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NOTES ON AMAZONIAN BITTACIDAE (MECOPTERA) WITH THE DESCRIPTIONS OF TWO NEW SPECIES

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New species of Issikiella *and* Nannobittacus *are described and notes are presented on other Amazonian species of Mecoptera.*

Issikiella byersi Penny and Arias, n. sp.

Original description based on 5 males, 2 females, pinned.

Head: Clypeus pale brown: rostrum, vertex and occiput brownish black. Rostrum slender, labrum about four times as long as its width at base; maxillary and labial palps brown, darker than other rostral elements. First segment of maxillary palp with long sensory hair. Terminal (fifth) segment of maxillary palp about same length as fourth. Eyes brown, separated in front by distance about equal to width of base of labrum, and width of ocellar triangle. Antennae short (about 3.0mm in both sexes), very slender, each comprising elongate scape and ovoid pedicel and apparently 18 thin, cylindrical flagellomeres (segmentation obscure beyond 10th flagellomere); hairs on apical segments about four times as long as diameter of flagellomeres.

Thorax: Pronotum dark brown anteriorly, posterior one-third, including spiracles, paler, sordid yellowish brown; no prominent setae on anterior margin or elsewhere. Mesonotum and metanotum generally glabrous, shining dark brown, nearly black on most elevated parts, scutella abruptly paler, yellowish brown. A few pale hairs at sides of all nota. Pleura and coxae unevenly sordid yellowish brown, episterna slightly darker than epimera; long yellowish hairs on anterior surfaces of coxae, pleura sparsely covered with short yellowish hairs. Femora and tibiae yellowish brown with a few scattered black spines; femora darkened at apices; tibiae only slightly darkened at tips, basitarsi dark yellowish brown grading into brown on more distal tarsomeres. Hind femur not enlarged, of more or less uniform diameter throughout in both sexes. Hind tarsus not conspicuously enlarged in male.

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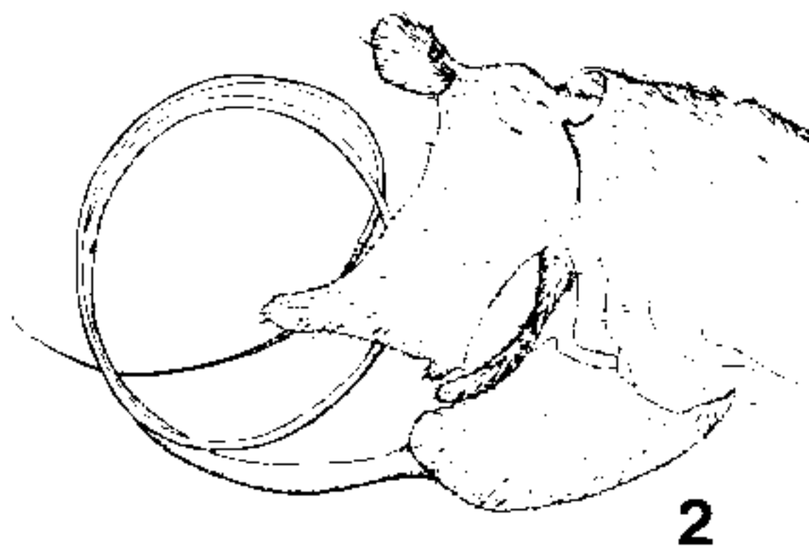

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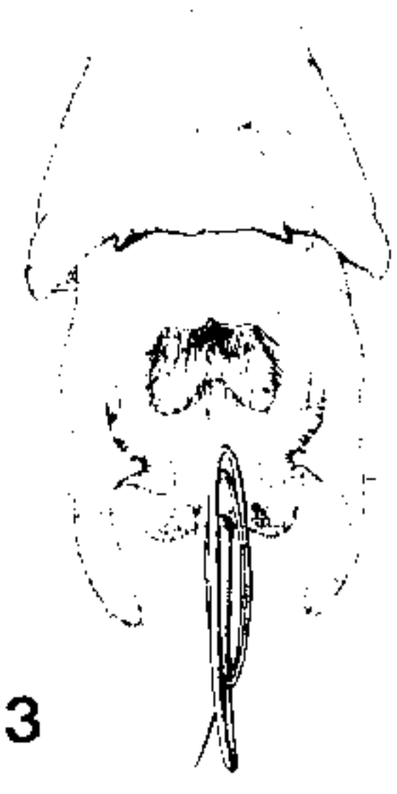

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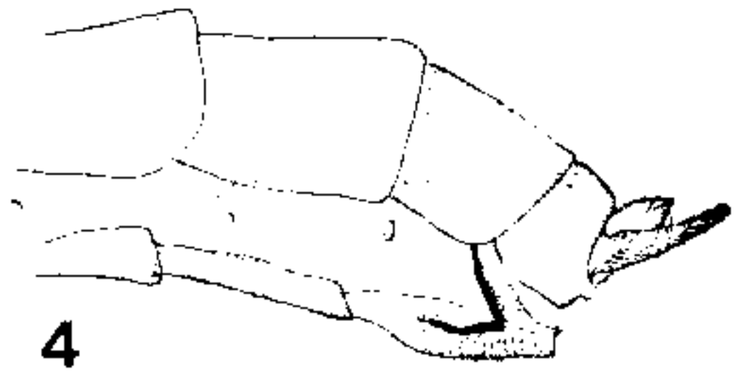

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Figs. 1-4 – *Issikiella byersi*, n. sp., 1) right forewing, 2) male genitalia, lateral view, 3) male genitalia, dorsal view, 4) female terminalia, lateral view (drawn by Artêmio Coelho da Silva).

Wings (Fig. 1): highly iridescent, clear dark yellow from base to origin of M and in cells C and Sc to stigma, veins dark brown; stigma intense dark browen, large, extending from anterior wing margin to vein R_{2+3}, color continuing broadly along all more distal longitudinal veins, narrowly along adjacent crossveins; additional spots of brown at origin of Rs (ORs), first fork of Rs (FRs), origin of M, end of Cu_2, cells R and M, both thyridia and along proximal set of crossveins. Subcosta extending only slightly beyond ORs, joining C well before level of FRs; Scv just beyond ORs. Vein R_{2+3} not deflected backward at Rcv. In front wing, vein 1A extends slightly beyond level of humeral crossvein (h), 2A ends just before level of h; apical crossvein (Av) present near end of 1A, another near end of 2A; vein 3A not present. In hind wing, 1A coalesces with Cu_2 for most of its length, turning to posterior wing margin as crossvein beyond h. Vein 2A scarcely developed. Only one pterostigmal crossvein (Pcv), near proximal end of stigma, joining R_{2+3} after first crossvein in cell R_3.

Abdomen of male: Tergum and sternum 2 with narrow, anterior, yellowish-brown, band, broad, posterior dark brown band; terga and sterna 3–5 mostly yellowish-brown, dark brown on posterior one-fourth. No spines on sides of anterior segments. Segments 6–8 dark brown dorsally, yellowish brown ventrally, of increasingly greater diameter than more anterior segments. A narrow, rounded projection on posterio-dorsal margin of tergum 8, at each side. Fused basistyles yellowish-brown; epiandrial lobes yellow. Epiandrial lobes elongate with upturned tip, with broad, low rounded ridge along mid-length; a mesally directed spiniferous point on dorsal margin approximately two-thirds distance to tip (Fig. 3); a mesally directed, subapical, setiferous projection on ventral margin (Fig. 3); numerous small, black denticles along mid-dorsal margin. Basistyles separated posterio-ventrally by elongate, narrow V-shaped membranous area, paler than cuticle of basistyles and without hairs. Dististyles small, with densely sclerotized, glabrous, rounded apices. Proctiger large, complex, with flat, plate-like dorsal projection and long tubular ventral extension terminating in numerous, large, recurved hairs. Cerci

slender, extending to tips of dististyles. Aedeagus slender, only slightly enlarged at base, elongate, coiled.

