

FOUR NEW SPECIES OF WING ROLLING **NEODAWNARIA** (HOMOPTERA : DERBIDAE) FROM THE AMAZON BASIN

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SUMMARY

Four new species of *Neodawnaria* are described, and compared with other members of the genus. Keys and geographical distribution are given for all new species and the wings of two other species are illustrated.

In a recent publication (O'Brien, 1982) the genus *Neodawnaria* was erected for four new species of Central and South American derbids with peculiar wing rolling behavior. While examining the INPA Systematic Entomology Collection for specimens of this genus, 22 specimens in four species were found, all of them different from the original species. Thus, with the addition of these four new species, the genus presently contains eight species, which can be separated using the following key:

KEY TO SPECIES OF **NEODAWNARIA** (MODIFIED FROM O'BRIEN, 1982)

- 1a. Crossvein from Cu_2 reaching wing margin beyond clavus (Figs. 19, 20)
-----2
- 1b. Crossvein from Cu_2 reaching claval vein -----7
- 2a. Pronotum concolorous -----N. **hondurensis**
(Fig. 20)
- 2b. Pronotum with contrasting color patterns -----3
- 3a. Wax pustules along basal half of forewing veins Rs, M and Cu_1 - 4
- 3b. Wax pustules absent from longitudinal veins Rs, M and Cu_1 -----5
- 4a. Apical forewing cells bearing five distinct spots-----N. **quinquepunctata**
(Figs. 14-18)
- 4b. Forewing apex with some dark infuscation, but without distinct
small spots -----N. **glandula**
(Figs. 12-13)
- 5a. Basal three spots on costal margin of forewing not linked by bands
to anal margin; anal tube of male longer than aedeagus, acutely -
tipped; flagellum long, straight -----N. **amazonica**
(Figs. 1 - 6)

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- 5b. Forewing not bearing series of distinct maculations along costal margin -----6
- 6a. Forewing bands reaching costal margin; without pale maculation along anal margin; male genital style bearing small teeth, but without protuberances; aedeagus with three vertical plates and short, downwardly-directed flagellum -----**N. obrianae**
(Figs. 7 -11)
- 6b. Dark forewing bands fading out before costal margin; with pale maculation along anal margin; male genital style with two medial projections; aedeagus with one vertical plate on right side and elongate, narrow flagellum ----- **N. ecuadorensis**
(Fig. 19)
- 7a. Larger than 5mm; from the West Indies ----- **N. jamaicensis**
- 7b. Smaller than 5mm; from Central America ----- **N. woldai**

NEODAWNARIA AMAZONICA PENNY & ARIAS, n. sp. (Figs. 1-6, map 1)

Original description based on 2 males, 4 females, pinned.
Holotype male in the INPA Systematic Entomology Collection, Manaus, Brazil.

Head: Golden yellow (Fig. 1).

Thorax: Ground color pale brown in males; golden yellow in females. Pronotum yellow medially, white laterally. Meso- and metascutella and tegula white.

Legs: Pale yellow

Wings: Forewing longitudinal veins yellow in pale areas and brown in dark areas, except bright red at base of R and along apical margin of wing (Fig. 3). Most longitudinal veins apically somewhat swollen. Cu_2 connected to wing margin beyond apex of clavus by a crossvein. Base of costal margin swollen with numerous pustules for wax secretion, forming a white wax coating at base of wing. Wing membrane yellow, with five brown spots along costal margin, two brown spots in basal anal area, and broad brown band along apical part of anal margin, narrowly connected to distal two spots on costal margin.

Abdomen: The color pattern appears to be dimorphic, with males being dark brown, except for narrow, dorso-medial, pale line. Females have first four segments pale yellow; caudal segments yellow ventrally, dark brown dorsally, and pale yellow, dorso-medial, triangular spots. Male anal tube bright red, and styles dark brown. Male anal tube longer than aedeagus, narrow, and apically acute (Fig. 6). Styles broadly quadrangular, bearing baso-medial lobe, which in lateral view is anteriorly acutely-lobed, and posteriorly broadly rounded and setiferous (Fig. 4). Aedeagus relatively simple, without lobes but with apex forming a short, recurved point above flagellum (Fig. 5). Flagellum very long and acute.

Length: (Body + forewing) : 7.4 - 7.8mm.

