except in 1A-2A where it is white, the white sometimes extending ahead of 1A.

Hindwing unmarked; fringe checkered, ground color at vein ends, white between, or may be almost entirely white, even at vein ends.

Underside, ground color as above but lighter and more purple in anal cell of forewing.



Figures **42-46**. *Narcosius dosula* (Evans), 1952. **42,43** ♂ Holotype upper (**42**) and under (**43**) surfaces (Photo nos. 830406D/8,9) Brasil: Rio Grande do Sul (BMNH). **44** Strongly marked ♂ under surface (Photo no. 860404/16) Brasil: Santa Catarina, Joinville (BMNH). **45,46** ♀ upper (**45**) and under (**46**) surfaces (Photo nos. 860324A/17,18) Brasil: Santa Catarina, Mafra (AMNH).

Forewing: hyaline spots as above with minor additional opaque white scaling; pale lavender-blue overscaling in distal area producing a poorly defined, pale submarginal band reaching from base of fringe at apex to base of fringe in 1A-2A but in between outwardly bordered by an approximately 2 mm dark marginal band; some scattered pale buff and dark brown scales proximad of the pale band, being slightly more concentrated along the discocellular veins, at the apex and in M_3-Cu_1 adjoining the pale band. Fringe as above but dark areas brownish.

Hindwing: extensive overscaling forming patterns as follows: a poorly defined pale lavender-blue distal border extending from Rs to the tornus and continuing along inner margin proximad of 2A about half way to wing base, this blue border about 4 mm wide in M_1-M_2 to 11mm in 1A-2A; a very irregular pale buff-brown discal band more or less separated from the pale border by a very narrow, irregular dark band (ground color); some very irregular and obscure pale buff-brown subbasal markings. All these markings can be seen better in the illustrations than through verbal description, therefore the underside of a ♂ more strongly marked than the holotype is shown in figure 44. Fringes as above but dark areas brown and there are some brown scales in the white areas. Palpi and eye fringes with some white scaling; fore legs with vague outer white stripe; mid and hind tibiae strongly spined. Abdominal anal tuft white in three specimens, destroyed in two, including the holotype.

FEMALE: As ♂ except forewing hyaline spots larger; underside ground color somewhat brownish black; underside brown maculation more marked; discal brown band on hindwing more widely separated from pale marginal band; abdominal anal tuft mousey grey, as is entire ventral abdomen.

Wing measurements: ♂ forewing averaged 32.2 mm from base to apex and 16.0 from costa to tornus in 5 specimens measured, varying from 31 x 15.5 to 33.5 x 16.5 (holotype); ♀ forewing is 36 x 18 in the one ♀ examined.

Antennal nudum: ♂ averaged 32.40 (9.6/22.8) in 5 specimens measured, varying from 9/21 (holotype) to 11/23; the one ♀ measured 8/24.

The ♂ genitalia have short, stout, divergent uncus arms; gnathos prominently spiculose; penis long and slender but shorter than the valva, more nearly straight than *narcosius*, not widened in dorsal view at either end, dentate distally on left side and bearing a single long thin spine as cornutus in the dorsally everted vesica; valvae long and slender, harpe recurved cephalad dorsally and very prominently and deeply dentate dorsally reminiscent of the antler of an Irish elk.

In the ♀ genitalia the lamella postvaginalis is very deeply indented on its caudal margin and is overlapped by the equally deeply indented, strongly sclerotized and densely setose lamella antevaginalis which is a single plate (probably the two fused lateral lobes of the 8th sternite) and has a very irregular central groove (suture) ventrally; the cephalad projections of the sinus conjunctionis are very small, completely hidden behind a sclerotized membrane cephalad of lamella antevaginalis; no internal sclerotized process other than the antrum in caudal portion of ductus bursae; corpus bursae small, spherical, weakly spiculose; papillae anales moderately concave on their distal margins.

The five ♂ and one ♀ specimens examined are all from southern Brasil: 4 ♂, 1 ♀ (3 ♂ BMNH, 1 ♂, 1 ♀ AMNH) from Sta. Caterina and 1 ♂ (holotype, BMNH) from Rio Grande do Sul. Two ♂ and one ♀ genitalia preparations were made and one previously prepared slide examined; the valvae of the other two ♂ were examined *in situ*.

Superficially some specimens of *samson* and *nazaraeus* a few of *colossus* and *c. granadensis* and a very few of *parisi* have underside markings somewhat similar to *dosula*, but *colossus*, in both sexes, lacks the forewing hyaline spot in Sc-R_1; *c. granadensis* does not usually and *samson* and *nazaraeus* almost never have the forewing spot in M_3-Cu_1 reaching the base of that space. The only completely reliable means of separating these species is genitalic examination.

Genitallically *dosula* is closest to *colossus* (sens. lat.), separable in the ♂ by the distinctive recurved harpe of *dosula* with its very large teeth. In the ♀, the lateral lobes of the lamella antevaginalis are narrow and rather bluntly pointed in *colossus* which also has a straight and very regular ventral groove in contrast with the broad lobes and irregular groove of *dosula*.

Narcosius samson (Evans), 1952, new combination

Figures **47**, **48**, (♂); **49**, **50** (♀); **64** (♂ genitalia); **76** (♀ genitalia)

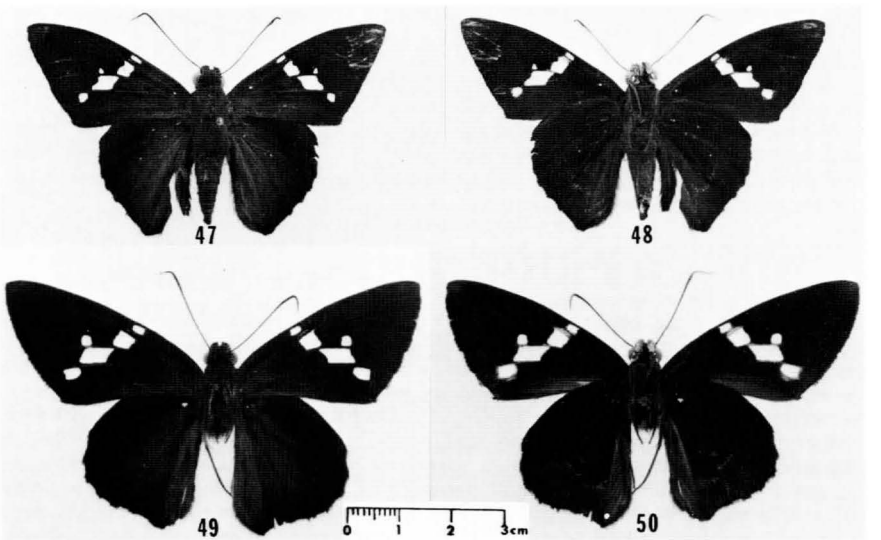
Astraptes samson Evans, 1952: 108. Type locality: Colombia. Holotype in BMNH.

