Neuroptera of the Amazon Basin

Part 3 Ascalaphidae

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Abstract

The nineteen species of the family Ascalaphidae occurring in the Amazon Basin are described, and keys are given for their separation. Three new species are included.

Introduction

Ascalaphidae, or owl-flies, are large neuropterans with long, knobbed antennae and long, narrow wings. There are numerous crossveins in the fore- and hindwings, and superficially these insects resemble Odonata, although owl-flies can be quickly separated by the form of the antennae.

Most of the species of Amazonian ascalaphids were described by the earliest taxonomists, such as J.C. Fabricius, Francis Walker, H. Burmeister, and P. Rambur. Weele (1908) presented descriptions of all known ascalaphids, including Amazonian species, and most of the descriptions were accompanied by photographs and illustrations. One species of Amazonian Ascalaphidae has subsequently been described (Navás, 1927), and the present study includes three more. All Neotropical species were catalogued (Penny, 1977) and the New World classification reviewed (Penny, in press). However, no one publication has been available describing all Amazonian species of owl-flies since Weele's (1908) work. Thus, this study was developed to meet the current needs of researchers working in the Amazon Basin.

Biology: Eggs of Ascalaphidae are laid in clusters of 30 to 75 eggs on the apex of small, dead twigs. Eggs are ovoid, with a cephalic cap. Frequently in New World ascalaphids, modified eggs, called rapagula, are laid near the "true" eggs. Rapagula function to repel predatory ants, or to provide first food for new-born larvae (Henry, 1972). Newly born larvae are gregarious near the egg cluster, but after seven or eight days drop to the ground to begin terrestrial life. *Ululodes* larvae cover the spiny dorsum with sand particles giving them a camouflaged appearance. Larvae wait in the sand with mandibles open at 180° to 270° for passing arthropods, which they immediately attack, paralyze, and empty of body fluids through their hollow mandibles (Henry, 1977). Some Amazonian species (Fig. 2) are arboreal, waiting on leaves, but without sand particles on their dorsum. Larvae pass through three instars in 77 to 509 days. When ready to pupate, the larvae form balls of sand particles over their bodies and spin silken inner envelopes. The pupa is exarate and decticous. After 24 to 32 days the adults emerge. Some European species of Ascalaphidae are day-flying predators, but Amazonian species appear to be crepuscular, feeding on small, flying insects. Adult longevity is not known. *Morphology:* Past taxonomic treatments of Ascalaphidae have relied for species identification on wing venation, shape and coloration; compound eye shape; antennal length and coloration; and male abdominal shape and coloration. Few structural differences have been noted for male and female genitalia, and these have never been used for species separation. However, Tjeder (1977) has described differences among ascalaphid genitalia in a study of genera from all regions of the world. Ascalaphids from the Amazon Region are remarkable for their lack of striking genitalic characters. The two subfamilies can easily be told apart on the basis of both male and female genitalia. However, I was unable

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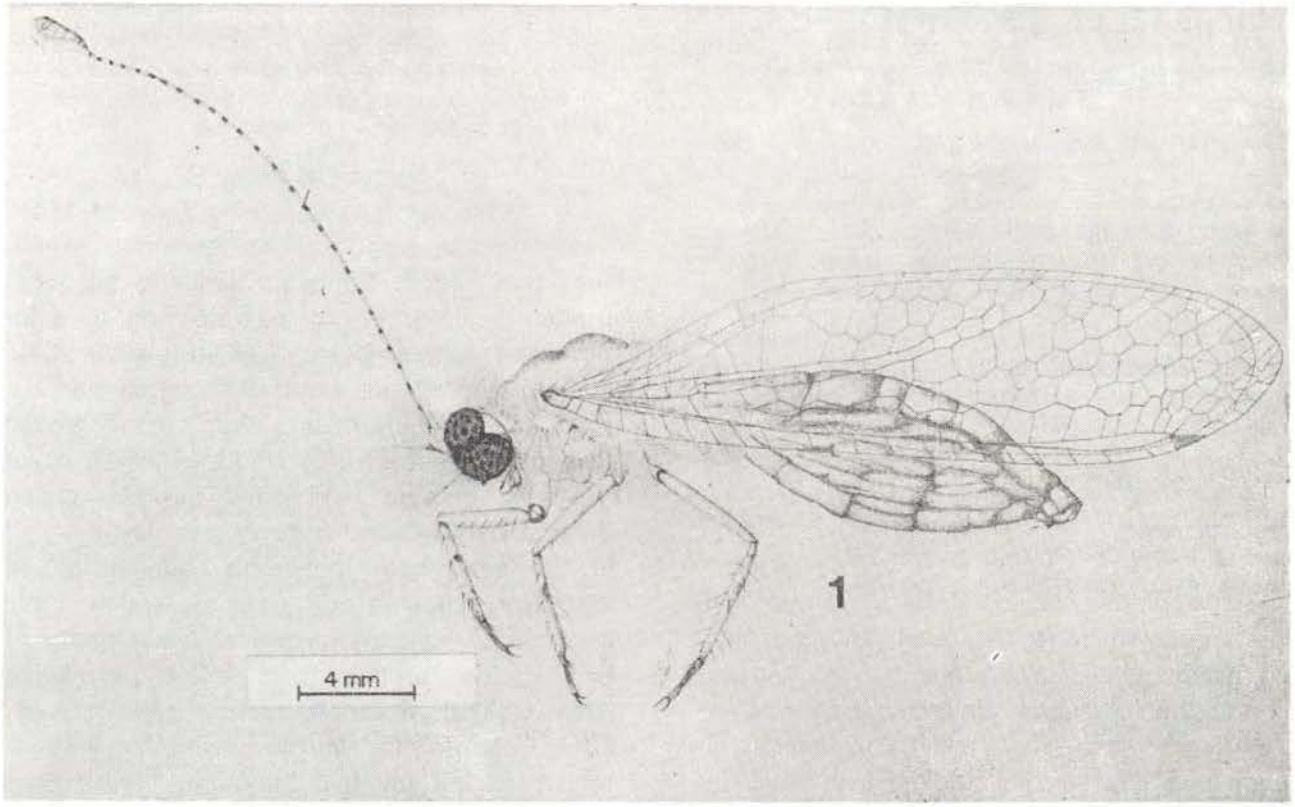


Fig. 1 — Lateral view of **Ululodes cajennensis** (Fabr.). (Drawn by Artemio Coelho da Silva).

to discern differences in genitalia great enough to even be used at generic level. Enlarged pulvini, elongate ectoprocts, setimeres, etc., were all absent from Amazonian species. The characters mentioned by Tjeder as unique to *Ululodes* and *Cordulecerus* were also found in the other two Amazonian genera of Ululodini, *Ascalorphne* and *Ameropterus*. Some differences were discernible in the male paramere-gonarcus complex, and in the pulvinus, but these differences were slight and it is felt that without study of further specimens, conclusions drawn at this time could be erroneus or misleading. Obvious wing and antennal differences are not easily correlated with the conservative genitalic structures. New (1971) and Henry (1978) have used ovariole number to a limited extent for separation of groups. However, other techniques are still needed. *Systematics:* The first species of Amazonian Ascalaphidae, *Ascalaphus cajennensis* was described by Fabricius (1787). Burmeister (1839) added the second species, *Haploglenius costatus*. Rambur (1842) added one more species, *Ulula vetula*, and Walker (1853, 1858) added four more species. MacLachlan (1871) and Selys (1871) added three species. Weele's (1908) monographic revision treated 16 species in seven genera from Amazonia, including three species and one subspecies as new. The present study includes 19 species in eight genera. The genera can be separated by the following key.

KEY TO AMAZONIAN GENERA OF ASCALAPHIDAE

1a. Eyes entire, not divided by transverse suture; female eighth tergite dorso-ventrally elongate, incorporating spiracle near ventral margin; male ninth sternite not extending caudally to apex of ectoprocts (Subfamily Haplogleniinae) 2

1b. Eyes divided by a transverse sulcus into two

parts, superior and inferior, equal or inequal; female eighth tergite not dorso-ventrally elongate, with spiracle incorporated into pleural membrane; male ninth sternite extending caudally to or beyond apex of ectoprocts (tribe Ululodini of subfamily Ascalaphinae) 5

2a. Antennae longer than distance to second Rs fork of forewing 3

2b. Antennae shorter than distance to second Rs fork of forewing ..... *Ascalobyas*

3a. Hindwing with 2A present long ..... *Haploglenius*

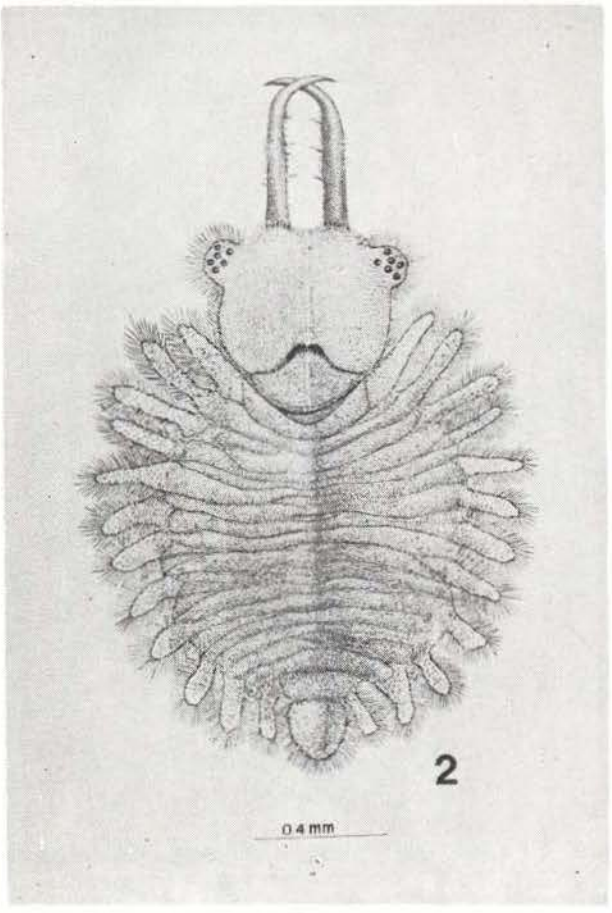


Fig. 2 — Dorsal view of larval Ascalaphidae. (Drawn by Artemio Coelho da Silva).

3b. Hindwing with 2A absent or extremely short ... 4

4a. Forewing with anal cells equally narrow proximal and distal to axillary angle ..... *Neohaploglenius*

4b. Forewing with anal cells wider distal to axillary angle than proximal, or only slight indication of axillary angle ..... *Amoea*

5a. Axillary angle of the forewing very distinct; antennae longer than forewing ..... *Ascaloryphne*

5b. Forewing smoothly curved to base, without axillary angle; antennae variable 6

6a. In hindwing CuP straight ..... Ameropterus

6b. In hindwing CuP clearly sinuous 7

7a. Hindwing long and narrow, approximately as wide at mid-length as near wing base ..... *Ululodes*

7b. Hindwing trianguloid, much wider at mid-length than near wing base ... *Cordulecerus*

SUBFAMILY HAPLOGLENIINAE Newman

Ascalobyas Penny, 1981

Byas Rambur, 1842, **Hist. nat. des Insectes.** Névroptères, p. 361 (preoccupied by **Byas** Dalman, 1820; and **Byas** Morris, 1837).

Ascalobyas Penny, 1981, **Acta Amaz.**

TYPE SPECIES: *Byas microcerus* Rambur, by monotypy.

The genus *Ascalobyas* is easily characterized by undivided eyes and very short antennae. As presently constituted, the genus includes four species ranging from Honduras to Ecuador and central Brazil. Three species are found in the Amazon Basin.

The first species of *Ascalobyas* to be described from Amazonia was *A. albistigma* by Walker in 1853. In 1871 MacLachlan described *A. terminalis* from Bates' collections along the Tapajós River, but this species was later synonomized with *A. microcerus* Rambur. In the Paris Museum are two nominal species of *Haploglenius* which are *Ascalobyas*. In the first species, *Haploglenius camposi* Navás, the syntype female agrees with the type of *Ascalobyas albistigma* (Walker), while the male syntype appears to be *A. microcerus* (Rambur). The other species, *Haploglenius dupuyi* Navás is from Rio de Janeiro, and thus does not fall into the area under discussion here. The present study describes a fourth species, *A. machadoi*. The following key separates the three known species of Amazonian *Ascalobyas*.

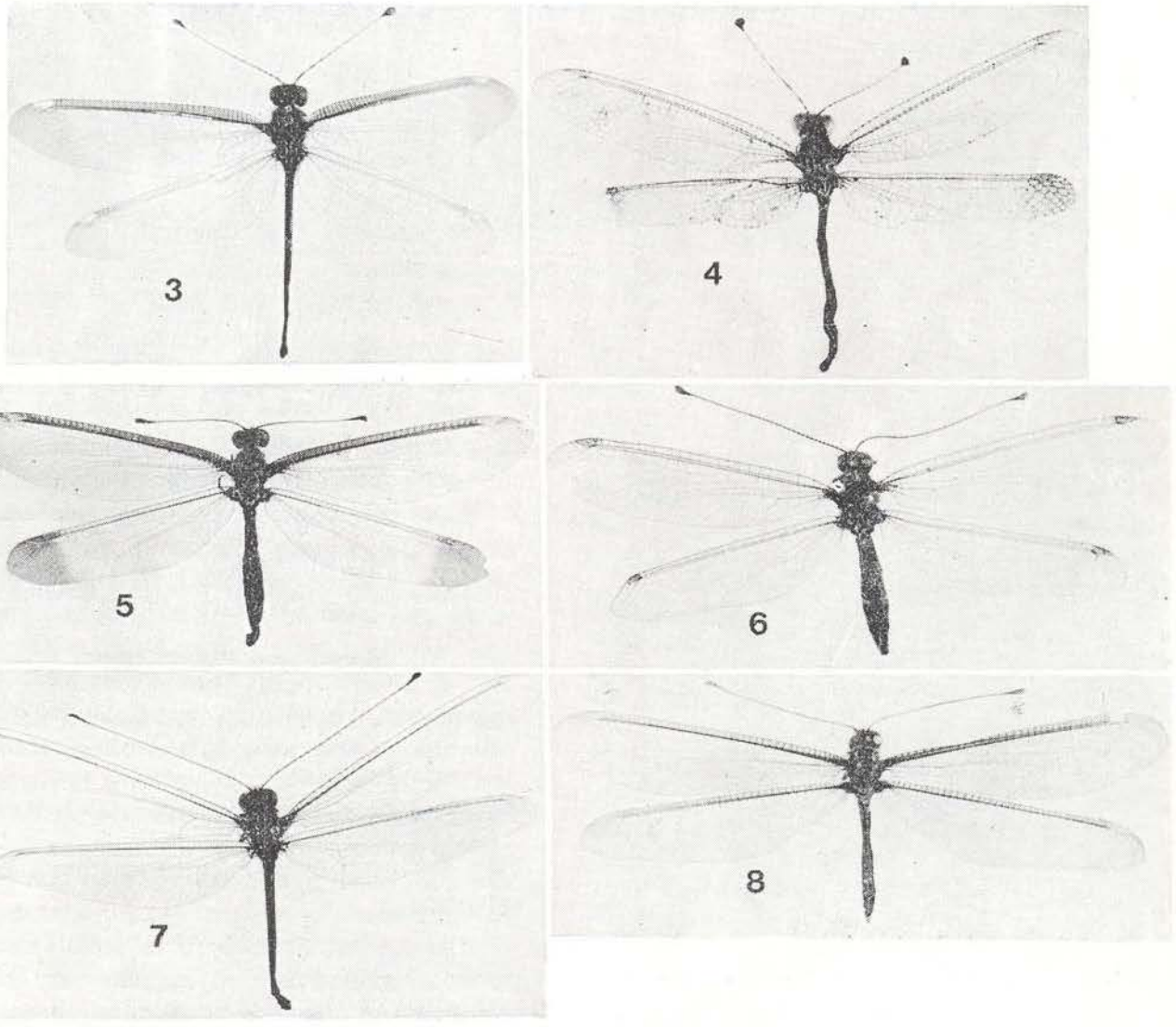
KEY TO AMAZONIAN SPECIES OF ASCALOBYAS

1a. Costal margin clear, without dark pigmentation (Fig. 4) . *A. machadoi*

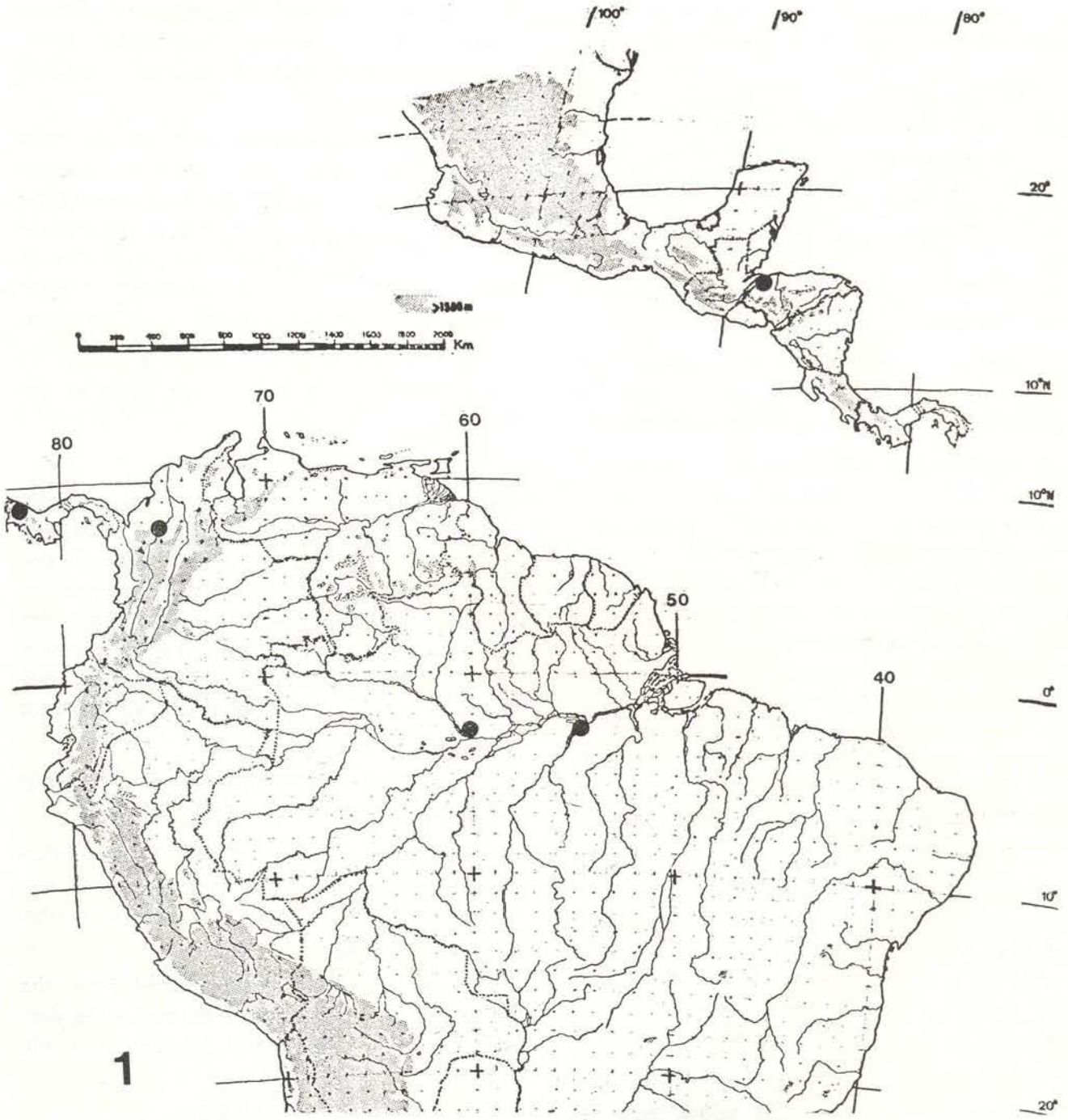
1b. Costal margin darkened from base to apex of forewing (Figs. 3, 5) 2

2a. Forewing with clear apex (Fig. 5) ..... *A. microcerus*

2b. Forewing with dark apex (Fig. 3) ..... *A. albistigma*



Figs. 3-8 — Dorsal view of: 3) — **Ascalobyas albistigma** (Walker); 4) — **Ascalobyas machadoi** n. sp.; 5) — **Ascalobyas microcerus** (Rambur); 6) — **Amoea iniquus** (Walker); 7) — **Haploglenius luteus** (Walker); 8) — **Haploglenius costatus** Burmeister.



Map 1 — Geographical distribution of **Ascalobyas albistigma** (Walker)

Ascalobyas albistigma (Walker, 1853)

(Fig. 3, Map 1)

Ascalaphus albistigma Walker, 1853, **Cat. Brit. Mus. Neuropt.**, p. 452.

Haploglenius albistigma (Walker) MacLachlan, 1871, **J. Linn. Soc. Zool.**, 11: 236.

Byas albistigma (Walker) Weele, 1908, **Coll. zool. Edm. Selys Longchamps**, 8: 30.

Ascalobyas albistigma (Walker) Penny, 1981, **Acta Amaz.**

Haploglenius terminalis MacLachlan, 1871, **J. Linn. Soc. Zool.**, 11: 235.

Haploglenius hilaris Gerstaecker, 1893, **Mitt. Vorpomm. und Rügen**, 25: 96.

Hoploglenius fervidus Gerstaecker, 1893, **Mitt. Vorpomm. und Rügen**, 25: 97.

Haploglenius camposi Navás (female), 1928, **Revta chil. Hist. nat.**, 32: 107. (new syn).

Holotype male of *Haploglenius hilaris* in Greifswald Museum, Greifswald, D.D.R.

Holotype female of *Ascalaphus albistigma* is in the Bristish Museum (Natural History), London. Two syntype males of *Haploglenius terminalis* in the British Museum (Natural History), London. Two syntype females of *Haploglenius fervidus* in Greifswald Museum, Greifswald, D.D.R. Syntype male and female of *Haploglenius camposi* in the Paris Museum, Paris, France.

Present description based on holotype of *H. albistigma,* syntype female of *H. camposi,* syntype of *H. terminalis,* and one male, pinned.

HEAD: Occiput dark brown with pale brown and white pilosity. Compound eyes without median sulcus; pale brown with brown spots. Clypeus and labrum white. Base of mandibles white, changing to dark reddish brown apically. Maxillary palpi five- segmented; basal segments whitish, gradually becoming apically reddish-brown; segments three and four with apical whorl of black hairs; first segment with four long, pale brown setae at mid-length. Antennae short, reaching laterally to about first fork of radial sector (Rs) of forewing; uniformly pale fuscous; without setae along total length.

