Arquivos de Zoologia

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VOLUME 24, FASCÍCULO 3

MUSEU DE ZOOLOGIA DA UNIVERSIDADE DE SÃO PAULO
SÃO PAULO, 1973

Arquivos de Zoologia

ARQ. ZOOL., S. PAULO, VOL. 24 (3): 163-209, 1 pl. 1.XI.1973

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CONTENTS

ABSTRACT

Examination of types and comparative studies of the male genitalia permitted a reclassification of Blepharepium *Rondani, 1848, the only recent representative of the tribe Blepharepiini. This tribe can be distinguished from all other tribes of Dasypogoninae by the presence of a complete prosternum.*

Blepharepium *has the following recognized species:*

1. annulatum (*Bigot, 1857* (= secabile *Walker, 1860; southern Mexico, Central America, northwestern South America, West Indies; forest areas);*

2. cajennensis *(Fabricius, 1787), with 3 subspecies:*

  i. cajennensis *s. s.* (= inserens *Walker, 1851;* = auricincta *Schiner, 1867;* = inca *Curran, 1942; Guianas, coastal Venezuela, western Brazilian Amazonia, Peru, northern Bolivia);*

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ii. coarctatum *(Perty, 1833; =* bonariensis *Macquart, 1838; =* occidens *Walker, 1851; =* lynchi *Carrera, 1949; open formations of Guiano-Brazilian subregion);*

iii. cunctabundum, *n. ssp., forest areas of the States of São Paulo south to Rio Grande do Sul, Brazil;*

3. fuscipennis *(Macquart, 1834; =* insertus *Walker, 1851; =* maculipennis *Macquart, 1855; western Amazonia, Brazilian Atlantic forest);*
4. luridum *Rondani, 1848* (= modesta *Bigot, 1878; Amazonia);*
5. subcontractum *(Walker, 1856; =* bassleri *Curran, 1942; western Amazonia);*
6. priapus, *sp. n., from Arizona, Phoenix;*
7. sonorensis, *sp. n.* (annulatum *group of sibling species; Sonoran Desert, s. Utah to n. Mexico);*
8. surumu, sp. n. (annulatum *group of sibling species; southern Venezuela, northeastern Roraima Territory in Brazil).*

"Senobasis" borealis *James, from the the Oligocene shales of Florissant, Colorado, may also belong to* Blepharepium.

Considerations on the biology, ecology, and evolution of the group are given.

1. INTRODUCTION

The first species of *Blepharepium* were described by Fabricius (1787 : *Asilus cajennensis*), Perty (1883 : *Laphria coarctata*), and Macquart (1834 : *Dasypogon fuscipennis,* 1838 : *Dasypogon bonariensis*).

The genus was erected by Rondani in 1848, monobasic for *luridum* Rondani, collected by Vittore Ghiliani in the forests near Belém, Pará (*cf.* Papavero, in press).

Walker (1851) ignored the genus and described three species more : *occidens* (from "South America"), *insertus* (Brazil, Pará), and *subcontractus* ("Amazon District"), all in the then very elastic genus *Dasypogon.*

In 1855 Macquart started the confusion between *Blepharepium* and his own genus *Senobasis,* describing in the latter genus a true *Blepharepium, maculipennis* (unknown type-locality). Bigot (1857a) repeated the same error, describing *"Senobasis" annulata* from Cuba, although recognizing *Blepharepium* as distinct from *Senobasis,* in his key to the genera of Asilidae (1857b). Bigot placed *Blepharepium* among the genera of his "Curie des Laphridae".

Walker (1860), always ignoring the recent changes in generic status, described another species, *Dasypogon secabile,* from Mexico.

Schiner (1866, 1867, 1868) was not able to recognize *Blepharepium* from Rondani's description and considered it a synonym of *Dasypogon.* Schiner confounded again *Blepharepium* and *Senobasis,* describing *"Senobasis" auricincta* from Surinam.

Bigot (1878) described *"Senobasis" modesta* from the Amazons.

In 1879 Enrique Lynch Arribálzaga erected the genus *Planetolestes,* for *Laphria coarctata* Perty. Two years later, having had access to Rondani's 1848 paper, he recognized the identity of his genus with

Blepharepium. Lynch Arribálzaga recognized the following species as valid :

1. *coarctatum* (Perty) (= *bonariensis;* = *luridum;* = *secabile*); 2. *subcontractum* (Walker); 3. *maculipennis* (Macquart); 4. *auricinctum* (Schiner).

Wulp (1882) synonymized *bonariensis, luridum* (with a query), *subcontractum, annulatum, secabile,* and *auricinctum,* with *coarctatum.* In his catalogue of the world Asilidae (1909) Kertész adopted Wulp's synonymy, and considered as valid species *maculipennis* and *modesta.*

Bromley (1929) furnished a partial key to the species of *Blepharepium* and transferred to it *Asilus cajennensis* Fabricius.

James (1939) also confounded *Blepharepium* and *Senobasis,* describing "*Senobasis*" *borealis* from the Oligocene shales of Florissant, Colorado.

Curran (1942) also furnished a partial key to the species, describing three Peruvian species — *vorax, inca,* and *bassleri.*

Carrera (1949) placed *Blepharepium* among the genera of "Saropogonini with an apical spur on the front tibiae", publishing a key to the Brazilian species. He recognized the following species :

1. *luridum* Rondani; 2. *maculipennis* (Macquart); 3. *cajennensis* (Fabricius) (= *auricincta* Schiner); 4. *lynchi* Carrera; 5. *subcontractum* (Walker); 6. *secabile* (Walker); 7. *coarctatum* (Perty); 8. *vorax* Curran; 9. *inca* Curran; 10. *bassleri* Curran; 11. *annulatum* (Bigot).

Commenting on the use of the prosternum in classifying Asilidae, Clements (1951 : 11) called attention to the fact that *Blepharepium* was an anomalous genus among the "Saropogonini" with an apical spur on the front tibiae :

> "Under the description 'Prosternum completely reduced so as to leave the ventral part isolated broadly by membrane and without the finger-like projection', Hardy placed the Saropogonini, Dasypogonini, Chrysopogonini, Phellini, and *Brachyrrhopala* Macquart. The Megapodini also fall under this description. In this section of the Dasypogonini tibial spurs are present in most genera, though absent in a few. All of those groups were examined except *Brachyrrhopala,* and Hardy's description was found to hold good for all genera examined except *Blepharepium* in the Saropogonini. *Blepharepium coarctata* (sic) Perty, *B. cayennensis* (sic) Fabr. and *B. subcontractum* Wk. were examined, and in all of them the prosternum was much emarginated but not divided."

Hull (1962) placed *Blepharepium* among the Dasypogonini and considered the following species as belonging to it:

1. *annulatum* (Bigot); 2. *asiloides* (Bigot); 3. *bassleri* Curran; 4. *coarctatum* (Perty); 5. *cajennensis* (Fabricius); 6. *fenestrata* (Macquart); 7. *fulvus* (Bigot); 8. *inca* Curran; 9. *luridum* Rondani; 10. *lynchi* Carrera; 11. *maculipennis* (Macquart); 12. *modesta* (Bigot); 13. *nigriventris* (Blanchard); 14. *secabilis* (Walker); 15. *subcontractum* (Walker); 16. *vorax* Curran.

Martin & Papavero (1970 : 28) placed *bassleri* in the synonymy of *subcontractum,* upon examination of the type; Artigas (1970 : 116) transferred *nigriventris* to *Deromyia;* Papavero (1971a) showed that *asiloides* equalled *Allopogon necans* (Wiedemann), and that *fulvus* was a synonym of *Diogmites castaneus* (Macquart); *fenestrata* was transferred to *Prolepsis,* in the Stenopogoninae, by Lamas (1973).

Blepharepium was transferred to the tribe Blepharepiini by Papavero (see Part II). Further studies of types by the senior author and the comparative study of the male genitalia of the several nominal species revealed a number of new synonymies and changes in status. The situation of the species of this genus, as proposed in the present revision, is as follows:

1. *borealis* (James, 1939; fossil);
2. *annulatum* (Bigot, 1857; = *secabile* Walker, 1860);
3. *cajennensis* (Fabricius, 1787), with 3 subspecies:
    i. *cajennensis* s. s. (= *inserens* Walker, 1851; = *auricincta* Schiner, 1867; = *inca* Curran, 1942; = *vorax* Curran, 1942);
    ii. *coarctatum* (Perty, 1833; = *bonariensis* Macquart, 1838; = *occidens* Walker, 1851; = *lynchi* Carrera, 1949);
    iii. *cunctabundum,* ssp. n.;
4. *fuscipennis* (Macquart, 1834; = *insertus* Walker, 1851; = *maculipennis* Macquart, 1855);
5. *luridum* Rondani, 1848 (= *modesta* Bigot, 1878);
6. *subcontractum* (Walker, 1856; = *bassleri* Curran, 1942);
7. *priapus,* sp. n.;
8. *sonorensis,* sp. n.;
9. *surumu,* sp. n.

2. MATERIALS AND METHODS

Collections studied and abbreviations used in the text are the same as those presented in Part I, plus the collection of the Naturhistoriska Riksmuseet of Stockholm (RM) and the University of California at Davis (UCD; through J. Wilcox).

Drawings of male genitalia and others were made with the help of a camera lucida; genitalia bristles and hairs were not represented; gonopods (basistylus plus dististylus) were shadowed. Distribution maps were hatched only for a better visualization of the distribution, but hatching does not indicate that the distribution is actually as shown nor that it is continuous.

For the elaboration of the maps all localities were used, both cited in the literature (and which were checked in the original specimens) and those of the new collections studied. Coordinates for placing the localities on the maps were taken from Vanzolini & Papavero (1968) for Brazilian localities, and from Hanson (1945) for other countries. When these sources failed, we have tried the gazetteers of the United States Board on Geographical Names and the maps of the American Automobile Association.

3. ACKNOWLEDGMENTS

The senior author is very grateful to the Fundação de Amparo à Pesquisa do Estado de São Paulo for Grants "Biológicas 68/604", which permitted the study of types in the United States in 1968, and "Biológicas 69/882 and 69/883", which made possible the acquisition of several important collections of Asilidae and other flies; to the Conselho Nacional de Pesquisas for Grant 3289/69, with which types in London and Paris were studied in 1970, and, in a very special way, to the John Simon Guggenheim Memorial Foundation, whose fellowship enabled him to study the collections of robber-flies in the Museums of North America and Europe during 1971-72.

Prof. F. M. Carpenter (MCZ) was extremely kind in supplying us with the photograph of the type of *Blepharepium borealis* (James).

We are especially indebted to all the curators of the several museums visited (whose names are published in Part I) and to Dr. Per Inge Persson (RM), for their kind assistance and hospitality, and also for sending collections to be studied.

4. SYSTEMATICS

Tribe **BLEPHAREPIINI** Papavero

Blepharepiini Papavero, 1973 : 277.

Moderately large, generally bright-colored flies, with reduced vestiture; palpus moderately long, one-segmented; antenna with spindle-shaped third segment; apical style absent, only an apical pit with minute spine present; prosternum complete, fused to pronotum (Figs. 1-2), forming a complete ring; fore tibiae with a strong, twisted, apical spur; scutellar bristles absent; pulvilli of middle and hind legs greatly reduced; marginal and first posterior cells open; fourth posterior and anal cells closed; abdomen subclavate; female with spines on acanthophorites; male genitalia with free hypandrial halves; hypandrium moderately large, free, triangular; dististyli subapically placed on the basistyli, elbow-shaped; apical process of basistyli with characteristic shapes; aedeagus conical, elongate, with well-developed pair of dorsal processes, more or less in the shape of wings, with wide and well-developed basal processes.

Type-genus, *Blepharepium* Rondani, 1848.

The Blepharepiini, as pointed out in Part II, can be immediately separated from all other Dasypogoninae by the complete prosternum.

Genus **Blepharepium** Rondani

Blepharepium Rondani, 1848 : 89. Type-species, *luridum* Rondani (mon.). Refs. — Bigot, 1857b (key); Lynch Arribálzaga, 1881 : 22 (discussion); Bromley, 1929 (partial key to spp.); Curran, 1942 (partial key to spp.); Carrera, 1949: 45 (partial rev.); Clements, 1951 : 11 (discussion); Hull, 1962 : 233 (descr.), figs. 543 (wing), 547 (wing), 1067 (head), 1076 (head), 1820 (♂ gen.); Martin & Papavero, 1970 : 28 (cat.).

Senobasis Macquart of authors (part).

Planetolestes Lynch Arribálzaga, 1879 : 147. Type-species, *Laphria coarctata* Perty (orig. des.).

Descriptions: Carrera (1949), Hull (1962).

KEY TO SPECIES

The key presented below had to include at times, as diagnostic characters, the geographical distribution of some species, and only one sex at times. There is a great variation in color patterns, due to mimicry and sometimes possibly hybridization; different species, with entirely different male genitalia, are exceedingly similar in color, due to convergence caused by the mimicry of a same species of wasp; sibling species differ only in their distribution. Therefore, it is impossible, for the moment, to differentiate some of them by external characters.

1. Abdomen entirely ferrugineous (reddish) or tergites 3-7 blackened (Amazonia) 2
   Abdominal tergites blackish or brownish (yellowish, reddish, or ferrugineous) on anterior margin, and yellow pollinose on posterior margin 4

2. Abdomen entirely ferrugineous (or reddish); third antennal segment black, with the bristles of the dorsal surface occupying its basal 3/4 (sometimes third antennal segment reddish, but bristles always on basal 3/4 of it); basal 2 segments of antenna reddish; posterior dorsocentrals present or absent (Amazonia) .... *luridum* Rondani
   Tergites 3-7 blackened 3

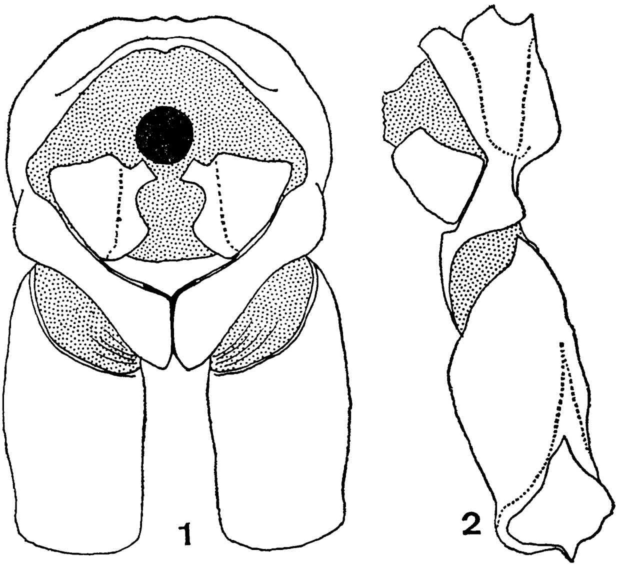
3. Palpal hairs black and yellow; tergites 3-7 only blackened (sometimes only darkened); basal 2 segments of antenna black; posterior dorsocentral bristles always absent; mesonotum blackened, without evident lateral spots (Eastern Amazonia; Brazilian Atlantic forest from Rio Grande do Norte s. to Rio de Janeiro) .... *fuscipennis* (Macquart)

   Palpal hairs entirely yellow; tergites 3-7 shining black; face yellowish; basal 2 segments of antenna yellowish-red; posterior dorsocentral bristles present, but not developed; mesonotum yellowish with very evident lateral black spots, divided by the transverse suture (Western Amazonia) .... *subcontractum* (Walker)

4. South American species 5

   North American species 8

5. Specimens with blackish integument; legs generally dark; palpal hairs black (or brown) and yellow; mesonotum with a more or less conspicuous golden-yellow pollinose spot on the posterior margin, in front of the scutellum (Guianas, costal Venezuela, western Brazilian Amazonia, s. Colombia, e. Peru, n. Bolivia) .... *cajennensis cajennensis* (Fabricius)



Prosternum and pronotum of *Blepharepium* (schematic): 1, frontal view; 2, lateral view.