MALE: Upperside, ground color and hair scaling as *narcosius*. Forewing: hyaline spots in cell, costal cell (usually centered over cell spot), occasionally a narrow dash in Sc-R_1, M_3-Cu_1 (usually quadrate but may be rounded or triangular, seldom filling base of space and usually not quite completely overlapped by spot in Cu_1-Cu_2, Cu_1-Cu_2 (the largest spot, usually somewhat excavate on outer edge, fore and rear edges usually about equal), Cu_2-1A a quadrate or rounded spot well separated from that in Cu_1-Cu_2. Fringe concolorous except in 1A-2A where it is white. Hindwing unmarked, fringe checkered, dark at vein ends, white between.

Underside, forewing hyaline spots as above, minor opaque white scaling around some of the spots, an opaque white dash in Sc-R_1, sometimes very faint. Superscaling stronger than in *narcosius* and *colossus*, but never as strong as *dosula* or heavily marked *granadensis*, forming a vague submarginal pale blue band. Hindwing superscaling forms broad marginal pale lavender border, inner edge of which is an irregular narrow pale blue line formed by denser superscaling; often a buff-brown discal spot in Cu_2-1A which may occasionally be quite prominent. Legs as *narcosius*, but tibial spines may be sparser in some individuals. Palpi, eyes, abdomen as *narcosius*, anal tuft white or greyish.

FEMALE: As ♂ except that forewing hyaline spot in costal cell usually offset somewhat basad of center of cell spot; spot in Sc-R_1 often present; spot in Cu_2-1A often partly overlapped by spot in Cu_1-Cu_2; all spots larger. Abdominal anal tuft varies from black to tan, whitish grey and white. Differs in wing size and antennal nudum as outlined below.

Wing measurements: ♂ forewing averaged 36.6 mm from base to apex and 18.2 from costa to tornus in 28 specimens measured, varying from 33 x 16.5 to 39 x 20 (holotype 36 x 18); ♀ forewing averaged 40.3 x 20.3 in 13 specimens measured, varying widely from



Figures **47-50**. *Narcosius samson* (Evans), 1952. **47**,**48** ♂ Holotype upper (**47**) and under (**48**) surfaces (Photo nos. 830406D/2,3) Colombia (BMNH). **49**,**50** ♀ upper (**49**) and under (**50**) surfaces (Photo nos. 860324A/15,16) Bolivia: Sta. Cruz (AMNH).

35 x 18 to 44 x 22. *Samson* is the largest of the *Narcosius* species.

Antennal nudum: ♂ averaged 28.93 (3.7/25.2) in 14 specimens measured, varying from 2/25 to 8/25 (holotype); ♀ averaged 30.00 (5.1/24.9) in 8 specimens measured, varying from 3/25 to 9/23.

The ♂ genitalia have relatively slender, parallel uncus arms; gnathos prominently spiculose; penis long and slender, much longer than valvae, curved (in lateral view concave ventrally and curving dorsad at each end, neither of which is widened in dorsal view, with a curving, single row of very large teeth on left side, bordering the vesica opening and extending from about mid-dorsal side to ventral side at terminus, cornutus of one or two long thin spines, if two-spined, one is much smaller, vesica opening dorsal, but curving to dorso-sinistral terminally; valvae with long harpe curving dorsad distally to end in a point, more or less weakly and irregularly dentate on its dorsal margin; a prominent, dorsally projecting, rounded process on the ampulla, bearing on its inner face two inwardly projecting curved lips, the ventral one often weakly developed, but when strongly developed forming, with the dorsal lip, a nearly circular ring; dorsal lip rather densely setose, ventral lip relatively hairless.

In the ♀ genitalia, the lamella postvaginalis is usually well rounded caudally with a more or less deep central indentation, relatively broad longitudinally, its caudal margin broadly separated from the caudal edge of the ostium bursae by at least the longitudinal width of the ostium which is a very prominent sub-circular opening separating the two lateral lobes of the lamella antevaginalis which is not centrally developed; antrum broad and prominent, fused to the large oval sclerotized process in the ductus bursae ventrad of the ductus seminalis connection; narrow section of ductus bursae containing sclerotized half tube is relatively short, may be shorter than the very large corpus bursae which is cylindrical, constricted in several places and usually without visible spicules; cephalad projections of sinus conjunctionis prominent; papillae anales moderately concave on their distal margins.

28 ♂ and 14 ♀ specimens were examined from the following countries: Mexico 1 ♂ (AME); Nicaragua 2 ♂ (BMNH); Costa Rica 1 ♀ (USNM); Panama 4 ♂, 1 ♀ (1 ♀ AME, 1 ♂ AMNH, 3 ♂ USNM); Colombia 7 ♂, 1 ♀ (4 ♂, including holotype, 1 ♀ BMNH, 2 ♂ AMNH, 1 ♂ USNM); Venezuela 1 ♂ (BMNH), 1 ♀ (AMNH); Surinam 1 ♀ (BMNH); Fr. Guiana 1 ♂, 1 ♀ (BMNH); Brasil 3 ♂, 4 ♀ (2 ♂, 4 ♀ BMNH, 1 ♂ MPM); Peru 1 ♀ (BMNH); Bolivia 7 ♂, 3 ♀ (1 ♀ BMNH, 1 ♂, 1 ♀ AMNH, 6 ♂, 1 ♀ CM); no data 2 ♂ (BMNH). 8 ♂ and 8 ♀ genitalia preparations were made; the remaining specimens, including the holotype were examined genitallically either *in situ*, on slides or on cards.