THORAX: Pronotum narrow, collar-like, pale brown with an expanded, rounded, dorso-caudal lobe. Meso- and metanota pale brown with numerous pale brown setae. Pleural region dark brown with pale brown spots on some pleurites; no lateral stripes.

LEGS: Coxae and femora white basally. Apical part of femora and tibia pale brown. Tibial spurs long, reddish brown. Tarsal segments black. Tarsal claws reddish brown, long, nearly straight. All leg segments with black setae.

WINGS: Both fore- and hindwings elongate, narrow, without axillary angle. Costal and subcostal margins of forewing dark brown from base to wingtip, except for pterostigma. Costal margin of hindwing transparent. Distal fifth of both fore- and hindwings infuscate (sometimes rather pale). Pterostigma white, encompassing five crossveins. Cubital fork distinct. Second anal vein extremely short in forewing; short in hindwing, extending only to level of cubital fork.

ABDOMEN: Narrow for total length. Uniformly dark brown with rugose sculpting dorsally; each ruga with band of tiny yellow hairs; sparser and larger dark setae. Segments III to VII with vertical slit on each side of dorsum a little anterior to mid-length. Longer black setae protruding from terminal segments. No evidence of lateral protuberances.

MALE BODY LENGTH: 38 mm (without antennae).

FOREWING LENGTH: 37 mm.

GEOGRAPHICAL DISTRIBUTION: Weele (1908) recorded this species from Panama, Honduras and Colombia, in addition to Walker's type from the Brazilian Amazon. Within Amazonia, this species is known from the Santarém holotype, and, in addition the Systematic Entomology Collections of INPA, Manaus have a male specimen collected on the INPA campus by I.S. Gorayeb.

TEMPORAL DISTRIBUTION: The Manaus specimen was collected on 15-XII-1976.

HABITAT: The only known habitat information is that the INPA specimen was collected on the INPA campus, which is young, secondary forest.

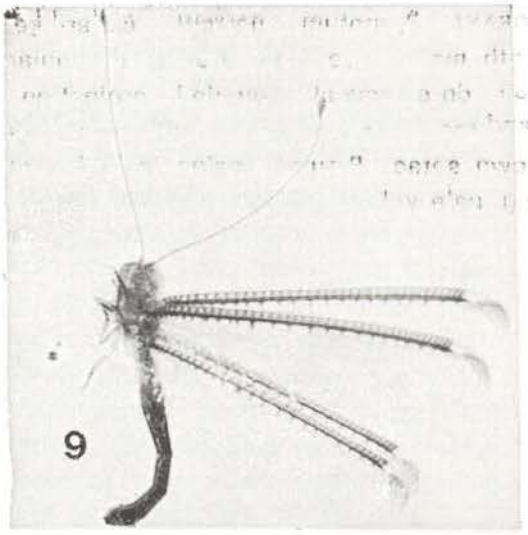
A. albistigma can be separated from the other two species in the genus by the dark pigment along the costal border and at the wingtip of the forewing.

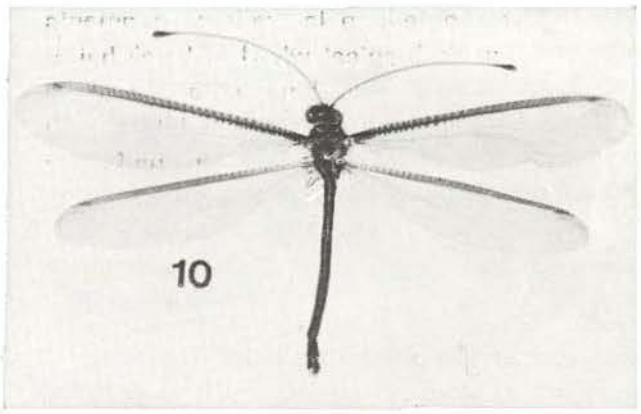
Ascalobyas machadoi n. sp.

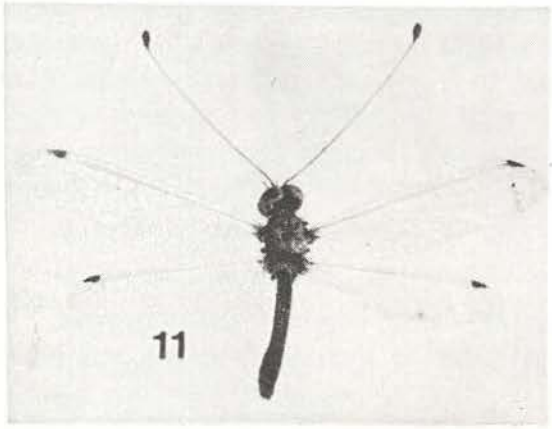
(Fig. 4, Map 2)

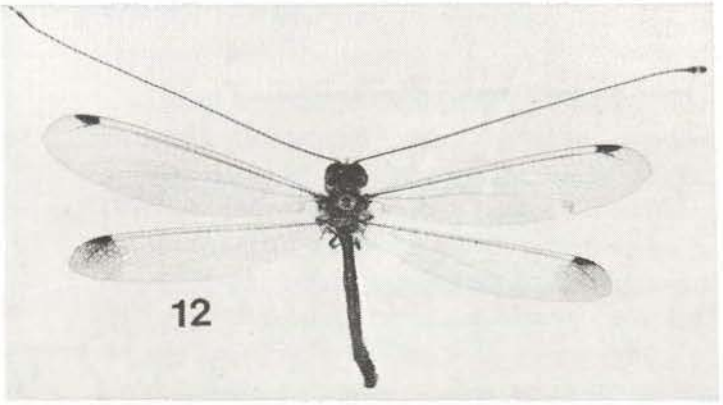
Original description based on 1 male, pinned.

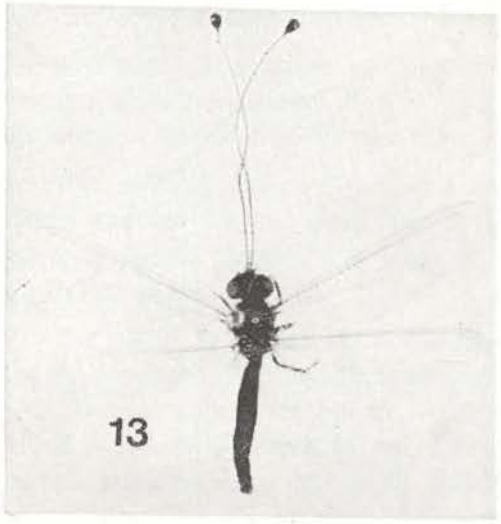
HEAD: Occiput pale brown with pale brown pilosity. Compound eyes without median sulcus; uniformly pale brown. Clypeus and labrum pale yellow. Base of mandibles pale yellow, changing to black apically. Maxillary

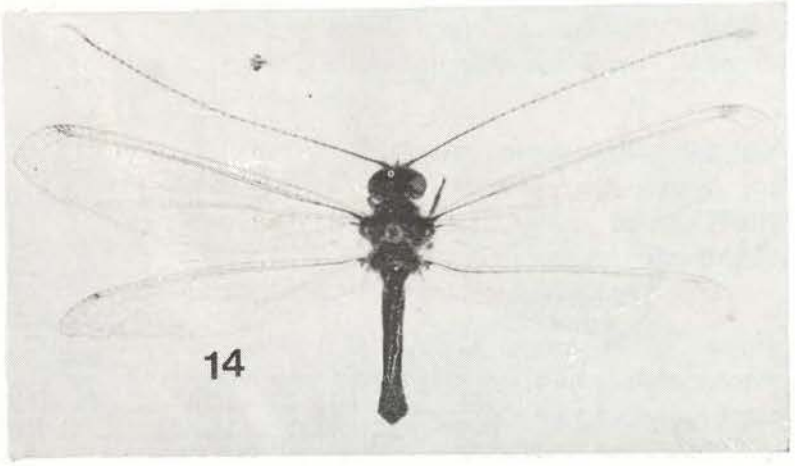








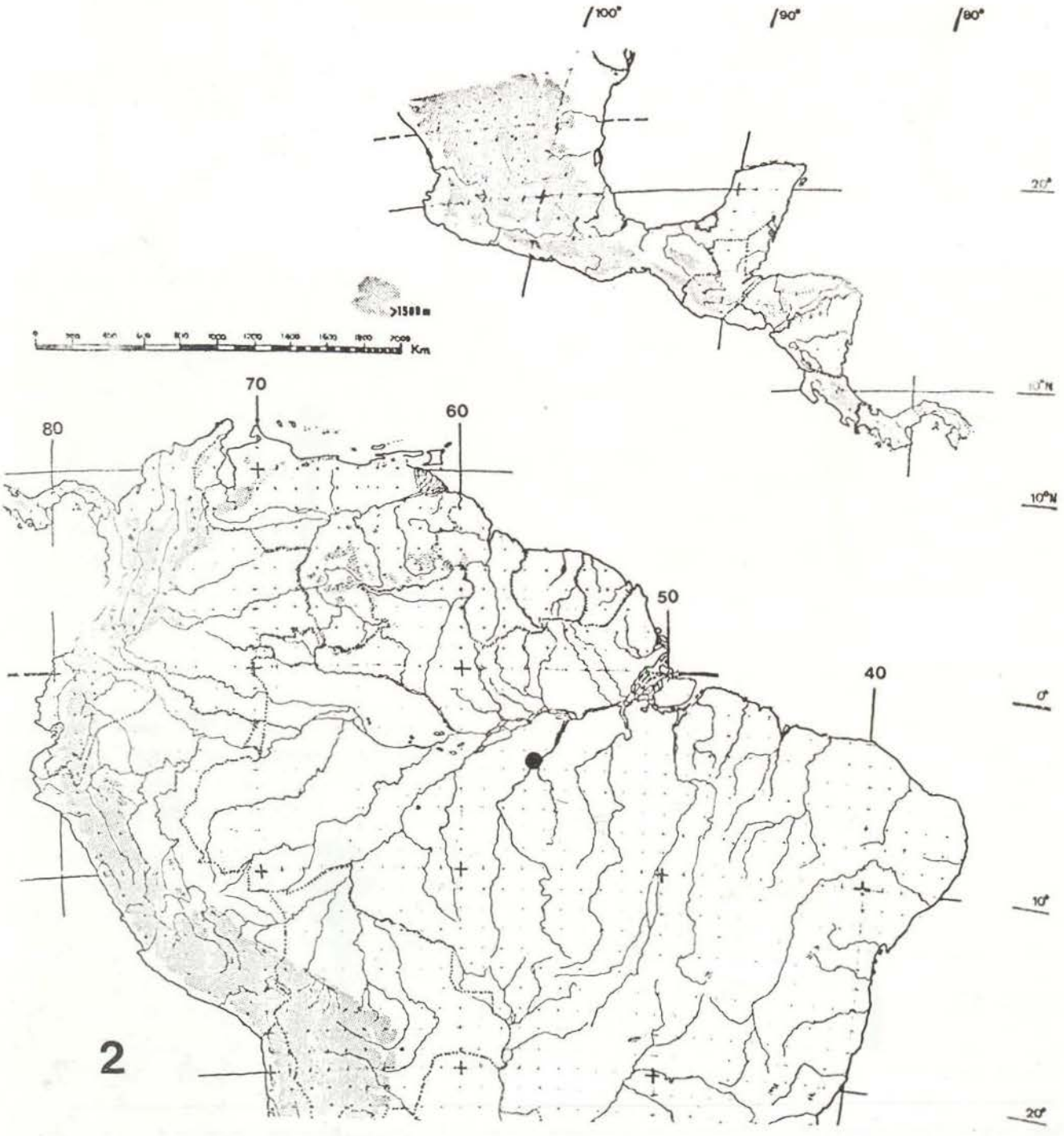




Figs. 9-14 — Dorsal view of: 9) — **Haploglenius peruvianus** Weele; 10) — **Neohaploglenius rondonianus** n. sp.; 11) — **Ameropterus breviantennis** n. sp.; 12) — **Ameropterus delicatulus** (MacLachlan); 13) — **Ameropterus dissimilis** (MacLachlan); 14) — **Ameroterus selysi** (Weele).

palpi five-segmented; pale yellow; segments three and four with apical whorl of black hairs; first segment with four, long yellowish setae at base. Antennae short, reaching laterally to about first fork of Rs of forewing; uniformly dark brown; without setae along total length.

THORAX: Pronotum narrow, collar-like, black with medial, reddish brown, triangular mark on dorso-caudal, rounded projection. Meso- and metanota pale brown with numerous pale brown setae. Pleural region pale brown with long, pale yellow setae; no lateral stripes.



Map 2 — Geographical distribution of **Ascalobyas machadoi** n. sp.

LEGS: Coxae and femora pale yellow basally. Apical part of femora and tibia pale brown. Tarsal segments reddish brown. Tarsal claws reddish brown, long, only slightly curved. All leg segments with long, black setae.

WINGS: Both fore and hindwings elongate, narrow, without axillary angle. Costal margin of forewing clear from base to apex, except for pterostigma. Costal margin of hindwing clear. Distal fifth of hindwing dark brown. Pterostigma of forewing yellowish brown, encompassing three crossveins. Cubital fork distinct. Second anal vein extremely short in forewing; short in hindwing, extending only to level of cubital fork.

ABDOMEN: Narrow for total length Uniformly reddish brown above, with only slight indication of transverse striae. Segments III to VII with vertical slit on each side of dorsum, slightly anterior to mid-length. Long black setae protruding from terminal segments. No evidence of lateral protuberances.

MALE BODY LENGTH: 35 mm.

FOREWING LENGTH: 34 mm.

GEOGRAPHICAL DISTRIBUTION: The Systematic Entomology Collections of INPA, Manaus contain one male, collected by B.C. Ratcliffe at 65 km S.W. of Itaituba on 12-15-X-1977.

TEMPORAL DISTRIBUTION: This species has been collected during October.

ECOLOGY: The INPA specimen was collected at light in a cutover area of upland forest, but within 1 km of the Tapajós River.

This species differs from the other two known species by the clear border along the forewing costal margin, and from *A. microcerus* by its smaller size.

The name is given in honor of Dr. Prof. Angelo Machado, a Brazilian specialist of Odonata, whose active interest in Neuroptera has added much information to our knowledge of the geographical distribution of this group.

Ascalobyas microcerus (Rambur, 1842)
(Fig. 5, Map 3)

Byas microcerus Rambur, 1842, **Histoire nat. des Insectes Névroptères,** p. 362.

Ascalaphus microcerus (Rambur) Walker, 1853, **Cat. Brit. Mus. Neuropt.,** p. 446.

Haploglenius microcerus (Rambur) MacLachlan, 1871, **J. Linn. Soc. Zool.,** 11: 235.

Ascalaphus leucostigma Walker, 1858, **Trans. Ent. Soc. London,** 5 (2): 195.

Hploglenius leucostigma (Walker) MacLachlan, 1871, **J. Linn. Soc. Zool.,** 11: 235.

Haploglenius camposi Navás (male), 1928, **Rveta chil. Hist. nat.,** 32: 107.

Holotype female of *Byas microcerus* and syntypes of *Haploglenius camposi* in the Paris Museum, Paris, France. Holotype female of *Ascalaphus leucostigma* in the Collection of the British Museum (Natural History), London.

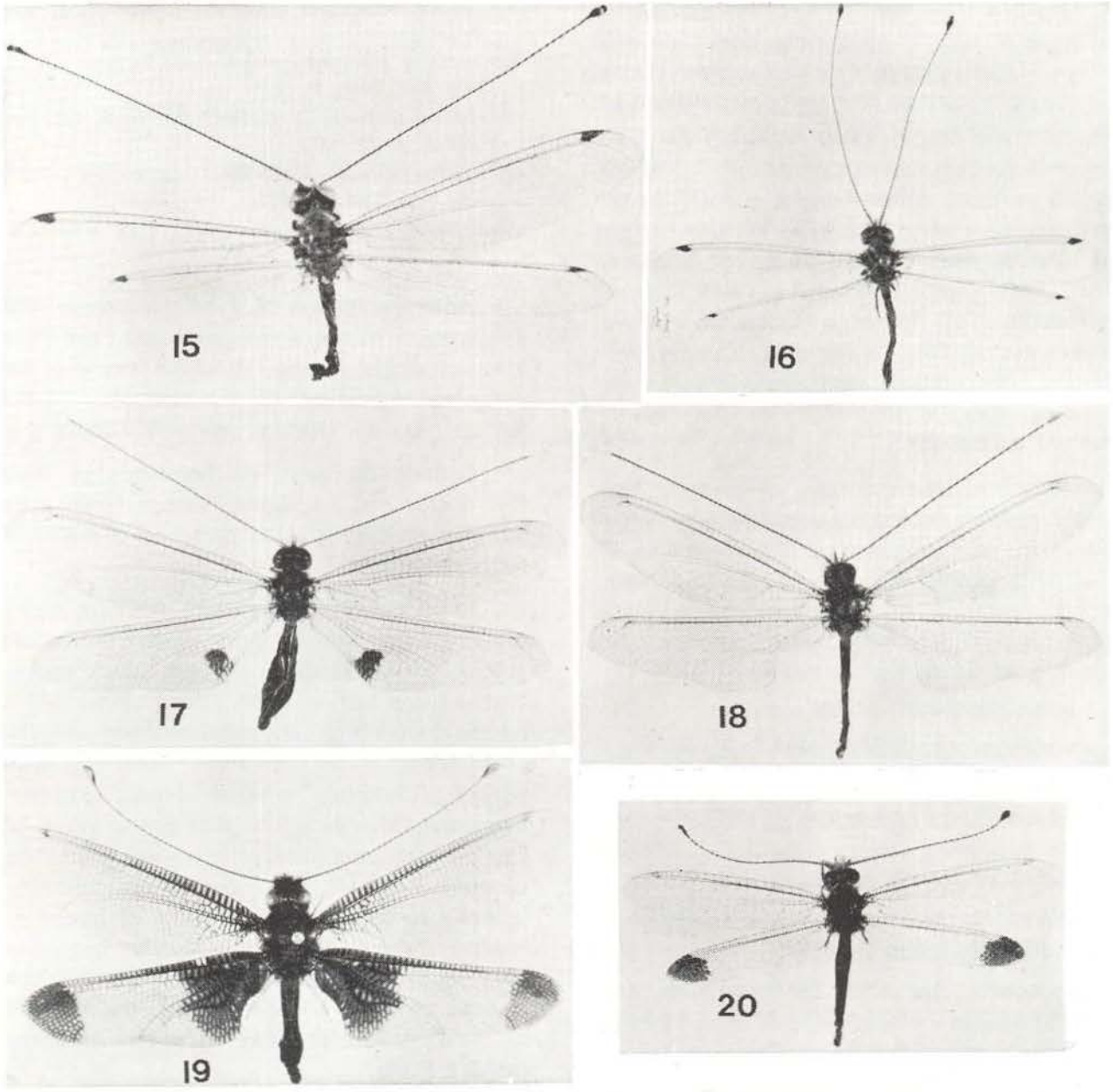
Description based on holotypes of *Byas* microcerus and *Ascalaphus leucostigma;* male syntype of *Haploglenius camposi;* 3 males, 4 females, pinned.

HEAD: Occiput pale brown with dark brown pilosity. Compound eyes without median sulcus; dark reddish brown with black spots. Clypeus and labrum white. Base of mandibles white, changing to dark reddish brown apically. Maxillary palpi five-segmented; basal segments whitish, changing to pale brown apically; segments three and four with apical whorl of black setae; long pale yellow setae at middle of first segment. Antennae short, reaching laterally to about first fork of Rs of forewing; reddish brown basally, gradually becoming pale yellow, until abruptly changing to black at base of apical knob, then abruptly changing to pale yellow at apex of knob. Antennae without setae.

THORAX: Pronotum narrow; collar-like, dark brown. Meso- and metanota pale brown with long, pale yellow and black setae. Pleural region pale brown with abundant white pilosity directly below fore- and hindwings.

LEGS: Coxae and femora white basally. Apical part of femora and tibiae pale brown. Tibial spurs large, reddish brown. Tarsal segments black. Tarsal claws reddish brown; long, nearly straight. All leg segments with black setae.

WINGS: Both fore- and hindwings elongate, narrow, without axillary angle. Costal and



Figs. 15-20 — Dorsal view of: 15) — **Ameropterus sepultus** (Walker); 16) — **Ascalorphne impavida** (Walker); 17) — **Cordulecerus elegans** Weele, female; 18) — **Cordulecerus elegans** Weele, male; 19) — **Cordulecerus maclachlani** Selys, female; 20) — **Ululodes cajennensis** (Fabr.), male.

subcostal margins of forewing dark brown from base to apex, except for pterostigma. Costal margin of hindwing clear. Remainder of forewing clear. Distal fifth of hindwing infuscate. Pterostigma yellowish brown, encompassing five crossveins. Cubital fork distinct. Second anal vein extremely short in forewing; short in hindwing, extending only to level of cubital fork.