Abdomen of female: Terga and sterna 2–5 yellowish-brown anteriorly to dark brown posteriorly. Segments 2–4 slender, 5 abruptly enlarged posteriorly, 6 of greatest diameter, 7 slightly smaller in diameter than 6, 8 still smaller; segments 5-10 forming an elliptical enlargement. Tenth segment and anterior portion of tergum 11 retracted beneath 9th tergum. Cerci slender tipped. Spiracles evident on segments 5–8, concealed on more anterior segments. Ninth sternum bearing caudal, crescent-shaped, heavily sclerotized mark (Fig. 4).

Body length: male, 13.2 – 15mm (holotype, 15.0mm); front wing 15.4 – 16.8 mm (holotype, 15.4 mm). Body length of female, about 12.5 mm (allotype 12.5 mm); front wing 15.0 – 15.5 mm (allotype 15.0 mm).

Types: Holotype, male, collected at Reserva Ducke, 26 km north of Manaus, Amazonas State, Brazil, 28 March, 1978, by J.R. Arias using a flight trap. Allotype female, same locality, collector and collection method as holotype, 4 December 1978. Paratypes, 2 males collected by J.A. Rafael on the INPA campus, Manaus, Brazil on 12 September 1978 and October, 1978; 1 male collected by Mauricio Mendonça on the INPA campus, Manaus, on 14 January 1978; 1 topotypic male, 1 topotypic female collected by J.R. Arias with light traps on 15 and 21 November 1977. Holotype, allotype and two paratypes at INPA; further paratypes in Snow Entomological Museum, Lawrence, Kansas, U.S.A.; British Museum (Natural History), London, England; and Museu de Zoologia, Universidade de São Paulo, Brazil.

Damage: Holotype has right hindwing partially torn. Allotype is missing right metathoracic leg. Paratype male collected at Reserva Ducke on 21 November, 1977, is callow with genitalia badly misshapen. This holotype was selected because of the extraordinarily well extended proctiger.

The temporal data indicate that adult *Issikiella byersi* can be collected at any time of the year.

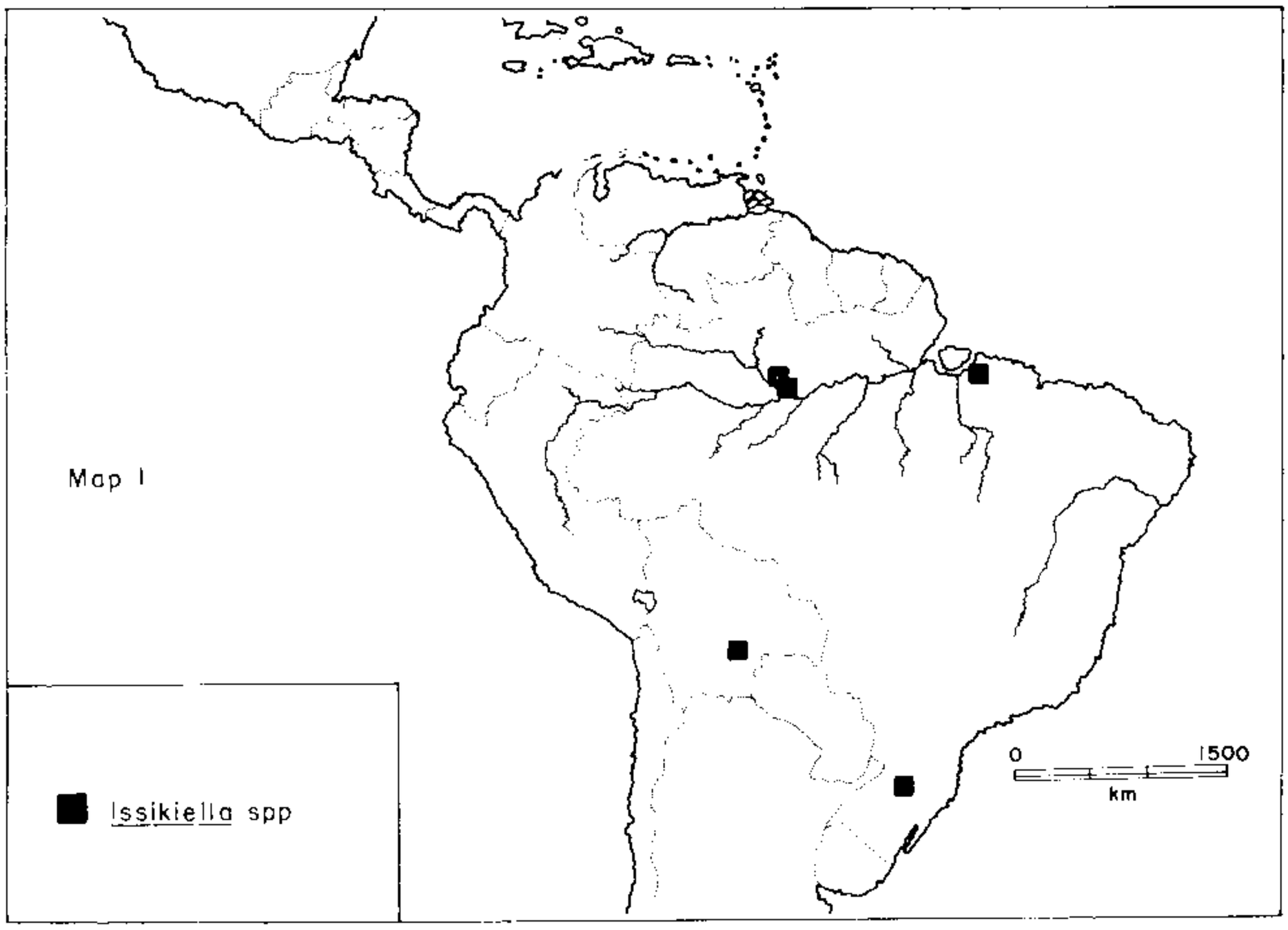
The name was chosen to honor George W. Byers, who has done more than any other person to elucidate our knowledge of the Mecoptera fauna in recent times, and more specifically our knowledge of the genus *Issikiella.*

Issikiella byersi can be easily separated from the only other known species of this genus, *Issikiella pulchra* Byers, by the more extensive wing pigmentation, position of Pcv and characteristics of the male genitalia, such as upturned epiandrial lobes and distinctive proctiger. The female has a distinctive crescent-shaped, darkly pigmented mark on the subgenital plate.

The original type locality for *Issikiella pulchra* Byers is Nova Tuetônia, Santa Catarina State, Brazil and Byers (1972) also mentioned an undescribed species of *Issikiella* from Buena Vista, Department of Santa Cruz, Bolivia. In addition to the type specimens of *Issikiella byersi* mentioned above, there is an additional female specimen of *Issikiella* in the collections of Museu Paraense Emílio Goeldi from Mocambo Forest, Belém, Pará State, Brazil, which also has the distinctive crescent-shaped mark on the subgenital plate. These new records add considerably to the range of *Issikiella* (Map 1), and additional collecting in lowland forests of western Amazonia should extend the generic range further.

The type locality for *Issikiella pulchra, Nova Teutônia,* has been characterized by the collector, Mr. Fritz Plaumann (personal communication), as a primary forest before extensive forest destruction in the area. All specimens of *Issikiella* from Reserva

Ducke were collected with light traps or flight traps in primary, terra firme forest (Penny & Arias, 1982); but the specimens from Manaus were collected from the INPA campus – which at the time was a young secondary forest area. *Issikiella* has never been collected from grasslands, savannahs, or seasonally inundated forest and is probably restricted to terra firme forest.