Specimens with ferrugineous (reddish, brownish or yellowish) integument; legs ferrugineous (sometimes integument blackened, but legs always ferrugineous, especially tibiae and tarsi) 6

6. Basal 2/3 or more of middle and hind femora distinctly shining black, apex yellow; palpal hairs yellow (Forest areas of southern Brazil, from São Paulo s. to Rio Grande do Sul) .... *cajennensis cunctabundum*, ssp. n.
   Middle and hind femora unicolorous, ferrugineous 7

7. Male genitalia as in Figs. 18-20; palpal hairs yellow or yellow and black; highly variable coloration (Open formations of Guiano-Brazilian subregion, especially south of Amazonia) .... *cajennensis coarctatum* (Perty)
   Male genitalia as in Figs. 7-9; palpal hairs entirely yellow; very light yellow specimens, anterior margin of tergites 3-7 brownish (Exclusively in the Gran Sabana of Venezuela and northeastern Roraima Territory in Brazil) .... *surumu*, sp. n.

8. Middle and hind femora shining black on basal 2/3 or more; apex yellow; male genitalia as in Figs. 4-6 (Forest areas of Central America, southern Mexico, northwestern arch in South America, West Indies) .... *annulatum* (Bigot)
   Middle and hind femora unicolorous, ferrugineous 9

9. Male genitalia as in Figs. 7-9 (Southwestern United States, northern Mexico : Sonoran Desert) .... *sonorensis*, sp. n.
   Male genitalia as in Figs. 35-37, with very long aedeagus (USA: Arizona) .... *priapus*, sp. n.

According to the male genitalia, the species of *Blepharepium* may be grouped as follows:

Group I: apical process of basistylus relatively narrow, with the shape shown in Figs. 10-14 and 18-20: *cajennensis* and its subspecies; abdomen blackish or brownish, posterior margin of tergites yellow pollinose;

Group II: apical process of basistylus very similar to groups I or III (see Figs. 29-31, 38-40); abdomen with tergites 3-7 darkened: *fuscipennis* and *subcontractum;*

Group III: apical process of basistylus with two long lobes, broadly separated by a deep concavity (Figs. 4-9, 32-34); abdomen unicolorous, reddish (brownish) or with posterior margins yellow polinose: *annulatum* group of sibling species (*annulatum, sonorensis, surumu*), and *luridum;*

Group IV: genitalia elongate, apical process of basistylus and aedeagus very long; abdomen brownish-yellow, with yellow pollinose posterior margins on tergites : *priapus*.

Blepharepium borealis (James), comb. n.

(Fig. 3)

Senobasis borealis James, 1939 : 451. Holotype (MCZ, 4498) from the Oligocene shales of Florissant, Colorado, USA.
Paleomolobra borealis; Hull, 1962 (erroneous generic assigment).

Original description: "*Female.* Length, 14.5 mm, of wing 8.5 mm. Head black. Proboscis strong, at least 1 mm in length. Antennae missing. Thorax black, relatively bare and without obvious pilosity; legs yellowish, the tarsi somewhat darker, especially apically, the anterior and middle femora at their apices and the posterior ones on the upper side evidently black. Legs uniformly clothed with rather thick, short pile, but the bristles evident only at the apices of the tibiae and on the tarsi, and in those places rather weak. The anterior tibia terminates in a short but strong spur. Wings hyaline. Fourth posterior cell closed and petiolate at the apex; anal cell closed in the wing margin, its sides straight and its apex strongly angular. The cross-vein r-m joins the discal cell at two-thirds the length of that cell. The following measurements are in millimeters: origin of Rs to separation of R_{2+3}, 1.2; origin of R_{4+5} to r-m, 2.0; r-m to separation of R_4 and R_5, 1.1; length of second submarginal cell, 2.5; of cross-vein m-cu, 0.1. Abdomen yellow or light brown, the first segment and the basal half of each of the subsequent ones, however, black; the abdomen somewhat spatulate in outline, narrower at the base, where it measures 2 mm, widest in the fourth and fifth segments (2.5 mm), and from that point gradually tapering to the apex; *the genitalia ending in a circlet of spines, at least 4 or 5 on each side.*" (italics ours).

"A well preserved specimen, lying with the dorsal side exposed, the wings and legs expanded, and practically the complete venation visible in both wings. The generic reference seems to be satisfactory. The venation shows no important variation from that of *S. mendax* Curran, and other characters, so far as visible, are compatible with the generic diagnoses given by Macquart, Williston, and Curran. The abdomen is not as strongly narrowed basally as in some recent forms, but this is a character which might easily be subject to considerable variation."

In spite of James' statement that the generic assignment seems to be correct, the author evidently overlooked a very important character in placing *borealis* in *Senobasis* — none of the species of *Senobasis* has spines on the acanthophorites. This at once excludes *borealis* from that genus.

The characters shown by this species point to a problable inclusion in *Blepharepium,* although it is impossible to observe the prosternum; the type lacks the antennae, moreover. However, the color pattern agrees so well with the present species of *Blepharepium* (especially with *annulatum*), that we consider this new assigment as probable.

Hull's assignement of *borealis* to *Palaeomolobra* Hull is evidently an error. That genus was erected for *Senoprosopis antiqua* James. Hull confounded the names *Senoprosopis* and *Senobasis,* which resulted in this wrong generic placement for *borealis.*

Blepharepium annulatum - species group

Three different groups, all with exactly the same genitalia, but differing somewhat in color pattern, can be recognized within this complex. The key given above will serve to separate those three groups. One of them has the middle and hind femora shining black on the basal 2/3 or more, and occurs in forest areas in southern Mexico, Central America, the West Indies, and in the northwestern arch of South America. The second group, occurring in the Sonoran Desert, and parapatric with the first, has unicolorous hind femora. The third, very similar in color to the second, only the abdomen much lighter yellow, is completely allopatric, and seems to be completely isolated in the Gran Sabana region of Venezuela and Roraima Territory in Brazil. This Gran Sabana group is completely surrounded by forest areas, and does not probably maintain gene flow with the first group, an inhabitant of forest areas.

In spite of the difficulty in separating these three groups by traditional taxonomic procedures, we are considering them as valid species, which have been recently formed, and not yet sufficiently differentiated morphologically (sibling species).

Examination of types showed that the first group corresponds to *annulatum* (Bigot; = *secabile* Walker). The second and third groups represent new species, here designated by *sonorensis* and *surumu*, respectively.

Blepharepium annulatum (Bigot)

(Figs. 4-6)

Senobasis annulata Bigot, 1857a: 331, pl. 20, figs. 3, 3a (whole insect, head). Type-locality : "Cuba". Type's remains examined at MNHN, in 1970, 1971. Refs. — Kertész, 1909: 124 (cat.) ; Martin & Papavero, 1970: 57 (cat.).

Dasypogon secabile Walker, 1860: 276. Type-locality : "Mexico". Type ♀, BMNH (examined in 1970, 1972). *N. SYN.*

?*Saropogon secabile;* Bellardi, 1861: 63, pl. 1, fig. 4 (whole insect) (Mexico : Tampico, Cuautla, Mexico City, Oaxaca; specimens vid., 3 ♂ and 3 ♀, TORO, 1972).

Stenobasis secabile; Schiner, 1867: 371.

Diogmites annulatus; Osten Sacken, 1874 (cat.) ; 1878: 233 (cat.) ; Williston, 1891: 75 (cat.).

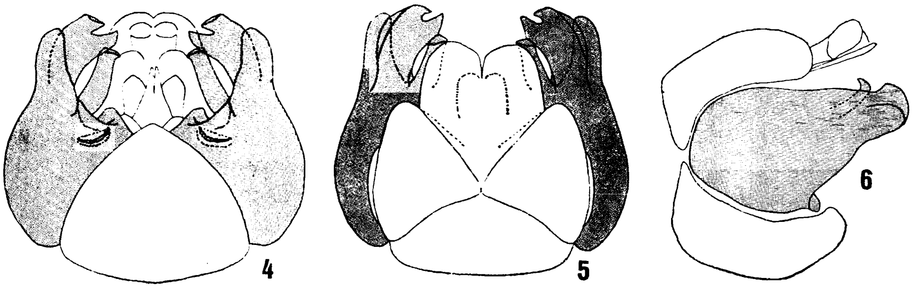
Planetolestes secabilis; Lynch Arribálzaga, 1879: 150 (note) ; Osten Sacken, 1887: 171 (Mexico : Córdoba; Guatemala : Teleman; Panama : Bugaba).

Blepharepium secabile; Lynch Arribálzaga, 1881: 24; Williston, 1891: 76 (cat.) ; Bromley, 1929: 279 (key) ; Curran, 1942: 55 (Honduras; Panama : Fort Randolph) ; Carrera, 1949: 53 (Part : only specimen from Panama, Gatún) ; Carrera & Papavero, 1962: 47; Carrera & Machado-Allison 1963: 237 (Venezuela : El Limón, Maracay, Desvio Ribas, Cumbre de Aguirre, Acosta, Turmero) ; Martin, 1965: 20; Wilcox & Martin, 1965: 265 (cat.) ; Martin & Papavero, 1970: 28 (cat.).

Fig. 3, *Blepharepium borealis* (James). Holotype.

Stenobasis secabile; Kertész, 1909: 124 (cat.; as syn. of *coarctatum*).
Blepharepium annulatum; Bromley, 1929: 279 (Cuba: Havana, Guantánamo); Curran, 1942: 55; Carrera, 1949: 46 (note).

The type of *Senobasis annulata* (MNHN, Coll. Guérin-Méneville, n.º 2504) has no head, and only 3 tergites remain in the abdomen; the fore left leg, the right middle one and the thorax are partially destroyed; the pleura are covered with some kind of glue. However, it can be easily identified by the black basal portion of the hind femur. Specimens from Cuba in the MNHN compared with the type of *annulata* agree very well, and were dissected. Walker's type of *secabile* (BMNH, drawer B.3.49) is in good condition and is the same species as *annulatum.*



Blepharepium annulatum (Bigot), male genitalia : 4, ventral view; 5, dorsal view; 6, lateral view.

Considerable confusion has been created by the several authors regarding this species. In fact, *annulatum* has exactly the same coloration as our new subspecies *cajennensis cunctabundum* from southern Brazil. This led the several authors to confound the two. Only examination of the male genitalia can show their different identity. The strong similarity between them is probably due to convergence through mimicry of the same model. A parallel case occurs between *sonorensis* and *cajennensis coarctatum.*

Careful mapping showed that *annulatum* is limited to the forests of southern Mexico, Central America, the forests of coastal Colombia and Venezuela, and to the West Indies.

Material examined. MEXICO : Jalisco (no other data), 1785, 1 ♂, 2 ♀ (USNM); "côte occidentale", 1864 (Biart), 4 ♂, 3 ♀, (MNHN); 2 mi. W. of La Venta, vii.1965 (Martin), 2 ♂, 1 ♀ (CHM); La Venta, vii.1965 (Yensen), 1 ♀ (CHM); 11 mi. N. of Chapala, on road to Guadalajara, vii.1947, 1530 m (Hubbell), 1 ♂ (CHM); Tequila, vii.1965 (Martin), 1 ♂ (CHM); 8 km W of Tequila, viii.1965 (Martin), 1 ♀ (CHM); 3 mi SE of Plan de Barrancas, vii.1963 (Parker & Stange), 2 ♀, 4 ♂ (CHM); Guadalajara, viii.1903 (no collector), 1 ♀ (USNM); env. of Guadalajara (Diguet), 2 ♂, 1 ♀ (MNHN);

Jalisco, 1903 (Diguet), 1 ♀ (MNHN); Santiago Iscuintla, vii.? (Schumann), 2 ♂ (BMNH); *San Luis Potosí* : El Salto Falls, 1250 ft, x.1957 (Scullen), 2 ♀ (CHM); Huichihuayan, 20 mi. N of Tamazunchale, v.1952 (Cazier, Gertsch & Schrammel), 1 ♂, 1 ♀ (CHM); 5 mi. E of Xilitla, 1600 ft, vii.1954 (Chillcott), 1 ♂ (CNC); *Veracruz* : Jesus Carranza, 26 m, vi.1944 (Guerra), 1 ♀ (AMNH); 30 mi. S Acayucan, iv.1962 (Parker), 1 ♀ (CHM); Cotaxtla Expt. Sta., Cotaxtla, vii.1962 (Janzen), 2 ♂, 5 ♀ (CHM); Cotaxtla, x.1957 (Padilla A.), 1 ♀ (CHM); Córdoba, v.1946 (J. & D. Pallister), 1 ♂ (CHM); do., vii.1964 (Fisher & Verity), 1 ♀ (EF); Puente Nacional, vi.1962 (Janzen), 1 ♂ (CHM); Córdoba, v.1964 (J. & D. Pallister), 1 ♀ (AMNH); Atoyac, iv.? (H. H. Smith), 1 ♂, 2 ♀ (AMNH); do., no date (Schumann), 1 ♂ (AMNH); Medellín, near Veracruz, i.1888 (H. H. Smith), 1 ♀ (AMNH); Atoyac, no date (Schumann), 1 ♂, 1 ♀ (BMNH); do., no date (H. H. Smith), 1 ♂, 1 ♀ (BMNH); *Yucatán* : (no other data) (Sallé), 1 ♀ (BMNH); do. (Gaumer), 3 ♀ (JW), and 3 ♂, 1 ♀ (Gaumer) (LACM), and 5 ♀ (MCZ), 1 ♀ (USNM); Pisté, viii.1967 (Welling), 1 ♂, 1 ♀ (CHM); Chichen Itzá, (no date) (Thompson), 1 ♂ (USNM), 2 ♂, 1 ♀ (FMNH); do., vi.1924 (Bequaert), 1 ♀ (MCZ); *Guerrero* : Tepetlapa, 3000 ft, x.? (H. H. Smith), 1 ♀ (AMNH); Acapulco, vi.1935 (Pritchard), 1 ♂ (USNM); *Tabasco* : Teapa (no date) (H. H. Smith), 1 ♂ (AMNH), 1 ♀ (BMNH), 1 ♀ (BMNH); *Oaxaca* : Oaxaca (no date) (Crawford), 1 ♂ (USNM); *Chiapas* : Doña Maria (no date) (Crawford), 1 ♀ (USNM); Musté, xi.1968 (Welling), 1 ♂, 5 ♀ (CHM); *Morelos* : Alpuyeca, vii.1951 (Hurd), 1 ♀ (UCB); Lake Tequesquitengo, approx. 5000 ft, ix.1957 (Scullen), 1 ♀ (CHM); Jalostoc, vi.1951 (Pacheco M.), 1 ♂ (CHM); (no other data) (Koeberle), 1 ♀ (CAS); Miscatlán (?), vi.1947 (Downs), 1 ♀ (AMNH); Cuernavaca (no date) (Crawford), 1 ♀ (UCB); do., vii.1962 (Michelbacher), 1 ♀ (UCB), xi.1922 (Smyth), 1 ♀ (USNM); *Nayarit* : Tépic, vii.? (Schumann), 2 ♂ (BMNH); Oaxaca : Tehuantepec (no date) (Sumichrast), 3 ♀ (USNM).