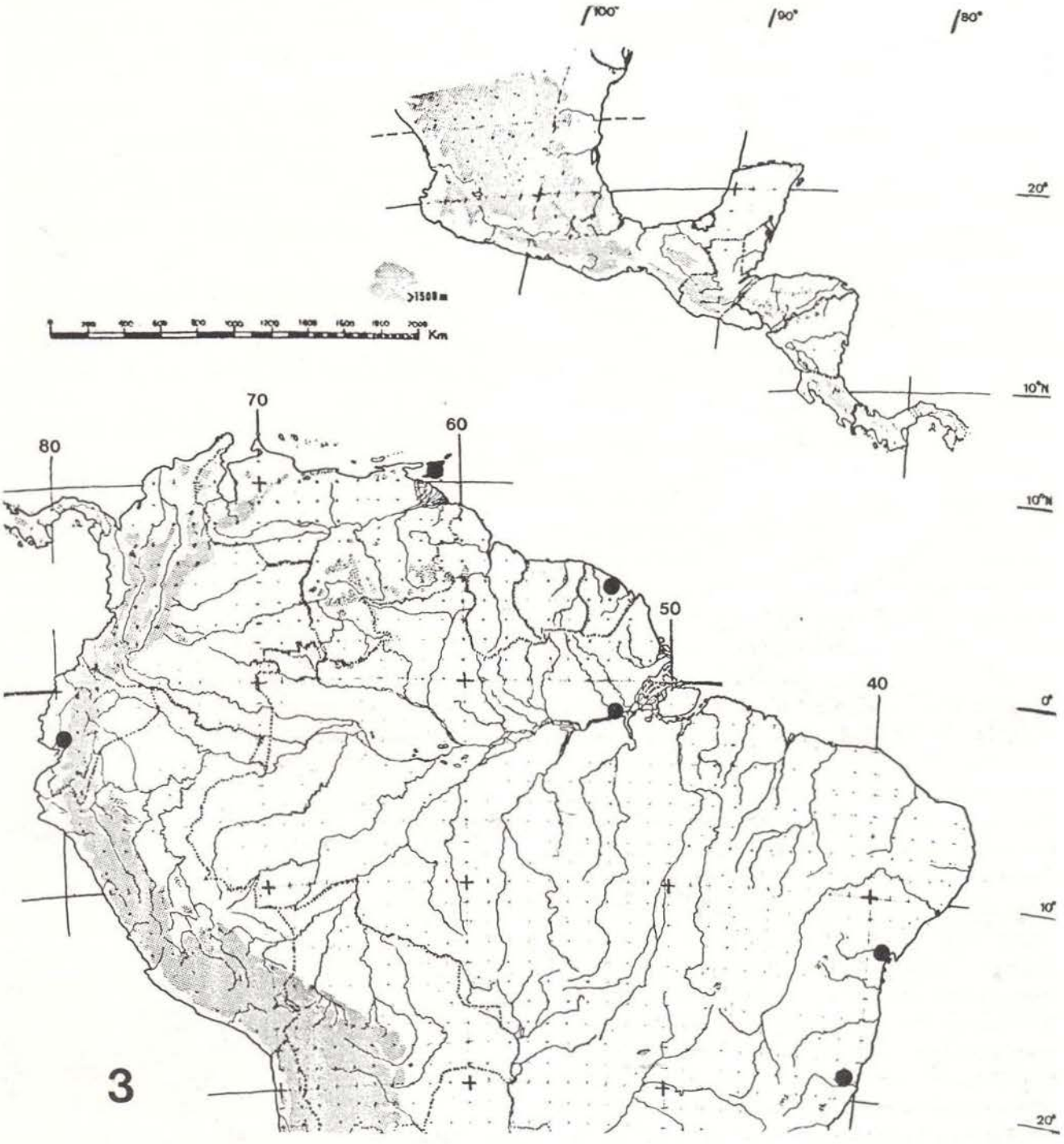
ABDOMEN: Narrow for total length; dark brown to black with pale yellow, dorsal, longitudinal line. Dorsal rugae bearing tiny hairs and larger, sparser, black setae. Segments III to VII with vertical slit on each side of dorsum, a little anterior to mid-length. Longer black setae protruding from terminal segments. No evidence of lateral protuberances.

BODY LENGTH: male, 39 mm; female, 38 mm.

FOREWING LENGTH: male, 36-40 mm; female, 39-46 mm.

VARIATION: One male from Panama has slight infuscation along the anal margin of the forewing.

GEOGRAPHICAL DISTRIBUTION: Rambur's original type material came from the Antilles in the Caribbean. Weele (1908) also mentioned specimens from Trinidad, French Guyana and the Brazilian Amazon. Navás (1912) recorded specimens from east-central Brazil, and the syntype male of *A. camposi* comes from Ecua-



Map 3 — Geographical distribution of **Ascalobyas microcerus** Rambur.

dor. Material collected by Adolpho Ducke in the Bern Museum is from Almeirim, Pará State, Brazil.

Ascalobyas microcerus is similar to *A. albistigma*, but is larger, has no pigmentation at the tip of the forewing, and has more contrastingly colored antennae among other characteristics.

Amoea Lefèbvre, 1842

Amoea Lefèbvre, 1842, **Guérin's Mag. Zool.**, 4: 6.
Episperches Gerstaecker, 1893, **Mitt. Vorpomm. und Rügen**, 25: 98.

TYPE SPECIES: of *Amoea* is *Haploglenius subcostatus* Burmeister, now considered a synonym of *Amoea immaculata* Olivier, by monotypy. Type species of *Episperches* is *Haploglenius vacuus* Gerstaecker by subsequent designation of Penny (1981). Penny (ibid.) also has designated *Episperches* as a synonym of *Amoea*.

The genus *Amoea* is similar to *Ascalobyas* and *Haploglenius*, but has longer antennae than *Ascalobyas* and no second anal vein in the hindwing, as is found in *Haploglenius*. All known species of *Amoea* have clear costal margins to the forewings, while all but two species of *Ascalobyas* and *Haploglenius* have darkly pigmented costal margins. The dorsocaudal lobe of the pronotum, which is very distinct in *Ascalobyas* and males of *Haploglenius*, is absent in *Amoea*. Gerstaecker (1893) described the genus *Episperches*, separating this new genus from *Amoea* mainly on the greater width of the basal part of the male abdomen. Penny (ibid.) has synonomized these two genera, because of the variable width of male abdomens among individuals. Amazonian specimens, although they were described as *Episperches* by Weele (1908) show none of the basal widening of the male abdomen attributed to this genus. The distributional range, as presently known, is from northern Argentina to Honduras. Penny (1977) recorded 11 species in the genera *Amoea* and *Episperches*, of which only one is known from the Amazon Basin. Three species were described by Walker in 1853. Two more species were described by Gerstaecker (1893), but were subsequently synonomized by Weele (1908). The six species mentioned by Weele (ibid.) in *Amoea* and *Episperches* are so similar as to be virtually identical. Characters used by him for species separation (coloration of the thorax) can easily be duplicated by different preservation techniques, and I suspect that age may also be important for coloration, as it is in some Odonata. Some consistent, slight differences have been noted between two size classes, but these appear to be sexual differences. Consequently, lacking any consistent differences between specimens (including the male and female genitalia), the three species described from Amazonia by Walker are herein synonomized.

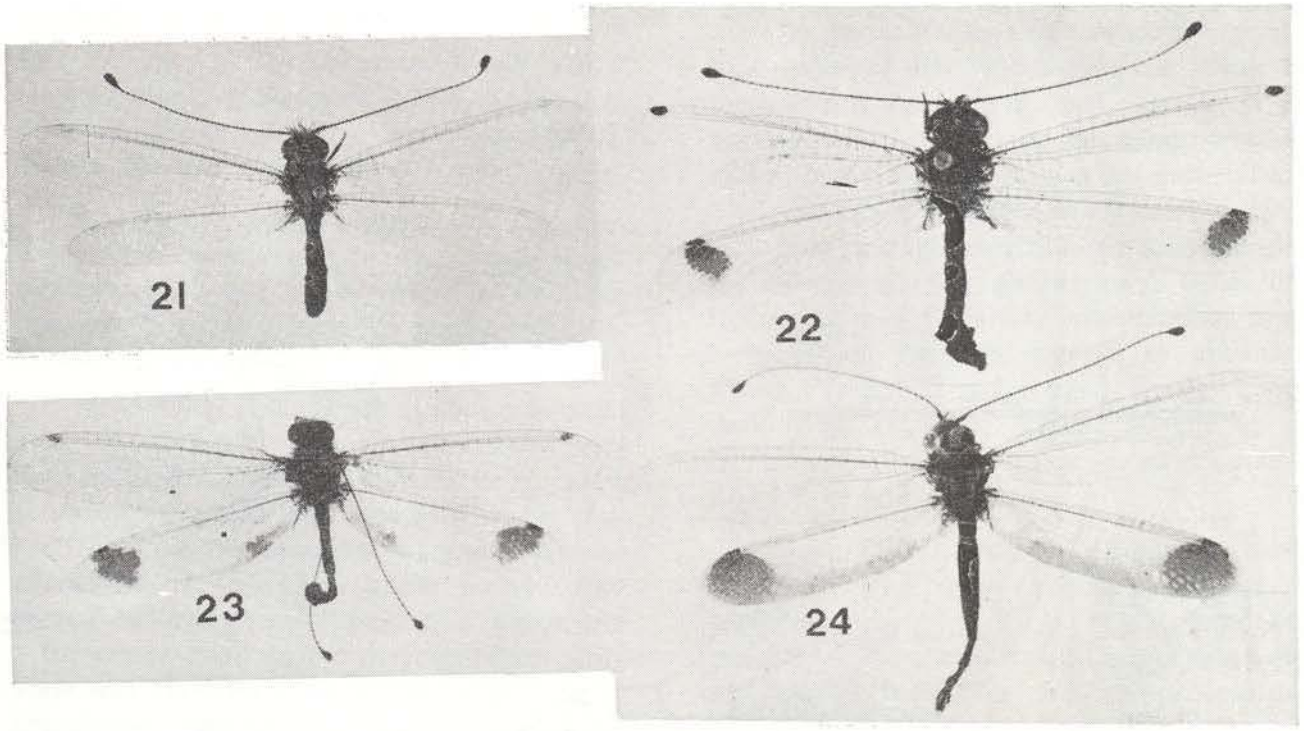
Amoea iniquus (Walker, 1853)

(Fig. 6, Map 4)

Ascalaphus iniquus Walker, 1853, **Cat. Brit. Mus. Neuropt.**, p. 448.
Haploglenius iniquus (Walker) MacLachlan, 1871, **J. Linn. Soc. Zool.**, 11: 237.
Episperches iniquus (Walker) Weele, 1908, **Coll. zool. Edm. Selys Longchamps**, 8: 39.
Ascalaphus impediens Walker, 1853, **Cat. Brit. Mus. Neuropt.**, p. 449, new synonomy.
Haploglenius impediens (Walker) MacLachlan, 1871, **J. Linn. Soc. Zool.**, 11: 238.
Episperches impediens (Walker) Weele, 1908, **Coll. zool. Edm. Selys Longchamps**, 8: 42.
Ascalaphus arenosus Walker, 1853, **Cat. Brit. Mus. Neuropt.**, p. 450, new synonomy.
Haploglenius arenosus (Walker) MacLachlan, 1871, **J. Linn. Soc. Zool.**, 11: 237.
Episperches arenosus (Walker) Weele, 1908, **Coll. zool. Edm. Selys Longchamps**, 8: 41.
Episperches taeniatus Gerstaecker, 1893, **Mitt. Vorpomm. und Rügen**, 25: 99.
Episperches irideus Gerstaecker, 1893, **Mitt. Vorpomm. und Rügen**, 25: 100.

Holotype males of *A. iniquus*, *A. impediens* and *A. arenosus* in the collection of the British Museum (Natural History), London. Two syntype males of *Episperches irideus* and male holotype of *E. taeniatus* in the Greifswald Museum, Greifswald, D.D.R.

Present description based on holotypes of *A. iniquus*, *A. impediens*, *A. arenosus*, 8 males, 7 females, 1 ?, pinned.



Figs. 21-24 — Dorsal view of: 21) — **Ululodes cajennensis** (Fabr.), female; 22) — **Ululodes macleayana** var. venezolensis; 23) — **Ululodes macleayana** var. venezolensis x limbata; 24) — **Ululodes macleayana** var. limbata.

HEAD: Dark brown with brown pilosity. Compound eyes without median sulcus; dark brown with black spots. Clypeus and labrum yellowish to brown. Base of mandible pale yellow, becoming dark brown distally. Maxillary palpi pale yellow becoming yellowish brown distally; segments three and four with apical whorl of black setae; three or four long setae at middle of first segment. Antennae reaching laterally well beyond first fork of Rs of forewing; entirely dark brown, with occasionally white dorsal surface of apical knob. Antennae without setae, except on apical knob.

THORAX: Pronotum narrow; collar-like; dark brown, with occasional transverse yellow stripe. Meso- and metanota dark brown, with occasional yellow spots at lateral margins of scutum and scutellum, spots becoming joined in two longitudinal bands in some individuals, while mesoscutellal marks form a transverse band. Intermediate forms are also present. Pleural region pale yellow dorsally, and dark brown ventrally. Males tend to have a much wider pale yellow band laterally.

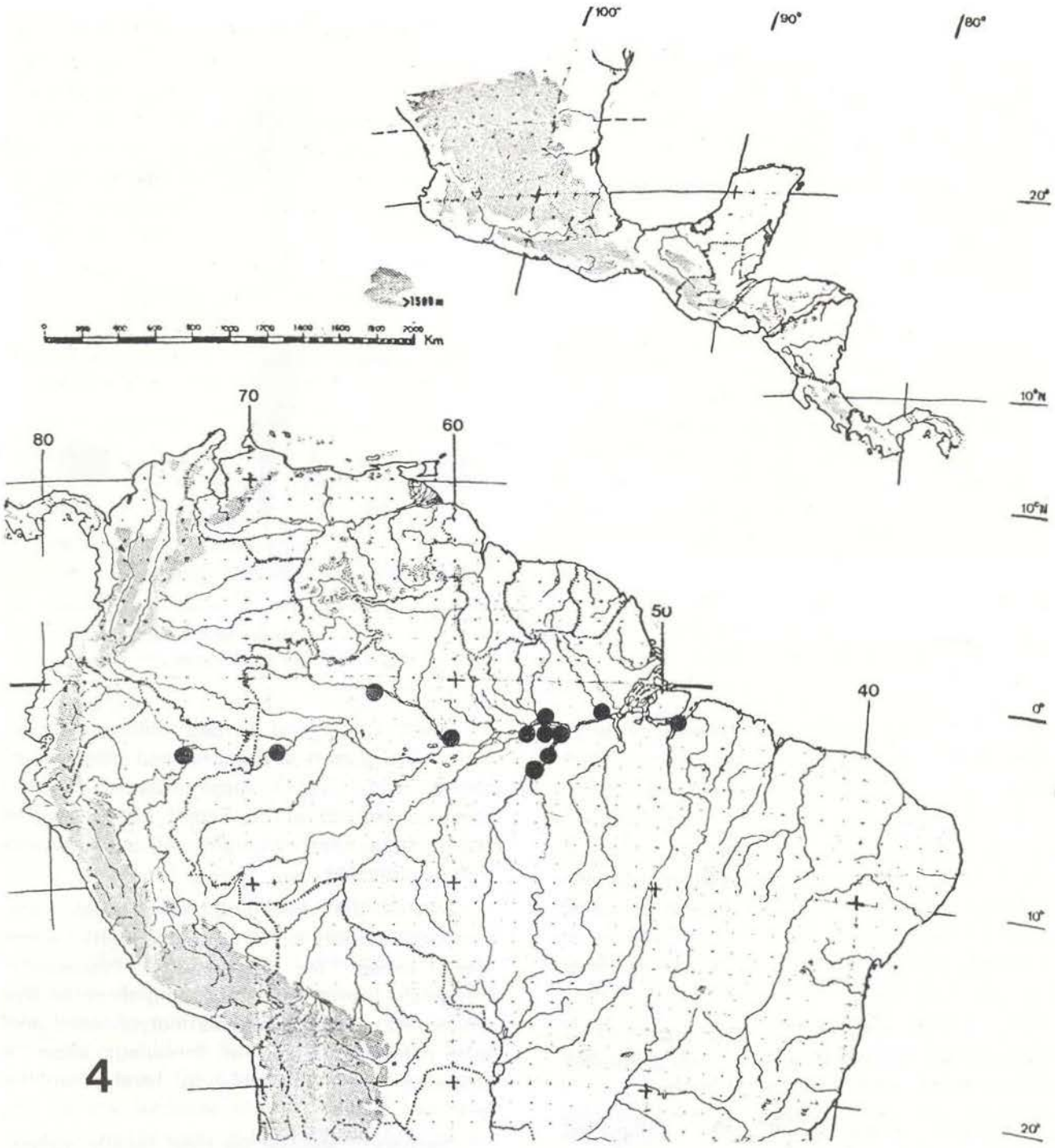
LEGS: Coxae and femora pale yellow basally. Apical part of femora and tibiae dark brown. Tibial spurs large, reddish brown. Tarsal segments black. Tarsal claws reddish brown; long, nearly straight. All leg segments with black setae.

WINGS: Both fore- and hindwings elongate, narrow, without axillary angle. Both wings clear, except for pterostigma. Pterostigma yellowish brown, encompassing three to five crossveins. Cubital fork distinct. Second anal vein extremely short in forewing; short in hindwing, extending only to level of cubital fork.

ABDOMEN: Narrow for total length; yellowish brown to black above, with black spots dorso-laterally on caudal margin of each segment and laterally over vertical slits. Darker specimens with spots obscured. Males with abundant, white pubescence in pleural region.

BODY LENGTH: male, 25-30 mm; female, 23-31 mm.

FOREWING LENGTH: male, 26-31 mm; female, 29-38 mm.



Map 4 — Geographical distribution of **Amoea iniquus** (Walker).

GEOGRAPHICAL DISTRIBUTION: Weele (1908) recorded this species from Venezuela, Brazil and Peru. Specific Amazonian localities were Brazil: Pará, Santarém; Vila Nova; Almeirim; Óbidos; Itaituba; Peru: Iquitos. Further specimens in the Systematic Entomology Collections of INPA, Manaus, are from Brazil: Amazonas, Santana, 9-VI-1977, R. Best, 2 males, 1 female; Manaus, 19-I-1979, J.A. Rafael, 1 male; Manaus, 18-IX-1978, J.A. Rafael, 1 female; Manaus, 14-IV-1977, N.D. Penny, 1 male; Manaus, 20-X-1978, A. Soares, 1 female; Manaus, 29-XI-1978, A.Y. Harada, 1 female; Manaus, 13-XI-1976, N.D. Penny, 1 female; Manaus,

9-XII-1978, J.A. Rafael, 1 female; Reserva Egler, 64 km N.E. of Manaus, 24-VIII-1970, 2 females; Pará, rio Arapium, I-1977, Kesselring, 2 males; Juruty, II-1977, Kesselring, 1 male; Óbidos, III-1962, J. Brasiliano, 1 male.

TEMPORAL DISTRIBUTION: This species appears to be present in the adult stage throughout the year in the Manaus area, but reaches maximum population levels from November to January.

VARIATION: This species shows a great deal of variability among individuals and between sexes. Darker specimens have yellow spots on the meso- and metanota which Walker (1853) used to describe *A. iniquus*. In paler specimens these yellow spots become connected into two lateral, longitudinal bands and a transverse band on the mesoscutellum This state was described by Walker (1853) as *A.* impediens. Additionally, darker specimens appear to have a uniformly dark brown abdomen, while paler specimens appear to be yellowish to reddish brown with dark brown spots dorso-laterally at the posterior end of each segment, and over the lateral, vertical slits. Further variation is noted in that males are usually smaller, with less wing reticulation. Also, the antennae may vary from dark brown to pale brown with paler coloration on the ventral surface of the apical knob. A paler specimen with ventral surface of the apical knob clearly visible was used to describe *A. arenosus*. Much of this variation is only partly visible in any one individual, thus making it difficult to maintain distinctions among *A. iniquus, A. impediens* and *A. arenosus*. As all three species were described in the same article, the name *A. iniquus* has priority because it was described first.

HABITAT: Manaus specimens have been caught in flight traps in open, swampy, cutover areas and in young secondary forests.

Haploglenius Burmeister, 1839

Haploglenius Burmeister, 1839, **Handbuch der Entomologie**, p. 1000.

TYPE SPECIES: *Haploglenius costatus* Burmeister, designated by MacLachlan (1871).

The genus Haploglenius is closely related to *Ascalobyas* and *Amoea*, but has longer antennae than *Ascalobyas*, and possesses the second anal vein of the hindwing which is absent in *Amoea*. Males have the pronotal lobe expanded into a structure which can be opened to expose a bright white, inner area, possibly for release of sex pheromones. Males also frequently have finger-like, membranous protuberances on the hind margin of abdominal pleura VII and VIII. All but one species have a dark band along the costal margin of the hindwing, which is absent in all species of *Ascalobyas* and *Amoea*.

Penny (1977) recorded 12 species in the genus, ranging from southern Mexico to northern Argentina. Penny (1981) has taken two Central American species out of this genus and placed them in a new genus, and two others (*camposi* and *dupuyi*) are actually species of *Ascalobyas*. Two new synonomies are mentioned herein for *H. bolivianus* Navás and *H. reticulatus* Navás. However, the remaining six species within the genus show a great many overlapping characteristics. Probably some of the existing names are synonyms. A thorough revision of *Haploglenius* is badly needed. Three species are recorded for the Amazon Basin. The following key will separate the Amazonian species.

KEY TO AMAZONIAN SPECIES OF HAPLOGLENIUS

1a. Costal margin of forewing clear ..... *H luteus*

1b. Costal margin of forewing with some infuscations .. 2

2a. Hindwing with dark apex; area beyond pterostigma only slightly darkened; pigmentation of costal margin not extending to radial crossveins ..... *H. costatus*

2b. Hindwing with clear apex; area beyond pterostigma very dark; pigmentation of costal margin often extending to radial crossveins .. *H. peruvianus*

Haploglenius luteus (Walker, 1853)

(Fig. 7, Map 5)

Ascalaphus luteus Walker, 1853. **Cat. Brit. Mus. Neuropt.**, p. 450.

Haploglenius luteus (Walker) Weele, 1908, **Coll. zool. Edm. Selys Longchamps**, 8: 47.

Haploglenius bolivianus Navás, 1927, **Memorie Accad. pont. Nuovi Lincei**, 10 (2): 1, n. syn.

Holotype male of *Ascalaphus luteus* in the British Museum (Natural History), London. Whereabouts of holotype male of *Haploglenius bolivianus* Navás unknown. Present description based on holotype of *H. luteus* and 8 males, 1 female, pinned.

HEAD: Occiput dark brown with black pilosity. Compound eyes without median sulcus; dark brown with black spots. Clypeus and labrum pale yellow. Base of mandible pale yellow, changing to reddish brown apically. Maxillary palpi five-segmented; basal segments pale yellow, changing to pale brown apically; segments three and four with apical whorl of black setae; two long, pale yellow setae at middle of first segment. Antennae reaching laterally to third fork of Rs of forewing; reddish brown basaly, gradually becoming black. Antennae without setae.

THORAX: Pronotum narrow, collar-like, with dorso-caudal rounded lobe in males overlapping mesonotum. Meso- and metanota dark brown with yellowish spots at lateral margins and middle of mesoscutellum. Notal region bearing numerous, long, black setae. Pleural region with three vertical, white bands; one each directly below each wing and one halfway between the other two. Other pleural areas dark brown.

LEGS: Coxae and femora pale brown. Tibiae yellow ventrally and dark brown dorsally. Tibial spurs large, reddish brown. Tarsal segments black. Tarsal claws reddish brown; long, slightly curved.

WINGS: Both fore-and hindwings elongate narrow, with slight indication of an axillary angle. Costal margins of fore- and hindwings clear from base to apex, except for pterostigma. Remainder of wings clear. Pterostigma yellow, encompassing five crossveins. Cubital fork distinct. Second anal vein extremely short in forewings; short in hindwings, extending only to level of cubital fork.