Map 1 – Known geographical distribution of *Issikiella*.

Nannobittacus souzalopesi Penny and Arias, n. sp.

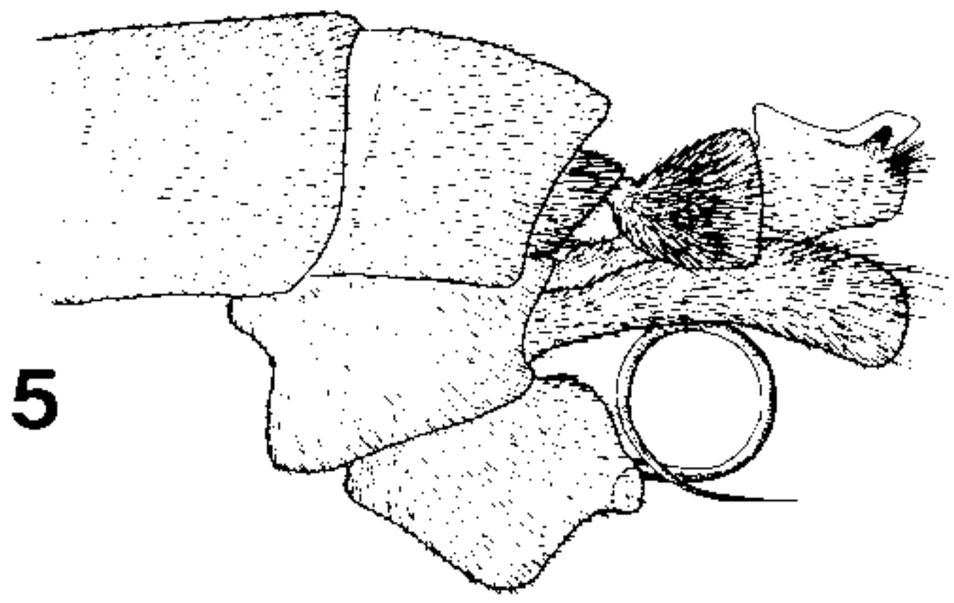
Original description based on 1 male, 5 females, pinned.

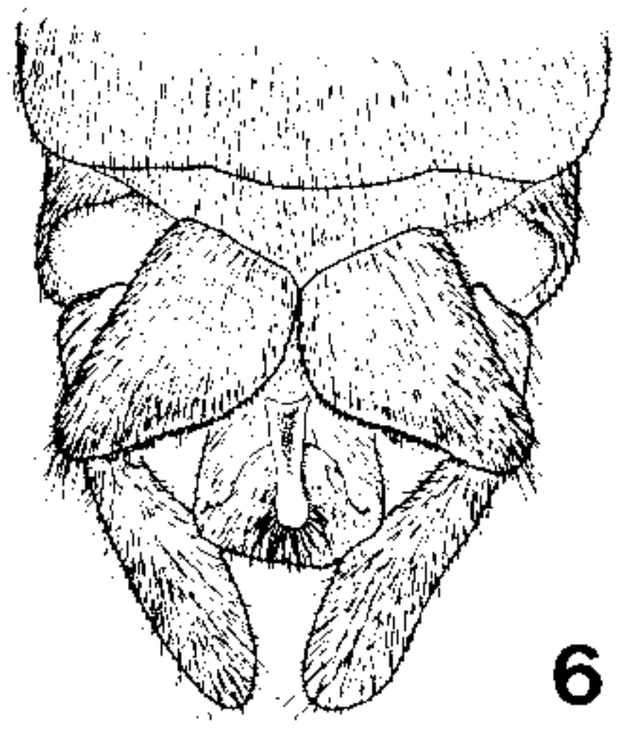
Head: Clypeus, rostrum and vertex pale brown; occiput brownish black. Rostrum slender, labrum about five times as long as its width at base; maxillary and labial palps dark brown, darker than other rostral elements. Terminal segment of maxillary palp longer than fourth. Eyes reddish, separated in front by distance shorter than width of base of labrum, but equal to width of ocellar triangle. Antennae short (about 4.0 mm in both sexes), very slender, each comprising ovoid scape and pedicel and apparently 18 thin, cylindrical flagellomeres (segmentation obscure beyond 10th flagellomere); hairs on apical segments about four times as long as diameter of flagellomeres.

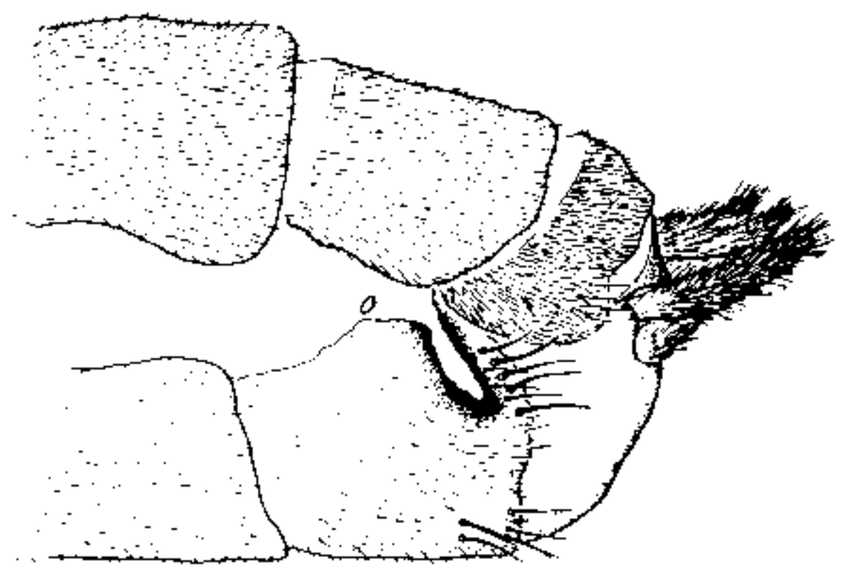
Thorax: Pronotum dark brown; no prominent setae on anterior margin or elsewhere. Meso – and metanota glabrous, dark brown. Pleura and coxae yellowish brown. Femora and tibiae yellowish brown with numerous annulae of fine dark hairs and a few scattered black spines. Hind femur not enlarged, of more or less uniform diameter throughout. Hind tarsus not conspicuously enlarged in male.

Wings: Highly iridescent, clear dark yellow from base to origin of M and in cells C and Sc to stigma; veins dark brown; stigma intense dark brown, large, extending

from anterior wing margin to vein R_{2+3}, color continuing narrowly along wing margin and apical row of crossveins; additional spots of brown at ORs, FRs, and origin of M. Subcosta extending slighty beyond FRs; Scv at ORs. Vein R_{2+3} deflected backward at Rcv. In forewing, vein 1A extends well beyond level of h, 2A ends at h; Av present near middle of 1A, another near end of 2A; vein 3A not present, In hindwing, 1A coalesces which Cu_2 for most of its length, turning to posterior wing margin as crossvein beyond h. Vein 2A scarcely developed. Only one Rcv near proximal end of stigma, joining R_{2+3} after first crossvein in cell R_3.







Figs. 5-7 – *Nannobittacus souzalopesi* n. sp., 5) male genitalia, lateral view, 6) male genitalia, dorsal view, 7) female terminalia, lateral view (drawn by Artêmio Coelho da Silva).