N. samson differs from other similar species as noted in the descriptions of those species. It is closest to *nazaraeus*, described next, to which it is very similar both superficially and genitalically; the differences will be pointed out in the description of *nazaraeus*.

Narcosius nazaraeus, new species

Figures **51**, **52** (♂); **53**, **54** (♀); **65** (♂ genitalia); **77** (♀ genitalia)

MALE: Upperside, ground color and hair scaling as *narcosius*. Forewing with hyaline spots in cell (more or less quadrate), costal cell (more or less centered over cell spot but may be offset basad as in holotype), occasionally a narrow dash in Sc-R_1, M_3-Cu_2 (generally quadrate but may be rounded or triangular, not reaching base of space, nearly always completely overlapped by spot in Cu_1-Cu_2), Cu_1-Cu_2 (the largest spot, quadrate with front and rear edges usually about equal, may partially overlap cell spot or be completely separate), Cu_2-1A (more or less quadrate, slightly larger than spot in M_3-Cu_1, not overlapped by spot in Cu_1-Cu_2 though occasionally touching it). Fringe concolorous except in 1A-2A where it is white. Hindwing unmarked, fringe checkered dark at vein ends, white between.

Underside, forewing hyaline spots as above, usually some opaque white scaling around spot in Cu_2-1A and usually an opaque white dash in Sc-R_1; distal pale blue and discal buff overscaling about as in *narcosius*, but generally faint and indistinct or missing entirely; fringe as above. Hindwing with pale blue distal superscaling forming a very vague (and

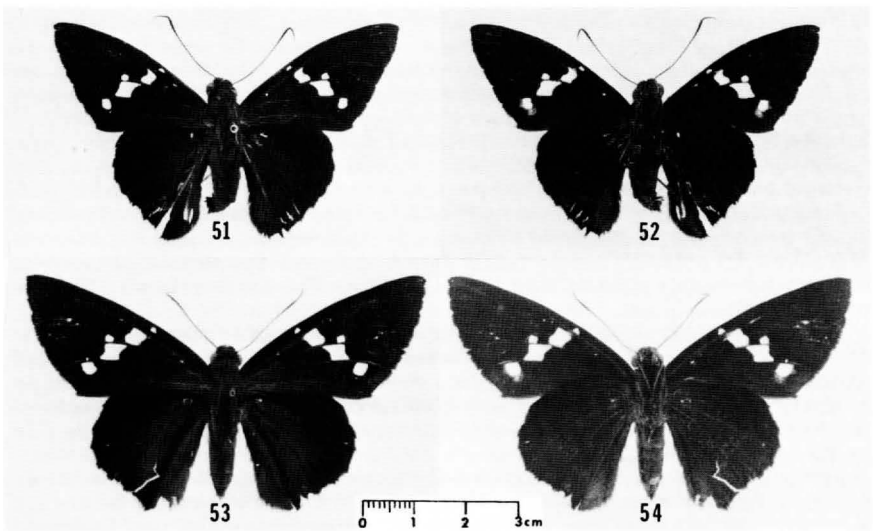
individually very variable) distal border; buff superscaling in the discal area forms vague patterns which are individually variable or missing entirely, usually in the form of a pale discal spot in Cu_2-2A, post-discal spots immediately before the pale border in M_3-Cu_1 and Cu_1-Cu_2, sometimes a pale central cell spot and another at cell end, and vague pale markings forward of the cell; fringe as above with reduced white. Palpi and eye fringes with admixed white scales; forelegs with vague outer white striping; mid and hind tibiae prominently spined. Abdomen with white anal tuft.

FEMALE: Upperside as ♂ but forewing hyaline spots larger; costal spot offset slightly basad of center of cell spot; spot in Cu_1-Cu_2 usually partly overlapped by cell spot. Underside as ♂ but opaque white scaling around spot in Cu_2-1A stronger, occasionally reaching 2A. Differs in wing size and antennal nudum as outlined below.

Wing measurements: ♂ forewing averaged 34.2 mm from base to apex and 16.9 from costa to tornus in 30 specimens measured, varying from 31.5 x 15.5 to 37 x 18.5 (holotype 36 x 18); ♀ forewing averaged 39.4 x 19.4 in 7 specimens measured, varying from 36.5 x 18 to 41.5 x 20.

Antennal nudum: ♂ averaged 30.17 (5.2/25.0) in 12 specimens measured, varying from 4/23 to 6/27 (holotype 7/23); ♀ averaged 31.40 (6.6/24.8) in 5 specimens measured, varying from 6/25 to 7/25.

The ♂ genitalia have relatively long slender parallel uncus arms; gnathos prominently spiculose; penis long and slender, much longer than valva, curved (in lateral view concave ventrally and recurved dorsad at each end), not widened at ends in dorsal view, with a curving single row of very large teeth along left side of vesica opening from mid dorsal to ventral at terminus, vesica opening dorsal to dorso-sinistral terminally, cornutus of one or two long thin spines, one of which is smaller than the other; valvae broad with long narrow harpe curving dorsad distally to end in a point, generally smooth or with irregular dorsal projections rather than teeth along its dorsal margin; ampulla with a prominent dorsally and caudally projecting, more or less rhomboid process bearing a relatively straight, inwardly projecting ridge roughly parallel to the dorso-caudal margin



Figures 51-54. *Narcosius nazaraeus*, new species. 51,52 ♂ Holotype upper (51) and under (52) surfaces (Photo nos. 860324A/7,8) [Mexico]: Chiapas, Chajul, Rio Lacantun (AME). 53,54 ♀ Paratype upper (53) and under (54) surfaces (Photo nos. 860324A/9,10) Honduras: San Pedro Sula (BMNH).

of the process, the ridge not prominently hirsute; the ventral edge of the process may project somewhat inward and is prominently hirsute.