GUATEMALA : 23 mi. S of Escuintla, 350 ft, vii.1963 (Scullen & Bellinger), 1 ♀ (CHM); Nueva Concepción, viii.1963 (Cavagnaro & Irwin), 1 ♀ (CAS); Variedades (Suchitepéquez), 500 ft, viii.1947 (C. & P. Vaurie), 1 ♀ (AMNH); Teleman (Verapaz), no date (Champion), 1 ♀ (BMNH).

HONDURAS : Zamorano, viii.1964 (Axtell), 1 ♀ (UCD); Lancetilla (Tela), ix.1931 (Bates), 1 ♀ (USNM).

EL SALVADOR : Quezaltepeque, 500 m, vi.1963 (Cavagnaro & Irwin), 1 ♂ (CAS); Santa Tecla, v.1958 (Cartwright), 1 ♂ (USNM); Metapan, v.1954 (M.S.V.), 1 ♂ (USNM).

COSTA RICA : Golfito, vii-viii.1957 (Menke, and Menke & Truxal), 3 ♀, 4 ♂ (LACM); Dominical, v.1943 (no collector), 1 ♂, 1 ♀ (AMNH); Palmar (Depto. Puntarenas), no date (P. & D. Allen), 1 ♀ (MCZ).

BRITISH HONDURAS (BELIZE) : (no other data), x.1928 (no collector), 1 ♀ (AMNH).

CUBA : Guantánamo, viii.1920 (Ramodeu), 1 ♀ (MCZ); Habana, 1909 (P. Serre), 1 ♂, 1 ♀ (MNHN); Loma del Gato, Cobre Range (Oriente), approx. 3000 ft, 1936 (Darlington), 1 ♂ (MCZ); vic. Havana, no date (Barbour), 3 ♂, 2 ♀ (MCZ); (no other data) (Riehl), 1 ♂ (Coll. Loew, MCZ), 1 ♂ (Coll. Osten Sacken, MCZ); Santiago de Cuba, no date, 1 specimen without apex of abdomen (AMNH); Hoyo Colorado (Enamorado), 1 ♂ (USNM; with note: "mimics *Polistes cubensis* Lep."); Tropical, vi.1922, viii.1923 (Cervera), 2 ♀ (USNM); Santiago, ix.1924 (no collector), 1 ♂ (USNM); vic. Havana, no date (Barbour), 1 ♂ (USNM).

PANAMA : Bugaba, 800-1500 ft, no date (Champion), 1 ♂ (BMNH); Madden Dam (Canal Zone), i.1940 (Fairchild), 1 ♀ (MCZ); Fort Randolph (Canal Zone), i.1929 (Curran), 2 ♀ (AMNH); Darien, no date (Geay), 1 ♀ (MNHN); Gatún, vi.1909 (Jennings), 1 ♀ (USNM); Cano Saddle, Gatún Lake, v.1923 (Shannon), 2 ♀ (USNM).

TRINIDAD : Curepe, vi.1965 (no collector), 1 ♀ (CNC).

ST. EUSTATIUS : New Well, Downtown, vii.1949 (Hummelinck), 1 ♂ (RNH).

ARUBA : "wand van school op S. Nicolaas", xii.1951 (Bergh), 1 ♂ (RNH).

BONAIRE : (no other data), 1900 (Simon), 1 ♀ (BMNH).

COLOMBIA : Sapatoza Region, Chiriguana Distr., viii-ix.1924 (Allen), 2 spec. (BMNH).

VENEZUELA : Acosta (no date) (Kugler), 1 ♀ (MZUSP); (no other data) (Smith), 1 ♀ (MZUSP); do. (S. A. Smith), 2 ♀ (BMNH).

Blepharepium sonorensis, sp. n.

(Figs. 7-9)

Blepharepium coarctatum (Perty) of Snow, 1896 : 177, of Aldrich, 1905 : 263, and of Martin, 1965 : 19; misident.

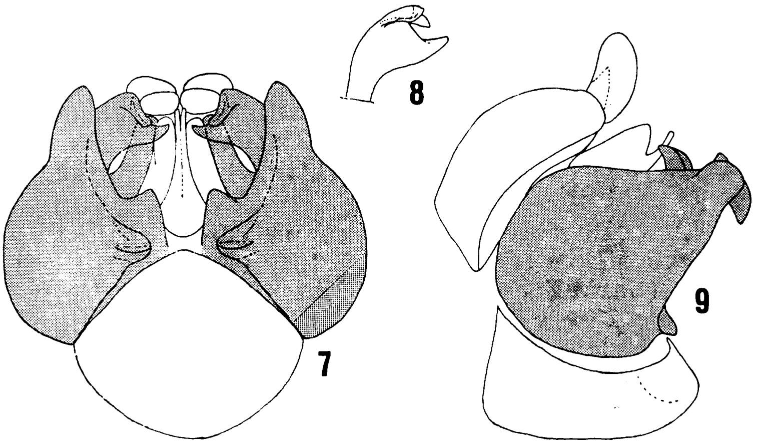
Blepharepium secabile (Walker) of Wilcox, 1937 (USA : Arizona and New Mexico), and of Linsley, 1960 (biological notes); misident.

♂ ♀ — This species is limited to the Sonoran Desert. It differs from *cajennensis coarctatum*, which has a similar coloration, in the male genitalia; from *annulatum* in the completely unicolorous, ferrugineous hind femora; from *surumu* in the darker brown of the abdominal tergites.

As remarked above, *sonorensis* has the male genitalia exactly the same as *annulatum* and *surumu*, differing from both on certain color characteristics. We are considering it a valid species because it has an entirely different ecology from *annulatum* with which it is parapatric, and is completely allopatric with *surumu*, being separated from the latter by the broad forested areas of southern Mexico, Central America and northern South America.

Holotype ♂, from USA, Arizona, Palos Verdes, viii. 1949 (C. H. Martin), in the MZUSP.

The following specimens are considered paratypes :



Blepharepium sonorensis, sp. n., male genitalia : 7, ventral view; 8, dorsal view; 9, lateral view.

UNITED STATES : *Utah* : St. George, viii.1965 (Roberts), 1 ♂ (JW) ; *Arizona* : 3 mi. W. of Cochise, vii.1962 (Fisher), 19 ♀, 1 ♂ (EF) ; Willcox Dry Lake, viii.1968 (Gruwell), 1 ♀ (EF) ; San Bernardino Ranch, 3750 ft (no date) (Snow), 1 ♀ (JW), 2 ♀ (CHM) ; Willcox, vii.1955 (Butler & Werner), 1 ♀ (CHM) ; 17 mi. E. of Douglas, iii.1958 (Bowen), 1 ♀ (CHM) ; 21 mi. N. of Douglas, 4400 ft, vii.1946 (Scullen), 1 ♂ (CHM) ; 7 mi. N. of Apache, viii.1959 (Linsley), 2 ♀ (UCB) ; 1.5 mi. NE. of Portal, viii.1959 (Statham), 2 ♂, 2 ♀ (UCB) ; Portal, viii.1958 (Hurd), 1 ♀ (UCB) ; do., vii.1963 (Cazier), 1 ♂ (JW) ; Apache, 5 mi. SE. of Cochise, viii.1958 (Opler), 1 ♂ (UCB) ; Willcox, 3.5 mi. S. Cochise, viii.1958 (Linsley Hurd), 5 ♂, 4 ♀ (UCB) ; Douglas, 18 mi. E Cochise, ix.1958 (Hurd), 1 ♂ (UCB) ; Tombstone, 5 mi. S. of Cochise, viii.1959 (Evans), 2 ♀ (UCB) ; Douglas, viii.1940 (Jones), 2 ♀, 1 ♂ (UCB) ; do., no date (Snow), 2 ♂, 1 ♀ (JW) ; Patagonia, 10 mi. SW. of Santa Cruz, ix.1958 (Hurd), 1 ♂ (UCB) ; 2 mi. E. of Lochiel, ix.1958 (Menke & Stange), 1 ♂ (LACM) ; 11 mi. S. Continental, 3200 ft, viii. 1962 (Scullen), 2 ♂ (CHM) ; Douglas, vii.1940 (Swisher), 1 ♀ (LACM) ; 10 mi. E. of Douglas, viii.1940 (Ross), 1 ♂, 2 ♀ (LACM) ; Palos Verdes, viii.1949 (Martin), 4 ♂, 5 ♀ (CHM) ; Oracle Junction, viii. 1949 (Martin), 1 ♂ (CHM) ; Tucson, 2375 ft, viii.1946 (Scullen), 2 ♀ (CHM) ; do., vii.1952 (Bequaert), 1 ♀ (MCZ), ix.1932 (Crismon), 1 ♀ (JW), viii.1939 (Bryant), 2 ♂ (JW), viii.1934 (Engelhardt), 1 ♂ (JW) ; Phoenix, Highley, ab 20 mi. SE. of Phoenix, 1100 ft, viii.1946 (Scullen), 2 ♂, 9 ♀ (CHM) ; Phoenix, 1100 ft, viii.1946

(Scullen), 10 ♂, 6 ♀ (CHM); do., viii.1930 (no collector), 1 ♀ (JW); no data, 2 ♂, 9 ♀ (JW); Mesa, 1800 ft, viii.1925 (Streets), 1 ♀ (JW), and vii.1924 (Van Duzee), 1 ♀ (CAS); W. of Blabee, vii.? (Van Dyke), 1 ♀ (CAS); "Southern Arizona" (no other data) 1 ♀ (MCZ); Tempe, no date (Bequaert), 8 ♀, 4 ♂ (MCZ); do., vii-viii. 1917 (Bequaert), 1 ♂, 1 ♀ (MCZ); Pinal Co., Florence, vii.1917 (Bequaert), 1 ♀ (MCZ); 2 mi. SE. of Portal, Cochise Co., vii.1959, viii.1959 (Statham), 2 ♀ (AMNH); 3 mi. SE. Portal, vii.1959 (Cazier & Statham), 2 ♂, 2 ♀ (AMNH); 4-6 mi. NE. Portal, vii.1959 (Statham), 2 ♀ (AMNH); Tucson, ii.1939 (Crandall), 1 ♀ (AMNH); Phoenix, ii.1933, 1934 (Crandall), 3 ♀ (AMNH); 1 mi. S. Rodeo, Hidalgo Co., vii.1959 (Statham), 1 ♀ (AMNH); Don Luis, Cochise Co., viii. 1952 (Cazier & Schrammel), 1 ♂ (AMNH); 6 mi. SE of Willcox, Cochise Co., viii.1952 (Cazier & Schrammel), 1 ♀ (AMNH); Tucson, viii.1909 (Fisher), 1 ♂, 1 ♀ (USNM); El Dique, Tucson, iii.1917 (Rust), 1 ♀ (USNM); Florence, Pinal Co., vii.1917 (no collector), 1 ♀ (USNM); Nogales, viii.1927 (Bradley), 1 ♀ (USNM); Phoenix, vii.1946 (no collector), 1 ♀ (USNM); do., ix.1935 (Parker), viii.1946 (no collector), 1 ♀ (USNM); do., ix.1935 (Parker), viii. 1942 (Grassman), no date (Duncan), 5 ♂, 3 ♀ (USNM); Gila Valley, ix.1935 (Parks), 1 ♀ (USNM); Mesa, 1800 ft, viii.1925 (Streets), 1 ♀ (teneral) (USNM); Sonoita, viii.1947 (Parker), 1 ♀ (USNM); Winckelmann, viii.1967 (Martin), 1 ♀ (CHM); *New Mexico* : Luna Co., vii.1934 (Kellogg), 1 ♀ (JW); Hidalgo Co., Lake Cienega, viii. 1966 (E. G. & J. M. Linsley), 4 ♀ (UCB); 2 mi. N., 1 mi. N., 1.5 mi. S. of Rodeo, viii.1959, vii.1959, 13 ♂, 16 ♀ (UCB); Las Cruces, viii.1954 (Pritchard), 1 ♀ (USNM); *Texas* : 3 mi. S. Toyahvale, J. Davis Co., viii.1962 (Fisher), 2 ♀ (EF); 9 mi. SE. of Ft. Davis, J. Davis Co., viii.1967 (Gardner & Kavacic), 1 spec. (UCD).

MEXICO : *Tamaulipas* : Tiahualillo, vii.1906 (Morrill), 1 spec. (USNM); *Coahuila* : 7 mi. N. of Parras de la Fuente, viii.1965 (Fisrer), 1 ♀ (EF); *Nayarit* : vic. Higuera Blanca, vii.1971 (Fisher), 3 ♀ (EF); 25 mi. SE. Tépic. ix.1970 (Bohart), 1 ♀ (UCD); Acaponeta, viii.1960 (Arnaud, Ross & Rentz), 1 ♀ (CHM); 3 mi. NW of Santa Rita del Oro, vi.1963 (Doyen), 1 ♀ (CHM); *Durango* : 30 mi. S. Rodeo, 5650 ft, ix.1963 (Scullen & Bollinger), 1 ♂ (CHM); Durango, viii.1964 (Powell), 1 ♂ (UCB); *Chihuahua* : Charcos, Allende Distr., 6000 ft, vii.1947 (Michener), 1 ♀ (CHM); Samalayuca, viii.1960 (Smith), 1 ♀ (CHM); 82 mi. S. of Juárez, 4000 ft, viii.1957 (Scullen), 1 ♂ (CHM); Chihuahua, viii.1951 (Hurd), 1 ♂ (UCB).

CUBA : Guantánamo, x.1915 (Ramsden), 1 ♀ (USNM).

Blepharepium surumu, sp. n.

♂ ♀ — Very similar to *sonorensis*, but much lighter in color, being normally light yellow on the abdomen, and restricted to the savanna-like formations of the Gran Sabana Region of southern Venezuela and northeastern Roraima Territory in Brazil; male genitalia exactly the same as in the other two species (*annulatum* and *sonorensis*).

Holotype ♂, Brazil, Roraima Territory, Surumu, ix. 1966 (Alvarenga & Oliveira), in the MZUSP. 4 ♂ and 2 ♀ paratypes, same data, in the MZUSP; 1 ♂ paratype, Venezuela, E. Bolivar, Gran Sabana, Akuriman (= Acurima Mt, 4°40'N, 61°10'W), in the USNM.

Blepharepium cajennensis (Fabricius)

As happens with *annulatum,* three different groups, with the same male genitalia, exist within *cajennensis,* differing in the distribution, ecology and coloration. However, groups intergrade in the Amazons and in the forests of southeastern Brazil, and we have considered them as subspecies.