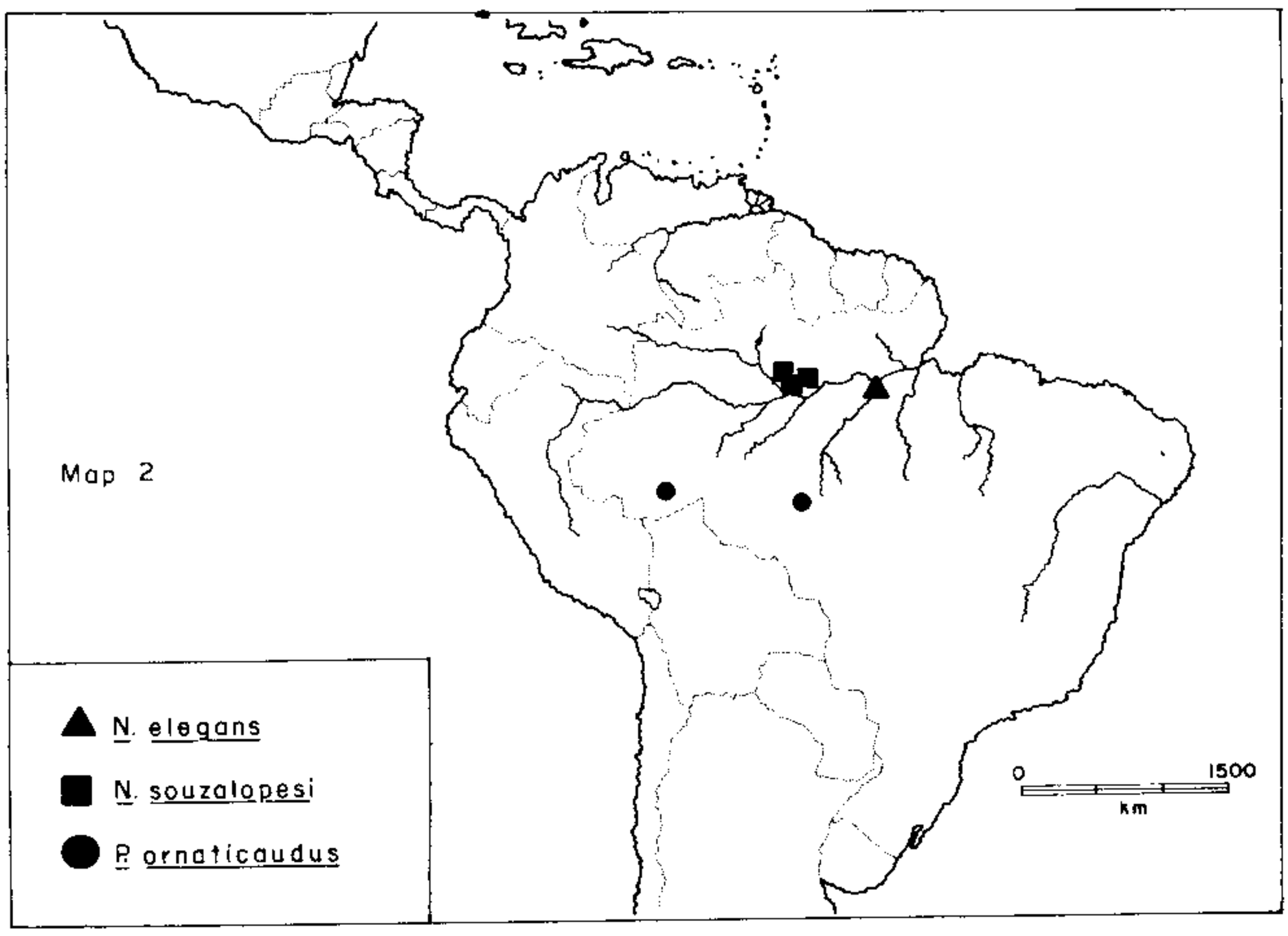
Abdomen of male: Terga and sterna 2–5 with narrow, anterior, yellowish-brown band; broad, posterior dark brown band. No spines on sides of anterior segments. Segments 6–8 dark brown dorsally, yellowish-brown ventrally, of increasingly greater diameter than more anterior segments. Fused basistyles yellowish-brown; epiandrial lobes dark brown. Epiandrial lobes dorso-ventrally flattened, with ventro-lateral margin forming an acute angle (Fig. 5); posterio-medial margin evenly curved to midline (Fig. 6). Proctiger extending well beyond epiandrial lobes. Basistyles broadly fused posterio-ventrally. Dististyles relatively large, inwardly directed, almost touching at midline. Proctiger with narrow medial, dorsal ridge and broader, flattened ventro-lateral ridges. Cerci very large and elongate, extending well beyond epiandrial lobes, apically swollen, medially touching. Aedeagus slender, only slightly enlarged at base, elongate, recurved.

Abdomen of female: Terga and sterna 2–5 yellowish-brown anteriorly and dark brown posteriorly. Terga and sterna 6–8 dark brown, of increasingly greater diameter

than anterior segments. Cerci elongate, extending beyond tenth tergum. Ninth sternum with narrow, posterio-dorsal extension, and a series of about 8 very strong spines at caudal margin (Fig. 7).

Body length: male, 15.0mm; front wing, 16.5 mm. Body length of female, 14.0 mm; front wing, 17.0 mm.

Types: Holotype, male, collected at Brazil: Amazonas, Reserva Ducke, Am-010, km 26, 21-II-1978, J.R. Arias (INPA). Allotype, female, collected at Amazonas, Manaus, INPA, 1-VIII-1977, Mauricio Mendonça (INPA). Other female paratypes are from Amazonas, Manaus, 14 April, 1976, A.P.A. Luna Dias, 1 female; Manaus, 17 March 1976, A.P.A. Luna Dias, 1 female; Manaus, 3 May 1976, A.P.A. Luna Dias, 1 female; 61 km north of Manaus, 18 April 1980, Penny and Arias, 1 female. All specimens are in the Coleções de Entomologia Sistemática, INPA, Manaus. The known range of *N. souzalopesi* can be seen in Map 2.



Map 2 – Known geograpchical distribution of *Nannobittacus elegans*, *N. souzalopesi* and *Pazius ornaticaudus*.

From the last of these collections, eggs and larvae were obtained (Penny & Arias, 1981) and were published as *N. elegans*.

The Manaus localities were all at the INPA campus, a young secondary forest area with vegetation characterized by Prance (1975). The Reserva Ducke locality is a primary forest area with vegetation, climate, and soils characterized in Penny & Arias (1982).

This species is named for Dr. Hugo de Souza Lopes, whose interest in Brazilian Mecoptera has contributed substantially to our knowledge of this group.

Nannobittacus souzalopesi can be immediately linked to the other known species of Amazonian *Nannobittacus*, *N. elegans*, by the enlarged cerci and stout epiandrial lobes of the male genitalia. The type of *N. elegans* has lost its abdomen, creating the necessity of making comparisions with the only known drawing of the male genitalia by Esben-Petersen (1927). This drawing shows male epiandrial lobes with a ventral point and smoothly rounded caudal margin. The cerci of *N. elegans* do not extend beyond the epiandrial lobes. However, the fully extended proctiger of *N. souzalopesi* indicate a distension of the male genitalia, which possibly has extended the cerci and rotated the epiandrial lobes. Thus, what appears to be a ventral projection in Esben-Petersen's drawing could be the ventro-caudal margin of the epiandrial lobe of our male specimen, and would make the specimens more similar. The smoothly curved apex of the epiandrial lobes in Esben-Petersen's drawing cannot be easily correlated with the male specimen we have from the Manaus region, and thus we are indicating this series as a new species.

Nannobittacus elegans Esben-Petersen (1927)

This species was described and illustrated by Esben-Petersen in 1927 from Santarém, Pará State, Brazil (Map 2). Byers (1965) reported that the male holotype had lost the terminal abdominal segments during the intervening years. Thus, this specimen remains the only known specimen of this species. Differences between *N. elegans* and *N. souzalopesi,* n.sp. are given under comments on the latter species. *Nannobittacus elegans* and *N. souzalopesi* are notably different from the other described species, *Nannobittacus tjederi* Byers, from Venezuela and two undescribed species from Colombia in the much smaller epiandrial lobes and expanded cerci of the male terminalia.