In the ♀ genitalia the lamella postvaginalis has a relatively straight caudal margin which may slope cephalad away from the center or be completely straight, central indentation small and shallow, the lamella quite narrow longitudinally, its caudal margin separated narrowly from the ostium bursae by a distance equal to about one half the longitudinal width of the ostium which is a very prominent, subcircular opening separating the two lateral lobes of the lamella antevaginalis which is not centrally developed; antrum broad and prominent, fused to a large oval sclerotized process in the ductus bursae ventrad of the ductus seminalis connection; narrow section of ductus bursae containing sclerotized half tube is relatively short, about equal to the large, smooth, cylindrical and variously constricted corpus bursae; cephalad projections of the sinus conjunctionis prominent; papillae anales moderately concave on their distal margins.

30 ♂ and 7 ♀ were examined from the following countries: Mexico 4 ♂, 1 ♀; Belize 1 ♂; Honduras 4 ♂, 3 ♀; Costa Rica 2 ♂, Panama 1 ♂; Venezuela 1 ♂, 1 ♀; Guyana 1 ♂, 1 ♀; Surinam 1 ♂; Fr. Guiana 4 ♂; Brasil 3 ♂; Ecuador 1 ♂, 1 ♀, Peru 5 ♂; Bolivia 1 ♂; no data 1 ♂. Museum distribution of these specimens is shown below. 1 ♂ and 3 ♀ genitalia preparations were made; all the remaining specimens, including the holotype, were examined genitalically either *in situ*, from slides prepared by E. L. Bell and determined as *samson*, on cards prepared by Evans, who also determined them as *samson*, or from vials prepared by H. A. Freeman.

Since the data used to formulate the description of *nazaraeus* were derived from all the specimens examined, I have included them all in the type series despite the wide geographic dispersion. The holotype ♂ bears the following labels on its pin: hand written white label, "Chajul Rio Lacantún Chis. 27.v.81" (this locality is in Mexico); printed and handwritten white label, "Allyn Museum Acc. 1983-34"; printed and handwritten red label, "Holotype ♂ Narcosius nazaraeus Sept. 1983 S. R. Steinhauser". The holotype was donated to AME by its collector, Javier de la Maza E.; the genitalia were not dissected.

The holotype is deposited in the Allyn Museum of Entomology, Sarasota, Florida. Paratypes are distributed as follows: AME — 1 ♀ Mexico: Chiapas; San Quintin 14.x.1971, R. Wind; 1 ♀ Venezuela; Delta Amacuro (Terr.) Rio Acure; 1 ♀ Ecuador: Imbabura; Cochoco 700 m. i.1972, R. de la Febre; AMNH — 1 ♂ Mexico: Veracruz; Paraje Nuevo iv.52, T. Escalante; 2 ♂ Mexico: Veracruz; Presidio vii.1936 & ix.1940, C.C.Hoffmann; 1 ♂ Honduras, AC: 23042; 1 ♂ Venezuela: Carabobo; Las Quiguas 28.ix.37, P. Anduze; 2 ♂ Fr. Guiana: St. Laurent du Maroni; 1 ♂ Peru; 1 ♂ Peru: Iquitos 18.iii.1931; 1 ♂ Peru: Rio Santiago 20.xi.24; BMNH — 1 ♂ Belize; 3 ♂, 3 ♀ Honduras: San Pedro Sula, E. Wittkugel; 1 ♂ Costa Rica: Carillo, Feb.; 1 ♂ Panama: Veraguas, Arce; 1 ♂, 1 ♀ [Guyana]: Demerara, Castell; 1 ♂ Surinam (Interior). Sept. 1892, C.W. Ellacombe; 1 ♂ Fr. Guiana; 1 ♂ Fr. Guiana: St. Jean de Maroni Jan.-Mar.; 1 ♂ [Brasil]: Amazon, Bates; 2 ♂ [Brasil]: Amazones; Sto. Paulo d'Olivenca. M. de Mathan; 1 ♂ [Ecuador]: Paramba 3500', iii.97 (dry season), Rosenberg; 1 ♂ Peru; 1 ♂ Peru: Huancabamba 600-1000 ft., Boettger; 1 ♂ no data, Joicey Colln.; CM — 1 ♂ Costa Rica: Carillo, Feb.; 1 ♂ Bolivia: Rio Songo 750 m., Fassl.

Superficial characters in *nazaraeus* are quite variable, although no more so than in most other *Narcosius* species. The maculation differences separating it from other closely related species have been noted in the descriptions of those species; genitalic examination is required for positive identification. The only species whose genitalia might be confused with *nazaraeus* is *samson*, in fact, Evans determined all of the ♂ and two of the ♀ in the BMNH as *samson*.

In the ♂ genitalia, the shape of the dorsal process of the ampulla is different, more or less rhomboid and prominently projecting caudad in *nazaraeus*, but rounded and not projecting in *samson*. The form of the inwardly projecting ridges of this ampulla process is also consistently different; a hairless straight ridge parallel to the dorsal edge of the process in *nazaraeus*, but a curved ridge prominently hirsute dorsally and frequently accompanied by a second, oppositely curved ridge ventrad of the first, forming an oval or circular rim, in *samson*. The base of the dorsal process of the ampulla (second ridge of *samson*) is hairless in *samson* but densely hirsute in *nazaraeus*.

In the ♀ genitalia the principal differences are in the lamella postvaginalis which is longitudinally much narrower in *nazaraeus* and with a straight dorsal edge, but broad and with a convex dorsal edge in *samson*.

The late Latin word for a consecrated person such as Samson, who was not allowed, among other things, to cut his hair, is *nazaraeus*, thus the name for this very close relative of *samson*.

Undetermined material

Figure **79** (♂ genitalia)

There is in the AMNH a vial containing the ♂ genitalia of a specimen dissected by H. A. Freeman bearing the number H-615 which Freeman's notebook lists as, "*Astraptes parisi* Williams ? n. sp. ? viii.3.68 Piste, Yucatan, Mex. E.C. Welling". Unfortunately no specimen can be found to accompany the genitalia. This may represent a new species as suggested by Freeman, or it may be a somewhat aberrant *N. parisi helen*. I have illustrated the valvae of H-615 in hopes that other similar material may come to light. The tegumen, uncus, gnathos and penis are exactly as normal *helen*.