Blepharepium cajennensis cajennensis (Fabricius)

(Figs. 10-17)

Asilus cajennensis Fabricius, 1787 : 360. Type-locality : French Guiana, Cayenne. Type, KIEL (according to Zimsen, 1964 : 469, the type is represented by "indeterminabel (sic) remains"). Neotype ♂, Guyana, Bartica, Kartabo, in the MZUSP. Refs. — Fabricius, 1794 : 386.

Asilus cayennensis; Gmelin, 1792 : 162.

Laphria cajennensis; Wiedemann, 1821 : 220; 1828 : 383; Walker, 1854 : 442; Schiner, 1866 : 677; Williston, 1891 : 67 (cat.); Kertész, 1909 : 126 (cat.).

Dasypogon inserens Walker, 1851 : 91. Type-locality : unknown. Type ♂, BMNH (seen in 1972). *N. SYN.*

Senobasis auricincta Schiner, 1867 : 371. Type-locality : "Surinam." Type ♀, WIEN (cabinet 10, drawer 377, mixed with "*coarctatum*") (seen in 1972).

Blepharepium auricinctum; Lynch Arribálzaga, 1881 : 26; Williston, 1891 : 75 (cat.) ; Kertész, 1909 : 124 (cat.) ; Curran, 1942 : 55 (Surinam) ; Hull, 1962 : 233 (cat.) ; Martin & Papavero, 1970 : 27 (cat.).

Blepharepium cayennensis; Bromley, 1929 : 279 (key) ; Curran, 1934 : 334 (Guyana : Demerara R. and Kartabo) ; 1942 : 54 (Guyana).

Blepharepium inca Curran, 1942:54. Type-locality: Peru, Loreto, Iquitos. (Additional localities — Peru: Rio Morona, Rio Ucayali, Rio Huallaga, Achinamiza, La Merced, and Lacorezza, Puntamayo Distr.). Type, AMNH (examined in 1968, 1971). Refs. — Carrera, 1949 : 57 (note) ; Martin & Papavero, 1970: 28 (cat.). *N. SYN.*

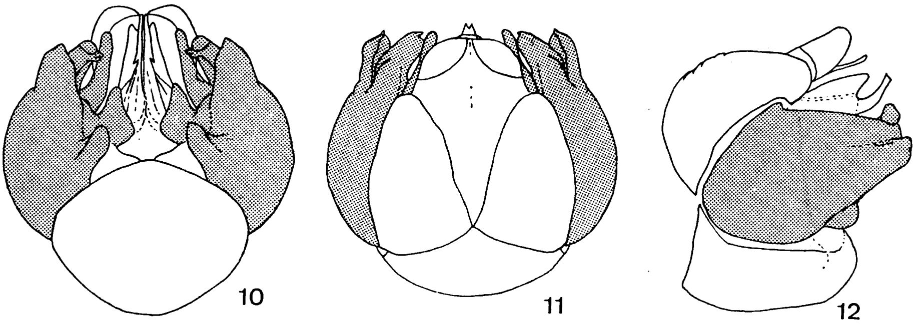
Blepharepium vorax Curran, 1942: 53. Type-locality: Peru, La Merced. Type, AMNH (examined in 1968, 1971). Refs. — Carrera & d'Andretta, 1953: 65 (Peru: Iquitos, Satipo, Chanchamayo) ; Carrera & Papavero, 1962: 48 (Brazil : Eirunepé, Tabatinga, Benjamin Constant; Peru : Satipo) ; Martin & Papavero, 1970: 28 (cat.). *N. SYN.*

Blepharepium cayennense; Carrera, 1949: 50 (Guyana: Kartabo); Carrera & Machado-Allison, 1963: 237 (Venezuela : Bolivar, El Dorado).

Blepharepium cajennensis; Martin & Papavero, 1970: 27 (cat.).

This subspecies, as shown in the key, may be identified by its dark integument and legs, and by the presence of a more or less large golden-yellow pollinose spot on the posterior margin of the mesonotum, in front of the scutellum.

It is interesting to note that specimens from the Guianas and Venezuela show a very large spot, while those from the westernmost Amazonia and Peru a very small one. The two groups are also more or less separate geographically. This may be perhaps indication of an incipient differentiation of two groups.



Blepharepium cajennensis cajennensis (Fabricius), male genitalia : 10, ventral view; 11, dorsal view; 12, lateral view.

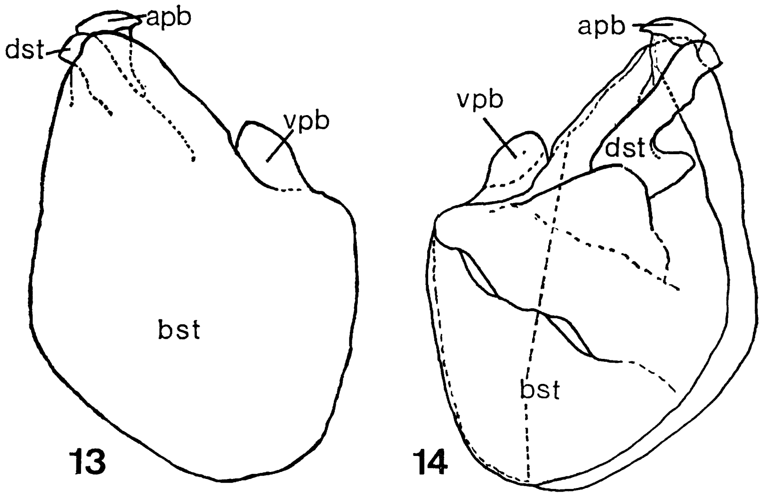
Material examined. VENEZUELA : Caripito, vii.1942 (no collector), 1 ♂, 1 ♀ (AMNH).

TRINIDAD : Paradise Mt., ii.1953 (Simmonds), 1 spec. (USNM), Maracas, xi-xii.1952, x.1953 (Simmonds), 3 ♂ (CNC); Brazil, ii.1961 (no collector), 1 spec. without abdomen, and 1 ♂ (CNC); Dabadu (no other data), 1 ♂ (MCZ); Nariva Swamp, xii.1934 (Weber), 1 ♂ (MCZ); Northern Range Mts., 100-800 ft (Buthn), 10 spec. (BMNH).

SURINAM : Lelydorp, vi.1939 (Geijskes), 1 ♂ (AMNH); Paramaribo, Agric. Expt. Garden, iv.1963 (Vecht), 1 ♀ (RNH); Commewijne, Matapica, v.1963 (Vecht), 1 ♀ (RNH); Paramaribo, iv.1955 (Geijskes), 1 ♀ (RNH); Brokopondo, iv.1965 (Mees), 1 ♂ (RNH).

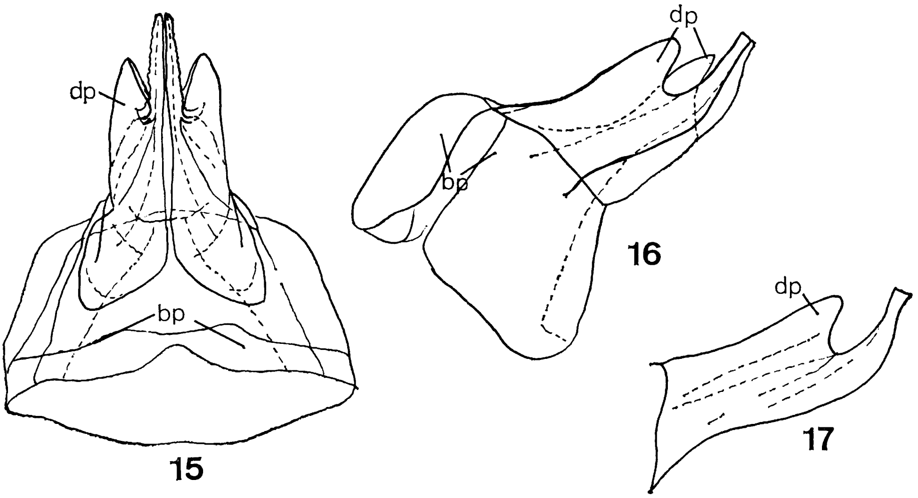
GUYANA : Bartica, Kartabo, vi.1924 (no collector), 1 ♂ (NEOTYPE; MZUSP); do., vi.1922 (Haviland), 1 ♀ (MZUSP); do., 1921 (no collector), 2 ♂ (CAS), vii.1920, x.1920, 1921, v.1924, vi.1924, ix.1923, vii.1922 (with a Richardiidae as prey), 6 ♀, 4 ♂ (AMNH); do., 1921, x.1924, 1 ♂, 1 ♀ (USNM); do., vii.1922 (Haviland), 1 spec. (BMNH); Tropical Research Station, N. Y. Zool. Soc., n.º 201118, 2 ♀ (CAS); Kamakusa (no other data) (Lang), 1 ♂ (MCZ);

Kartabo Point, vi.1936 (Weber), 2 ♂ (USNM); Cuyuni River, Kamaria Landing, xi.1929 (Oxf. Univ. Exp.; on clearing), 1 ♂ (USNM); Chenapowu to Saveretik, viii.1911 (no collector), 1 spec. (AMNH); Tumatumari, viii.1913 (no collector), 1 ♀ (AMNH), Kaieteur, v.1929 (Mackie), 2 ♀ (AMNH); Rockstone, vii.1911 (no collector), 1 ♀ (AMNH); Arakaka (no other data), 1 spec. (AMNH); Wismar, i.1936 (no collector), v.1936, viii.1934 (Pincus), 3 spec. (AMNH); Cuyuni River, Kamaria Landing, xi.1929 (Oxf. Univ. Exp.), 1 ♀, 2 ♂ (BMNH); Mazaruni, Teak Plantation, viii.1937 (Richards & Smart), 4 ♂, 1 ♀ (in high forest and in second growth forest) (BMNH); Essequibo River, Moraballi Creek, x.1929 (Oxf. Univ. Exp.), 1 ♂ (on clearing) (BMNH); Karisparu, 59°05'W, 5°00'N, vii.1968 (Ridout), 1 spec. (BMNH).



Blepharepium cajennensis cajennensis (Fabricius), gonopod : 13, external view; 14, internal view (bst : basistylus; dst : dististylus; apb : apical process of basistylus; vpb : ventral process of basistylus).

PERU : Satipo, viii.1941 (Weyrauch), 1 ♀ (MZUSP); do., 1940 (Paprzycki), 1 ? (MZUSP); Iquitos, iii.1924 (Bassler), 1 ♂, 1 ♀ (Holotype and "allotype" of *inca* Curran) (AMNH); do., 1 ♂ (paratype of *inca*) (MZUSP); do., i.1929 (Le Moult), 1 ♂ (MZUSP); iii-iv.1931 (Shannon), 1 ♂ (USNM); do., iii.1923 (Bassler), 1 ♂ (paratype of *inca*) (AMNH); do., i.1929 (Le Moult), several specimens (BMNH); Mischuyán (no date) (Le Moult), several specimens (BMNH); La Merced (no other data), 1 ♀ (MNHN); do. Holotype ♂, "allotype" ♀ of *vorax* Curran (AMNH); do., 1 ♂ (paratype of *vorax*) (AMNH); Chambamayo (?) 1919 (Coll. Séguy), 1 ♂, 1 ♀ (MNHN); Pucallpa, 200 m, xi.1966 (Schunke), 19 ♂, 1 ♀ (EF); do., iv.1965 (Schunke), several spec. (BMNH); Boquerón del Padre Abad, 500 m, v.1964 (Schunke), 1 ♂ (BMNH); Pucallpa, x.1964, xi.1964, iv-viii.1965 (Schunke), 30 ♂, 4 ♀ (LACM); x.1954 (Schlinger & Ross), 1 ♀ (CAS); do., 600 ft, xi.1946 (Pallister), 6 ♂, 2 ♀ (AMNH); Neshuya, 240 m, xi.1964 (Schunke), 6 ♂, 2 ♀ (LACM); Contamana, x.1962 (Peña), 1 ♂, 1 ♀ (CNC); Colonia Perené, Rio Perené, 18 mi. NE of La Merced, i.1955 (Schlinger & Ross), 2 ♂, 1 ♀ (CAS); Madre de Dios, 1908 (Garlepp) (abdomen missing) (ZMA); Achinamiza, xii.1925 (Bassler), 1 ♂ (paratype) (AMNH); Middle Rio Ucayali, ix.1923, ix.1924 (Bassler), 2 ♂, 1 ♀ (AMNH); Rio Santiago, xi.1924 (Bassler), 1 ♂, 1 ♀ (AMNH); Rio Morona, i.1925 (Bassler), 1 ♀ (AMNH); Rio Huallaga, ix.1924 (Bassler), 1 ♂ (AMNH); Bella Vista, San Martin, xii.1946, 1500 ft (Pallister), 2 ♂ (AMNH); Puerto Maldonado, Madre de Dios, iv.1946, 600 ft (Pallister), 1 ♂, 2 ♀ (AMNH); 75, 67 and 50 mi. E. of Tingo Maria, x-xii.1954 (Schlinger & Ross), 3 ♂, 2 ♀ (CAS); Avispas, Madre de Dios, 400 m, x.1962 (Peña), 1 ♀ (CNC); Chiforongo, Madre de Dios, x. 1962 (Peña), 1 ♂, 1 ♀ (CNC); Chanchamayo (no date) (Rosenberg), 1 ♂, 1 ♀ (USNM); do., 2 ♀ (Coll. Bezzi, MIL); Monson Valley, Tingo Maria, x.1954 (Schlinger & Ross), 1 ♂ (CAS); Pichis, Puerto Yessup, xii.1903 (Schnuse), 1 ♀ (ZMA).



Blepharepium cajennensis cajennensis (Fabricius), aedeagus : 15, ventral view; 16, semi-lateral view; 17, lateral view (bp : basal processes; dp : dorsal processes).

?COLOMBIA : La Chorrera (as Lacorezza), Puntamayo Distr., viii.1920 (Cornell Univ. Exp.), 1 ♂ (AMNH).

BOLIVIA : Mapiri, San Carlos, 800 m, iv.1903 (Schnuse), 2 ♂ (ZMA); Mapiri, Sarampiuní, ii.1903, 1 ♂ (BMNH); Rurrenabaque, 175 m, x.1965 (Peña), 2 ♂, 2 ♀ (CNC).

BRAZIL : *Amazonas* : Tabatinga, vii.1958 (Lima), 2 ♂ (MZUSP); Eirunepé, vi.1950 (Carvalho), 2 ♂, 1 ♀ (MZUSP); Benjamin Constant, ix.1955 (Lima), 1 ♂ (MZUSP); do., ix.1962 (Lenko), 2 ♂ (MZUSP); do., Rio Javari, i-ii.1942 (Rabault), 1 ♂ (AMNH);

Uaupés, Rio Negro, x.1927 (Zikán), 1 ♂ (MZUSP); *Acre* : Marmelo (?), xi.1962 (Bokermann), 1 spec. (MZUSP).

Blepharepium cajennensis coarctatum (Perty), n. status

(Figs. 21-28)

Laphria coarctata Perty, 1833: 181, pl. 36, fig. 4 (whole insect). Type-locality: Brazil, Amazonas, Rio Negro. Type ♂, ZBS (seen in 1972; head missing, ventral surface of abdomen eaten away by dermestids, legs missing).