Bittacus diversinervis Souza Lopes and Mangabeira

This species (Figs. 8, 9) was described in 1942 from Minas Gerais, Rio de Janeiro, São Paulo, and Goias States in southern Brazil. This species has more recently been collected in several Amazonian states and territories, thus extending its known range approximately 2300 km farther north. These records are: Roraima, Boa Vista, 9-10-VII-1977, N.D. Penny, 6 males, 9 females; Acre, Rio Branco, 24-II-1979, M. Mendonça, 1 female; Amazonas, Humaitá, 22-23-II-1980, N.D. Penny and J.B. Brasil, 3 males, 7 females; Amapá, S.J. Pacuí, 9-II-1979, Paulo Celso, 1 female. The Museu de Zoologia, São Paulo, also has specimens from Colatina in Espirito Santo State and Arcoverde in Pernambuco State, thus also extending the range into the dry northeastern part of the country (Map 3).

Amazonian specimens of this species have been collected in the savannahs that are occasionally encountered in the Amazon Basin. Individuals have been found during the rainy season underneath the shady canopy of the isolated trees, where grasses are usually longer.

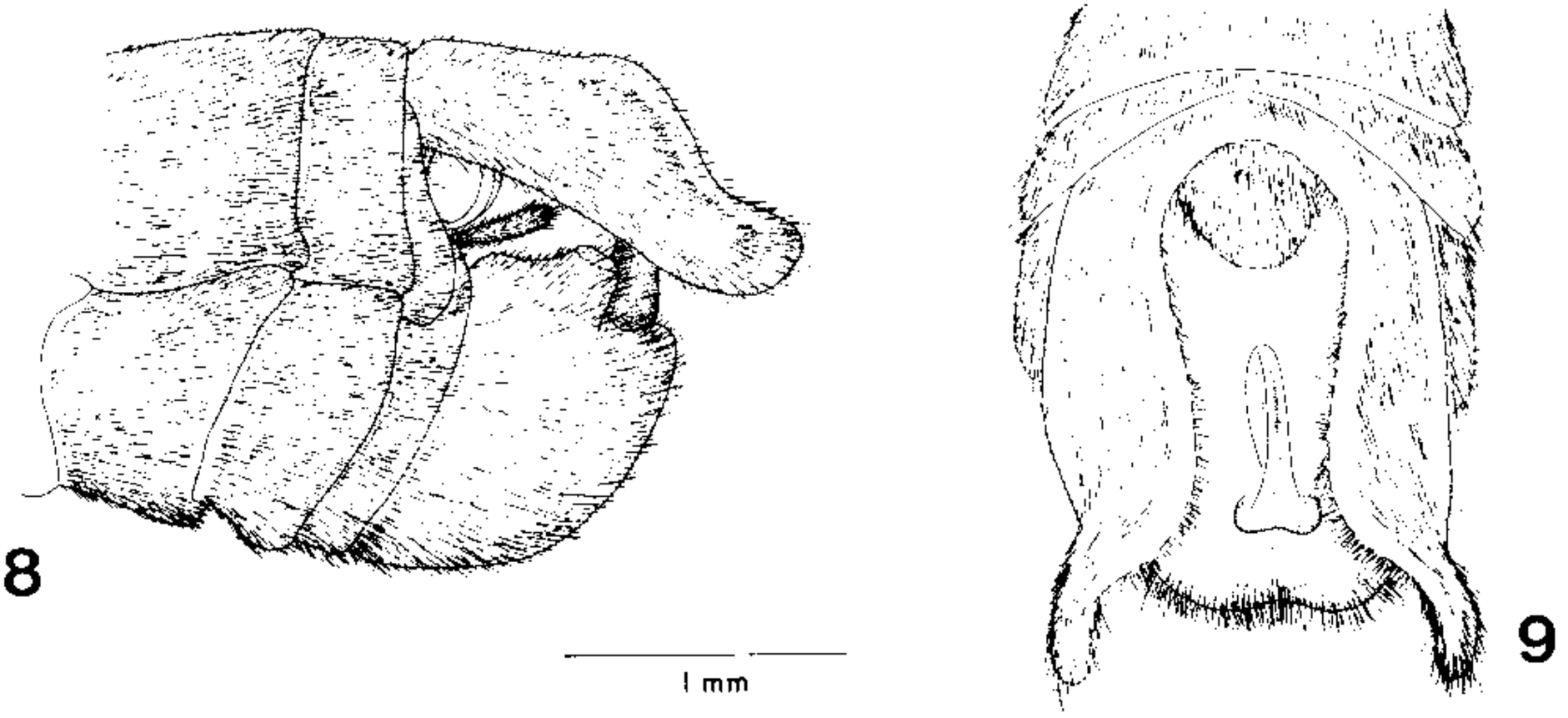
Bittacus maculosus Byers

This species was described in 1965 on the basis of a single distinctive female collected at St. Augustine on Trinidad. The male of this species is still unknown, but on 6 December, 1977, Eloy Castellon collected a second female on the INPA campus in Manaus. This extends the known geographic distribution of this species southwards for 1500 km (Map 4).