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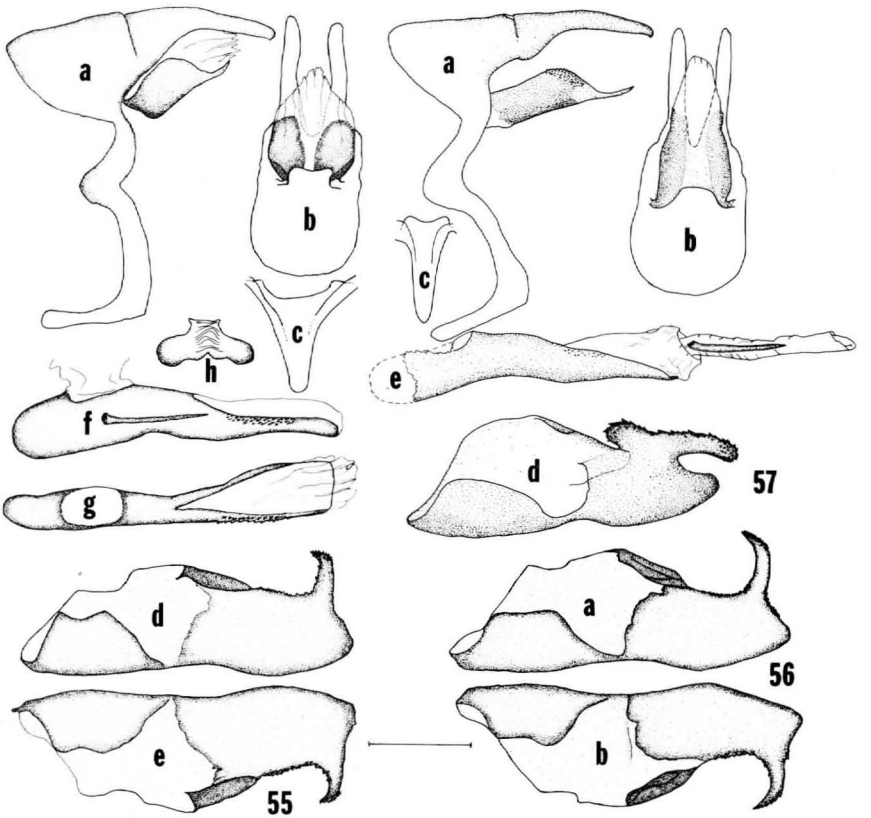
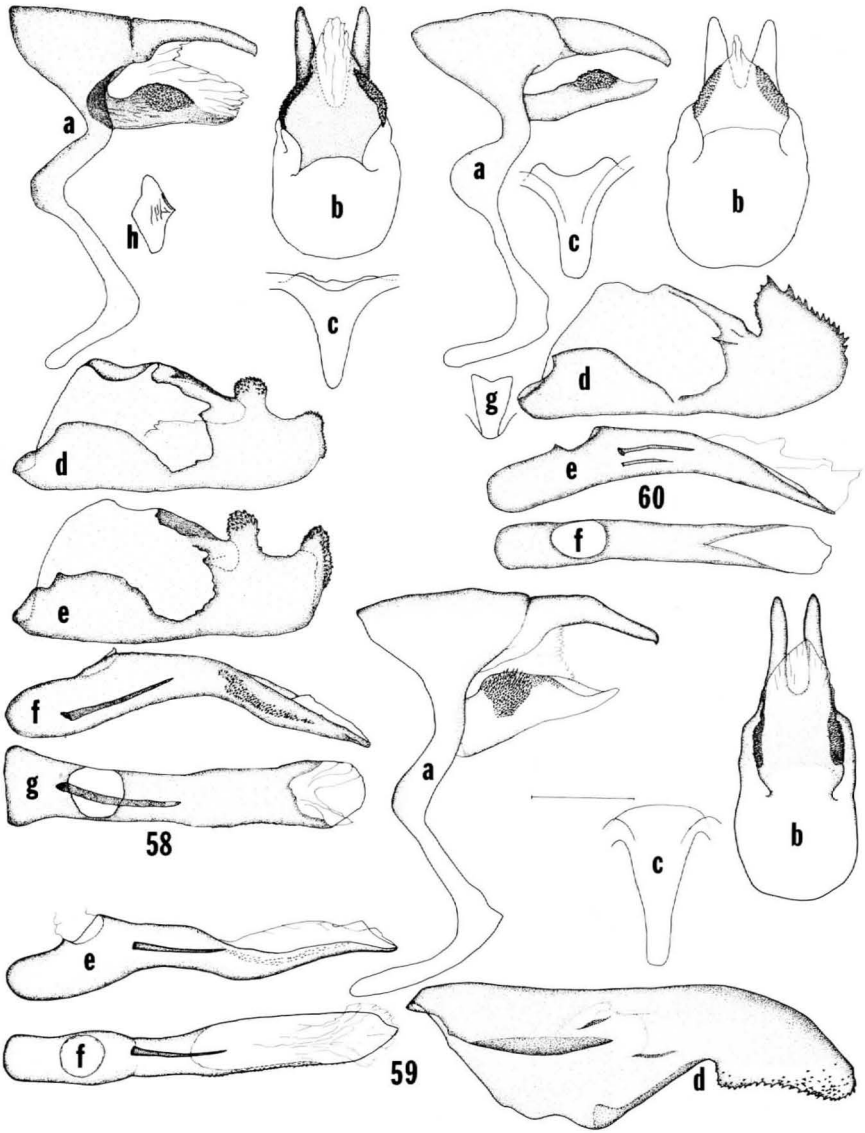
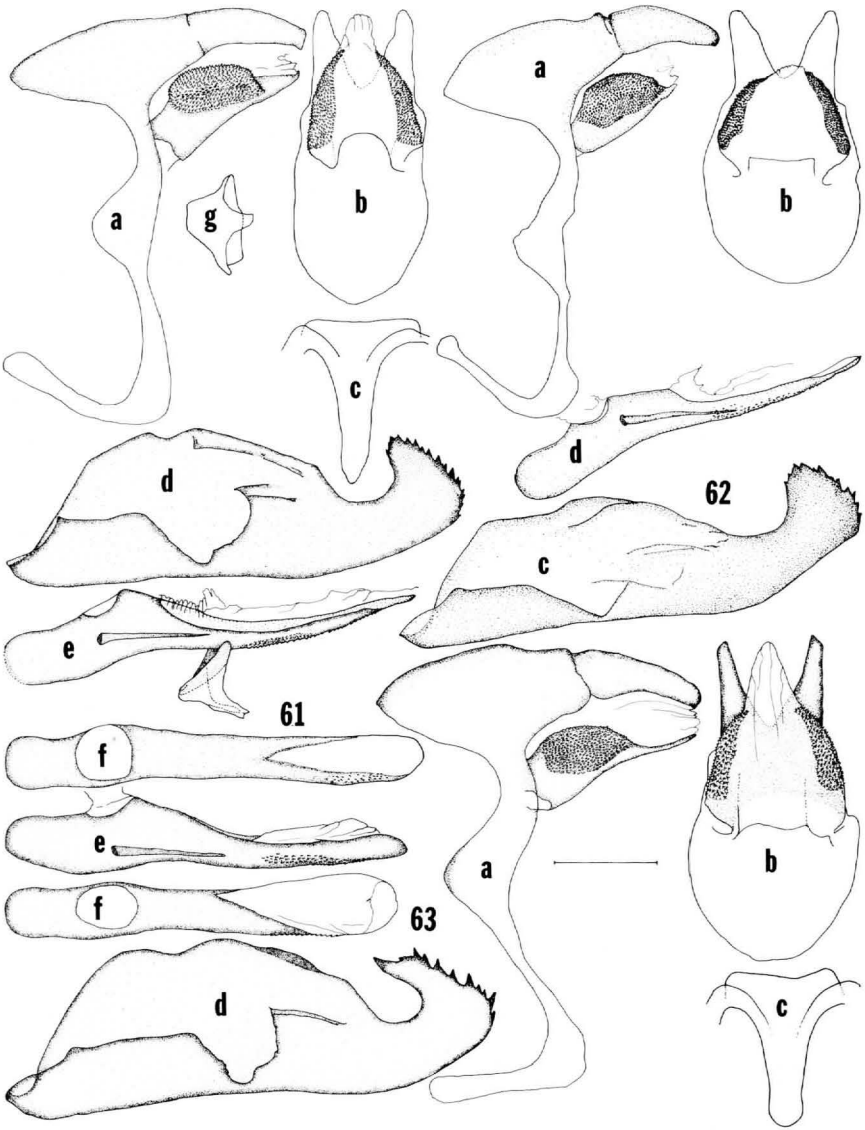