Dasypogon bonariensis Macquart, 1838: 194 (1839 : 310). Type-locality: Argentina, Buenos Aires. Type n.º 1471 (MNHN; examined in 1970, 1972). Refs. — Walker, 1854: 439; Lynch Arribálzaga, 1879: 150 (as syn. of *coarctatum*); Carrera, 1949: 47; Martin & Papavero, 1970: 27 (cat.).

Dasypogon occidens Walker, 1851: 91. Type-locality: unknown ("South America, ex coll. W. W. Saunders, 68.4" in the type's label). Type ♂, BMNH (examined in 1970, 1972). Refs. — Walker, 1854: 485; Kertész, 1909: 130 (cat.). *N. SYN.*

Dasypogon coarctatus; Walker, 1854: 504.

Planetolestes coarctatus; Lynch Arribálzaga, 1879: 150 (Argentina: Las Conchas, Chascomús, Baradero).

Blepharepium coarctatum; Lynch Arribálzaga, 1881: 24; Wulp, 1882: 88 (specimens vid., ZMA); Williston, 1891: 75 (cat.); Kertész, 1909: 124 (cat.); Bromley, 1929: 279 (key); Lindner, 1929: 170 (Chaco; biological notes; specimens vid., SMN, 1972); Engel, 1930: 469 (Argentina : Tapikiolé, Lapango, San José; specimens vid., SMN, 1972); Curran, 1942: 55 ("Brazil"); Carrera, 1947: 43 (Paraguay: Colonia Elisa); 1949: 55 (Brazil : Onda Verde, Maracaju, Bodoquena, Lassance); Carrera & Papavero, 1962: 47 (part).

Blepharepium lynchi Carrera, 1949: 51, figs. 71 (palpus), 171 (antenna). Type-locality: Argentina, Delta, Abra Vieja. (Additional localities: Paraguay: Villarica and Sapucay; Brazil: Porto Cabral, Espírito Santo, and Nova Friburgo). Type, MZUSP (seen). Refs. — Carrera & Papavero: 1962: 48 (Brazil: São Félix, Campo Grande, Pelotas; Argentina: Pirané, Gran Guardia, Iguazú, Villa Ana, Tandil, San Pedro, Tigre, Paycaravi Delta, Rosario de la Frontera, Campaña; Paraguay: Colonia Independencia; Uruguay: Florida); Martin & Papavero, 1970: 28 (cat.). *N. SYN.*

Blepharepium secabile Walker of Carrera, 1949: 53 (part), misident.

This subspecies has a wide distribution and a noticeable variation in coloration; it differs from the typical *cajennensis* in the color of integument and legs; from *cajennensis cunctabundum,* ssp. n., for not having the middle and hind femora conspicuously shining black on the basal portion; it appears to be a very aggresive subespecies, and seems to occupy almost all the open formations in the Guiano-Brazilian subregion.

We have found within this subspecies a great variation of characters : the palpus may have yellow and black bristles, or be entirely yellow bristled; the fore coxae may be light ferrugineous, or very dark; the pleura may also be light or dark colored; the hind femora may be entirely ferrugineous, or entirely darkened; the genitalia, however, shows that they belong to the same species and subspecies; a very slight variation was found in the aedeagus (compare Figs. 21-24, and 25-28) ; but all other details of the male genitalia agree perfectly well with the other two subspecies, *cajennensis* s. s. and *cunctabundum*, ssp. n. Color variation (polymorphism) may be understood if we consider that this subspecies occupies very different open formations (caatingas, cerrados, pampas, chacos, etc.). No distinct geographical pattern of color variation has been observed, and all possible combinations of the above mentioned color characters were found. For that reason, we have considered this group as only one subspecies.

Material examined. ECUADOR : (no other data) (Parish), 1 ♂, 2 ♀ (USNM).

PERU : Pichis and Perené Valleys, 2000-3000 ft (Soc. Geogr. Lima), 1 ♂ (USNM).

BOLIVIA : Puente (?), S. Bolivia, ii.1951 (Ross & Michelbacher), 1 ♂ (CAS).

BRAZIL : *Pernambuco* : Tapera, iv.1928 (Pickel), 1 ♀ (MZUSP) ; *Mato Grosso* : Maracaju, v.1934 (Serv. Febre Amarela), 1 ♀ (MZUSP) ; Chapada dos Guimarães, xi.1963 (Alvarenga & Werner), 1 ♂, 2 ♀ (MZUSP) ; Rosário Oeste, xi.1963 (Alvarenga & Werner), 1 ♂ (MZUSP) ; Bodoquena, xi.1941 (Com. Inst. Oswaldo Cruz), 1 ♂ (MZUSP) ; *Goiás* : Leopoldo Bulhões, xii.1933 (Spitz), 1 ♂ (MZUSP) ; Brasília, D.F., i.1964 (Lopes), 1 ♂ (MZUSP) ; *Minas Gerais* : Araguari, ii.1930 (Spitz), 1 ♂ (USNM) ; Serra do Cipó, no date (Monte, Ribeiro, Lopes & Tupinambá), 1 ♂ (MZUSP) ; Caxambu, iii.1964 (Jurberg), 1 ♀ (MZUSP) ; Cambuquira, ii.1942 (Lopes), 1 ♂ (MZUSP) ; Lassance, i.1939 (Martins, Lopes & Mangabeira), 1 ♀ (MZUSP) ; Lagoa Santa, i.1954 (Machado), 1 ♀ (MZUSP) ; *Espírito Santo*: (no other data), iv.1898 (Michaelis), 1 ♀ (USNM) ; do., 1 ♂ (Coll. Bezzi, MIL) ; *Rio de Janeiro* : Nova Friburgo, ii.1934 (Oiticica), 1 ♀ (MZUSP) ; *São Paulo*: Porto Cabral, Rio Paraná, iii-iv. 1944 (Travassos), 1 ♂ (paratype of *lynchi* Carrera) (MZUSP) ; Onda Verde, Faz. São João, i.1946 (Lane), 2 ♀ (MZUSP) ; Nova Europa, Faz. Itaquerê, xi.1963 (Lenko), 2 ♀ (MZUSP) ; *Rio Grande do Sul* : Guaíba, ii.1961 (Marston), 2 ♂, 3 ♀ (CHM) ; Porto Alegre, ii-iii.1961 (Marston), 1 ♂, 1 ♀ (CHM) ; Pelotas, i.1965, iv.1965, i.1962, i.1961 (Biezanko), 2 ♂, 2 ♀ (MZUSP) ; iii.1963 (Biezanko), 3 ♂, 1 ♀ (MZUSP).

PARAGUAY : Colonia Independencia, ii.1931 (Foerster), 1 ♂ (MZUSP); Villarica, i.1937 (Schade), 1 ♂ (paratype of *lynchi*) (MZUSP); Sapucay, xii.1927, x.1927 (no collector), 2 spec. (USNM); Colonia Elisa, xii.1940 (no collector), 1 spec. (MZUSP); P. Canera (?), no date (Schrottky), 1 ♀ (Coll. Bezzi, MIL).

URUGUAY : near Entre Rios (?), i.1940 (Boero), 1 ♀ (MZUSP); Montevideo (no other data), 1 ♂ (MNHN); do., iii.1943 (Silveira), 2 ♂ (USNM); Florida, ii.1952 (no collector), 1 ♂ (MZUSP); "Buschental", Depto. San José, iii.1935 (H. Schneider), 2 ♀ (SMN).

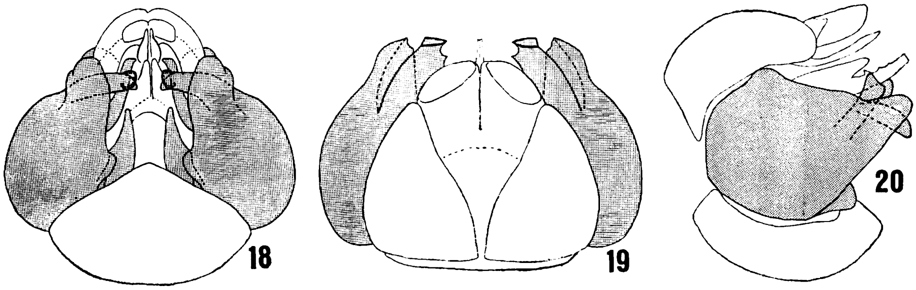
ARGENTINA : *Santiago del Estero* : "bords du Rio Salado, Icaño", 1904 (Wagner), 5 ♂ (MNHN); La Palisa del Bracho, 20 km NNW of Icaño, Laguna Mamaita, 1904 (Wagner), 2 ♂ (MNHN); Bañados del Rio Salado, Paso de Don José, 26 km N of Icaño, 1910 (Wagner), 1 ♂ (MNHN); Rio Salado (no date) (Le Moult), 1 ♂ (MNHN); Rio Colalao, no date (Wagner), 1 ♂ (MZUSP); Chaco de Santiago del Estero, "bords du Rio Salado", env. of Icaño, i-ii.1940 (Wagner), 5 ♂, 2 ♀ (MNHN); do., Mistol Paso, 1918 (Wagner), 1 ♂ (MNHN); "Chaco" (no other data), ii.1906 (no collector), 1 ♂ (MNHN); "bañados du Rio Salado, Paso de Don José", 26 km N. of Icaño, xii.1960 (Wagner), 1 ♀ (MNHN); *Chaco* : Tapikiolé, xii. 1925-i.1926 (Lindner), 2 ♀, 1 ♂ (SMN); Lapango, xii.1925 (Lindner), 1 ♂, 2 ♀ (SMN); San José, x.1925 (Lindner), 1 ♀ (SMN); *Entre Rios*: (no other data), 1 ♀ (MZUSP); Aya (?), i.1953 (Martinez), 1 ♂ (MZUSP); *Santa Fe* : Villa Ana, ii.1946 (Willink & Monrós), 3 ♂, 1 ♀ (MZUSP); Rosario de la Frontera, i.1948 (Monrós), 1 ♀ (MZUSP); La Gallareta, iii.1946 (Hayward & Willink), 1 ♂, 2 ♀ (MZUSP); Chaco de Santa Fe, Las Garzas, "bords du Rio de las Garzas", 25 km W of Ocampa, 1903 (Wagner), 1 ♀ (MNHN); *Misiones* : Iguazú, i-iii.1945 (Hayward, Willink & Golbach), 1 ♂ (MZUSP); do., xii.1957 (Vulcano), 1 ♂, 1 ♀ (MZUSP); Bemberg, i.1945 (Hayward, Willink & Golbach), 1 ♀ (MZUSP); *Formosa* : Gran Guardia, ii.1953 (Foerster), 2 ♀ (MZUSP); Pirané, xii.1948 (Golbach), 1 ♂, 1 ♀ (MZUSP); *Salta* : San Carlos, i.1950 (Willink & Monrós), 1 ♂, 1 ♀ (MZUSP); Ruiz de los Llanos, ii.1947 (Golbach), 3 ♀ (MZUSP); Cafayate, iii.1950 (Hayward), 1 ♀ (MZUSP); *Córdoba* : Carcarana (?), (no other data), 1 ♀ (CHM); *Mendoza* : (no other data), (Reed), 1 ♂ (Coll. Bezzi, MIL); *Jujuy* : San Juancito, ii.1920 (Cornell Univ. Exp.), 1 ♀ (USNM); *Tucumán* : Tucumán, i.1917 (no collector), 1 ♂ (USNM); do., ii.1949 (Meyer), 1 ♂ (MZUSP); Ciudad Siambón, xi.1946 (Golbach), 1 ♂ (MZUSP); San Pedro Colalao (no date) (Terán), 1 ♂ (MZUSP); do., i.1948, xii.1950 (Arnau), 1 ♂, 1 ♀ (MZUSP); "Crest Ridge", NW Tucumán, ii.1951 (Ross & Michelbacher), 1 ♂, 1 ♀ (CAS); *Buenos Aires* : Tigre, i.1954 (Dirings), 1 ♀ (MZUSP); Delta Abra Vieja, ii.1926 (Holotype ♂ and "allotype" ♀ of *lynchi*) (MZUSP); Buenos Aires, no date (F. & M. Edwards), 1 ♂ (BMNH); Tandil, ii.1950 (no collector), 1 ♀ (MZUSP); Tala, 1951 (Sanchez), 1 ♂ (MZUSP); Colonel Moldes, ii.1948 (Willink & Monrós), 1 ♀ (MZUSP).

Blepharepium cajennensis cunctabundum, ssp. n.

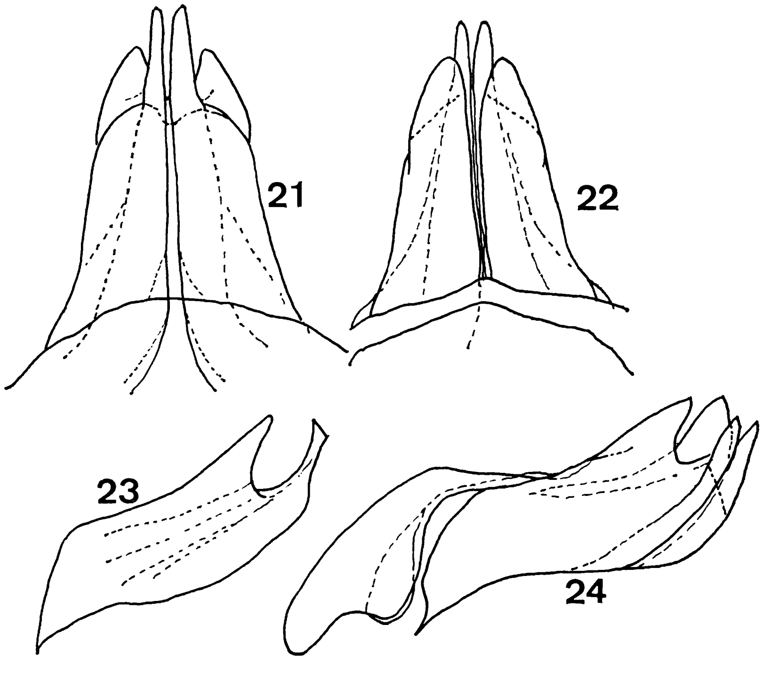
(Figs. 18-20)

Blepharepium secabile (Walker) of Carrera, 1949 : 53 (part), misident.