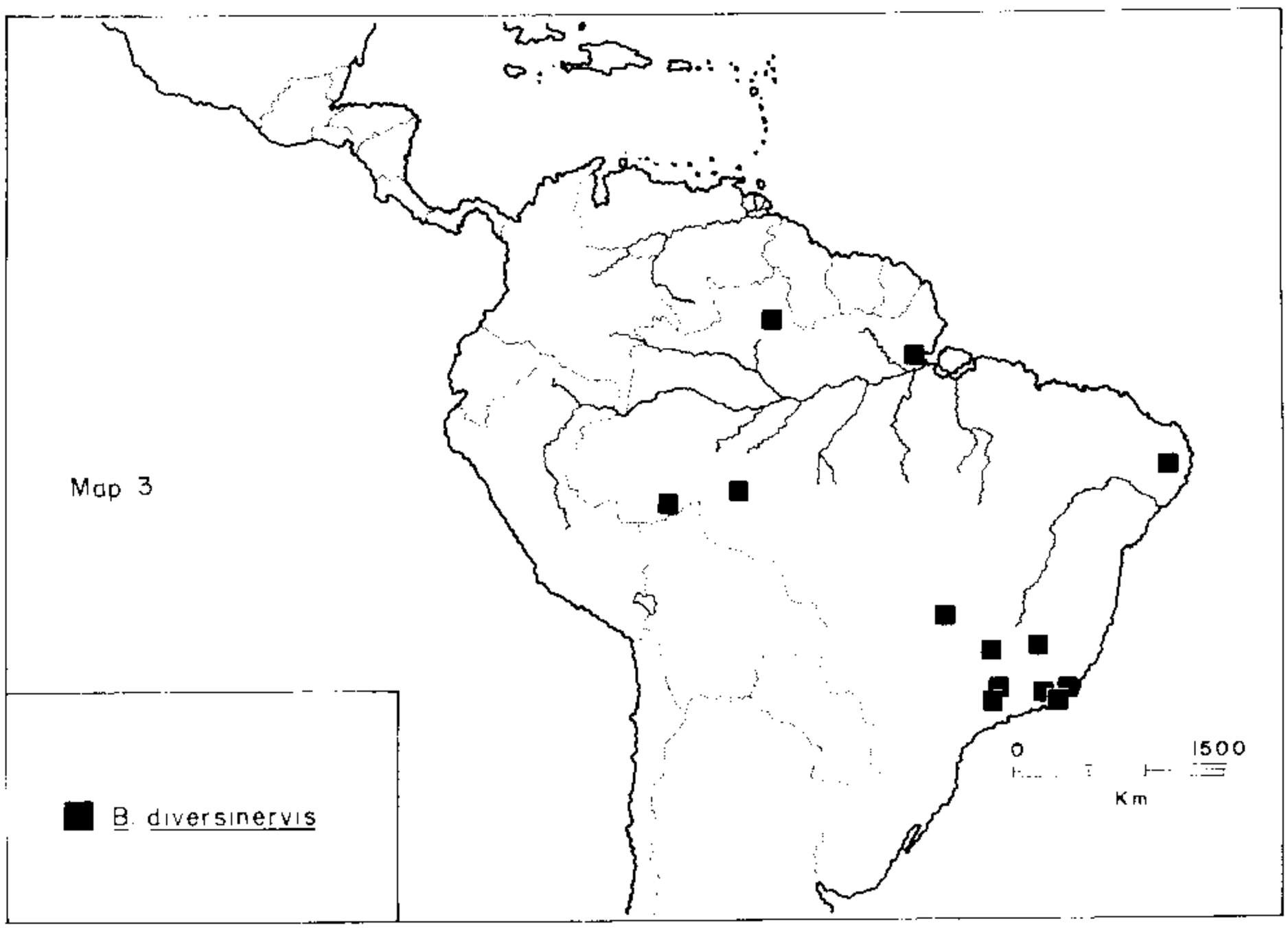
Bittacus femoralis Klug

Bittacus femoralis was first described by Klug in 1838 from southern Brazil. Esben-Peterson (1921) reported that the two types in the Berlin Museum had lost their terminal abdominal segments, making further genitalic comparisons impossible. Souza Lopes & Mangabeira (1942) reported one female specimen from Goias State

in south-central Brazil. Ten more specimens were recently collected in the southwestern part of the Amazon Region at the beginning of the rainy season. They were: Rondonia, Vilhena, 7-XII-1979, N.D. Penny, 6 males, 4 females. They were all collected in tall grasses in open savannah, usually near small bushes. To facilitate future identifications, we are providing illustrations of both male and female terminalia (Figs. 10-12). A map of the distribution of this species can be found in Map 4.



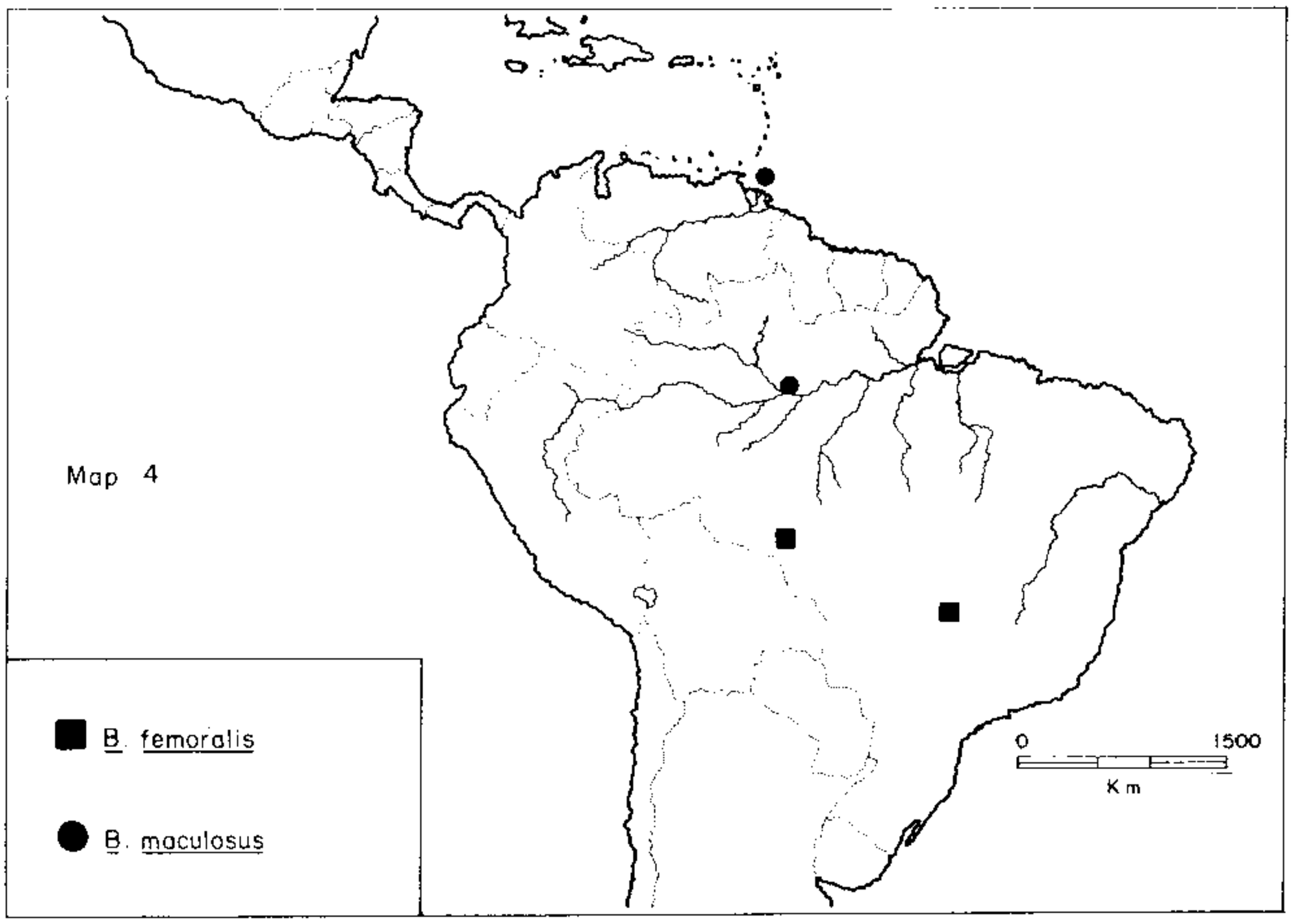
Figs. 8-9 – *Bittacus diversinervis* Souza Lopes and Mangabeira, 8) male genitalia, lateral view, 9) male genitalia, dorsal view (drawn by Artêmio Coelho da Silva).



Map 3 – Known geographical distribution of *Bittacus diversinervis*.

Pazius ornaticaudus Penny

Since the description of this new species in 1977, two more specimens have been collected which allow us to take a better look at male and female terminalia (Figs. 13-15) and geographical distribution (Map 2). They were collected at Acre: 11 km northeast of Rio Branco, 10-V-1981, J.R. Arias, 1 male, 1 female, flight trap. Because some of the terminal structures of male and female genitalia were not clearly shown in the original illustrations, new illustrations are presented here. The geographical distribution is extended 950 km farther west, and brings the distribution of this species closer to that of other known species of this genus, which are mostly Andean in South America. These specimens, like the types, were collected in primary forest.



Map 4 – Known geographical distribution of *Bittacus femoralis* and *Bittacus maculosus.*

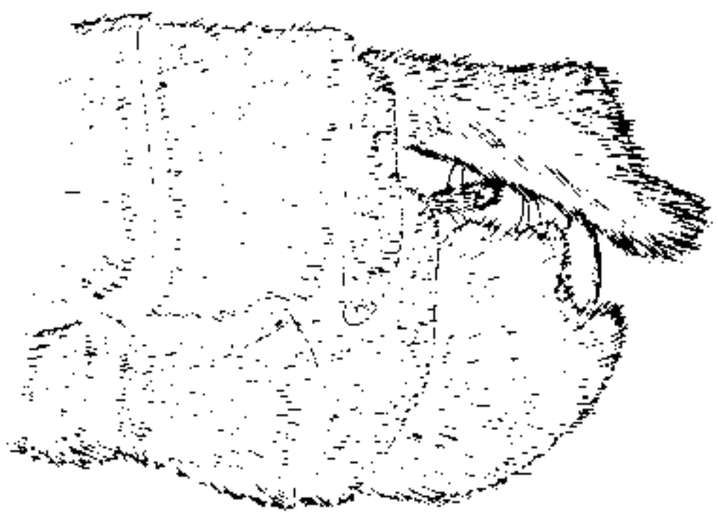
Neobittacus aripuanaensis Penny

We know of no further collections of this species since the types were described in 1977. As the female was not originally illustrated, and much better illustrations of the male genitalia are now available (Figs. 16-18), they have been included.