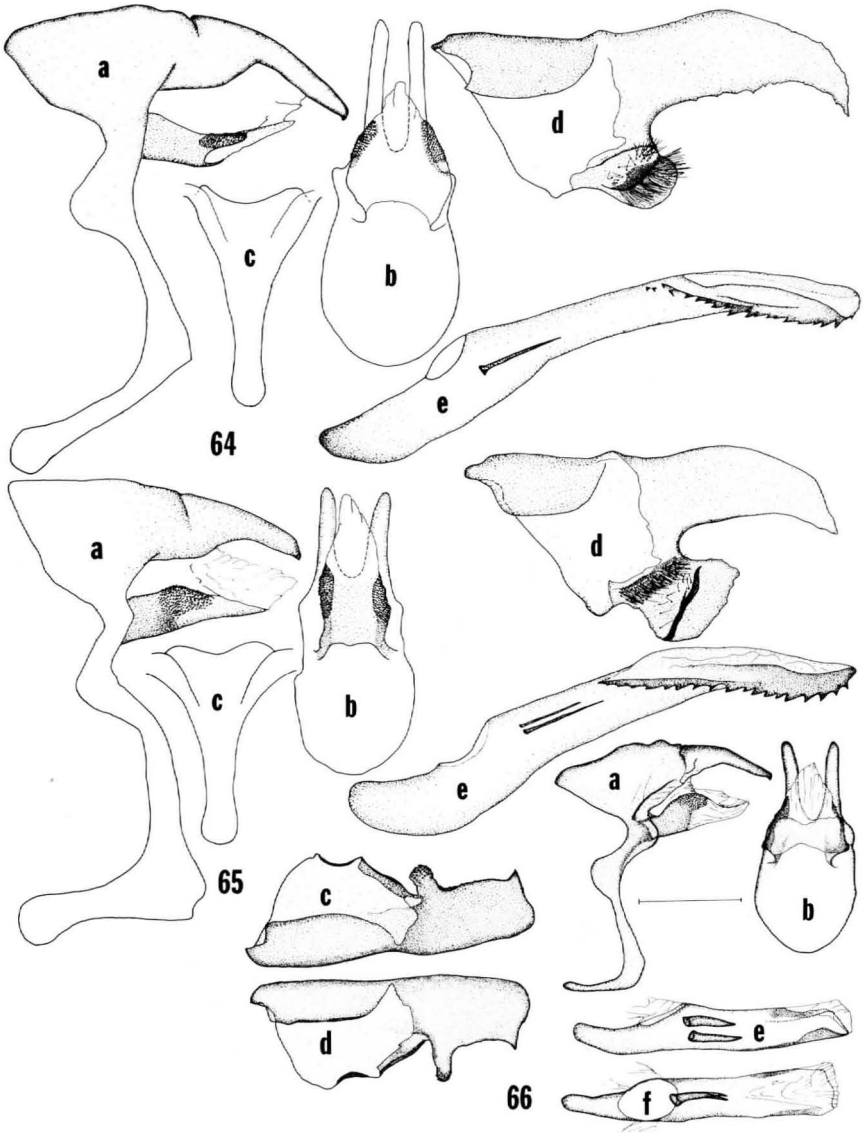
Figures 55-57. *Narcosius* spp. ♂ genitalia: 55 *N. parisi parisi*, Bolivia: Buena Vista, P. del Sara (CM). Genit. Prep. SRS-991: a) uncus, gnathos, tegumen, *etc.*-lateral; b) same-ventral; c) saccus-ventral; d, e) valvae-R, L; f, g) penis-lateral, dorsal; h) juxta-ventral. 56 *N. p. helen* Mexico: Michoacan, Coahuayana (AME). Genit. Prep. SRS-803: a, b) valvae-R, L. 57 *N. hercules* HT, Bolivia: Santa Cruz (AMNH). Genit. Prep. G-2301: a, b, c, d) as *parisi*; e) penis-lateral.