Geographical Distribution: (Map 1) Holotype male from BRAZIL: Amazonas, Reserva Ducke (AM-010, km 26), 1-X-1976, N.D. Penny (INPA). Allotype female from BRAZIL: Amazonas, Manaus, Ponta Negra, 19-XI-1976, N.D. Penny (INPA). Paratypes from BRAZIL: Amazonas, Reserva Ducke, 14-III-1977, N.D. Penny, 1 male (USNM); Reserva Campinas (BR-174, km 45), 6-III-1979, N.D. Penny, 1 female (O'Brien Collection); Amazonas, CEPLAC (AM-010, km 30), 5-V-1977, N.D. Penny, 1 female (Museu Paraense Emílio Goeldi); Amazonas, CEPLAC, 13-XI-1976, N.D. Penny, 1 female (Museu de Zoologia, USP).

Habitat: This species has only been collected in lowland, primary forest.

Species Relationships: This species does not appear to have close relatives among the species so far described. The bright red, very elongate anal tube and elongate, straight flagellum are unknown among other species. The crossvein connecting Cu_2 with the wing margin has so far only been seen in the other Amazonian species, and *N. hondurensis* and *N. ecuadorensis*.

This species was named for the river basin in which it has been collected.

NEODAWNARTA OBRIENAE PENNY & ARIAS, n. sp. (Figs. 7-11, Map. 1)

Original description based on one male, one female, in alcohol.

Holotype and allotype in the INPA Systematic Entomology Collection, Manaus, Brazil.

Head: Yellowish-brown medially; dark brown laterally (Fig. 7).

Thorax: Pronotum and tegula dark brown medially; pale yellow laterally. Meso- and metanota pale brown medially; dark brown laterally.

Legs: Pale yellow.

Wings: Forewing longitudinal veins yellow in costal half, and dark brown in anal half, with most veins apically somewhat swollen. Color pattern mostly dark, with four pale central spots and pale areas along costal margin (Fig. 8). Crossvein from Cu_2 to wing margin extending only half the distance, and the rest appearing as a pale line in wing membrane. Base of costal margin swollen with numerous pustules for wax secretion.

Abdomen: Tergites and sternites dark brown. Male anal tube dark brown, slightly longer than wide, with lateral lobes apically blunt (Fig. 11). Styles elongate, oval, with six small dentate hairs on dorsal surface and ventral field of small, stout hairs. Baso-medial lobe of style bi-lobed, the anterior acute and bearing two setae, while posterior lobe rounded and bearing four setae (Fig. 9). Aedeagal complex consisting of three vertical plates, the outer, left plate being smallest, and plate farthest right bearing short, downward-directed flagellum (Fig. 10).

Length: male, 6.9 mm; female, 5.0 mm.

Geographical Distribution: (Map 1) Holotype is from BRAZIL: Pará, Serra Norte Parapebas (southwest of Marabá), VIII-IX-1982, P. Ready (INPA); allotype female from BRAZIL: Amazonas, Represa Balbina (approximately 100 km north of Manaus), 11-16-XI-1983, equipe J.R. Arias (INPA).

Intraspecific Variation: Even though the female is much smaller than the male, and

comes from a region more than 1000 Km distant from the holotype, we can find no differences of significance in the wing venation or body coloration.

Species Relationships: This is one of the Amazonian species whose Cu_2 crossvein reaches the wing margin and not the claval vein. In some respects this species resembles *N. woldai* from Panama in the stout anal tube, and short flagellum, but *N. obriena* has a longer anal tube, a bipartite baso-medial lobe to the style, and the distinctive vertical plates of the aedeagus, as well as darker wings.

This species is dedicated to Dr. Lois O'Brien, whose extensive collecting and careful species analysis has greatly enhanced our knowledge of the Fulgoroidea, especially within the genus *Neodawnaria*.

NEODAWNARIA GLANDULA PENNY & ARTIAS, n. sp. (Figs. 12 - 13, Map 2).

Original description based on 1 female, pinned.

Holotype female in the INPA Systematic Entomology Collection, Manaus, Brazil.

Head: Uniformly pale brown (Fig. 12).

Thorax: Pronotum red centrally (near eyes), pale brown dorsally and laterally. Tegulae pale brown dorsally, pale yellow ventrally. Meso- and metanota uniformly pale brown.

Legs: Pale brown.

Wings: Forewing longitudinal veins red along costal and anal margins and basal part of R; remainder of veins brown; most veins somewhat swollen apically. Cu_2 connected to anal margin of wing beyond apex of clavus by crossvein. Base of costal margin swollen with numerous pustules for wax secretion, forming a white wax coating at base of wing, and other pustules scattered along veins Rs , M and Cu_1 . These latter pustules form a distinctive series of small white spots along their respective veins in basal half of forewing. Liquid preserved material show little of this spotting. Color pattern similar to *N. amazonica*, but dark pigmentation somewhat more extensive (Fig. 13).