ABDOMEN: Narrow for total length; brown. Dorsal rugae bearing tiny yellow hairs and larger, sparse, black setae. Segments III to VII with vertical slit on each side of dorsum, a little anterior to mid-length. Longer black setae protruding from terminal segments. Lateral protuberances at caudal margin of segments VII and VIII of males. Protuberance of segment VII longer than VIII.

BODY LENGTH: male, 37-38 mm; female, 36 mm.

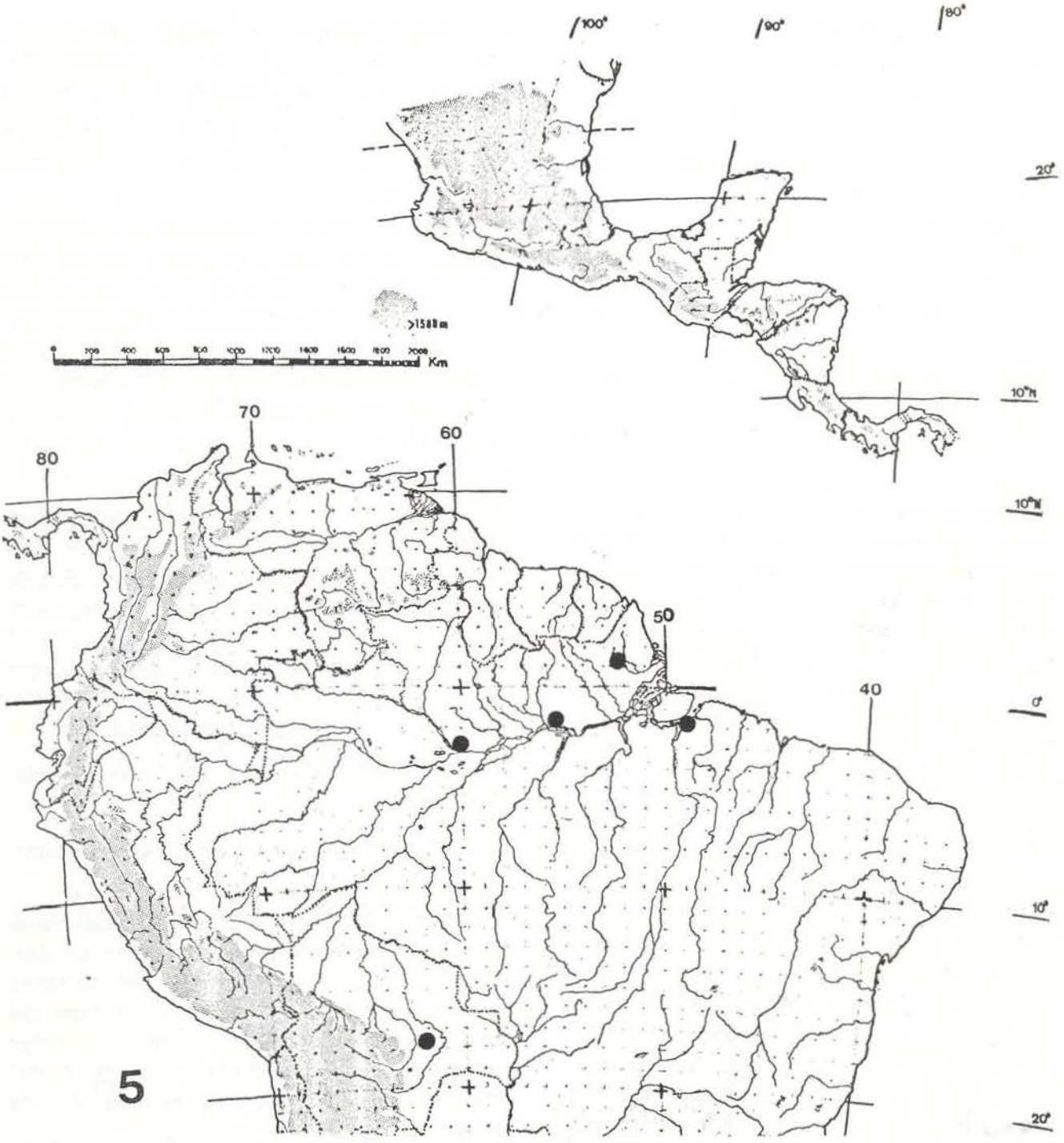
FOREWING LENGTH: male, 44-47 mm; female, 44 mm.

GEOGRAPHICAL DISTRIBUTION: Walker's holotype has no recorded locality data. Navás recorded a male holotype of *H. bolivianus* from Bolivia: Santa Cruz, Buena Vista. Additional specimens in the Systematic Entomology Collections of INPA, Manaus are: Brazil: Amazonas, Manaus, 25-VI-1976, N. Meganon, 1 male; Manaus, 15-II-1977, I.S. Gorayeb, 1 male; Manaus, 10-II-1978, W.E. Kerr; Manaus. 15-II-1978, A. Soares, 1 male; Manaus, 29-VI-1979, L.A. Lacey, 1 male; Pará, Óbidos, J.B. Ferreira, 1 female; Amapá, Serra do Navio, II-1957, A. Machado, 1 male. Two additional males from Museu Goeldi, Belém, Pará, are from Brazil: Pará, Belém, Mocambo, 7-IV-1978; Utinga, II-1938, A. Pinheiro.

TEMPORAL DISTRIBUTION: This species has been collected in Feb., March, April and June.

HABITAT: This species has been collected in open fields and young secondary forest, and is attracted to light.

H. luteus is the only species of *Haploglenius* with clear costal margin of the forewings. It is clearly a species of *Haploglenius* because of the relatively long antennae, enlarged pronotal lobe, and presence of the secondary anal vein in the hindwing.



Map 5 — Geographical distribution of **Haploglenius luteus** (Walker).

In Weele's (1908) monograph of the Ascalaphidae, the description of *H. luteus* is actually of *H. costatus*. Apparently Weele never saw the holotype in the British Museum (Natural History). This is probably what led Navás in 1927 to describe a second species with transparent costal margin to the wings. In this 1928 description of *Haploglenius camposi*, Navás lists species of *Haploglenius* with differentiating characteristics. Only *bolivianus* was mentioned as having a clear costal margin, although the holotype of *luteus* also has a clear costal margin. As no other characters were given by Navás which could be used for separating *H. luteus* from *H. bolivianus*, and because *H. luteus* is a common species through-

out the Amazon Basin, and quite likely occurs in the type locality of *bolivianus*, the species of Navás is being synonomized.

Haploglenius costatus Burmeister, 1839

(Fig. 8, Map 6)

Haploglenius costatus Burmeister, 1839, **Handbuch der Entomologie**, II. Berlin. p. 1000.

Ascalaphus circumflexus Walker, 1853, **Cat. Brit. Mus. Neuropt.**, p. 451.

Ascalaphus contrarius Walker, 1853, **Cat. Brit. Mus. Neuropt.**, p. 452.

Haploglenius pictus Gerstaecker, 1884, **Mitt. Vorpomm. und Rügen**, 16: 2.

Holotype of *H. costatus* in Hallenser Collection; holotype females of *H. circumflexus* and *H. contrarius* in the British Museum (Natural History), London. Two female syntypes of H. pictus in Greifswald Museum, Greifswald, D.D.R.

Present description based on types of *H. circumflexus* and *H. contrarius* and 12 males, 16 females, 5?, pinned.

HEAD: Occiput dark brown with dark brown pilosity. Compound eyes without median sulcus; dark brown with black spots. Clypeus and labrum yellowish brown. Base of mandible yellowish brown, changing to dark brown apically. Maxillary palpi five- segmented; basal segments pale yellow, changing to pale brown distally; segments three and four with apical whorl of black setae; two long, dark setae at middle of first segment. Antennae reaching lateraly to second fork of Rs of forewing; pale reddish brown basally, becoming dark reddish brown apically. Antennae without setae, except for apical knob.

THORAX: Pronotum narrow; collar-like; dark brown; with dorso-caudal, rounded lobe. Meso- and metanota dark brown, without markings. Pleural region with a vertical, white stripe below each wing base. Numerous setae pale brown to yellowish.

LEGS: Coxae and femora dark brown. Tibia dark brown dorsally, pale yellow ventrally. Tibial spurs long, reddish brown. Tarsal segments black. Tarsal claws reddish brown, long, slightly curved. All leg segments with black setae.

WINGS: Both fore- and hindwings elongate, narrow, without axillary angle. Costal and subcostal margins of both wings dark brown from base do apex. Remainder of wings clear. Pterostigma dark brown, encompassing five to six crossveins. Cubital fork of forewing distinct. Second anal vein of forewing extremely short; short in hindwing, extending to level of cubital fork.

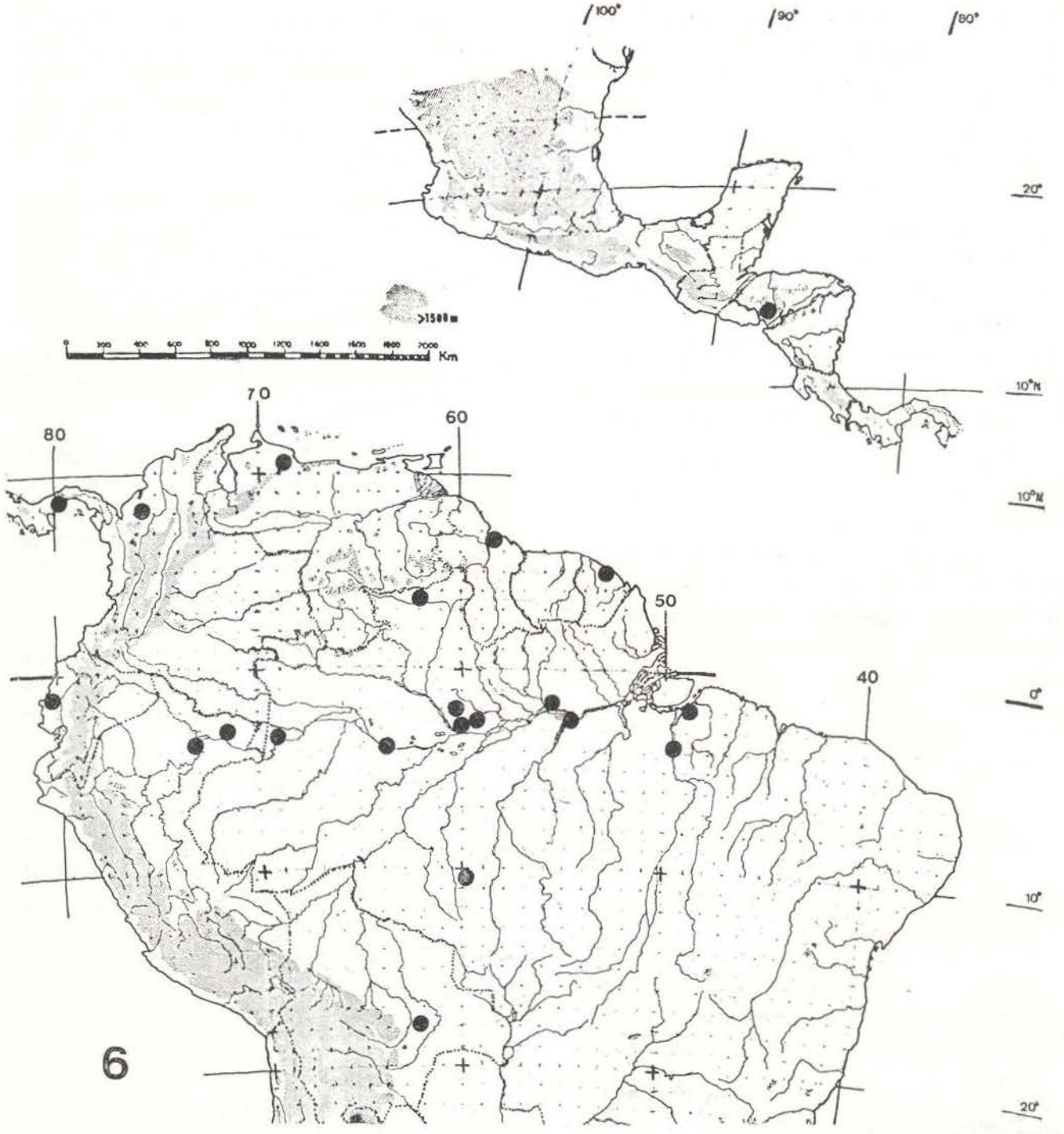
ABDOMEN: Narrow for total length; dark brown. Dorsal rugae bearing tiny, yellow pilosity and larger, sparse, black setae. Female with diagonal yellow lines laterally. Segments III to VII with vertical slit on each side of dorsum, a little anterior to midlength. Longer black setae protruding from terminal segments. Lateral protuberances not developed.

BODY LENGTH: male, 32-43 mm; female 31-37 mm.

FOREWING LENGTH: male, 39-47 mm; female, 41-52 mm.

VARIATION: There is a great deal of variation in wing pigmentation within this species. Specimens from the northern part of the range have a paler stigma, and specimens from the northwestern part of the range have darker wing apices. Some individuals have the costal margin paler than normal, perhaps due to recent emergence.

GEOGRAPHICAL DISTRIBUTION: Weele (1908) listed this species (as *H. luteus*) from Honduras, Panama, Colombia, Venezuela, Ecuador, Peru, Bolivia, Guyana, French Guyana and Brazil. Williner (1945) further lists this species from Argentina. Within the Amazon Basin, *H. costatus* is known from Peru: Iquitos; Pebas; Brazil: Pará, Santarém; Amazonas, Coari and São Paulo de Olivença. Further Amazonian ma-



Map 6 — Geographical distribution of **Haploglenius costatus** Burmeister.

terial in the Systematic Entomology Collections of INPA, Manaus, are: Brazil: Pará, Óbidos, VIII-1962, J.B. Ferreira, 1 female; Tucuruí, rio Tocantins, 12-16-VI-1980, J.A. Rafael, 1 male; Amazonas, Manaus, 13-IV-1979, L.A. Lacey, 1 female; Manaus, 19-IV-1977, N. Paraluppi, 1 female;; 14 km N of Manaus, 9-IV-1981, R.F. da Silva, 1 female; Reserva Ducke, 26 km north of Manaus, 13-II-1980, B. Mascarenhas, 1 male; 30 km north of Manaus, 31-I-1979. N.D. Penny, 1 male; 45 km north of Manaus, 14-I-1977, N.D. Penny, 1 male; 134 km east of Manaus, 10-VII-1968, 1 female; São Paulo de Olivença, Aparicio, 1 male; Mato Grosso, Aripuanã,

27-IX-1975, L.P. Albuquerque, 1 female; Aripuanã, 16-22-III-1977, B.C. Ratc'iffe, 1 male; Aripuanã, 17-III-1977, N.D. Penny, 1 male; Roraima, ilha de Maracá, 9-XI-1980, E. Fernandez, 1 male; Bolivia: Santa Cruz, Buena Vista, III-1951, Martinez, 1 female. There is one additional female in the Invertebrate Collection of Museu Paraense Emilio Goeldi from Brazil: Pará, Município Benevides, Faz. Morelândia, 24-III-1981, Soter.

TEMPORAL DISTRIBUTION: Records indicate that this species can be collected the whole year, but most records are concentrated in the first four months of the year.

HABITAT: This species has been collected in primary forest, at forest ecotome, and is attracted to light.

This species is separated from *H. luteus* by the dark markings along the costal margins of the wings, and from *H. peruvianus* and *H. handlirschi* by the relatively pale markings beyond the pterostigma. *H. handlirschi* additiionally has a very dark stigmal area, and *H. peruvianus* often has markings along the radial crossveins.

Haploglenius peruvianus Weele, 1908

(Fig. 9, Map 7)

Haploglenius peruvianus Weele, 1908, **Coll. zool. Edm. Selys Longchamps,** 8: 44.

Three male, 1 female syntypes in the Weele Collection, Leyden Museum, Holland. Present description based on 2 males, pinned.

HEAD: Occiput dark brown. Compound eyes without median sulcus; gray with black flecks. Clypeus and labrum yellow. Base of mandible yellowish-brown, changing to dark brown apically. Maxillary palpi five-segmented; pale yellow throughout; segments three and four with apical whorl of black setae. Antennae reaching laterally to second or third fork of Rs of forewing; dark brown throughout, except for white spot on dorsal surface of apical knob. Antennae without setae, except for apical knob.

THORAX: Pronotum narrow, collar-like; dark brown; with dorso-caudal, rounded lobe. Meso- and metanota dark fuscous, without markings. Pleural region a vertical, white stripe below each wing base. Numerous setae pale brown to yellowish.

LEGS: Coxae dark fuscous. Dorsal surface of fore- and mid femora and tibiae pale fuscous; ventral surface of same femora and tibiae yellow. Posterior femora and tibiae completely yellow. Tibial spurs short, reddish brown. Tarsal sgments black. Tarsal claws reddish brown, long, slightly curved. All leg segments with long black setae.

WINGS: Both fore- and hindwings elongate, narrow, without axillary angle. Costal and subcostal margins of both wings dark fuscous from base to pterostigma; abruptly changing to dark fuscous in postptersotigmal region. Remainder of both wings transparent with some irridescense. Pterostigma encompasses four to five crossveins. Cubital fork of both wings distinct. Second anal vein of forewing extremely short; short in hindwing, extending to level of cubital fork.

ABDOMEN: Narrow for total length; dark brown. Dorsal rugae bearing tiny, yellow hairs. Larger, sparser black setae ventrally. Segments III to VII with vertical slit on each side of dorsum, a little anterior to mid-length. Last two abdominal tergites and lateral protuberances of segments VII and VIII white.

BODY LENGTH: male, 34 mm.

FOREWING LENGTH: male, 42 mm.

GEOGRAPHICAL DISTRIBUTION: The original type series of *H. peruvianus* was from Chanchamayo, Peru. Navás (1928) also reported this species from Buena Vista, Santa Cruz Dept., Bolivia. Two additional males in the Systematic Entomology Collection of INPA, Manaus are from Brazil: Pará, rio Arapium, I-1977, Kesselring, and Mato Grosso, Aripuanã, 27-IX-1975, L.P. Albuquerque, 1 male. This species appears to be infrequently collected in the western part of Amazonia, as far east as the western part of Pará state.

Map 7 — Geographical distribution of **Haploglenius peruvianus** Weele.

This species is very similar to *H. costatus*, with dark costal margin and pale pterostigma of both wings. However, *H. peruvianus* has a much darker postpterostigmal area and complete lack of infuscation of the apex of the hindwing (apparent only in more western specimens of *H. costatus*). The Amazonian specimens of *H. peruvianus* also have dark pigmentation along radial crossveins. Despite these differences, the two species remain quite close morphologically, and further study may reveal them to be different forms of the same species. The male genitalia of *H. peruvianus* from Amazonia have a wider, less sclerotized

gonarcus that forms a smaller arch than in *H. costatus*, but this, too, is a difference of degrees.

Neohaploglenius Penny (in press)

Neohaploglenius Penny, 1981, **Acta Amaz.**

TYPE SPECIES: *Haploglenius flavicornis* MacLachlan.

This genus appears superficially to resemble Haploglenius, with relatively long antennae and dark costal margin of the forewing; but additionally has a very distinctive axillary angle in the forewing and lacks the second anal vein in the hindwing. Male parameres are relatively quite small.

The genus was erected in 1981 for two Central American species, *Haploglenius angulatus* Gerstaecker and *Haploglenius flavicornis* MacLachlan. The known geographical range was from Mexico southward to Panama. However, recent Brazilian collections indicate a much wider range for the genus, with a third species described below. These are the first records of this genus from South America.

Neohaploglenius rondonianus, n. sp.

(Fig. 10, Map 8)

Holotype male and allotype female in the Systematic Entomology Collections of INPA, Manaus. Paratypes in the National Museum of Natural History, Washington, D.C., U.S.A., and Universidade Federal de Minas Gerais, Belo Horizonte, Brazil. Original description based on 2 males, 2 females, pinned.

HEAD: Occiput reddish brown, with black pilosity. Compound eyes without median sulcus; dark reddish brown to black. Clypeus and labrum pale brown. Base of mandibles pale brown, changing to dark reddish brown apically. Maxillary palpi five-segmented; yellowish brown; segments three and four with apical whorl of black setae; three long, black setae at middle of first segment. Antennae laterally reaching to third fork of Rs of forewing; reddish brown. Antennae without setae.

THORAX: Pronotum narrow, collar-like, reddish brown; dorso-caudal, rounded lobe in males overlapping mesonotum. Meso- and metanota dark brown with pale brown markings lateral to pronotal lobe and caudal margin of mesoscutellum. Pleural region with two vertical pale stripes, one below each wing base; anterior stripe pale yellow, posterior stripe white. Thoracic pilosity black dorsally, pale yellow laterally.

LEGS: Coxae pale brown. Femora and dorsal part of tibia dark brown to reddish brown. Ventral part of tibia pale yellow. Tibial spurs large, reddish brown. Tarsal segments pale reddish brown. Tarsal claws reddish brown; long, slightly curved. All leg segments with black setae.

WINGS: Both fore- and hindwings elongate, narrow, with distinct axillary angle. Costal area of both wings dark brown from base to apex. Distal part of pterostigma, subcostal area, and along R_1 vein bright yellow in life, fading to pale yellow in preserved material. Remainder of forewing amber tinted. Cubital fork of forewing distinct. Second anal vein extremely short in forewing; absent in hindwing.

ABDOMEN: Narrow for total length; dark brown to reddish brown. Dorsal rugae bearing tiny, yellow hairs and larger, sparse black setae. Segments III to VII with vertical slit on each side of dorsum, a little anterior to mid-lenght. Longer black setae protruding from pale yellow terminal segments. Lateral protuberances developed, that of segment VII longer than segment VIII.

BODY LENGTH: male, 31 mm; female, 26 mm.

FOREWING LENGTH: male, 33 mm; female, 35 mm.

VARIATION: The female allotype has pale yellow, rather than dark brown antennae.

GEOGRAPHICAL DISTRIBUTION: The four known specimens of this new species were collected at Brazil: Rondonia, Vilhena, 5-XI-1979, J.R. Arias, 1 female; Vilhena, 7-XI-1979, N.D. Penny, 1 male; Minas Gerais, Belo Horizonte,

XII-1978, A. Machado, 1 male; Parque Florestal Estadual do Rio Doce, 24-X-1979, M.A. Vulcano, 1 female.

TEMPORAL DISTRIBUTION: This species has been collected from late October to December.