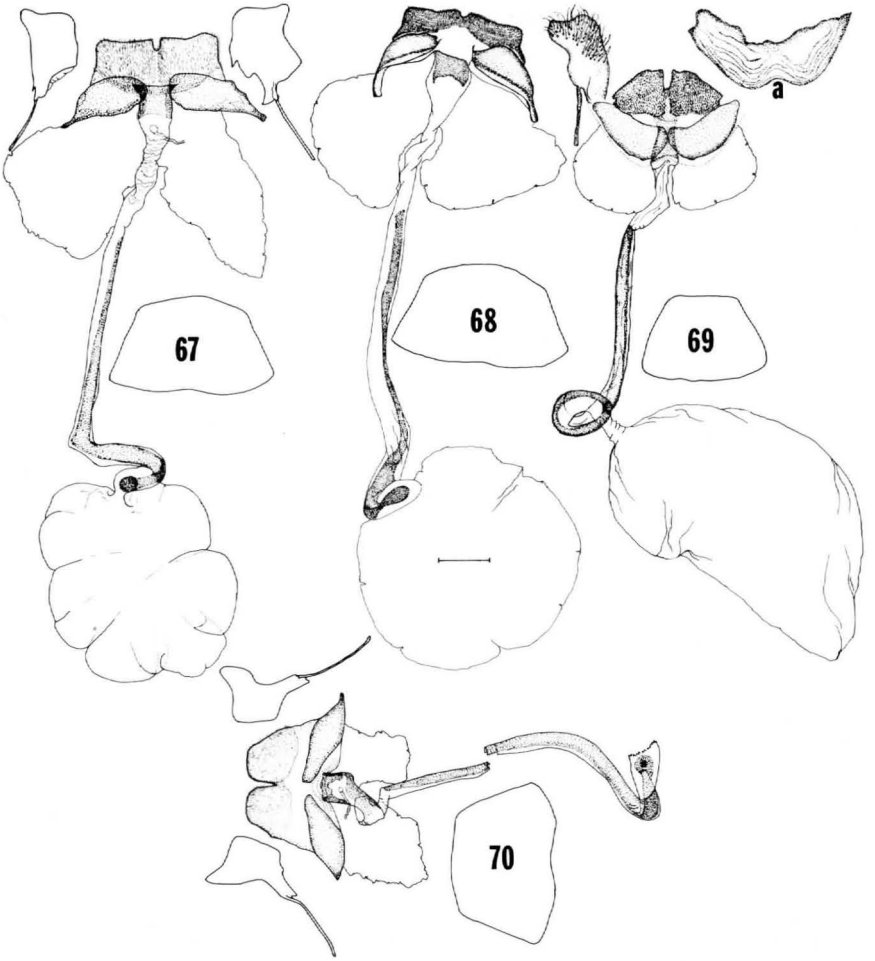
Figures 58-60. *Narcosius* spp. ♂ genitalia: **58** *N. aulina* HT, Fr. Guiana (BMNH). Genit. Prep. SRS-1086: a) tegumen, uncus, gnathos, *etc.*-lateral; b) same-ventral; c) saccus-ventral; d) R valva. Other specimen, Venezuela: Delta Amacuro, R. Acure (AME). Genit Prep. SRS-719: e) R valva; f, g) penis-lateral, dorsal; h) juxta-ventral. **59** *N. narcosius*, Peru: Iquitos (AMNH). Genit. Prep. G-2308: a, b, c) as *aulina*; d) L valva; e,f) penis-lateral, dorsal. **60** *N. mura*, no data (AME). Genit. Prep. SRS-915: a, b, c, d) as *aulina*; e, f) penis-lateral, dorsal; g) juxta-ventral.



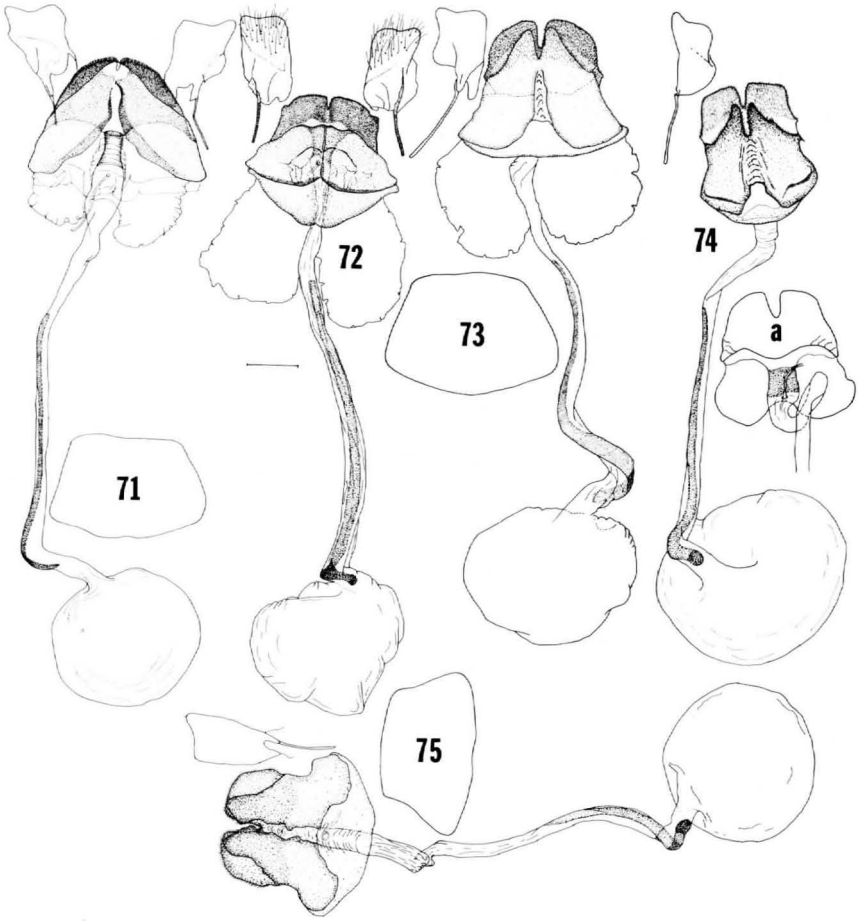
Figures 61-63. *Narcosius* spp. ♂ genitalia: **61** *N. colossus colossus*, Mexico: Veracruz, Catemaco (AME). Genit. Prep. SRS-799: a) tegumen, uncus, gnathos, *etc.*-lateral; b) same-ventral; c) saccus-ventral; d) R valva; e) penis and juxta-lateral; f) penis-dorsal; g) juxta-ventral. **62** *N. c. granadensis*, Peru: Huanuco, Tingo Maria. Genit. Prep. SRS-823: a, b) as *colossus*; c) R valva; d) penis-lateral. **63** *N. dosula* HT, Brasil: Rio Grande do Sul (BMNH). Genit. Prep. SRS-1093: a, b, c, d) as *colossus*; e, f) penis-lateral, dorsal.