This subspecies differs from the other two by the shining black basal portion of the middle and hind femora; it occurs exclusively in the forests of the southern states of Brazil, from São Paulo to northern Rio Grande do Sul; the male genitalia (and the aedeagus) are exactly the same as in *cajennensis cajennensis.*

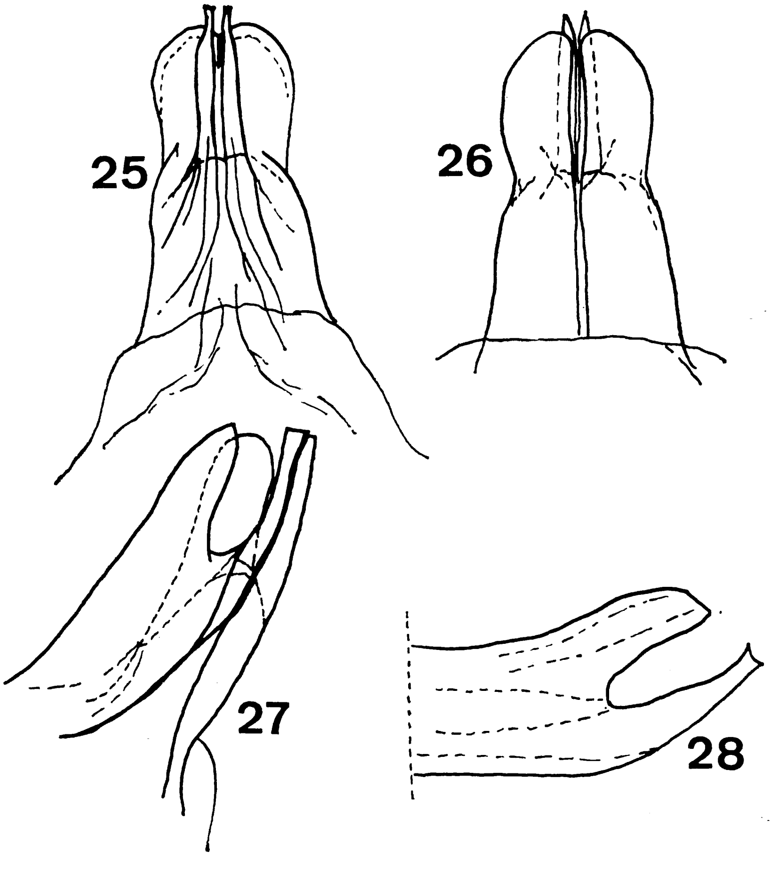


Blepharepium cajennensis cunctabundum, ssp. n., male genitalia : 18, ventral view; 19, dorsal view; 20, lateral view.



Blepharepium cajennensis coarctatum (Perty), aedeagus (basal processes not represented) : 21, ventral view; 22, dorsal view; 23, lateral view.

Holotype ♂, from Brazil, São Paulo, Santo André, i.1945 (Zoppei), in the MZUSP. Paratypes : BRAZIL. *São Paulo* : São Paulo (Cidade Jardim), xii.1945 (Barretto), 1 ♀ (MZUSP) ; *Paraná* : Vila Velha, iii.1944 (Lange), 1 ♂ (MZUSP) *Santa Catarina* : Nova Teutônia, ii.1948, i.1949, i-ii.1948, i.1947, xii.1946 (Plaumann), 2 ♀, 1 ♂ (MZUSP), 8 ♂, 1 ♀ (USNM), plus 33 spec. (several dates) (BMNH) ; *Rio Grande do Sul* : (no other data), 1 ♀ (USNM) ; São Leopoldo, no date (Stahl), 1 ♂, 1 ♀ (RM).



Blepharepium cajennensis coarctatum (Perty), aedeagus (showing different form of dorsal processes; basal processes not represented) : 25, ventral view; 26, dorsal view; 27, semi-lateral view; 28 : lateral view.

Blepharepium fuscipennis (Macquart), comb. n.

(Figs. 29-31)

Dasypogon fuscipennis Macquart, 1834: 294. Type-locality: French Guiana, Cayenne. Type, MNHN (N.º 1527) (examined in 1970, 1972). Refs. — Walker, 1854: 439; Williston, 1891: 68 (cat.); Kertész, 1909: 128 (cat.); Martin & Papavero, 1970: 89 (cat.).

Dasypogon insertus Walker, 1851: 94. Type-locality: Brazil, Pará, ex coll W. W. Saunders. Type, BMNH (examined in 1970, 1972). Ref. — Martin & Papavero, 1970: 89. *N. SYN.*

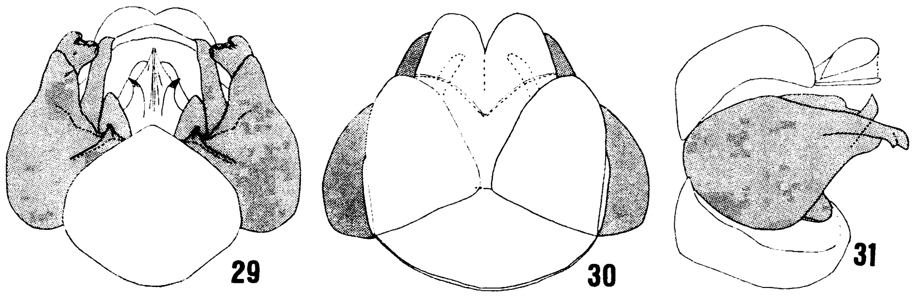
Senobasis maculipennis Macquart, 1855: 71 (1855 : 51). Type-locality: unknown. Type lost. Ref. — Kertész, 1909: 124. *N. SYN.*

Blepharepium maculipennis; Lynch Arribálzaga, 1881: 25; Carrera, 1949: 49 (Brazil : Macaíba, Barra do Tapirapé); 1953: 273 (Brazil: Manacapuru); Carrera & Papavero, 1962: 47 (Brazil : Oiapoque, Belém; Surinam: Paramaribo); Martin & Papavero, 1970: 28 (cat.).

In the Paris Museum (MNHN) *Dasypogon fuscipennis* Macquart is represented by one male and one female, n.° 1527 (Macquart collection). In the catalogue of the collection they are indicated as "*Trupanea fuscipennis*". This is erroneous. The type of *Trupanea fuscipennis,* described by Macquart in 1846 (p. 209) is in Oxford (Bigot Collection). The two syntypes in Paris are really the types of *Blepharepium fuscipennis;* the label in the box reads "*S*[*enobasis*] *fuscipennis.*"

Dasypogon fuscipennis Macquart agrees very well with Macquart's description of "*Senobasis*" *maculipennis,* as well as with the interpretation of this species by subsequent authors; *fuscipennis* could be considered a "nomen oblitum", but as the type is still extant, and as the type of *maculipennis* is lost, we prefer to maintain the first name as the valid one for this species.

B. fuscipennis is undoubtedly very similar to *subcontractum,* differing however in the presence of black hairs among the yellow hairs of the palpi, and in the darkened face, in addition to the differences found in the male genitalia.



Blepharepium fuscipennis (Macquart), male genitalia : 29, ventral view; 30, dorsal view; 31, lateral view.

Material examined : SURINAM : (no other data), viii.1959 (Doesburg), 1 ♂ (MZUSP); Saramacca, Tambabredjo, ix. 1964 (Geijskes), 1 ♂ (RNH); Paramaribo, v.1958, i-ii.1960 (Doesburg), 1 ♂, 2 ♀ (MZUSP); do., Saramacca, xii.1963 (Belle), 1 ♂, 1 ♀ (RNH); do., Zorgen Hoop, viii.1963 (Broekhuizen), 1 ♀ (RNH); Christian Kondre, Marowijne Distr., x.1963 (Malkin), 1 ♂ (MZUSP); R. Surinam, Sint Barbara Plains, iv.1927 (no collector), 1 ♂ (EF); Republiek, ix.1959 (Doesburg), 1 ♀ (RNH).

FRENCH GUIANA : Cayenne, no date (Bar), 1 ♂ (MZUSP); do., (Flétiaux), 1 ♂ (MNHN); Maroni, 1919 (Coll. Séguy), 1 ♀ (MNHN).

BRAZIL : *Amapá* : Oiapoque, v. 1959 (Alvarenga), 2 ♀ (MZUSP); *Pará*: Belém, ix.1955 (Martinez), 1 ♀ (MZUSP); R. Amazon (H. W. Bates), 1 ♀ (BMNH); Lower Amazon, i.1896 (Faraday Exp.; E. E. Austen), 1 ♀ (at light) (BMNH); *Rio Grande do Norte* : Macaíba, iv.1939 (Alves), 1 ♀ (MZUSP); *Espírito Santo* : Itapina, xii.1970 (Elias), 1 spec. (MZUSP); *Rio de Janeiro* : Itaguaí, km 47 da estrada Rio-São Paulo, iv. 1960 (Zikán), 1 ♀ (MZUSP).

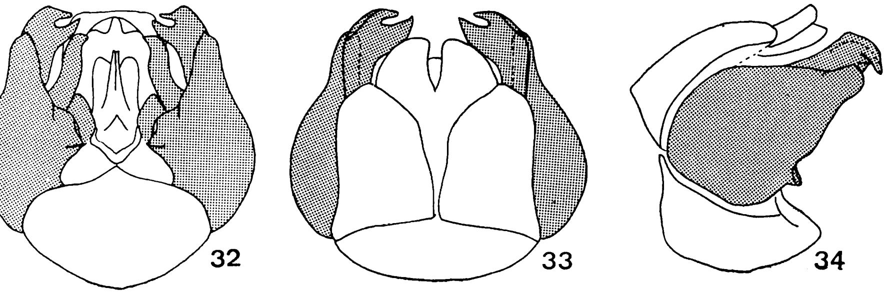
Blepharepium luridum Rondani

(Figs. 32-34)

Blepharepium luridum Rondani, 1848: 89. Type-locality: "Brazil" (i.e., Pará, Belém; cf. Papavero, in press). Type lost. Neotype, ♀, from Brazil, Pará, Oriximiná, in the MZUSP. Refs. — Lynch Arribálzaga, 1881: 24 (as syn. of *coarctatum*); Williston, 1891: 75 (cat.; as syn. of *coarctatum*); Kertész, 1909: 124 (cat.; as syn. of *coarctatum*); Carrera, 1949: 47 (revalidation of sp.; Brazil : Manacapuru, Abaeté); Carrera & d'Andretta, 1953: 66 (Peru: Iquitos); Carrera & Papavero, 1962: 47 (Brazil: Manaus, Barra do Tapirapé); Martin & Papavero, 1970: 28 (cat.).

Senobasis modesta Bigot, 1878: 472. Type-locality: "Amazon". Type, OXF (n.º 419) (examined in 1970, 1972). Refs. — Williston, 1891: 75 (cat.); Kertész, 1909: 124 (cat.); Martin & Papavero, 1970: 58 (cat.). *N. SYN.*

Neotype designation : As has occurred with most of Rondani's types, the type of *luridum* is lost. As Neotype we have selected a female



Blepharepium luridum Rondani, male genitalia : 32, ventral view; 33, dorsal view; 34, lateral view.

specimen from Brazil, Pará, Oriximiná, viii.1968 (Expedição Permanente da Amazônia), which is deposited in the MZUSP.

The Holotype of *Senobasis modesta* Bigot is in OXF (n.º 419). The left antenna and the abdomen are missing; the thorax is covered with mold. However, the presence of black palpal hairs, the black third antennal segment, and the reddish basal 2 antennal segments indicate clearly that *modesta* is a synonym of *luridum.*

This species is closely related to *cajennensis,* differing as shown in the key.

Material examined : GUYANA : Demerara, i.1914 (Janson), 2 ♀ (BMNH) ; Georgetown, 1912 (Janson), 1 ♂, 1 ♀ (BMNH) ; Bartica (no other data), 1 ♂ (AMNH).

SURINAM : Nickerie, vi.1938 (Geijskes), 1 ♀ (RNH) ; Republiek, x.1963 (Geijskes), 1 ♀, 2 ♂ (RNH) ; Paramaribo, Zorgen Hoop, xii.1963, vii.1964 (Broekhuizen), 1 ♂, 1 ♀ (RNH) ; Galibi, vii.1959 (Doesburg Jr.), 1 ♀ (RNH) ; Paramaribo, Charlesburg, Krepi-rits, i.1964 (Geijskes), 1 ♂ (RNH) ; Langaman Kondre, Marowijne Distr., viii. 1965 (Melkin), Zanderij, xi.1964 (Geijskes), 1 ♀ (RNH) ; Pl. Jagtlust (?), vii.1938 (Geijskes), 1 ♀ (AMNH).

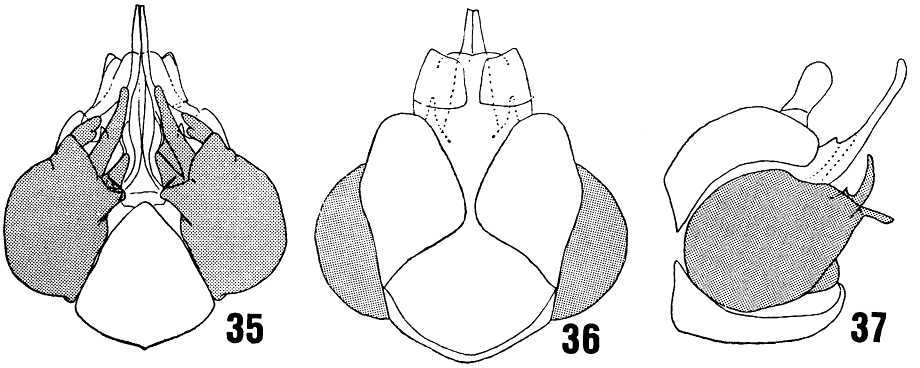
FRENCH GUIANA : St. Jean du Maroni (no date) (Coll. Le Moult), 1 ♂ (MNHN).

BRAZIL : *Amazonas* : Manacapuru, x.1936 (no collector), 1 ♀ (MZUSP) ; *Pará* : Oriximiná, viii.1968 (Exp. Perm. Amaz.), 1 ♀ (Neotype, MZUSP) ; Abaeté, v.1938 (no collector), 1 ♀ (MZUSP) ; Rio Cuminá, near Lago Salgado, Mun. de Oriximiná, ix.1960 (Exp. Perm. Amaz.), 1 ♀ (MZUSP) ; Boa Vista, Rio Tapajós, (no date) (Townsend), 1 ♀ (USNM) ; *Mato Grosso* : Barra do Tapirapé, 1940 (Carvalho), 1 ♂ (MZUSP).

Blepharepium priapus, sp. n.

(Figs. 35-37)

Agrees in every respect with the North American light-colored forms of *coarctatum,* differing only in the male genitalia, by the excessive development of the aedeagus.



Blepharepium priapus, sp. n., male genitalia : 35, ventral view; 36, dorsal view; 37, lateral view.

Holotype ♂, from U.S.A., Arizona, Phoenix, no date (Duncan), in the collection JW; paratype ♂, same locality, in the MZUSP.

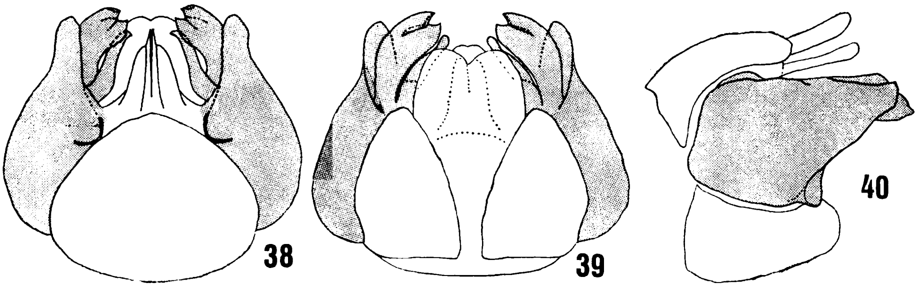
Blepharepium subcontractum (Walker)

(Figs. 38-40)

Dasypogon subcontractum Walker, 1856: 455. Type-locality: Brazil, "Amazon District". Type, BMNH (examined in 1970, 1972).
Blepharepium subcontractum; Lynch Arribálzaga, 1881: 24; Williston, 1891: 76 (cat.); Carrera, 1949: 52 (Brazil: Urucurituba), 1953: 273 (Guyana : New River); Martin & Papavero, 1970: 28 (cat.).
Stenobasis subcontracta; Kertész, 1909: 124 (as syn. of *coarctatum*).
Blepharepium bassleri Curran, 1942: 54. Type-locality: Peru, Rio Marañón. (Additional localities: Peru: Rio Santiago and Iquitos). Type, AMNH (examined in 1968, 1971). Ref. — Martin & Papavero, 1970: 28 (cat.; synonymy).