GENERAL COMMENTS

The addition of the preceding records brings the total number of known Mecoptera species in the Amazon Basin to eight, in five genera.

Identification of bittacid species has almost always been based on characteristics of the male genitalia, except for a few species with distinctive wing patterns, or hairy antennae, etc. However, the Amazonain species appear to have some very striking characters in the female terminalia, which are only clearly seen after softening the speci-



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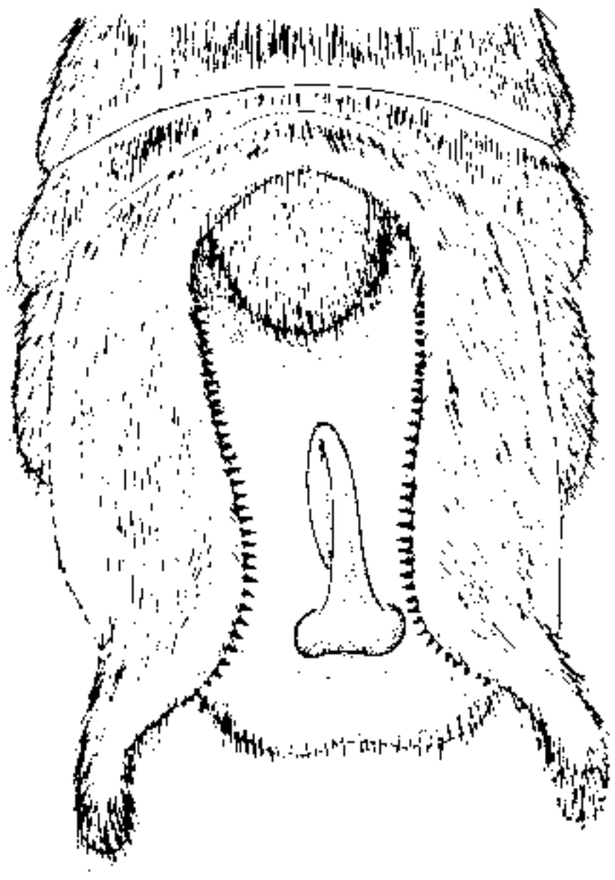

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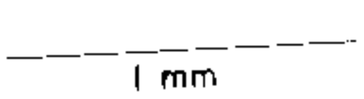

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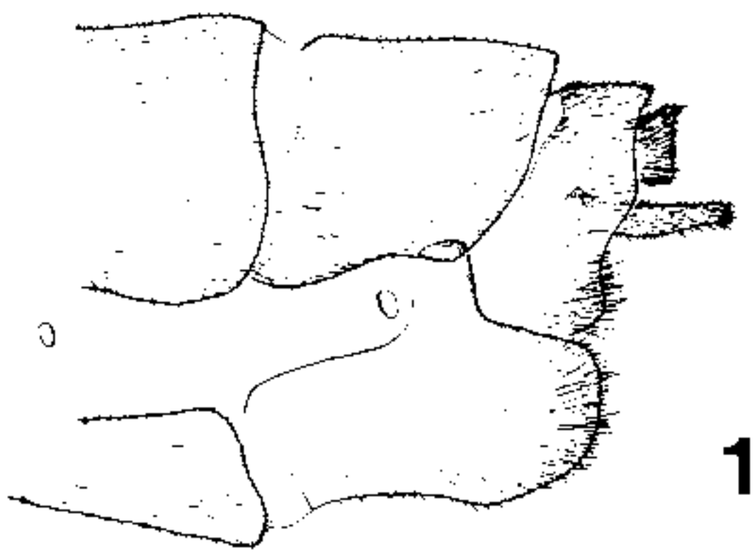

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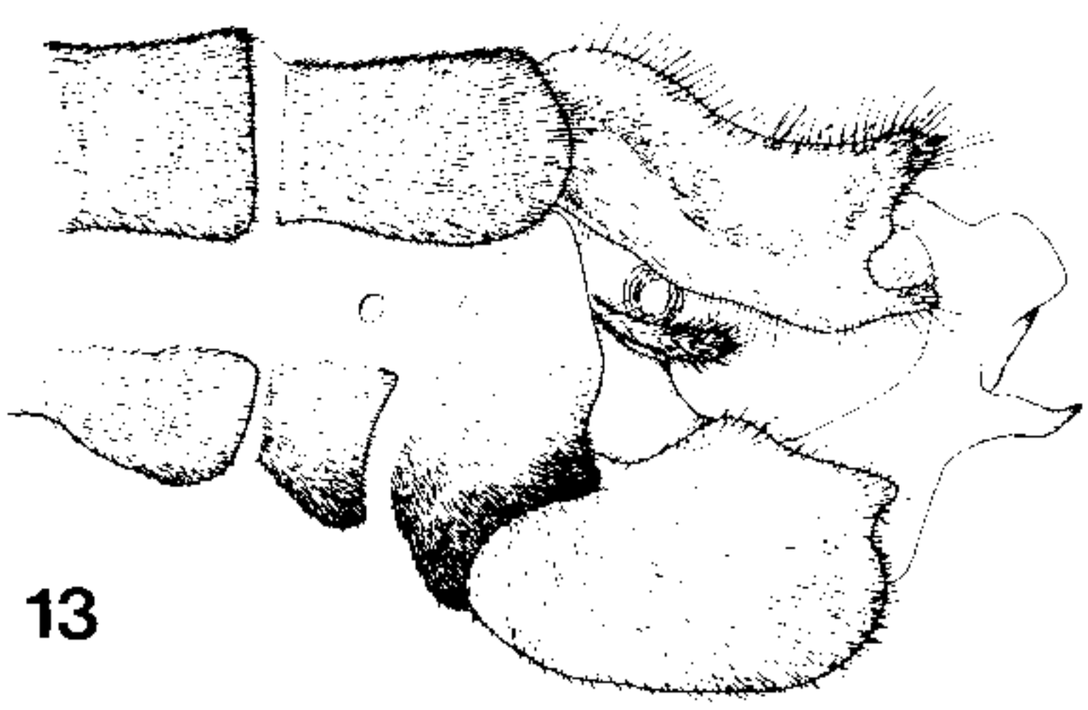
Figs. 10-12 – *Bittacus femoralis* Klug, 10) male genitalia, lateral view, 11) male genitalia, dorsal view, 12) female terminalia, lateral view (drawn by Artêmio Coelho da Silva).