HABITAT: The male holotype was collected in open, natural savannah ("cerrado"), while the female allotype was caught in a cutover, scrub area of a roadside ditch, near primary forest.

Map 8 — Geographical distribution of **Neohaploglenius rondonianus** n. sp.

This species, *Neohaploglenius rondonianus*, is named for the Brazilian Federal Territory in which the holotype and allotype were caught. The territory was, in turn, named for the Brazilian diplomat and naturalist Marechal Candido Marinho da Silva Rondon. This species of *Neohaploglenius* can be separated from the other two known species by the yellow marks in the apex of the wing and the slightly smaller size.

SUBFAMILY ASCALAPHINAE Lefèbvre

Ameropterus Esben-Petersen, 1922

Colobopterus Rambur, 1842, **Histoire nat. des Insectes Névroptères**, p. 360 (preoccupied).

Ameropterus Esben-Petersen, 1922, **Ann. Mag. nat. His.**, ...10: 621.

TYPE SPECIES: *Ascalaphus versicolor* Burmeister, designated by Weele (1908).

This genus is easily separated from two other Amazonian genera of Ascalaphinae, *Ascalorphne* and *Cordulecerus*, by the narrow, elongate form of the hindwing and lack of axillary angle in the forewing. The genus *Ululodes* is very similar to *Ameropterus*, but the latter genus can be separated by the very long antennae and CuP of hindwing nearly straight, not sinuous as in *Ululodes*. However, occasionally a species of *Ameropterus* has somewhat shorter antennae, and the only good character is the form of CuP of the hindwing.

Penny (1977) listed 21 species of *Ameropterus* from Latin America, and the genus ranges from as far north as Massachusetts in the United States southward to Argentina. Five species have been collected within the Amazon Basin, including one new species. They can be separated by the following key.

KEY TO AMAZONIAN SPECIES OF AMEROPTERUS

1a. Apex of hindwing infuscate ..... *A. delicatulus*

1b. Apex of hindwing clear 2

2a. Antennae predominately white, including all of apical knob ..... *A. selysi*

2b. Antennae predominately fuscous, including the majority of apical knob 3

3a. Antennae laterally not reaching to pterostigma of forewing ..... *A. breviantennis*

3b. Antennae laterally reaching to pterostigma of forewing 4

4a. Pterostigma darkly pigmented; antennae only as long as forewings; forewing length more than 25 mm ..... *A. sepultus*

4b. Pterostigma almost transparent; antennae longer than forewing; forewing length less than 20 mm ..... *A. dissimilis*

Ameropterus breviantennis n. sp.

(Fig. 11, Map 9)

Original description based on 1 male, pinned.

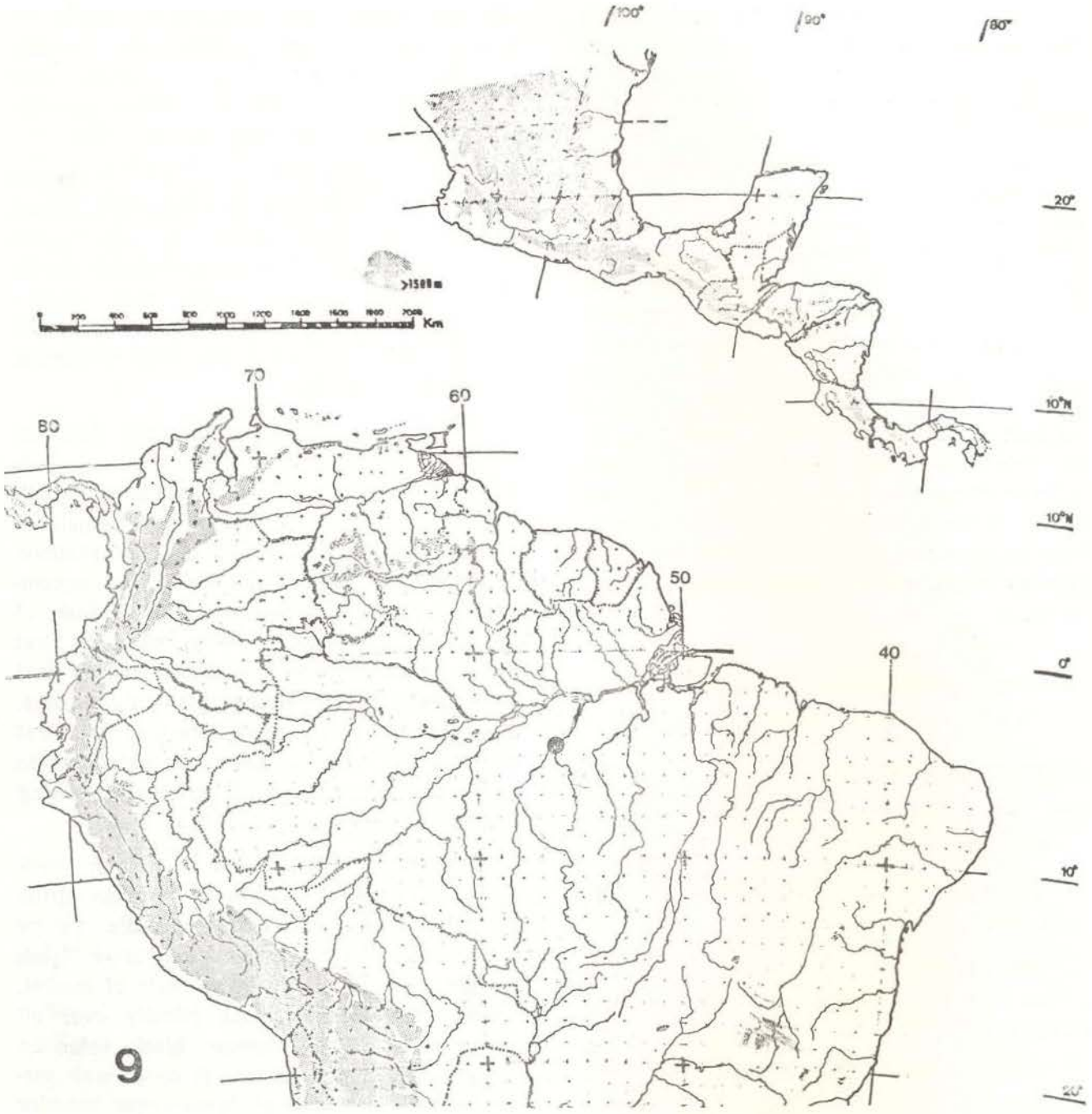
Holotype male in the Systematic Entomology Collections of INPA, Manaus.

HEAD: Occiput dark brown with dark pilosity. Compound eyes with median sulcus; dark brown with black spots. Clypeus and labrum reddish brown. Mandibles reddish brown throughout. Maxillary palpi five-segmented; reddish brown. Antennae relatively short for this genus, reaching laterally almost to pterostigma of forewing; dark brown throughout. Antennae without setae throughout.

THORAX: Pronotum narrow, collar-like, dark brown. Meso- and metanota dark brown with abundant, long, white pilosity. Pleural region dark brown with sparse, long, white pilosity.

LEGS: All leg segments dark reddish brown with black setae and spines, except coxae with long, white setae.

WINGS: Both fore- and hindwings elongate, narrow, without axillary angle. Wings clear, except for pterostigma. Pterostigma very dark



Map 9 — Geographical distribution of **Ameropterus breviantennis** n. sp.

brown, encompassing four crossveins. Cubital fork of forewing distinct, of hindwing indistinct. CuP of hindwing straight, extending just beyond origin of Rs. First and second anal veins of both wings very short.

ABDOMEN: Narrow for totai length; dark brown throughout, with sparse, short, black setae on ventral surface. Segments II: to VII with vertical slit on each side of dorsum near anterior margin. No evidence of lateral protuberances.

BODY LENGTH: male, 19 mm.

FOREWING LENGTH: male, 20 mm.

GEOGRAPHICAL DISTRIBUTION: The holotype male is from Brazil: Pará, 65 km southwest of Itaituba, 12-15-X-1977, B.C. Ratcliffe.

TEMPORAL DISTRIBUTION: The only known specimen was collected in October.

HABITAT: This male specimen was attracted to light.

A. breviantennis is immediately separable from most species of *Ameropterus* by its relatively short antennae, not reaching to the pterostigma of the forewing. It is a quite small species, similar to *A. dissimilis*, but with much shorter antenna. It appears to be somewhat similar to *A. mulleri* from east-central Brazil, which was described solely from females. This could be the male of this latter species, but for that to be the case, there, would have to be strong dimorphism between sexes because *A. breviantennis* lacks hindwing spots and has much darker pterostigma. I prefer to keep them as separate species for the present. This species was named for its distinctively short antennae.

Ameropterus delicatulus (MacLachlan, 1871)

(Fig. 12, Map 10)

Colobopterus delicatulus MacLachlan, 1871, **J. Linn. Soc. Zool.**, 11: 250.

Ameropterus delicatulus (MacLachlan) Penny, 1977, **Acta Amaz.** (supl.), 7 (4): 10.

Holotype female in the *British Museum* (Natural History), London.

Present description based on holotype, 14 males, 7 females, pinned, and 10 males, 4 females in alcohol.

HEAD: Occiput dark brown with black pilosity. Compound eyes with median sulcus; reddish brown with black spots. Clypeus and labrum reddish brown. Mandibles reddish brown throughout. Maxillary palpi five-segmented; fourth segment shorter than third or fifth; long, black setae on basal three segments. Antennae very long, reaching laterally well beyond tip of forewing; very dark brown, except pale yellow mark on apical knob. Antennae without setae, except apical knob.

THORAX: Pronotum narrow, collar-like, dark brown. Mesonotum dark brown laterally; medially with yellow hour-glass mark on scutum and two spots on scutellum. Mesonotum dark brown, except for two yellow spots on metascutellum. Pleural region grayish-yellow with abundant, long, white pilosity.

LEGS: Coxae and basal part of femora yellow. Apex of femora and tibiae dark brown; tibiae bearing black apical ring. Tibial spurs large, reddish brown. Tarsal segments black. Tarsal claws reddish brown; long, slightly curved. All leg segments with black setae and spines, except for coxae and base of femora bearing white setae.

WINGS: Both fore- and hindwings elongate, narrow, with quadrate axillary angle of forewing. Costal and subcostal margins of both wings clear, except for pterostigma. Remainder of forewing clear; hindwing with infuscations in apical fifth. Pterostigma dark brown, encompassing 5 to 6 crossveins. Cubital fork of forewing distinct, of hindwing indistinct. First anal vein of forewing very short; second anal vein absent. CuP of hindwing slightly sinuous, extending to about second fork of Rs. First anal vein of hindwing short, not extending to origin of Rs; second anal vein of hindwing comprising only one or two basal cells.

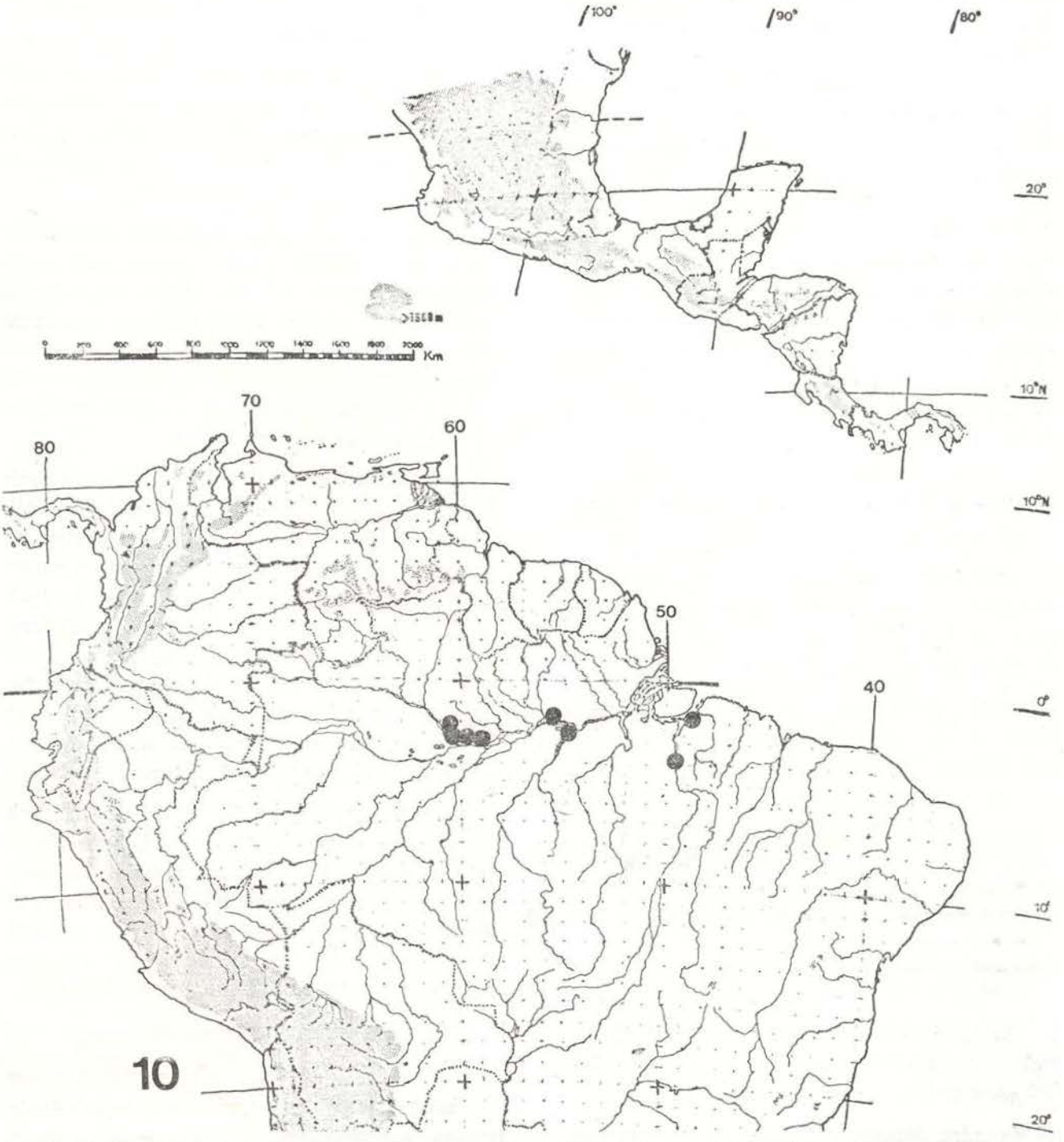
ABDOMEN: Narrow for total length; dark brown with medial, longitudinal, yellow stripe in paler specimens. Some variable yellow marks sometimes present laterally. Eighth tergum always yellow with pair of medial, black spots. Sparse black pilosity over all abdomen, with more, longer, black setae on apical segments. Segments III to VII with vertical slit on each side of dorsum near anterior margin. No evidence of lateral protuberances.

BODY LENGTH: male, 21-26 mm; female, 20-21 mm.

FOREWING LENGTH: male, 20-24 mm; female, 22-26 mm.

VARIATION: The amount and darkness of hindwing, apical infuscations varies, but always seems to be present. A few specimens have slightly amber tinted wings, perhaps due to preservative-killing agent.

GEOGRAPHICAL DISTRIBUTION: MacLachlan's original female holotype was collected at Brazil: Pará, Santarém. Specimens in the Systematic Entomology Collections of INPA, Manaus, are: Brazil: Pará, Óbidos, 21-VIII-1967, J.B. Ferreira, 1 male; Amazonas, 125 km north of Manaus, 10-VIII-1968, E. Vieira and A. Faustino, 1 male; 134 km east of Manaus, 13-VIII-1968, E. Vieira and A. Faustino 1 male; 35 km northeast of Manaus, 16 VIII-1979, J. Vidal, 1 male; 45.5 km north of Manaus, 16-22-VIII-1979, H.M. Savage, 2 males, 1 female; 246 km east of Manaus, 12-VII-1979, J.R. Arias, 1 female; 170 km north of Manaus, 20-IX-1979, J.D. Charlwood, 1 female; CEPLAC, 30 km north of Manaus, 30-VII-1979, H.M. Sa-



Map 10 — Geographical distribution of **Ameropterus delicatulus** (MacLachlan).

vage, 1 male; Reserva Ducke, 26 km north of Manaus, VIII-1964, A. Machado, 1 male; Reserva Ducke, 26 km north of Manaus, 19-IX-1977, N.D. Penny, 1 female; Manaus, 19-VII-1976, A.P.L. Dias, 1 male; Manaus, 7-I-1977, M. Mendonça, 1 male; Manaus, 18-VIII-1978, J A. Rafael, 3 males, 1 female; Manaus, 11-XI-1978, J.A. Rafael, 1 male; Manaus, 23-VI-1979, J.A. Rafael, 1 male, 1 female; Manaus, 30-VI-1979, J.A. Rafael, 2 males; Manaus, 7-VII-1979, J.A. Rafael, 2 males; Manaus, 23-VII-1979, J.A. Rafael, 1 male, 1 female; Manaus, 11-VIII-1979, J.A. Rafael, 1 male; Manaus, 25-31-VIII-1979, J.A. Rafael, 1 female; Reserva Ducke, 26 km north of Manaus, 14-VII-1960, J. Nunes de Mello, 1 female; Pará, Tucuruí, Tocantins River, 12-16-VI-1980, J.A. Rafael, 3 males. Three additional specimens in the Museu Paraense Emilio Goeldi, Belém, Pará, are: Brazil: Pará, Benefica, 18-VI-1979, R.B. Neto, 1 male; Amazonas, CEPLAC, 30 km north of Manaus, 22-VIII-1977, I.S. Gorayeb, 1 male; CEPLAC, 30 km north of Manaus, 29-IX-1977, I.S. Gorayeb, 1 female.

TEMPORAL DISTRIBUTION: This species displays a distinctive July to September adult emergence peak.

HABITAT: *A. delicatulus* is often collected at lights. A large number of specimens were collected by J.A. Rafael using a flight trap in an open, swampy grassland.

This species is distinctive among *Ameropterus* species for its very long antennae and darkened apex of hindwings.

Ameropterus dissimilis (MacLachlan, 1871)

(Fig. 13, Map 11)

Colobopterus dissmilis MacLachlan, 1871, **J. Linn. Soc. Zool.**, 11: 251.

Ameropterus dissimilis (MacLachlan) Penny, 1977, **Acta Amaz.** (Supl.), 7 (4): 10.

Syntype male and female in the Hope Entomology Collection, University Museum, Oxford, England.

Present description based in syntype male, and 1 male, pinned.

HEAD: Occiput dark brown with black pilosity. Compound eyes median sulcus; reddish brown with black spots. Clypeus and labrum reddish brown. Mandibles reddish brown throughout. Maxillary palpi five-segmented; pale brown with whorl of black setae at apex of fourth segment. Antennae very long, reaching laterally well beyond tip of forewing; dark brown throughout; with numerous short, black setae throughout.

THORAX: Pronotum narrow, collar-like, dark brown. Meso- and metanota dark brown laterally; with two indistinct, longitudinal yellow stripes medially. Pleural region yellowish brown numerous, long, white setae.

LEGS: Coxae femora yellowish brown. Foretibiae yellowish brown. Meso- and metatibiae dark brown with two yellow rings. Tibial spurs large, reddish brown. Tarsal segments reddish brown. Tarsal claws reddish brown; long, slightly curved. All leg segments with black setae and spines, except coxae and base of femora bearing white setae.

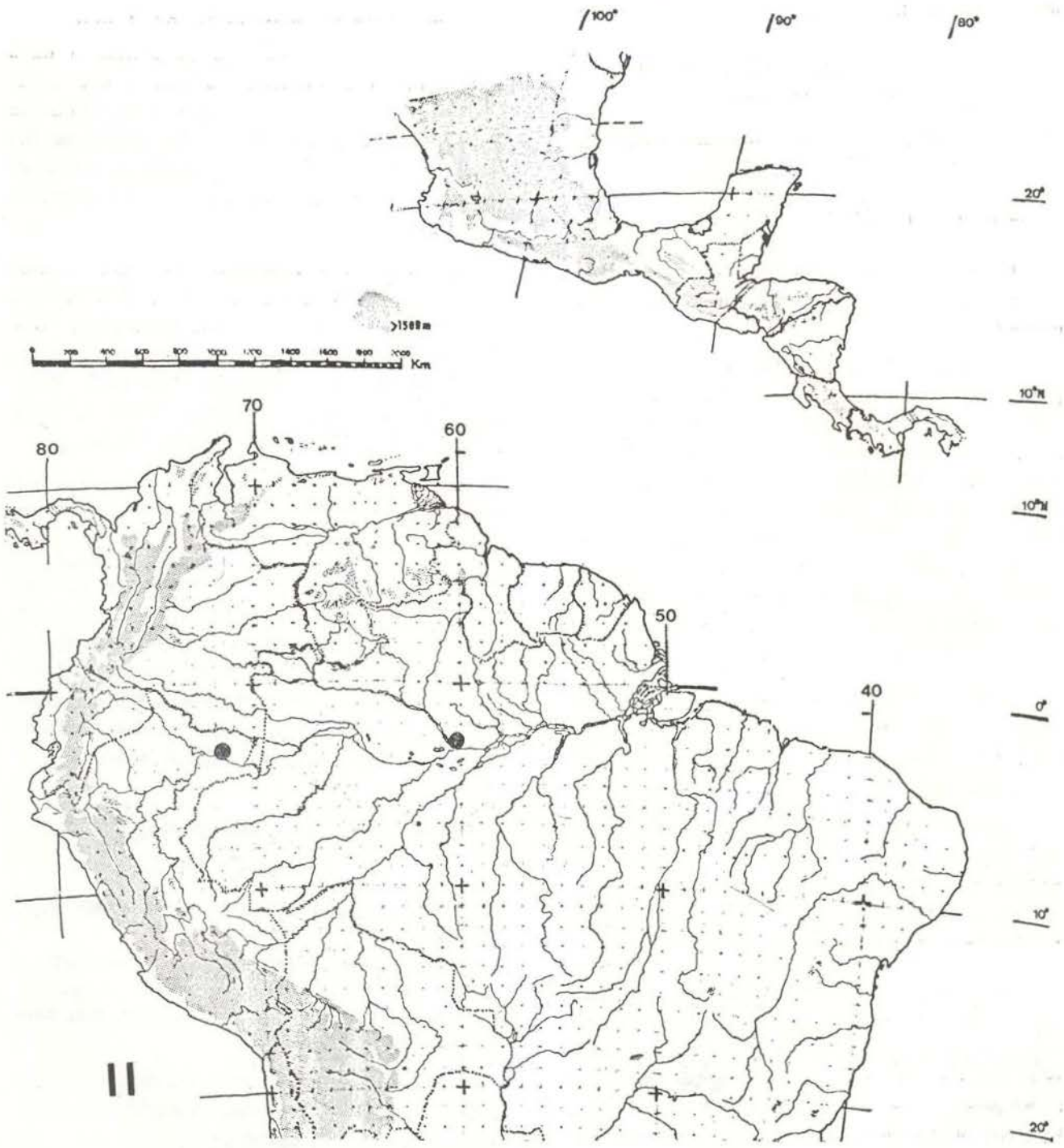
WINGS: Fore- and hindwings elongate, with forewing being somewhat trianguloid. Both wings entirely clear, including pterostigma. Pterostigma encompassing 5 to 6 compact crossveins. Cubital fork of forewing distinct, of hindwing indistinct. First anal vein of forewing enclosing only two cells; second anal vein extremely short. CuP of hindwing straight, extending to slightly beyond origin of Rs. First anal vein of hindwing short, enclosing only five cells; second anal vein of hindwing absent.