Material examined: COSTA RICA : *San José* : San José, vii.1965 (Hamton), 1 ♀ (EF).

PERU : *Loreto* : Iquitos, iii.1924 (Bassler), 1 ♀ (paratype of *bassleri*) (AMNH); Rio Marañón, viii.1923 (Bassler), 1 ♀ (type of *bassleri*) (AMNH).



Blepharepium subcontractum (Walker), male genitalia : 38, ventral view; 39, dorsal view; 40, lateral view.

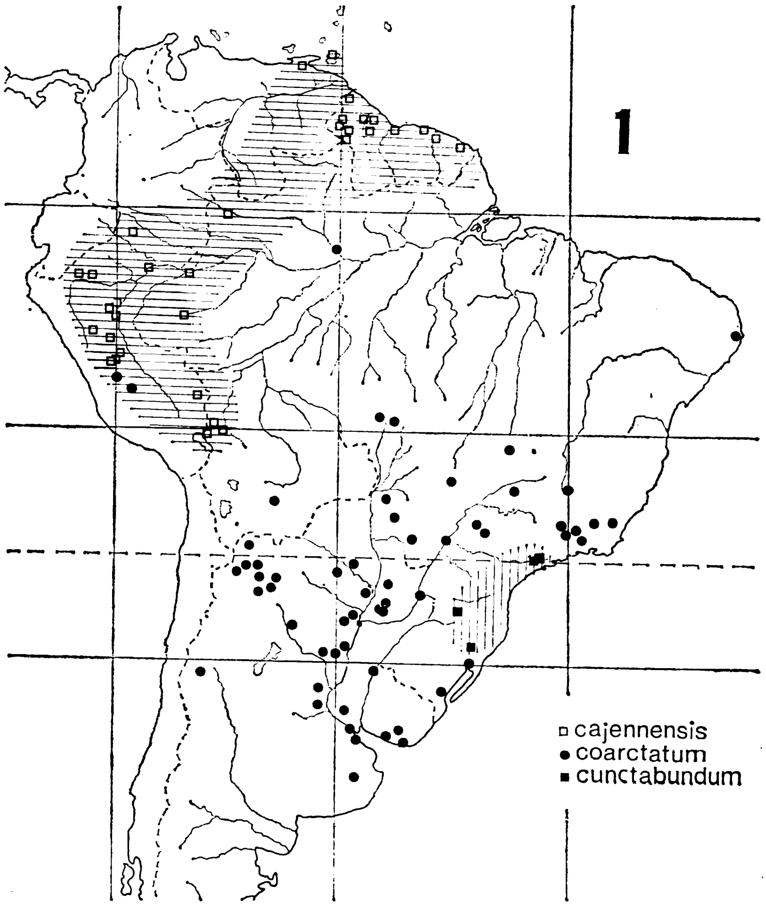
BRAZIL : *Amazonas* : Manaus, no date (Huebner), 1 ♀ (RM); Rio Purus (no other data) (Roman), 1 ♂, 1 ♀ (RM), 1 ♀ (MZUSP); Ipiranga, ii.1945 (Pretorius), 1 ♂ (AMNH); São Paulo de Olivença, vi-vii.1883 (Mathan), 1 ♀ (MNHN); *Pará* : Boa Vista, Rio Tapajós, no date (Townsend), 1 ♀ (USNM); Urucurituba, iii.1923 (Townsend), 1 ♀ (MZUSP).

5. GEOGRAPHICAL DISTRIBUTION

Examination of Maps 1-3 shows that *Blepharepium* is predominantly tropical and subtropical, ranging from St. George, Utah (or approximately 37°N) to Tandil, in the Province of Buenos Aires (or approximately 37° S).

The genus is mainly Guiano-Brazilian, entering also Central America, Mexico, the southwestern United States, and the West Indies; it does not occur along the trans-Andean, Pacific coast of South America, except along the South American northwestern corner.

The distribution of the four groups of species may be described as follows :



Map 1, Distribution of *Blepharepium cajennensis*.

1. Group I (*cajennensis*) (Map 1)

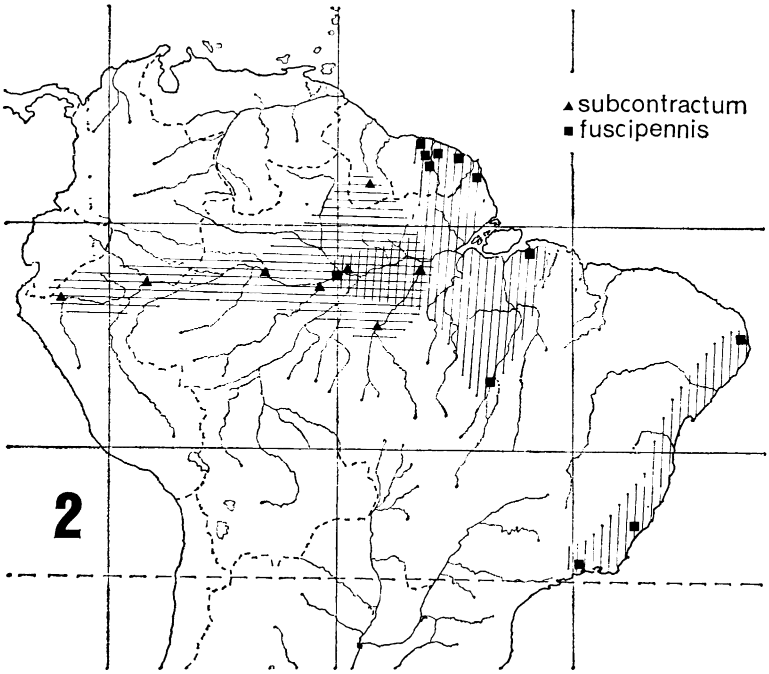
The three subspecies of *cajennensis* are thus distributed: *cajennensis* s.s. along the Guianas, Venezuela, westernmost Brazilian Amazonia, Peru, and northern Bolivia — it penetrates very little the Amazon Valley; *coarctatum* occupies almost all the open formations south of Amazonia, south to Buenos Aires; its distribution overlaps that of *cajennensis* and *cunctabundum;* this latter subspecies is restricted to the southern Brazilian states of São Paulo down to northern Rio Grande do Sul.

It is to be noted that this species leaves a more or less "empty" space along the Amazonian Valley.

2. Group II (*fuscipennis-subcontractum*) (Map 2)

B. fuscipennis has a disjunct distribution — it occurs in eastern Amazonia, from the Guianas to northern Mato Grosso, west to Manacapuru (State of Amazonas), and east to Belém (State of Pará); then, from Macaíba, Rio Grande do Norte, south to the state of Rio de Janeiro, along the coast.

B. subcontractum ranges from Peru (Iquitos) east to the Tapajós River, in the State of Pará, north to southern Guyana, being sympatric with *fuscipennis* in the area comprised between the Tapajós River and Manaus. There is also a record from Costa Rica.



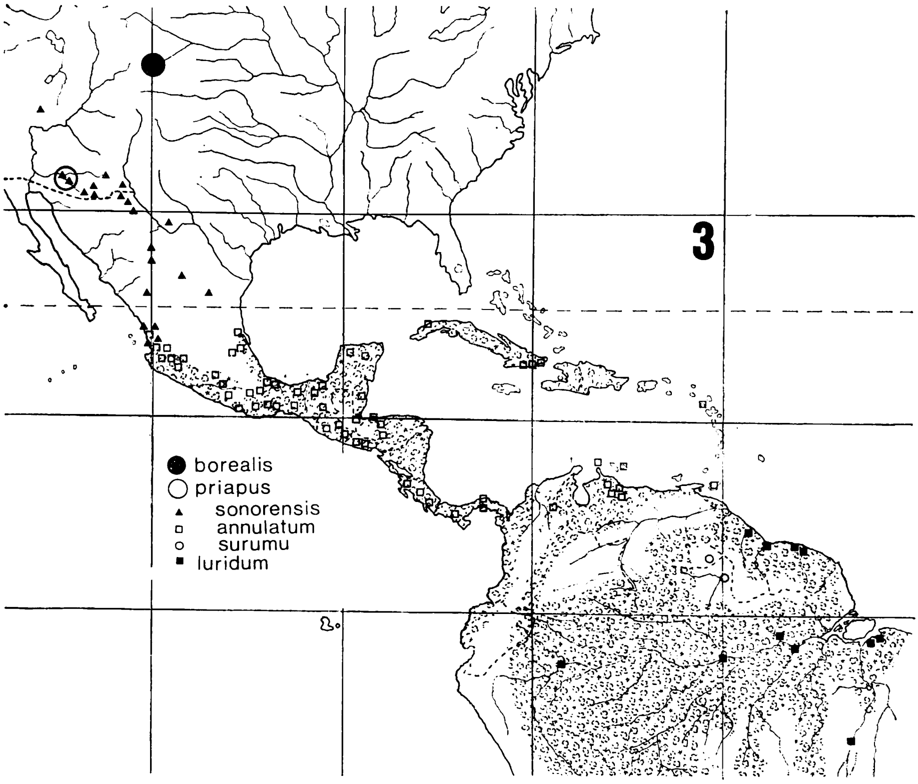
Map 2, Distribution of *Blepharepium fuscipennis* and *subcontractum*.

3. Group III (*luridum-annulatum*) (Map 3)

B. luridum occupies most of the Amazonian area. The three species of the *annulatum* group are thus distributed : *surumu* is restricted to the Gran Sabana of Venezuela and northeastern Roraima Territory of Brazil; *annulatum* occupies southern Mexico, Central America, the northwestern corner of South America, and the West Indies; *sonorensis* ranges from the State of Utah south to Central Mexico, and is also known from Cuba.

4. Group IV (*priapus*) (Map 3)

B. priapus is only known from its type-locality (Phoenix) in Arizona.



Map 3, Distribution of *Blepharepium luridum*, *annulatum* group, *priapus*, and *borealis*.

6. THE NATURAL HISTORY OF *BLEPHAREPIUM*

6.1. Preys

Lynch Arribálzaga (1879: 151) said that "las presas preferidas por este Dasypogónite [*B. cajennensis coarctatum*] son los himenópteros del género *Bombus* y los Múscites del género *Lucilia;* húndeles sus lancetas en la unión del tórax con el abdómen y les chupa los jugos con tal rapidez que las víctimas tardan muy poco en morir."

Lindner (1929 : 170) commented upon *B. cajennensis coarctatum* : "Als Beutetiere fand ich mehrfach die schwächere Asilide *Laphystia scalaris* Herm. und den tipulidenschlanken *Diogmites placidus* v. d. Wulp, ein ausgesprochenes Grasslandtier, während *L. scalaris* sich immer auf dem Boden, auf glattgetretenen Pfaden und ähnlichen Stellen aufhält."

Carrera & Vulcano (1961 : 68) cite *B. cajennensis coarctatum* preying upon *Apis mellifera* L. (Apidae) and a Tiphiidae (Hymenoptera).

The most complete biological note on *Blepharepium,* up to the present, was published by Linsley (1960). On Table 3 of that paper Linsley lists 15 species of bees and 9 of wasps, in addition to a Bombyliidae and an Ichneumonidae, taken as preys of. *B. sonorensis* (misidentified as *secabile*).

Linsley's comments on the behavior of that species are as follows :

"*Perching and foraging. Blepharepium* prefer to perch low in rather dense vegetation, from an inch or two to 18 to 20 inches above the ground. They select horizontal or slightly sloping perches but keep the head well elevated and the body sloping upward at an angle. When watching for prey they turn their heads from side to side. Their foraging flights are slow, resembling those of *Polistes,* but when disturbed or when prey is sighted they move very rapidly. Their feeding perches are low and commonly in the center of small shrubs and bushes where flight is difficult and often involves striking the wing tips against twigs and stems. When males are seeking females they cruise along rows of plants, flying mostly from 9 to 28 inches above the ground.

"*Prey selection.* — The choice of prey by *Blepharepium* is limited by availability, but in foraging sites that offer a wide selection, the flies showed a marked selection for the larger, more robust bees (female *Melissodes, Hemisia, Anthophora,* etc.), especially those with large, yellow pollen loads, and for yellow and black or red and black wasps (bembicids, vespids, pompilids, etc.), holding them in the spiny tarsi until subdued. Of 46 individuais with prey 34 (74 per cent) had captured bees, 10 (22 per cent) wasps. In bulk and size, most of the prey varied from half as large as the asilids (most bees) to as large or almost as large (most bembicids and vespids). However, they occasionally capture much larger wasps, such as *Priocnemiodes, Pepsis,* and *Sphecius.* Not all attacks are successful, however, and a *Blepharepium* was seen to capture and drop a female of *Scolia nobilitata tricincta* Say after an unsuccessful attempt to subdue it (or perhaps after being stung by the wasp). It takes considerable time to overcome the larger wasps, as indicated by the following observation made August 13, 1959 (notes by E. G. and Juanita M. Linsley):

"9:52 A. M. A *Blepharepium* caught a female of *Sphecius grandis* Say in flight and both insects fell to the ground, the asilid on its back, holding the wasp away from the body with all six legs. The wasp kept the abdomen curved and the sting working, but was unable to find a vulnerable spot or penetrate the abdominal integument of the fly.

"9:57 A. M. After five minutes of tumbling about on the ground, the *Sphecius* stopped trying to sting the asilid and straightened out the abdomen, which continued to pulsate at the apex. Whether the fly had been able to penetrate the underside of the wasp with its mouthparts could not be seen. However, *Blepharepium* now moved to the upper side of the wasp and oriented itself in the opposite direction to the prey. Using the first two pairs of legs it pulled the head of the wasp forward and inserted its proboscis into the neck behind the head. A few moments later it moved forward down the dorsum of the abdomen probing the intersegmental membranes. It then moved backwards to the head, which it again pulled forward using only the first pair of legs this time, and again penetrated the neck region.

"10:02 A. M. Wasp not moving much.

"10:05 A. M. The asilid dragged the wasp onto prostrate grass stems about an inch above the surface of the ground. The wasp was rotated by the fly onto its side and the thorax probed at base of abdomen; a few moments later each of the wing bases was probed in turn. The wasp was quiet except for feeble pulsations at tip of abdomen. Again the asilid returns to neck region. It then became troubled by ants feeding at puncture sites on the wasp. The fly was unable to carry away the wasp in flight but moved it short distances by grasping with all six legs and buzzing wings. Feeding continued, mainly at the neck but varied by probing between abdominal segments.

10:59 A. M. Asilid left prey. Elapsed time: 1 hour and 7 minutes since capture."

6.2. Ecology

Very few things are known about the ecology of *Blepharepium*. There is only one published note, by Lindner, about *B. cajennensis coarctatum*, which says (in translation) : "these beautiful, slender species occurs in savannas, at least during the spring, slightly above the soil, moving like a wasp, even during the flight. I also found this species frequently in human "abodes" (Lindner, 1929 : 170).