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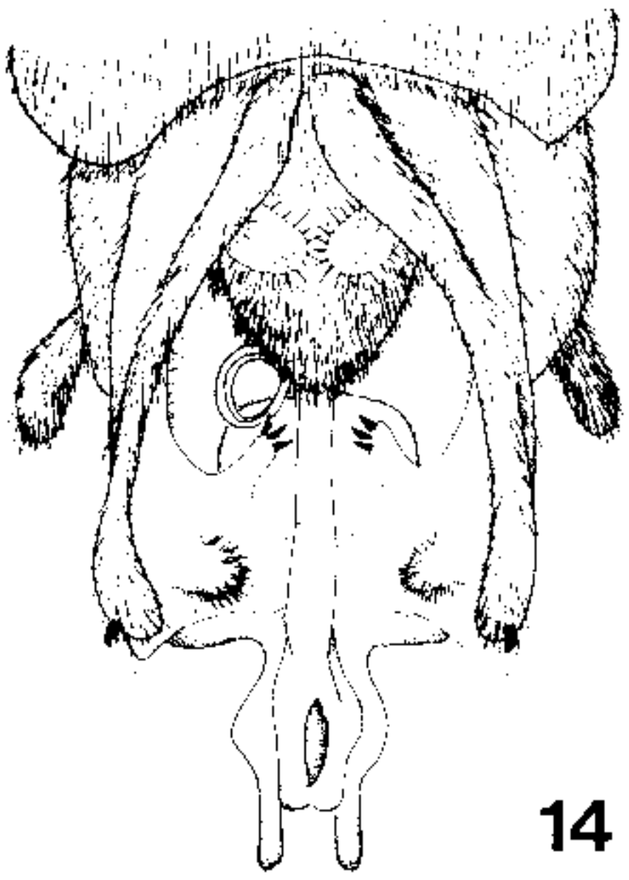

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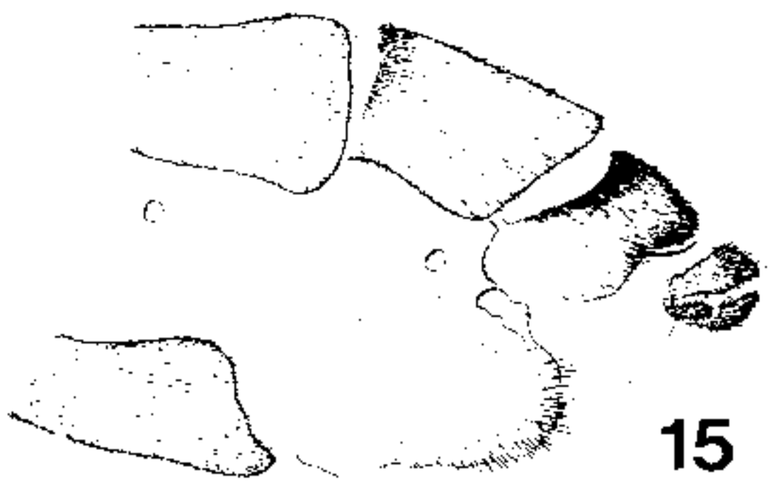

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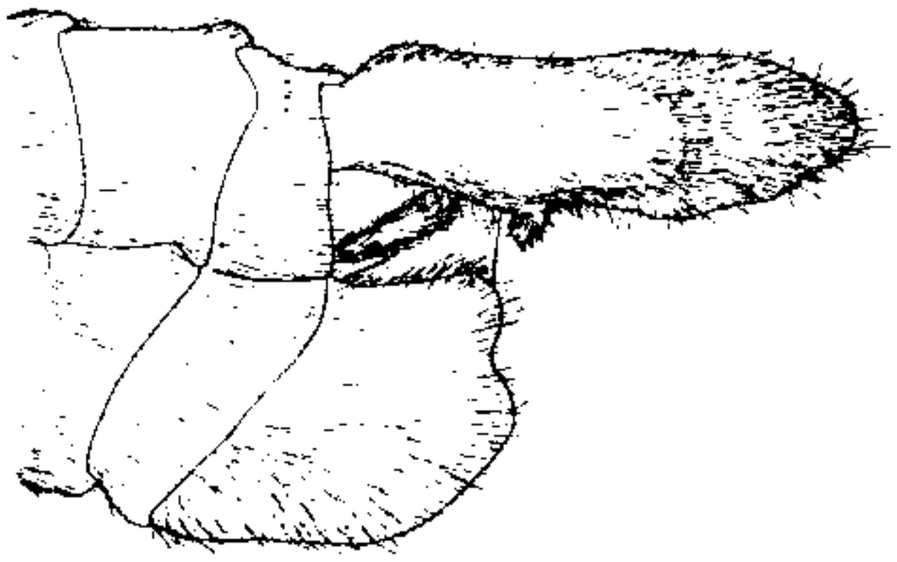
Figs. 13-15 – *Pazius ornaticaudus* Penny, 13) male genitalia, lateral view, 14) male genitalia, dorsal view, 15) female terminalia, lateral view (drawn by Artêmio Coelho da Silva).



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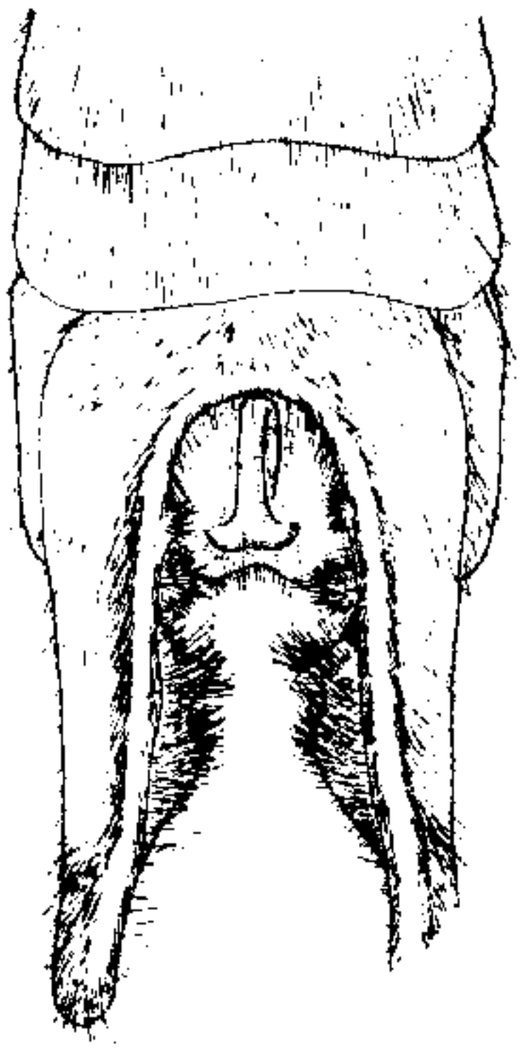

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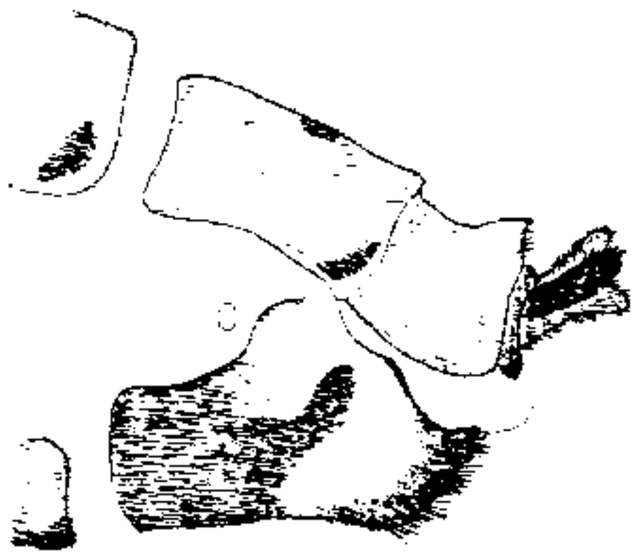

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Figs. 16-18 - *Neobittacus aripuanaensis* Penny, 16) male genitalia, lateral view, 17) male genitalia, dorsal view, 18) female terminalia, lateral view (drawn by Artêmio Coelho da Silva).

mens in a 10% KOH solution. Although we do not have enough specimens before us to draw conclusions about the usefulness of these female terminal characters for generic diagnosis, we feel that characters merit much more study.

RESUMO

Novas espécie *iella* e *Nannobittacus* são descritas e notas são apresentadas para outras espécie opteros da Amazônia.

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