ABDOMEN: Narrow for total length; dark brown with elongate black spot laterally in each segment. Sparse black pubescence ventrally; with more, longer, black setae on apical segments. Segments III to VII with vertical slit on each side of dorsum near anterior margin. No evidence of lateral protuberances.

BODY LENGTH: male, about 18 mm.

FOREWING LENGTH: male, 18 mm.

GEOGRAPHICAL DISTRIBUTION: MacLachlan's original syntypes are from Bates' collections in the Amazon Basin. Weele (1908) recorded



Map 11 — Geographical distribution of **Ameropterus dissimilis** (MacLachlan).

one female from Peru: Pebas. The Systematic Entomology Collections of INPA, Manaus, include: Brazil: Amazonas, Manaus, 6-X-1977, B.C. Ratcliffe, 1 male.

TEMPORAL DISTRIBUTION: The only collecting date I have is the first week of October

This species is quite different from other described species of Amazonian *Ameropterus*

in that it has forewings slightly triangular, and size quite small.

Ameropterus selysi (Weele, 1908)

(Fig. 14, Map 12)

Colobopterus selysi Weele, 1908, **Coll. zool. Edm. Selys Longchamps,** 8: 134.

Ameropterus selysi (Weele) Penny, 1977, **Acta Amazonica** (supl.), 7 (4): 10.

Holotype male in the Selys Collection.

Present description based on two males, pinned.

HEAD: Occuput dark brown with pale brown pilosity. Compound eyes with median sulcus; dark brown with black spots. Clypeus and labrum reddish brown. Mandibles dark brown throughout. Maxillary palpi five-segmented; reddish yellow. Antennae long extending laterally to pterostigma of forewing; pale yellow with apical dark ring on each segment; apical knob large, bright white. Scattered long, black setae at base of antennae; and scattered, short, black setae on apical knob.

THORAX: Pronotum narrow, collar-like, dark brown. Meso- and metanota dark brown with long, black pilosity. Pleural region white with abundant, long, white pilosity.

LEGS: Coxae white; all other leg segments dark brown, except tarsi black. Tarsal claws reddish brown; long, slightly curved. All leg segments with black setae and spines, except coxae and base of femora bearing white setae.

WINGS: Both fore- and hindwings elongate, narrow, without axilary angle. Wings completely clear, except for pterostigma. Pterostigma pale brown to black, encompassing four crossveins. Cubital fork of forewing distinct; of hindwing indistinct. CuP of hindwing straight, extending to first fork of Rs. First and second anal veins of both wings very short.

ABDOMEN: Narrow for total length; dark brown, without markings. Sparse, black pilosity over all sternal regions. Segments III to VII with vertical slit on each side of dorsum near anterior margin. No evidence of lateral protuberances.

BODY LENGTH: male, 21-22 mm.

FOREWING LENGTH: male, 25-27 mm.

VARIATION: In the two specimens I have before me, the Manaus specimen has paler pterostigma and uniformly dark legs, while the Purus River specimen has paler marks on the legs. These characteristics usually vary enough that this is considered as only intraspecific variation.

GEOGRAPHICAL DISTRIBUTION: This species was originally described by Weele (1908) from Venezuela. In the Systematic Entomology Collections of INPA, Manaus, are two males from Brazil: Amazonas, Manaus, 7-XII-1977. B.C. Ratcliffe, 1 male; mid-Purus River (7°30'S, 66°00'W), 9-X-1979, J. Campbell, 1 male.

TEMPORAL DISTRIBUTION: The only two records available from Amazonia are for October and December.

Ameropterus selysi is the only species from Amazonia with bright white antennae. This characteristic links it quite closely to *Ameropterus versicolor* from southern Brazil and *A. peruvianus* from Peru and Bolivia. However, the long, narrow shape of the hindwing of *A. selysi* immediately sets it apart

Ameropterus sepultus (Walker, 1853)

(Fig. 15, Map 13)

Ascalaphus sepultus Walker, 1853, **Cat. Brit. Mus. Neur.,** p. 445.

Colobopterus sepultus (Walker) MacLachlan, 1871, **J. Linn. Soc. Zool.,** 11: 251.

Ameropterus sepultus (Walker) Penny, 1977, **Acta Amazonica** (supl.), 7 (4): 10.

Holotype male in the Collection of the British Museum (Natural History), London. Present description based on holotype and 2 females, pinned.

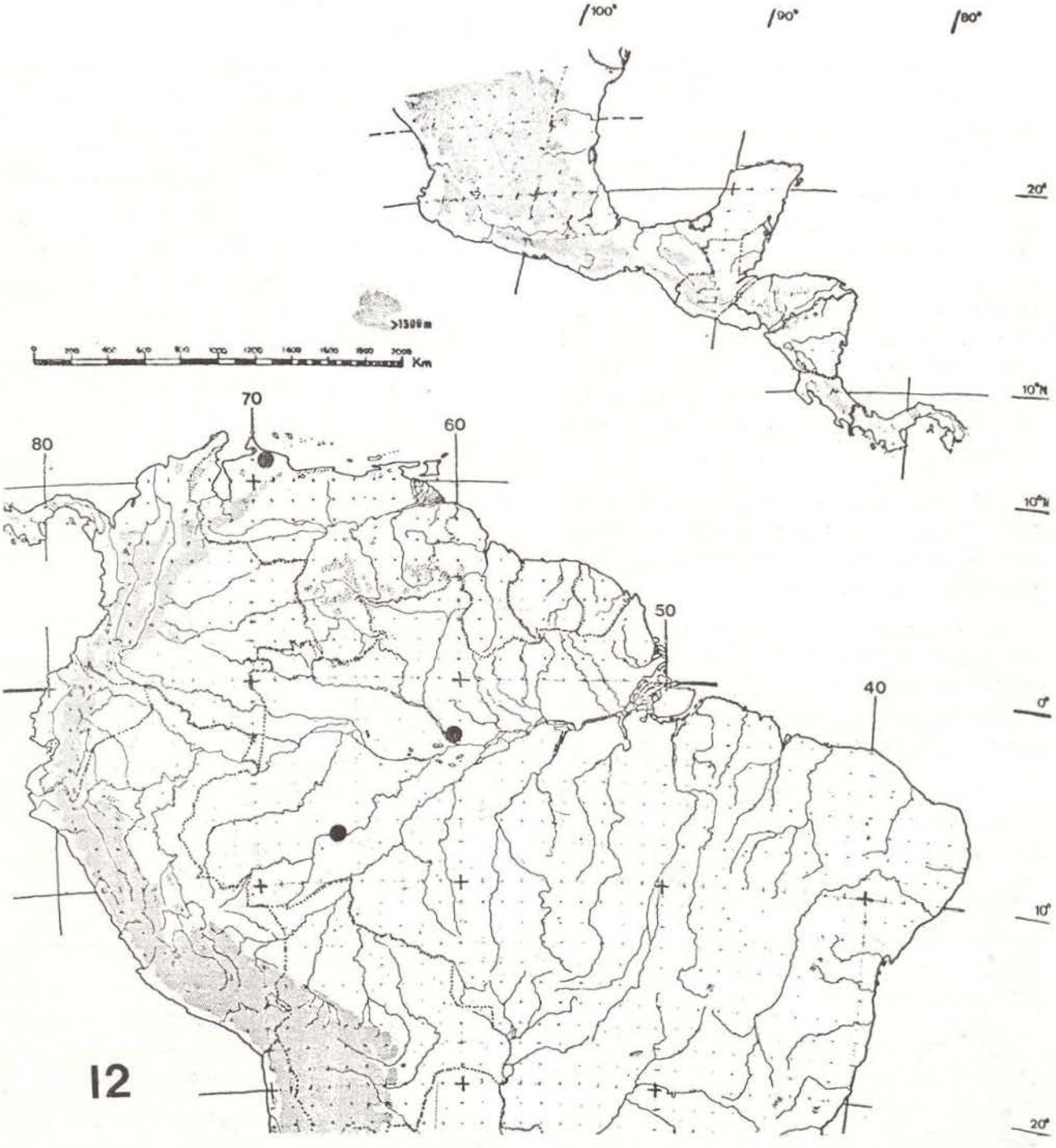
HEAD: Occiput reddish brown with pale brown pilosity. Compound eyes with median sulcus; almost black. Clypeus and labrum reddish brown. Mandibles reddish brown throughout. Maxillary palpi five-segmented; fourth segment shorter than third or fifth; long, black setae on basal four segments. Antennae

long, reaching laterally to apex of forewing; dark brown throughout. Sparse black setae entire length of antennae.

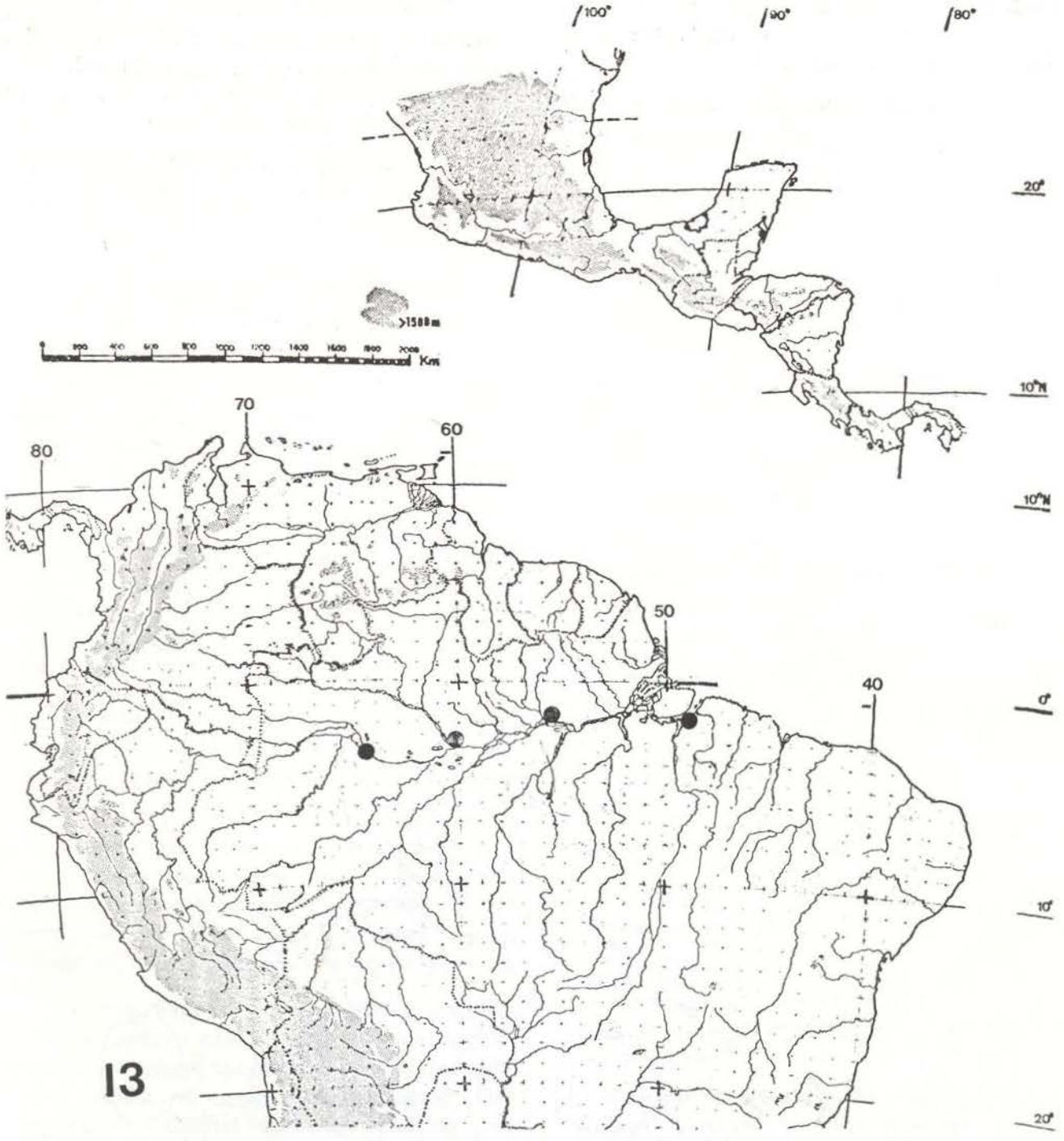
THORAX: Pronotum narrow, collar-like, dark brown. Meso- and metanota dark brown with long pale brown setae. Pleural region grayish brown with abundant, long, white hairs

LEGS: Coxae grayish brown. All other leg segments reddish brown, including tibial spurs and tarsal claws. All leg segments with black setae and spines, except coxae and base of femora bearing long, white setae.

WINGS: Both fore- and hindwings elongate, narrow, with slight indication of axillary angle.



Map 12 — Geographical distribution of **Ameropterus selysi** (Weele).



Map 13 — Geographical distribution of **Ameropterus sepultus** (Walker).

Both wings completely clear, except for pterostigma. Pterostigma yellowish brown, encompasing four to five crossveins. Cubital fork of forewing distinct, of hindwing indistinct. First anal vein of forewing very short, encompasing three cells. Second anal vein encompassing only two cells. CuP of hindwing straight, extending to first fork of Rs. First anal vein of hindwing very short, encompassing only six cells; second anal vein absent.

ABDOMEN: Narrow for total length; dark brown with lateral, elongate, black mark on each segment. Ventrally with sparse black pilosity; with more longer, black setae on

apical segments. Segments III to VII with vertical slit on each side of dorsum near anterior margin. No evidence of lateral protuberances.

BODY LENGTH: female, 21 mm

FOREWING LENGTH: female, 25-29 mm.

GEOGRAPHICAL DISTRIBUTION: Weele (1908) recorded this species from Brazil: Pará, Óbidos; Amazonas, Tefé (Ega). The Systematic Entomology Collections of INPA, Manaus, include: Brazil: Amazonas, Manaus, 12-VIII-1977, R. Best, 1 female. In the collections of Museu Paraense Emilio Goeldi, Belém, Pará, is a specimen from Brazil: Pará, Belém-Mocambo, 18-V-1978, 1 female.

TEMPORAL DISTRIBUTION: Records are too scattered to yet indicate an emergence pattern.

ECOLOGY: The Manaus specimen was caught in young, secondary forest on the INPA campus. The Belém specimen was caught using a Malaise trap in upland forest.

This species is separated from other Amazonian species by its clear hindwings; elongate, narrow forewings; and larger relative size.

Ascalorphne (Banks, 1915)

Orphne Lefèbvre, 1842, **Mag. de Zoo..**, 4: 7 (preoccupied).

Ascalorphne Banks, 1915, **Ent. News,** 26: 350.

TYPE SPECIES: *Ascalaphus macrocerus* Burmeister, designated by Weele (1908).

This genus is very distinctive among Amazonian Ascalaphinae because of its strongly developed axillary angle of the forewings. Hindwings, although narrow and elongate, in males also have a very distinctive, projecting lobe along the anal margin. Antennae are also very long, as in *Ameropterus.*

Penny (1977) listed only four species in *Ascalorphne,* ranging from northern Brazil to northern Argentina. Only one species, *Ascalorphne impavida* (Walker), has been collected in the Amazon Basin.

Ascalorphne impavida (Walker, 1853)

(Fig. 16, Map 14)

Ascalaphus impavida Walker, 1853, **Cat. Brit. Mus. Neur.,** p. 443.

Orphne impavida (Walker) MacLachlan, 1871, **J. Linn. Soc. Zool.,** 11: 252.

Ascalorphne impavida (Walker) Penny, 1977, **Acta Amazonica** (Supl.), 7 (4): 11.

Ascalaphus intempestivus Walker, 1853, **Cat. Brit. Mus. Neur.,** p. 444.

Holotype male of *Ascalaphus impavidus* and holotype female of *Ascalaphus intempestivus* in the British Museum (Natural History), London.

Present description based on holotypes of *A. impavidus* and *A. intempestivus* and 1 male, 3 females, pinned.

HEAD: Occiput dark brown with whitish pilosity. Compound eyes with median sulcus; reddish brown with black spots. Clypeus and labrum reddish brown. Mandibles reddish brown throughout. Maxillary palpi five-segmented; first, third and fourth segments with black setae. Antennae very long, reaching laterally well beyond apex of forewing; reddish brown. Antennae with numerous small setae and apical whorl of longer setae on each segment.

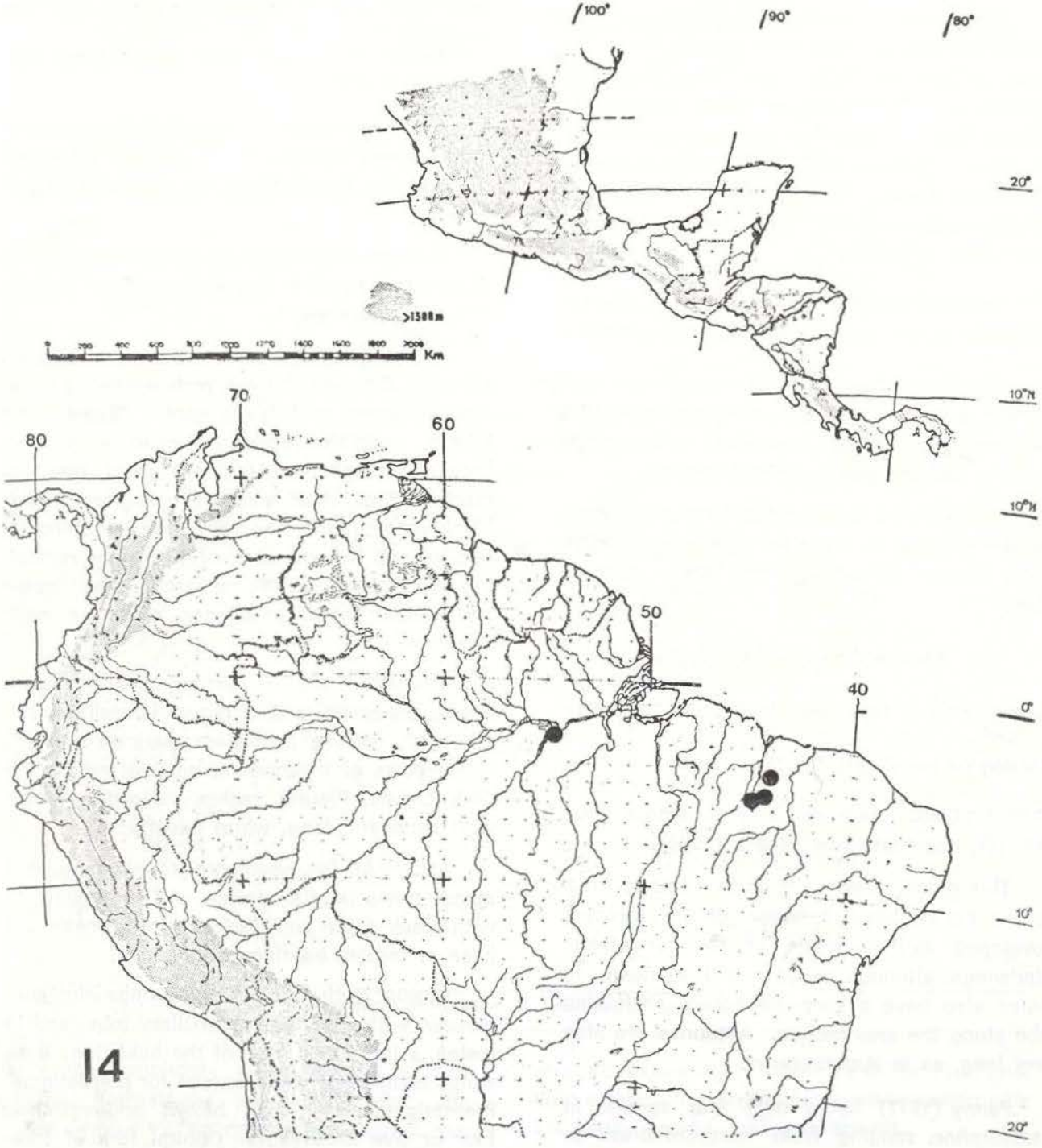
THORAX: Pronotum narrow, collar-like, dark brown. Mesonotum dark brown laterally; medially with yellow, hour-glass mark on scutum. Other parts of mesonotum and all metanotum dark brown. Pleural region yellowish brown with abundant, long, white pilosity.

LEGS: All leg segments, tibial spurs, and apical claws reddish brown. All leg segments with black setae and spines, except coxae and base of femora bearing white setae.

WINGS: Both fore- and hindwings elongate, narrow, with very distinct axillary lobe and in males, a large anal lobe of the hindwing. Both wings completely clear, except for pterostigma. Pterostigma very dark brown encompassing four or five crossveins. Cubital fork of forewing distinct, of hindwing indistinct. First anal vein of forewing very short; encompassing three cells of axillary angle. Second anal vein

of forewing encompassing two cells of axillary angle. CuP of hindwing straight, extending to about third fork of Rs. First anal vein of hindwing encompassing three cells of axillary angle; second anal vein absent.

ABDOMEN: Narrow for total length; dark brown with elongate, black mark on both sides of each tergite. Sparse black pilosity over all abdomen, with more, longer, black setae on apical segments. Segments III to VII with ver-



Map 14 — Geographical distribution of **Ascalorphne impavida** (Walker).

tical slit on each side of dorsum near anterior margin. No evidence of lateral protuberances.

BODY LENGTH: male, 22 mm; female, 19-20 mm.

FOREWING LENGTH: male, 22 mm; female, 22-26 mm.

VARIATION: Within this genus males and females are strikingly dimorphic in wing shape, with males having an enlarged anal lobe on the hindwing.