Our colleague José Henrique Guimarães also collected *B. cajennensis coarctatum* in the outskirts of the forest of Nova Friburgo, State of Rio de Janeiro. The insect, when flying, looked exactly like a *Polistes* wasp.

On the other hand, some very valuable and interesting indirect evidence can be inferred from the examination of the distribution maps of the several species:

1. If we compare the distribution of the two species with a blackened abdomen, *subcontractum* and *fuscipennis*, with a map of vegetation (cf. Hueck, 1966; Veloso, 1966), we will immediately see that these two species are very likely associated to the Amazonian and to the Brazilian coast forests. *B. fuscipennis* seems to occupy even the northernmost limit of the Atlantic forest in Brazil, in Macaíba, State of Rio Grande do Norte, which is situated almost inside the semi-arid "caatingas" of northeastern Brazil. According to Luetzelburg (1923, vol. 2, p. 88), there are some isolated tracts of forest near Macaíba : "Trez leguas antes de Macahyba a vegetação se tornava um tanto florestal. Bellas Acacias, Caesalpinias echinata, Machaerium, Nectandra e especies de Cedrella, como tambem altas Cecropias e diversas especies de Mimosas e Caesalpinias arboreas eram os principais componentes desta vegetação."

B. luridum (Map 3; forest limits represented in the map) also seems to occupy the Amazonian forest.

2. The three subspecies of *cajennensis* seem to have different ecologies — *cajennensis* s.s. occurring in the Amazonian forest, *cunctabundum* in the forests of southern Brazil, and *coarctatum* occupying all the open formations south of the Amazonian forest. Apparent exceptions presented by *coarctatum,* like for instance its occurrence in Amazonia (the type-locality), or in the middle of forested areas of southern Brazil and northeastern Argentina, may be explained by two factors : it either enters these areas along the sandy shores of rivers or areas that are being deforested, or else it occurs in small isolated "islands" of cerrados (savanna-like formations) in the middle of the dominant forest formations; such areas are know along the Rio Negro (cf. Spruce, 1908 : 303-304, and chapters 7-9; Ferri, 1960), and in southern Brazil (Veloso, 1962, 1966; Hueck, 1966 : 272; Romariz, 1963).

3. *B. priapus* is only known from Phoenix, Arizona; therefore it must be an inhabitant of semi-arid regions (cf. Küchler, 1964; vegetation types 42 : creosote bush — bur sage, and 43 : palo verde — cactus shrub).

4. The *annulatum* group presents the same pattern already found in *cajennensis* — one species (*annulatum*) occurring in forests, from southern Mexico to the northwestern corner of South America (cf. Hueck, 1966; Knapp, 1965) and also in the West Indies; *sonorensis* occupies a variety of arid and semi-arid regions — in Arizona and Texas, according to Küchler (1964a, 1964b) it lives in vegetation types 42 (creosote bush — bur sage), 43 (palo verde — cactus shrub), 44 (creosote bush-tarbush), 58 (grama tobosa shrubsteppe), 54 (grama tobosa prairie), and 59 (trans Pecos shrub savanna) ; in Mexico it lives in several open, more or less dry areas (compare its distribution with descriptions given by Goldman & Moore, 1946) ; its presence also in Cuba is explained by the fact that, although the mountains in the Province of Oriente are covered with forests, the southern coast, near Guantánamo, is covered by xerophytic vegetation (Carabia, 1945 : 68-70) ; finally, *surumu* is found in the Gran Sabana of Venezuela and northeastern Roraima Territory in Brazil, a xerophytic area completely surrounded by Amazonian forest (Hueck, 1966; Guerra, 1957 : 55, photo 43).

6.3. Mimicry

Lindner (1929 : 170), Hull (1962 : 233) and Linsley (1960 : 365) already called atention to the strong resemblances of *Blepharepium* to certain wasps, notably *Polistes.* Although actual observations and experiments to test the fact are absolutely lacking, it is remarkable to note how the distribution of the several species of *Blepharepium* and their probable *Polistes* models coincide almost exactly :

1. *B. luridum,* with a reddish thorax and abdomen, could mimic the following species of *Polistes* : *rufiventris* Ducke (Pará), *bicolor*

Lepeletier (Colombia, Peru, Guianas, Brazil : Pará, Amazonas), *sosia* Bequaert (Peru), *occipitalis* Ducke (Colombia, Guianas, Peru, Brazil : Amazonas, Pará, Espírito Santo and Bolivia), and *erythrogaster* Ducke (Amazonia). (Distribution of *Polistes* species based on Ducke, 1918, and Bequaert, 1937).

2. *B. subcontractum* and *fuscipennis,* characterized by the blackish abdomen, could have as models *Polistes testaceicolor* Bequaert (Costa Rica, Colombia, Venezuela, Guianas, Brazil : Amazonas, Pará, and Bolivia), or *deceptor* Schulz (Guianas, Brazil : Amazonas, Pará, Espírito Santo, São Paulo, and Peru). (Ref. — Bequaert, 1937). In this case, *deceptor* even occurs along the Brazilian coast, as does *B. fuscipennis.*

3. *B. cajennensis cajennensis* could mimic *Polistes pacificus liliaciosus* Saussure (see Bequaert, 1937). Coincidence in this case is extreme, as the populations of *P. pacificus* in the Guianas have a large yellow spot on the posterior margin of the thorax; the southern forms of this wasp ("varieties" of Bequaert, 1937) have a lighter body coloration, exactly as in the subspecies *coarctatum* and *cunctabundum* of *B. cajennensis,* and could be very well their model.

4. *B. priapus,* the *annulatum* group, *cajennensis coarctatum* and *c. cuntabundum* could have as models a wide array of species of *Polistes,* with a large distribution and equally variable in coloration, such as the following (to cite only a few) :

a. *major* Palisot de Beauvois (ranging from southern California and Arizona to Colombia and Brazil, entering the Bahamas and Puerto Rico; with 4 "varieties"; Bequaert, 1937);
b. *versicolor* (Olivier) (ranging from Costa Rica to southern Brazil, Paraguay and northern Argentina; with 9 "varieties"; Bequaert, 1933);
c. *ruficornis* Saussure (ranging from Colombia and the Guianas to southern Brazil and northern Argentina; with 3 "varieties"; Bequaert, 1936);
d. *canadensis* (Linnaeus), a very common and extremely variable species, ranging from Arizona and New Mexico to southern Brazil, Uruguay, Paraguay and northern Argentina, with at least 19 "varieties", Bequaert, 1943.

Of course, this is only a tentative hypothesis. Mimicry should be confirmed in this case, and the models better studied. *Polistes* is however a very tempting model, but its systematics is still in a very poor shape, and the distribution of its species has to be clarified. Notwithstanding, the similarities between the two genera are so striking, the convergence in color pattern shown by widely different species and subspecies of *Blepharepium* so great, that a note should be given, to interest future researchers in this field.

7. HYPOTHETICAL HISTORY OF THE EVOLUTION OF *BLEPHAREPIUM*

Considerations on the most probable events of the past history of *Blepharepium* can, at best, be approximate guesses. Numerous explanations may exist to explain the present pattern. We are well aware of the numerous solutions which may be applied to this case. Nevertheless, based on the data herein gathered, we suggest the following hypothesis.

Some facts about *Blepharepium* are reasonably established :

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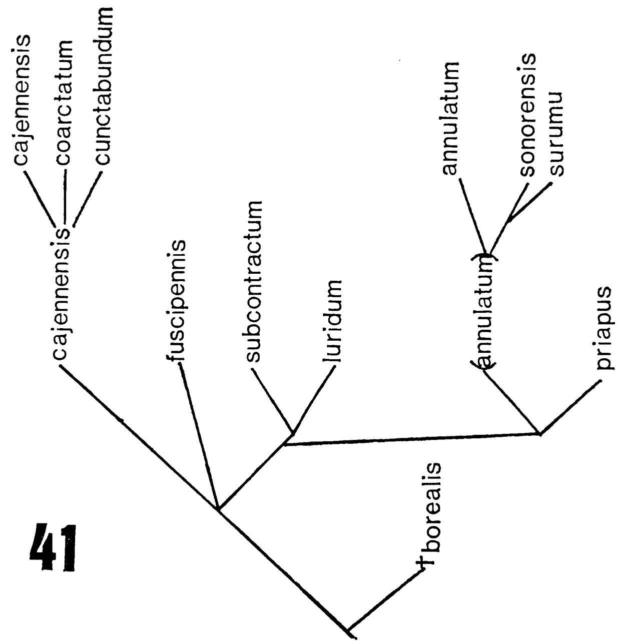

Fig. 41, Hypothetical phylogeny of the species of *Blepharepium*.

1. The very primitive condition of the prosternum points to an origin prior to or contemporary with that of the other tribes of Dasypogoninae;

2. *Blepharepium* seems to have existed already in the Oligocene, with exactly the same appearance of the recent forms;

3. The tribe is only known from the Americas;

4. The group seems to have originated in forests, only secondarily having colonized open formations;

5. Forest-dwelling species have a more or less unicolorous abdomen, whereas species (or subspecies) of open formations (or forest

inbabiting populations that still have gene flow with open formations populations) present a "banded" pattern in the abdomen.

These facts, allied to the comparative morphology of the male genitalia, indicate to us the following hypothetical history:

1. Origin of the Blepharepiini. As commented before (Part II of this series) the tribe is probably Mesozoic in origin, and very soon became restricted to South America (i.e., the Guiano-Brazilian subregion);

2. Evolution during Tertiary. Being faithfully linked with the forests of the Guiano-Brazilian subregion, the Blepharepiini had probably the occasion to spread northward to the North American continent, with the expansion of the Neotropical-Tertiary Flora. According to Chaney (1947 : 146) : "The Neotropical-Tertiary Flora ranged northward to latitude 49 degrees on the west side of the [North American] continent during Eocene time, and is recorded to progressively more southerly latitudes eastward across the continent, reaching only as far north as latitude 37 degrees in the Mississipi embayment of the southern United States."

There was then the possibility of a northbound migration of *Blepharepium* during the Eocene, when climate was warmer, along with the expansion of the Neotropical-Tertiary Flora. *Blepharepium* had therefore to cross the ocean gap between South and North America, as the establishment of the Panamanian landbridge was not completed until the Pliocene-Pleistocene transition (Haffer, 1970b).

By that time *Blepharepium* had probably already developed its mimicry with wasps.

Progressive cooling of the Northern Hemisphere during the Oligocene resulted in the expansion of the Arcto-Tertiary Flora toward the south, with the consequent substraction of the Neotropical-Tertiary Flora. Also according to Chaney (op. cit.) the Arcto-Tertiary Flora ranged northward to latitude 67 degrees in Alaska during the Eocene, with a boreal unit extending to within 8 degrees of the North Pole. During the Oligocene it is recorded from Washington and Oregon, and in the Rocky Mountain area this temperate Flora extended into Colorado, occurring as a relatively uniform forest throughout much of the northern hemisphere as late as Miocene time. During the Oligocene and Miocene epochs the Neotropical-Tertiary Flora was restricted southward in western North America to central and south California, leaving relicts to the north along the Oregon coast.

At the same time, the Madro-Tertiary Flora ranged northward from northern Mexico during the Tertiary, whenever favorable climatic, and wherever favorable topographic conditions existed (Axelrod, 1958). It reached its widest distribution in the western United States during the Pliocene, and while it is now largely confined as a dominant to the southwestern interior and adjacent Mexico, it is still represented over a much larger area in the west. The Florissant Oligocene Flora had the presence of ten or more Sierra Madrean species.

Blepharepium probably also receded with the Neotropical-Tertiary Flora. *B. borealis* probably existed as an ecotone dweller, between the forests (temperate or tropical) and the open formations, what would explain its "banded" abdominal pattern, still clearly visible in the fossil. It is also possible that *Blepharepium* suffered by that time from competition with other Dasypogoninae that began to radiate with the expansion of the Madre-Tertiary Flora.

By Pliocene time only a few relicts of the Neotropical-Tertiary Flora remained north of the Mexican border, this Flora having survived only in Mexico, Central America, the Antilles, and northern South America.

We believe that due to the progressive cooling of North America, and to competition with other Dasypogoninae, *Blepharepium* became extinct in North America, or, if it remained in the Mexican forests, was eliminated through competition with recent species from South American origin, such as *Blepharepium annulatum.*

As regards the history of the South American *Blepharepium* during the Tertiary, nothing can be said, since due to the climatic changes of the Quaternary the pattern may have changed completely.

3. Evolution during Quaternary. With the alternate climatic cycles of aridity and humidity that prevailed over the Guiano-Brazilian region (notably the Amazonian area) since the Pleistocene, the ancestral stocks of *Blepharepium* became restricted to forest refugia, during arid cycles, where in isolation they underwent several changes, according to the models proposed by Haffer (1969, 1970a) and Vanzolini & Williams (1970).

Group I (*cajennensis*) has probably appeared in the forests of the Guiano-Brazilian region, and became differentiated along the diagonal of open formations, going from northeastern Brazil to northern Argentina. Then the two populations living in forests (Amazonian and Southern Brazil forests) were separated by a differently colored population; gene flow probably still exists between the three populations (which we have considered as subspecies), which accounts for the great variation in color patterns.

Group II (*fuscipennis-subcontractum*) probably took its origin from Group I, also in the Amazonian forest. During one of the arid cycles in Amazonia it became split in two species — one probably formed in one of the eastern Amazonian refugia (Belém or Guianas) and the other in one of western Amazonian refugia (probably eastern Peru). The first is now represented by *fuscipennis,* the second by *subcontractum.* After the return of the forest to its former extent, these two species had the occasion to spread and became sympatric in the Middle Amazon area. Probably during one of the wet periods, when the forests of the Amazon region and the forests of the Atlantic coast became united, *fuscipennis* invaded the coastal forest, in what seems to be a very recent time, as the specimens of both areas show no significant differences between them, by traditional taxonomic methods.

Occupancy of the Amazon valley by this group of species may explain the rarity of *cajennensis* in the area. There is probably competition between the two groups, the more recent (Group II) being more aggressive and dominant.

Group III has probably derived from Group II, *luridum* being the most primitive species, having occupied all of Amazonia; after the establishment of the Panamanian landbridge in the Pleistocene, a stock from this group invaded the forests of Central America and southern Mexico, originating *annulatum;* by parapatric evolution *annulatum* probably originated *priapus,* which occupied the open formations of Mexico and the southwestern United States. Later, *annulatum* entered again the open formations of Mexico, giving a distinct species, *sonorensis,* which has probably competed with *priapus;* the latter species then became restricted to the northernmost limit of its range, in Arizona.

During one of the arid cycles, when the forests retreated, *sonorensis* had the occasion to spread southwards, invading South America, through a corridor of open formations which was practically continuous, from the southwestern United States to northern Argentina; arriving in South America it entered in competition with *cajennensis coarctatum,* which occupied a similar ecology; interactions between the two and the resulting pattern are now effaced, since the forest resumed its former extent in Amazonia. What we know now is that isolated populations of *sonorensis* became separated from the main North American populations, in enclaves of open formations completely surrounded by Amazonian forest — this is probably the origin of *surumu* in South America.

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