Abdomen: All segments pale brown, margined with red at edge of sclerites. Female ovipositor pale brown.

Length: female, 5.6 mm.

Geographical Distribution: (Map 2) Holotype female is from BRAZIL: Amazonas, Reserva Campinas (BR-174, km 45), 29-XI-1976, N.D. Penny (INPA).

Habitat: This species was collected in lowland, primary forest.

Species Relationships: On the basis of the position of the Cu_2 , this species fits into the group with five other species. The forewing is very distinctive with the white pustules along veins in the basal half of the wing. Two other species, *N. hondurensis* and *N. quinquepunctata* - both also quite small species, also have small pustules on the longitudinal veins of the forewing basally, but *N. quinquepunctata* is a very pale species with apical spots on the forewing, and *N. hondurensis* has pustules which are not white.

The name **glandula** is given to indicate the small wax glands along the wing veins, the most characteristic feature of this species.

NEODAWNARIA QUINQUEPUNCTATA PENNY & ARIAS, n. sp. (Figs. 14 - 18, Map 2)

Original description based on 2 males, 11 females, in alcohol.

Holotype male and allotype female in INPA Systematic Entomology Collection, Manaus.

Head: Frons, clypeus and vertex dark brown, becoming red at posterior margin of genae (Fig. 14).

Thorax: Pronotum dark brown, becoming red at margin with genae. Meso- and metanota and tegula pale yellow, with bright orange subdermal medial stripe on posterior half of mesonotum and all metanotum. Pleural areas dark brown.

Legs: Dark brown.

Wings: Forewing longitudinal veins pale yellow. Three areas of dark pigmentation form broken transverse stripes basally, at pterostigma, and apically. Apical cells bear five distinctive small spots at wing margin (Fig. 15). Bases of Rs, M and Cu veins have small wax pustules along their margin. Base of costal margin swollen with numerous pustules for wax secretion.

Abdomen: Dorsal coloration basically pale yellow, with longitudinal orange medial stripe bifurcate at small dark spot medially on fifth tergite, proceeding posteriorly dorso-laterally; ventrally dark brown; laterally bright red. Female terminalia pale yellow; male terminalia dark brown. Male genital styles elongate ovoid, with narrow basal and medial projections along dorsal surface (Fig. 17). Anal flap about twice as long as wide, apically pointed, and in dorsal view apically bifurcate (Fig. 16). Aedeagal complex consisting of two vertical elliptical plates (right plate larger) (Fig. 18). Pygofer with small lobe at mid-length.

Length: male, 4.2 mm; female, 4.1 - 4.2 mm.

Geographical Distribution: (Map 2) Holotype male from BRAZIL: Amazonas, Represa Balbina (100 km north of Manaus), 25-27-XI-1983, equipe J.R. Arias, CDC light trap at 15 m height (INPA). Allotype female same data as holotype. Paratype females from BRAZIL: Amazonas, Represa Balbina, 12-17-XI-1983, equipe J.R. Arias, CDC light trap at 15 m height, 2 females (Museu Paraense Emílio Goeldi and Museu de Zoologia; USP); Represa Balbina, 12-17-XI-1983, equipe J.R. Arias, CDC light trap at 1 m height, 1 female (U. S. National Museum); Amazonas; BR-174, km 60, 23-25-XI-1983, equipe J.R. Arias, CDC light trap at 15 m height, 1 female (O'Brien Collection; Amazonas, Reserva Ducke) (AM-010, km 26), 2-VIII-1977, J.R. Arias, 1 male, 3 females (INPA); Reserva Ducke, 6-IX-1977, J.R. Arias, 1 female (INPA); Reserva Ducke, 13-IX-1977, J.R. Arias, CDC light traps, 2 females (INPA).

Species Relationships: The male genitalia shows a close similarity to that of *N. ecuadorensis*, but size and wing coloration are completely different. The pale forewing with five apical spots and small dorsal abdominal spot do not allow confusion with any other known species.

The name *quinquepunctata* comes from the Latin for five small spots, the most distinctive feature on the forewing of this species.