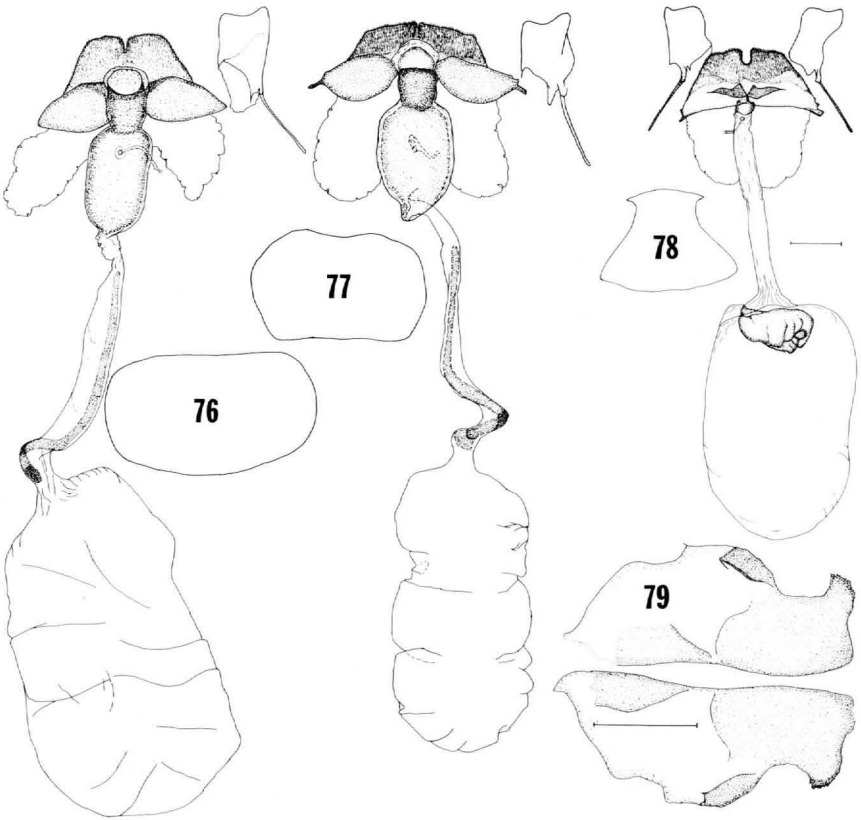
Figures **64-66**. *Narcosius* and *Astraptes* spp. ♂ genitalia: **64** *N. samson*, [Panama]: Chiriqui (USNM). Genit. Prep. SRS-974: a) tegumen, uncus, gnathos, *etc.*-lateral; b) same-ventral; c) saccus-ventral; d) L valva; e) penis-lateral. **65** *N. nazaraeus*, Mexico: Veracruz, Presidio (AMNH). Genit. Prep. G-2309: a, b, c, d, e) as *samson*. **66** *A. aulestis*, Mexico: Oaxaca, R. Satabia (AME). Genit. Prep. SRS-817: a, b) as *samson;* c, d) valvae-R, L; e, f) penis-lateral, dorsal.



Figures 67-70. *Narcosius* spp. ♀ genitalia and 7th sternite, ventral: **67** *N. parisi parisi*, Peru (USNM). Genit. Prep. SRS-1011. **68** *N. p. helen*, Mexico: Veracruz, Catemaco (AME). Genit. Prep. SRS-999; 7th sternite, same locality (AME). Genit. Prep. SRS-808. **69** *N. hercules*, Ecuador: Limoncocha, R. Napo (SN). Genit. Prep. SRS-1005: a) sclerotized pleura between 7th and 8th sternites; connects on dotted line. **70** *N. aulina* Venezuela: Delta Amacuro, Tucupita (AME). Genit. Prep. SRS-801, corpus bursae destroyed.



Figures **71-75.** *Narcosius* spp. ♀ genitalia and 7th sternite, ventral: **71** *N. narcosius* no data (CM). Genit. Prep. SRS-1004. **72** *N. mura*, no data (BMNH). Genit. Prep. SRS-1143, 7th sternite destroyed in all three specimens known. **73** *N. colossus colossus*, Colombia: Magdalena, Bonda (CM). Genit. Prep. SRS-1003. **74** *N. c. granadensis*, "Amazons" (CM). Genit. Prep. SRS-1009, 7th sternite not shown: a) specimen from Ecuador (AMNH), Genit. Prep. SRS-976, dorsal view; antrum stippled. **75** *N. dosula* Brasil: Sta. Cath., Mafra (AMNH).



Figures **76-79**. *Narcosius* and *Astraptes* spp. genitalia: **76** *N. samson* ♀ genitalia and 7th sternite, ventral, Surinam (BMNH). Genit. Prep. SRS-1138. **77** *N. nazaraeus* ♀ genitalia and 7th sternite, ventral, Mexico: Chiapas, San Quintin (AME). Genit. Prep. SRS-800. **78** *A. aulestis* ♀ genitalia, ventral, Panama: Colon, Piña (AME) Genit. Prep. SRS-811; 7th sternite, ventral, Mexico: Oaxaca, Chimalapa (AME) Genit. Prep. SRS-805. **79** *N.* undetermined species ♂ genitalia (R & L valvae) Mexico: Yucatan, Piste (AMNH) Genit. Prep. H-615.

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