GEOGRAPHICAL DISTRIBUTION: The types of both *A. impavida* and *A. intempestivus* were collected at Brazil: Pará, Santarém. One additional female in the Systematic Entomology Collections of INPA, Manaus, is from Brazil: Maranhão, Barra do Corda, 12-VI-1978, W. França, 1 female. Further material in the collections of Museu Paraense Emilio Goeldi, Belém, include Brazil: Maranhão, Codó, 10-VI-1978, W. França, 1 male; Pres. Dutra, 11-VI-1978, W. França, 1 female; Lago Rodrigues, 24-V-1979, M.F. Torres, 1 female. This species seems to be confined to the southeastern part of the Amazon Basin.

TEMPORAL DISTRIBUTION: Present information suggests a June emergence peak in Maranhão state.

Ascalorphne impavida is one of four closely related species of *Ascalorphne*, presently separated more easily by geographical distribution than morphological characters. However, *A. impavida* can be separated from *A. macrocerca*, its closest geographical associate, by the less pronounced notal markings and the lack of dense, short hairs at the base of the antennae. In *A. impavida* these hairs are longer and much sparser.

Cordulecerus Rambur, 1842

Cordulecerus Rambur, 1842, **Hist. nat. des Insectes Névroptères,** p. 359.

TYPE SPECIES: *Cordulecerus maclachlani* Selys, designated by Weele (1908).

Cordulecerus is distinctive among New World Ululodini for its very wide and apically tapering hindwings. Antennae are shorter than the forewings; and there is usually some pigmentation of the wings, occasionally attaining ornate dimensions. Males and females often appear quite different morphologically. Penny (1977) recorded 10 species and 1 subspecies, ranging from northern Argentina to southern Mexico. Only two species are known from the Amazon Basin, *C. elegans* and *C. maclachllani,* which can be separated by the following key.

KEY TO AMAZONIAN SPECIES OF CORDULECERUS

1a. Hindwing with basal and apical dark bands ..... *C. maclachlani* (fem.)

1b. Hindwing with at most a basal dark spot or some wing infuscation 2

2a. Hindwing with marginal spot in anal region ..... *C. elegans* (female)

2b. Hindwing clear or only somewhat infuscated, without marginal spots 3

3a. Hindwing infuscated, without obtuse, excavated angle along anal margin .... *C. maclachlani* (male)

3b. Hindwing clear, with obtuse, excavated angle along anal margin ..... *C. elegans* (male)

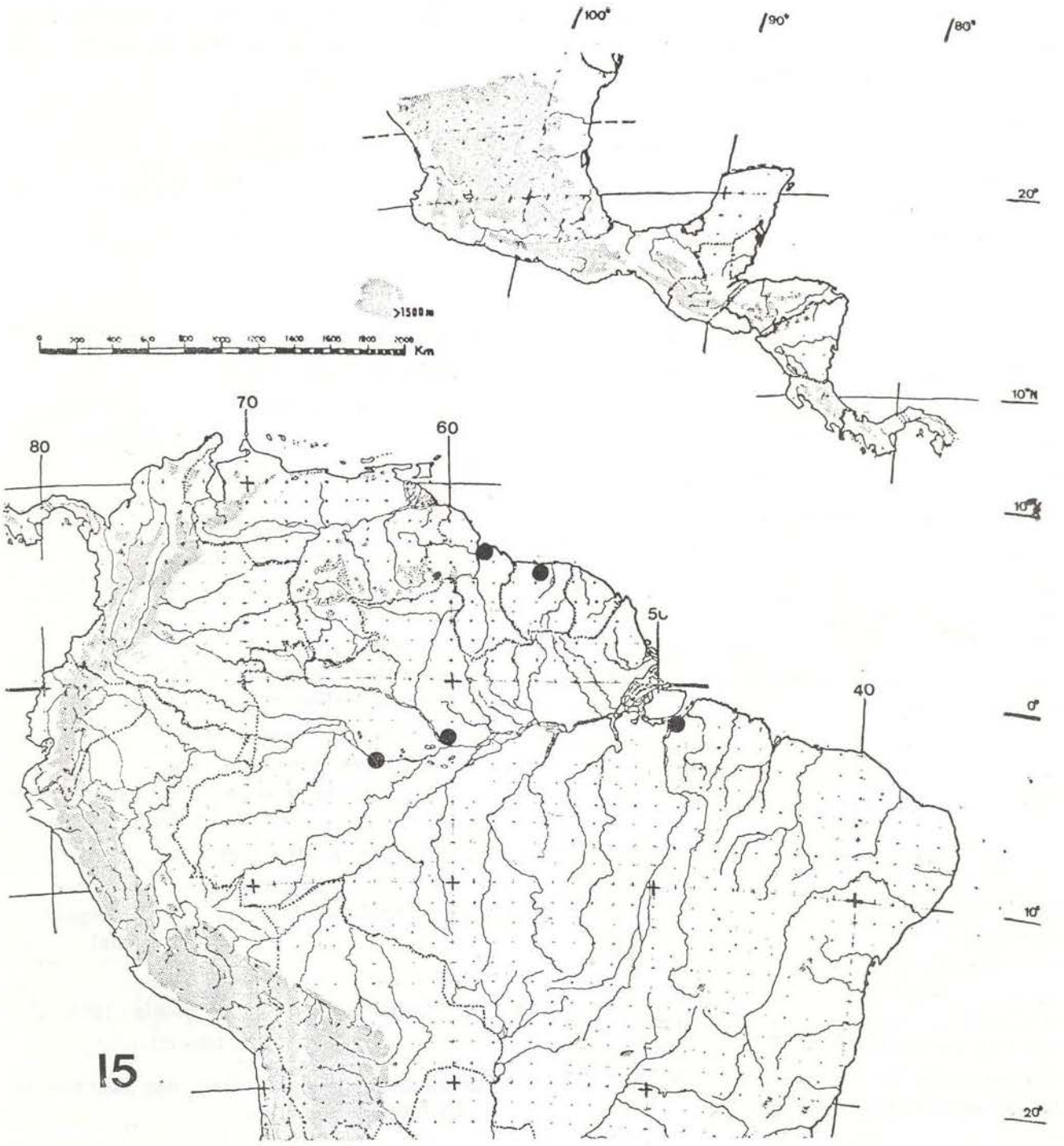
Cordulecerus elegans Weele, 1908

(Figs. 17, 18, Map 15)

Cordulecerus elegans Weele, 1908, **Coll. zool. Edm. Selys Longchamps,** 8: 146.

Four male syntypes in the Selys Collection. Present description based on 7 males, 19 females, pinned.

HEAD: Occiput dark brown with abundant, long, reddish pilosity. Compound eyes with median sulcus; black. Clypeus and labrum reddish brown. Mandibles reddish brown throughout. Maxillary palpi five-segmented; fourth segment shorter than third or fifth;



Map 15 — Geographical distribution of **Cordulecerus elegans** Weele.

reddish yellow. Antennae long, reaching laterally to just beyond pterostigma of forewing; reddish brown, except pale yellow mark on dorsal surface of apical knob. Antennae with sparse, small, dark setae scattered along entire length.

THORAX: Pronotum narrow, collar-like, pale yellow. Meso- and metanota pale brown mesally, dark brown laterally; bearing scattered, long, reddish pilosity. Pleural region very dark brown with long, black pilosity anteriorly and long, golden pilosity posteriorly.

LEGS: Coxae dark brown. All other leg segments pale yellow with long, reddish brown spines, tibial spurs and tarsal claws.

WINGS: Forewings long and narrow; amber; without axillary angle. Pterostigma pale brown, encompassing three crossveins. Cubital fork distinct. First and second anal cells extremely short, encompassing only two or three cells.

Hindwing of females elongate; amber; trianguloid with dark fuscous spot along anal margin. Hindwing of males trianguloid; clear to amber; with very excavate angle along anal margin. Pterostigma amber, encompassing three crossveins. Cubital fork indistinct. First anal vein short, second anal vein absent. CuP nearly straight, extending to between second and third fork of Rs. CuP more sinuous in females.

ABDOMEN: Narrow for total length; orange with chevron-shaped black marks on mid-dorsal surface of segments III, IV and V. Markings difficult to distinguish in darkened specimens. Almost no pilosity on dorsal surface, although sparse, pale setae apparent on ventral surface. Segments III to VII with vertical slit on each side of dorsum near anterior margin. No evidence of lateral protuberances.

BODY LENGTH: male, 25-29 mm; female, 23-26 mm.

FOREWING LENGTH: male, 30-35 mm; female, 32-36 mm.

GEOGRAPHICAL DISTRIBUTION: Weele (1908) mentioned specimens from Surinam, Guyana, Brazil and the Dominican Republic. In Amazonia, specimens were recorded from Brazil: Amazonas, Coari; and Pará. Additional material in the Systematic Entomology Collections of INPA, Manaus, are Brazil: Amazonas, Reserva Ducke, 26 km north of Manaus, 14-III-1977, D. Engleman, 5 males, 19 females; Reserva Ducke, 26 km north of Manaus, 13-I-1978, B.C. Ratcliffe, 2 males.

TEMPORAL DISTRIBUTION: A January to March emergence may be indicated.

This species has paler markings than *C. maclachlani*, as well as different pattern and shape of the wings.

Cordulecerus maclachlani Selys, 1871

(Fig. 19, Map 16)

Cordulecerus maclachlani Selys, 1871, **Annls. Soc. ent. Belg.**, 14: 31.

Holotype female in the Selys Collection.
Present description based on Weele (1908) and 1 female, pinned.

HEAD: Occiput black with black pilosity. Compound eyes with median sulcus; black. Clypeus and labrum reddish brown. Mandibles reddish brown throughout. Maxillary palpi five-segmented; yellowish brown. Antennae long, reaching laterally almost to pterostigma of forewing; black, except paler brown on apical knob.

THORAX: Pronotum narrow, collar-like, dark brown. Meso- and metanota dark brown with abundant, black pilosity. Pleural region dark brown with black pilosity.

LEGS: Coxae dark brown. All other leg segments yellowish; with long, black setae. Tibial spurs and tarsal claws reddish brown.

WINGS: Forewings elongate, wide, without axillary angle. Fuscous borders of all wing veins; center of each cell clear. Pterostigma dark brown, encompassing three crossveins. Cubital fork distinct. First and second anal veins very short, encompassing two or three cells.

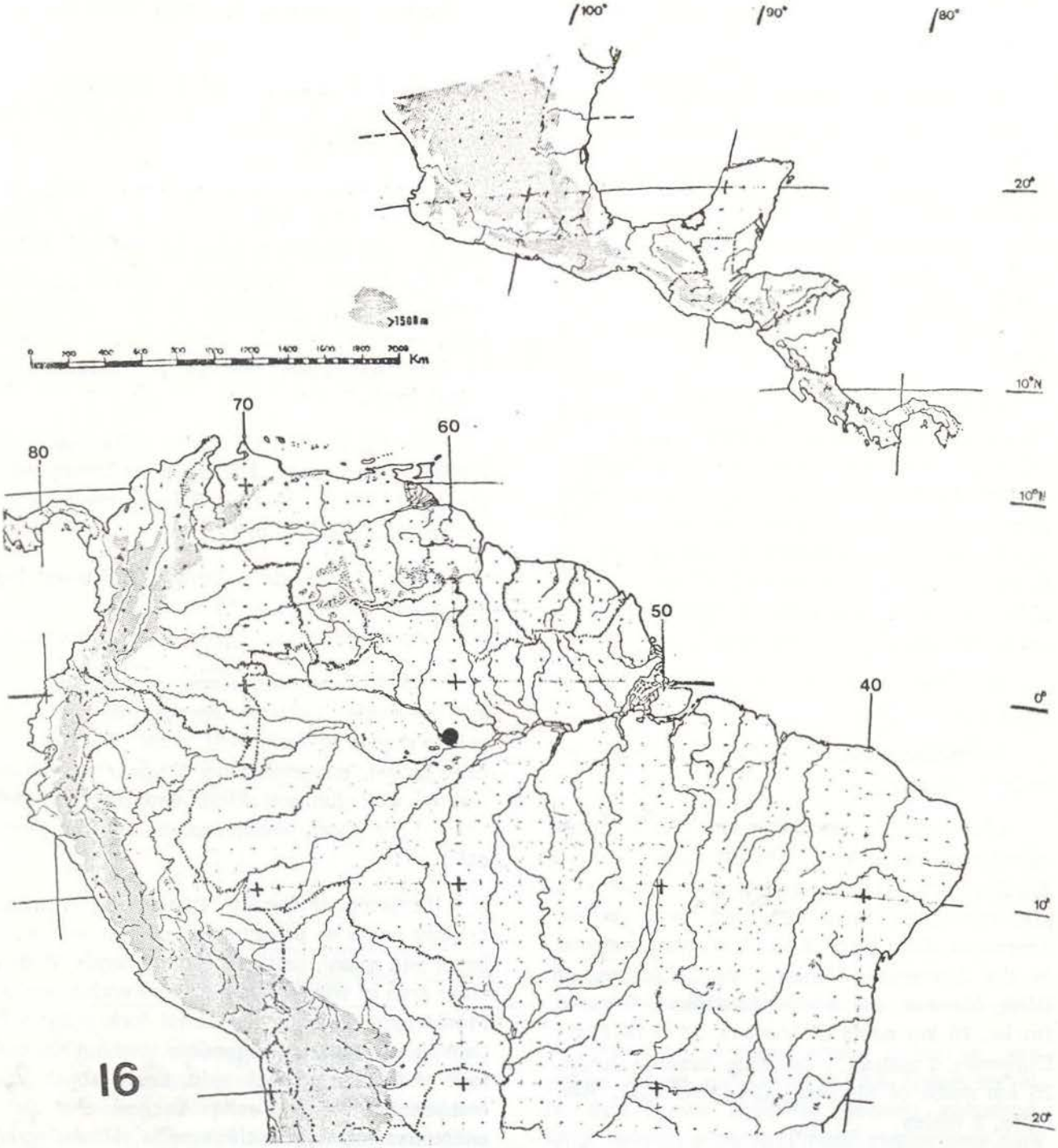
Hindwing of female trianguloid; without axillary angle or pronounced excavations; with basal and apical, vertical fuscous bands Within clear area of wing, cells bordered with fuscous. Pterostigma indistinct. Cubital fork indistinct. CuP clearly sinuous, extending to about second fork of Rs. First anal vein fairly short, encompassing seven cells. Second anal vein encompassing two or three cells. Hindwing of male clear with each cell bordered with fuscous.

ABDOMEN: Narrow for total length; dark brown throughout. Only small, sparse setae on dorsal surface after segment II. Segments III to VII with vertical slit on each side of dorsum near anterior margin. No evidence of lateral protuberances.

BODY LENGTH: male, 25 mm; female, 27 mm.

FOREWING LENGTH: male, 34 mm; female, 33 mm.

VARIATION: Hindwing pattern is dimorphic between sexes.



Map 16 — Geographical distribution of **Cordulecerus maclachlani** (Selys)

GEOGRAPHICAL DISTRIBUTION: The female holotype is without locality information. Weele (1908) mentioned two females in the Berlin Museum from Brazil. A further record in the Systematic Entomology Collections of INPA, Manaus, is from Brazil: Amazonas, Reserva Ducke, 26 km north of Manaus, 2-II-1979, N.D. Penny and O.S. Flint, Jr., 1 female.

TEMPORAL DISTRIBUTION: Females were repeatedly seen flying in the trees of Reserva Ducke in late January and early February, 1979.

HABITAT: This species seems to have a crepuscular activity period high in the trees near a small stream. Numerous individuals were seen high in the trees, but only rarely did they come low enough to be taken in an insect net. Black and fluorescent light traps set up in the same area proved almost completely unattractive, except for one female.

Ululodes Currie, 1899

Ulula Rambur, 1842, **Histoire nat. des Insectes Névroptères,** p. 357 (preoccupied).

Ululodes Currie, 1899, **Insects of New Jersey,** p. 57.

TYPE SPECIES: *Ascalaphus macleayna* Guilding.

This genus is most easily described by the lack of distinguishing characters used to easily separate the other three genera in this tribe. Thus, *Ululodes,* is characterized as having antennae shorter than the length of the forewing; forewing without distinct axillary angle; CuP of hindwing sinuous; and hindwing shape long and narrow.

This is the largest genus of owl-flies in the New World, with 24 species and 3 subspecies ranging from northern United States to northern Argentina (Penny, 1977). Three species are known from the Amazon Basin. They can be separated by the following key.

KEY TO AMAZONIAN SPECIES OF ULULODES

1a. Wings and thorax with yellowish coloration ..... *U. vetula*

1b. Wings clear or with fuscous spots; thorax with dark brown coloration .. 2

2a. Pterostigma pale yellow; apex of hindwing in males totally fuscous ..... *U. cajennensis*

2b. Pterostigma dark brown; hindwing with fuscous spot below pterostigma ..... *U. macleayana*

Ululodes cajennensis (Fabricius, 1787)

(Figs. 1, 20, 21, Map 17)

Ascalaphus cajennensis Fabricius, 1787, **Mantissa Insectorum,** p. 250.

Myrmeleon cajennensis (Fabricius) Gmelin, 1793, **Systema Naturae,** 13th edition, p. 2645.

Ulula cajennensis (Fabricius) MacLachlan, 1871, **J. Linn. Soc. Zool.,** 11: 248.

Ululodes cajennensis (Fabricius) Weele, 1908, **Coll. zool. Edm. Selys Longchamps,** 8: 106.

Ascalaphus hyalinus Latreille, 1811, **In** Humboldt's **Recueil d'observations,** 2: 118.

Ascalaphus inhonestus Walker, 1853, **Cat. Brit. Mus. Neur.,** p. 437.

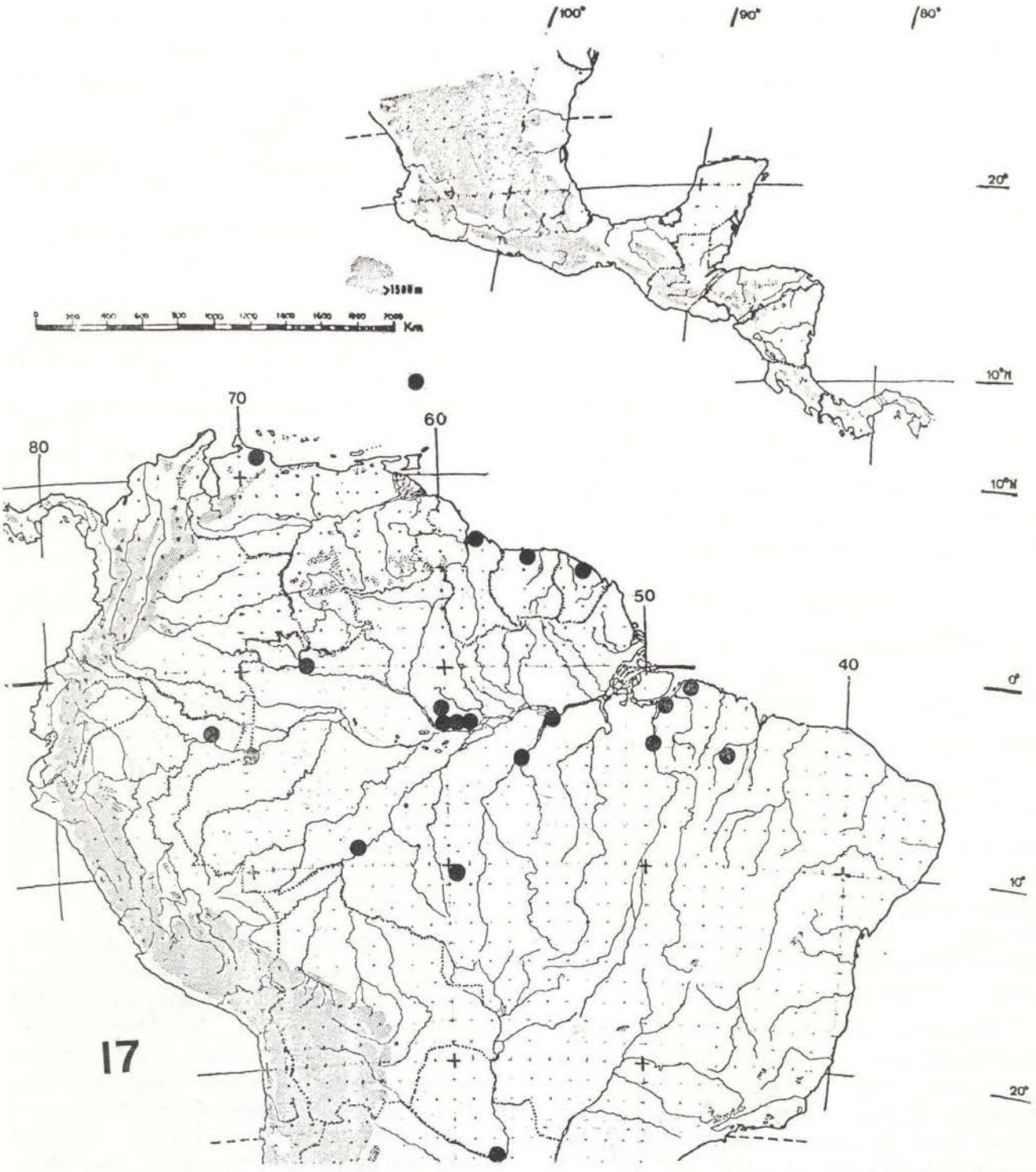
Ascalaphus sublugens Walker, 1858, **Trans. Ent. Soc. London,** 5 (2): 196.

Types of *A. cajennensis* and *hyalinus* not encountered in the Paris Museum, France.
Types of *A. inhonestus* and *sublugens* in the British Museum (Natural History), London.
Types of *U. immersa* is in the Greifswald Museum, Greifswald, D.D.R.
Present description based on holotypes of *A. inhonestus* and *A. sublugens* and 18 males, 45 females, pinned, 1 female, in alcohol.

HEAD: Occiput reddish brown with white pilosity. Compound eyes with median sulcus; dark fuscous with black spots. Clypeus and labrum reddish yellow. Mandibles reddish brown throughout. Maxillary palpi five-segmented; yellow. Antennae long, extending laterally almost to pterostigma of forewing; reddish brown; becoming fuscous on apical knob. Antennae with scattered, long setae basally.

THORAX: Pronotum narrow, collar-like, dark brown. Meso- and metanota dark fuscous with scattered, long, black setae. Pleural region dark brown with numerous, long, white setae.

LEGS: Coxae, femora and ventral surface of tibiae reddish brown. Dorsal surface of



Map 17 — Geographical distribution of **Ululodes cajennensis** (Fabr.).

tibiae white. Tibial spurs reddish brown. Tarsal segments white dorsally and black ventrally, white apical black rings. All leg segments with black setae and spines, except coxae and base of femora bearing white setae.

WINGS: Both fore- and hindwings elongate, narrow, without axillary angle of forewing. Forewing clear, except for pterostigma. Hindwing of male with fuscous apically; of female clear. Pterostigma amber, encompassing three

crossveins. Cubital fork of forewing distinct, of hindwing indistinct. First and second anal vein of both wings very short. CuP of hindwing sinuous, extending to second fork of Rs.

ABDOMEN: Narrow for total length; dark brown with medial, longitudinal black marks bordered with yellow on dorsum of segments III to VI. Two black spots at apex of dorsum VIII. Sparse, short, black pilosity over all abdomen, with longer, black setae on apical segments. Segments III to VII with vertical slit on each side of dorsum near anterior margin. No evidence of lateral protuberances.

BODY LENGTH: male, 21-23 mm; female, 19-23 mm.

FOREWING LENGTH: male, 23-25 mm; female, 20-26 mm.

VARIATION: Males have extensive fuscous markings at the apex of the hindwing, which is absent in females.

GEOGRAPHICAL DISTRIBUTION: Weele (1908) listed this species from French Guyana, Surinam, Guyana, Saint Lucia Island, Venezuela, Brazil, Peru and Paraguay. Within the Amazon Basin Weele listed Brazil: Pará, Santarém and Peru: Pebas. Additional Amazonian records in the Systematic Entomology Collections of INPA, Manaus, include: Brazil: Pará, Belém, I-1955, W.L. Paraense, 1 female; 63 km south of Itaituba, 7-X-1977, N.D. Penny, 1 female; Santarém, 17-V-1978, R. Best, 1 female; Mato Grosso, Aripuanã, 17-III-1977, N.D. Penny, 1 male, 3 females; Aripuanã, 18-III-1977, N.D. Penny, 1 male; Aripuanã, 16-22-III-1977, B.C. Ratcliffe, 1 male, 1 female; Aripuanã, 20-III-1977, N.D. Penny, 1 female; Aripuanã, 13-VII-1977, N.D. Penny, 1 female; Aripuanã, 6-IV-1979, N.D. Penny, 1 female; Rondônia, 6-IX-1966, E. Vieira, 1 male; Porto Velho, 20-V-1979, S. Campbell, 1 female; Porto Velho, 27-XI-1979, S. Campbell, 1 female; Porto Velho, 1-IV-1979, J. Campbell, 1 female; Porto Velho, 17-IV-1979, D. Need, 1 female; Porto Velho, 18-IV-1979, R. Yaddow, 1 female; Porto Velho, 15-II-1979, J. Campbell, 1 female; Porto Velho, 8-IX-1979, J. Campbell, 1 female; Amazonas, Manaus, 16-XII-1978, J.A. Rafael, 1 female; Manaus, 29-I-1978, N.D. Penny, 1 female; Manaus, 7-XII-1977, A. Soares, 1 female; Manaus, 11-VII-1979, E. Franco, 1 female; Lago Castanho, 17-IV-1977, B. Mascarenhas, 1 female; Cacau Pereira, 24-X-1979, B. Mascarenhas, 1 female; Reserva Ducke, 26 km north of Manaus, 11-XI-1976, N.D. Penny, 2 females; CEPLAC, 30 km north of Manaus, 2-VIII-1979, N.D. Penny, 1 female; CEPLAC, 30 km north of Manaus, 30-VII-1979, H.M. Savage, 1 male; CEPLAC, 30 km north of Manaus, 17-II-1978, N.D. Penny, 1 female; Reserva Campinas, 45.5 km north of Manaus, 16-22-VIII-1979, H.M. Savage, 1 male, 5 females; 107 km north of Manaus, 16-XI-1977, N.D. Penny, 1 male; 153 km north of Manaus, 13-VI-1977, N.D. Penny, 1 female; 180 km east of Manaus. 24-X-1965, F. Antonio, 1 male; 244 km east of Manaus, 19-I-1977, N.D. Penny, 2 males, 2 females; Manaus, 11-VIII-1977, B.C. Ratcliffe, 1 female; Reserva Ducke, 26 km north of Manaus, 13-I-1978, B.C. Ratcliffe, 1 female; Reserva Ducke, 26 km north of Manaus. 1-XI-1978, J. Arias and N.D. Penny, 1 male; Benjamin Constant, IX-1962, K. Lenko, 1 female; Puraquequara, 16-19-II-1980, U. Barbosa, 1 female; Pará, Tucurui, Rio Tocantins, 12-16-VI-1980, J.A. Rafael, 1 female; Tucurui, rio Tocantins, 2-VII-1980, J.A. Rafael, 1 female; Tucurui, rio Tocantins, 7-VII-1980, J.A. Rafael, 1 female; Tucurui-Bagageui, 4-VIII-1980, A. Faustino and Valdo, 1 male; Tucurui-Santo Antonio, 19-VI-1980, A. Faustino and Valdo, 1 female; Tucurui-Santo Antonio, 23-VI-1980, A. Faustino and Valdo, 1 female; Amazonas, São Gabriel da Cachoeira, 5-12-VII-1980, N.D. Penny and J. Brasil, 1 female. Additional material in Museu Paraense Emilio Goeldi, Belém, is from Brazil: Pará, Utinga, I-1938, Hagen, 1 male; Bragança, 6-IX-1978, 1 female; PA-070, km 32, 14-15-XI-1979, R.B. Neto, 1 female; Bragança, 5-IX 1978, 1 female; Bragança, 25-V-1978, F.F. Ramos, 1 female; Oyapoe, VII-1936, 1 female; Maranhão, Alenquer, 6-VII-1979, W. França, 1 female; Periforó, 10-VI-1978, M.F. Torres, 1 male; Buriticupu, 30-IX-1978, 1 male.

TEMPORAL DISTRIBUTION: This species appears to be present in the adult stage throughout the year.

HABITAT: *U. cajennensis* has often been taken at lights and seems to prefer open, cultivated areas.

This species is very similar to *U. macleayana venezolensis*, including to the distinctive abdominal markings, and clearly these two species are closely related. However, *U. cajennensis* has a much paler pterostigma, and males usually have a larger fuscous area at the tip of the hindwing. Some Amazonian males of *U. macleayana venezolensis* tend to have some basal infuscation of the hindwing, as is found in *U. macleayana limbata*, but this is wholly lacking in males of *U. cajennensis*.

Ululodes macleayana (Guilding, 1825)

(Figs. 22-24, Map 18)

Ascalaphus macleayana Guilding, 1825, **Trans. Linn. Soc. London**, 7: 140.

Ulula macleayana (Guilding) MacLachlan, 1871, **J. Linn. Soc. Zool.**, 11: 247.

Ululodes macleayana (Guilding) Weele, 1908, **Coll. zool. Edm. Selys Longchamps**, 8: 101.

Ascalaphus limbatus Burmeister, 1839, **Handbuch der Entomologie**, 2: 1001.

Ululodes macleayana limbata (Burmeister) Weele, 1908, **Coll. zool. Edm. Selys Longchamps**, 8: 102.

Ululodes macleayana venezolensis Weele, 1908, **Coll. zool. Edm. Selys Longchamps**, 8: 103.

Ulula limbata (Burmeister) Rambur, 1842, **Histoire naturelle des Insectes Névroptères**. p. 358.

Holotype male of *A. macleayana* not seen in the Oxford University Museum, Oxford, England. Whereabouts of types of *A. limbatus* unknown. Four syntypes of *U. macleayana venezolensis* in the Selys Collection, Weele Collection (Leyden Museum), and the Greifswald Museum, Greifswald, D.D.R.

Present description based on 7 males, 8 females, pinned.

HEAD: Occiput dark brown with gray pilosity. Compound eyes with median sulcus; reddish brown with black spots. Clypeus and labrum reddish yellow with white pilosity. Mandibles reddish brown throughout. Maxillary palpi five-segmented; reddish yellow. Antennae long, reaching laterally to third fork of Rs of forewing; yellowish brown, except apical knob dark fuscous. Antennae with scattered, long, dark setae basally.

THORAX: Pronotum narrow, collar-like, dark brown. Meso- and metanota dark fuscous, with numerous long, white setae. Pleural region dark brown with long, white pilosity.

LEGS: All leg segments reddish brown to black with black setae and spines except coxae and femora with long, white setae.

WINGS: Fore- and hindwings elongate, narrow, without axillary angle. Forewing clear, except for pterostigma. Hindwing of female clear, of male with dark spot behind pterostigma. Pterostigma dark brown to black, encompassing three to four crossveins. Cubital fork of forewing distinct, of hindwing indistinct. CuP of hindwing sinuous, extending to second fork of Rs. First and second anal cells short in both wings.

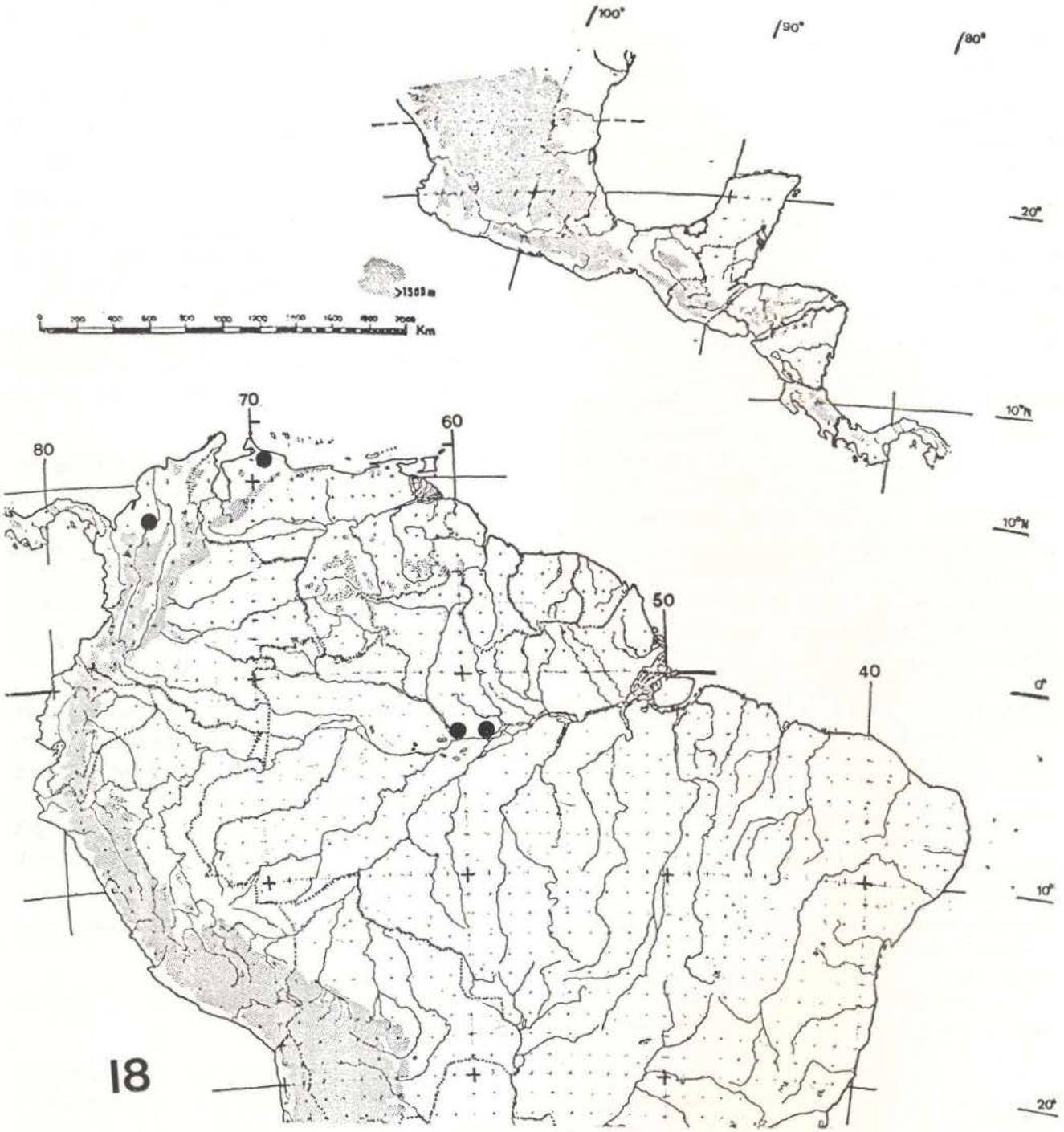
ABDOMEN: Narrow for total length; dark brown with dorsal, longitudinal black marks bordered with yellow on segments III to VI. Dorsum of segment VIII with two black spots. Segments III to VII with vertical slit on each side of dorsum near anterior margin. No evidence of lateral protuberances.

BODY LENGTH: male, 17-21 mm; female, 17-24 mm.

FOREWING LENGTH: male, 24-26 mm; female, 23-28 mm.

VARIATION: Males have a dark spot behind the pterostigma of the hindwings, missing in females.

GEOGRAPHICAL DISTRIBUTION: Weele (1908) mentioned *U. macleayana venezolensis* as being from Venezuela and Colombia, while he recorded *U. macleayana limbata* from southern Brazil and Argentina. Amazonian records of material in the Systematic Entomology Collections of INPA, Manaus, are: Brazil: Amazonas, Manaus, 23-IX-1978, J.A. Rafael, 1 male; Manaus, 30-IX-1978, J.A. Rafael, 1 male; Manaus, 4-XI-1978, J.A. Rafael, 1 male; Manaus, 21-X-1978, J.A. Rafael, 1 male; Manaus, 7-X-1978, J.A. Rafael, 1 male; CEPLAC, 30 km



Map 18 — Geographical distribution of **Ululodes macleayana** (Guilding).

north of Manaus, 30-VII-1979, H.M. Savage. 1 female; Reserva Campinas, 45.5 km north of Manaus, 16-22-VIII-1979, H.M. Savage, 1 male, 2 females; 244 km east of Manaus, 19-I-1977, N.D. Penny, 2 males, 1 female; Manaus, 23-IV-1976, I.S. Gorayeb, 1 female; Reserva Egler, 64 km northeast of Manaus, 26-VIII-1970, A. Faustino, 1 female.

TEMPORAL DISTRIBUTION: This species seems to be most common from August to November, the driest part of the year in central Amazonia.

ECOLOGY: This species is taken at lights, and J. Rafael collected several individuals from flight traps in an open wet, grassy area.

In Weele's (1908) monographic revision of the Ascaclaphidae, he created several subspecies for the species *Ululodes macleayana*, including two which are found in Amazonia, *limbata* and *venezolenssi*. However, by definition subspecies are geographically isolated, and both Amazonian forms have been collected from the same open field. The subspecies *limbata* has much more pigmentation on the hindwing of the male, but several intermediates exist in the INPA collections. Therefore, these cannot be true subspecies, and because of the existence of intermediates, I prefer to think of them as varieties. Whether they form a single species with *U. macleayana macleayana*, or more than one species is not known, but because they are so similar morphologically, I suspect that we are dealing with morphological variability within a single species. *Ululodes* cajennensis also is quite similar, but can be separated by the pale pterostigma in *U. cajennensis*.

Ululodes vetula (Rambur, 1842)

(Map 19)

Ulula vetula Rambur, 1842, **Histoire naturelle des Insectes Névroptères**, p. 358.

Ascalaphus vetula (Rambur) Walker, 1853, **Cat. Brit. Mus. Neur.**, p. 436.

Ululodes vetula (Rambur) Weele, 1908, **Coll. zool. Edm. Selys Longchamps**, 8: 119.

Ulula aurifera MacLachlan, 1871, **J. Linn. Soc. Zool.**, 11: 249.

Holotype of *U. vetula* in the Paris Museum, France, and holotype female of *U. aurifera* in the British Museum (Natural History) London, England.

Present description based on holotypes of *U. vetula* and *U. aurifera*, and 2 males and 3 females, pinned.

HEAD: Occiput yellowish brown with long, yellow pilosity. Compound eyes with median sulcus; reddish brown with black spots. Clypeus and labrum yellow. Mandibles reddish brown throughout. Maxillary palpi five-segmented, yellow. Antennae long, extending laterally almost to pterostigma of forewing; dark fuscous, except tip of apical knob pale yellow. Antennae with scattered, long, black setae basally.

THORAX: Pronotum narrow, collar-like fuscous. Meso- and metanota fuscous with abundant, long, yellow pilosity. Pleural region fuscous with abundant long, yellow pilosity.

LEGS: All leg segments yellowish brown; bearing black setae and spines, except coxae and basal part of femora with long, yellow setae.

WINGS: Both fore- and hindwings elongate, narrow, without axillary angle. Both wings transparent and amber tinted. Pterostigma amber, encompassing three crossveins. Cubital fork of forewing distinct, of hindwing indistinct. CuP of hindwing sinuous, extending to level of third fork of Rs. First and second anal vein of both wings very short.

ABDOMEN: Narrow for total length; dark brown dorsally, with two quadrate yellow spots posterio-laterally on each segment. Sparse black pilosity dorsally; sparse yellow pilosity ventrally. Segments III to VII with vertical slit on each side of dorsum near anterior margin. No evidence of lateral protuberances.

BODY LENGTH: male, 20-23 mm; female, 21-25 mm.

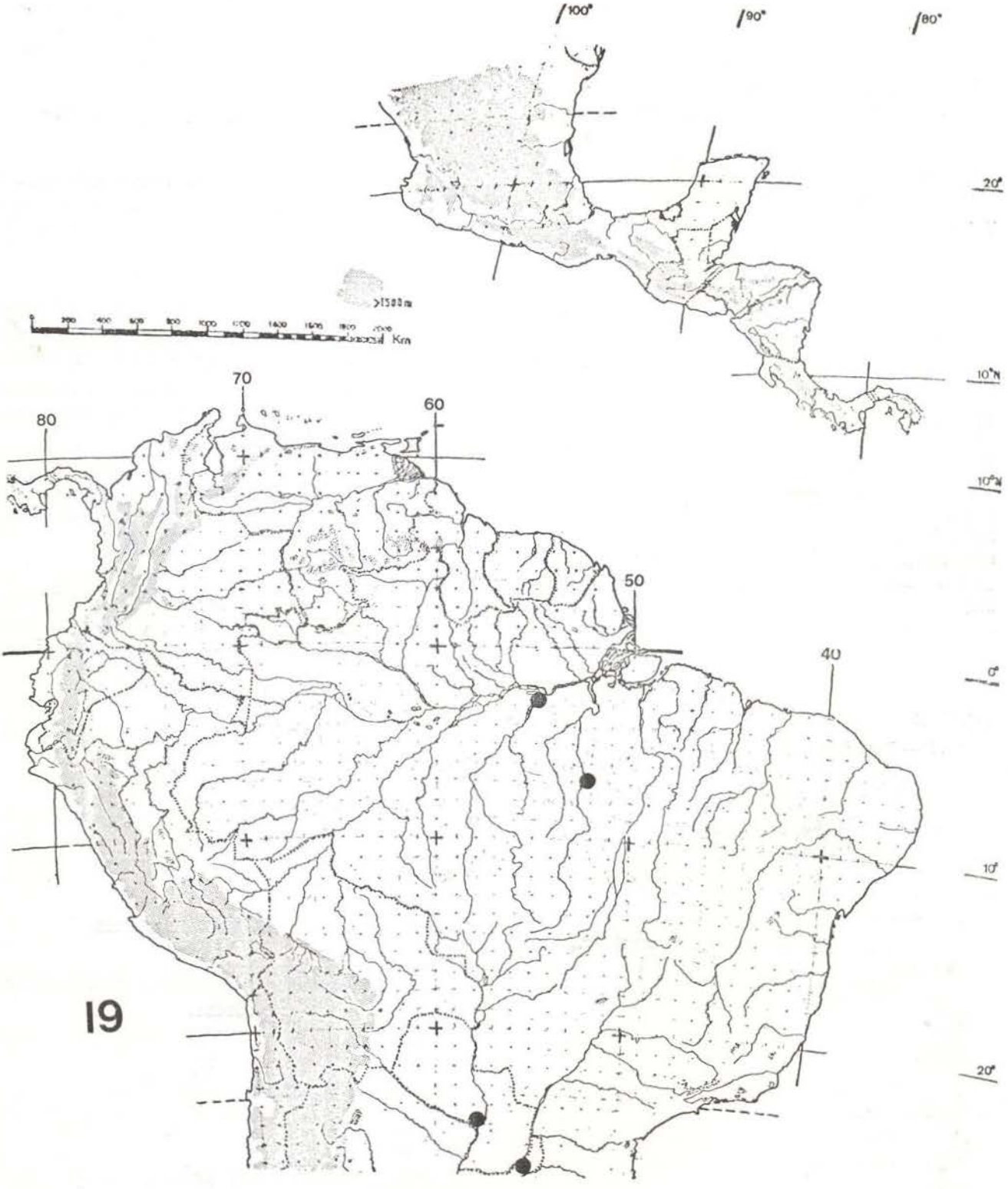
FOREWING LENGTH: male, 25-26 mm; female, 26-30 mm.

VARIATION: The darkness of the amber tint to the wings is variable, and in darker specimens the lateral, yellow markings of the abdomen are indistinct.

GEOGRAPHICAL DISTRIBUTION: Weele (1908) listed specimens from Brazil, Paraguay, and Argentina. Within the Amazon Basin, Weele only mentioned Brazil: Pará, Santarém. The invertebrate collections of Museu Paraense Emilio Goeldi have one more Amazonian specimen: Brazil: Pará, Gorotire Xingu, 14-XI-1977, D.A. Posey, 1 male.

TEMPORAL DISTRIBUTION: The one Amazonian record is for November.

Ululodes vetula is a very distinctive species, due to its abundant yellow coloration,



Map 19 — Geographical distribution of **Ululodes vetula** (Rambur).

and cannot be mistaken for any other species of *Ululodes*.

Acknowledgments

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Resumo

Apresentam-se descrições de 8 gêneros e 19 espécies de Ascalaphidae (Neuroptera) procedentes da Amazônia, além de comparações com outras espécies mais relacionadas. Chaves e mapas de distribuição são apresentados para a identificação de todas as espécies da Amazônia. Três espécies novas são descritas **(Ameropterus breviantennis, Ascalobyas machadoi** e **Neohaploglenius mondonianus)** e três espécies são sinonomizadas **(Episperches impediens** (Walker) e **Episperches arenosus** (Walker) = **Amoea iniquus** (Walker) e **Haploglenius bolivianus** Navás = **Haploglenius luteus** (Walker)).

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