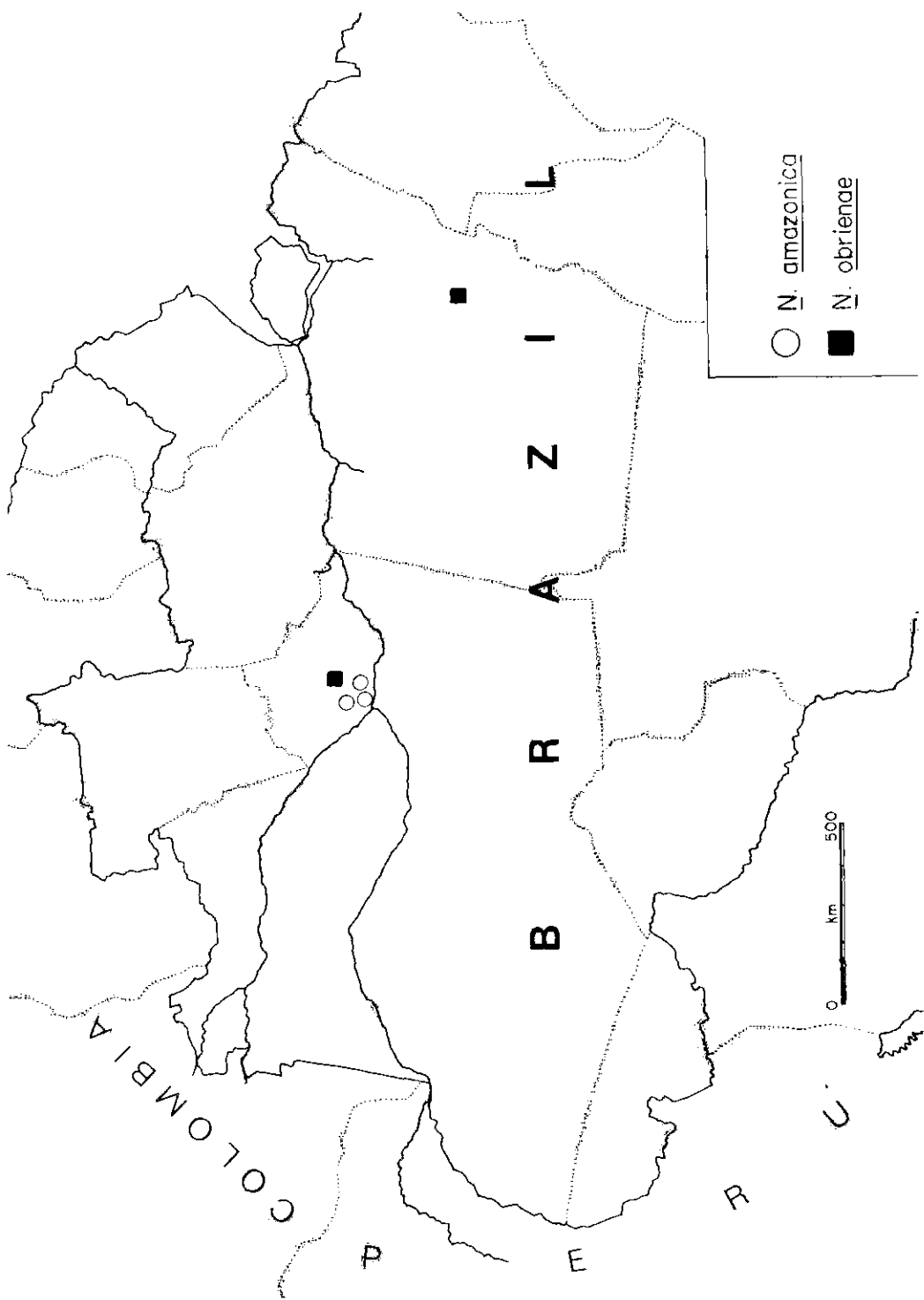
Note: In the key genera of Cenchreini (O'Brien, 1982) there are two characters used to separate *Dawnaroides* from *Neodawnaria*: the presence of a crossvein from Cu_2 to the claval vein, and the shape of the pronotum in frontal view. We found that in measuring the species from central Amazonia, the pronotal width was usually somewhat less than twice the height, but the drawing of *N. ecuadorensis* indicates that this pronotum also was not twice as wide as high. The crossvein which is linked to the clavus in other species always terminates at the wing margin beyond the clavus in the four central Amazonian species, and two others, and in *N. obrienae* this crossvein actually appears to stop short of the margin. However, one characteristic which may be of importance are the acute processes found on the left side of the aedeagus in *Dawnaroides*. In the six species of *Neodawnaria* for which male genitalia are known, these processes are absent.

ACKNOWLEDGMENTS

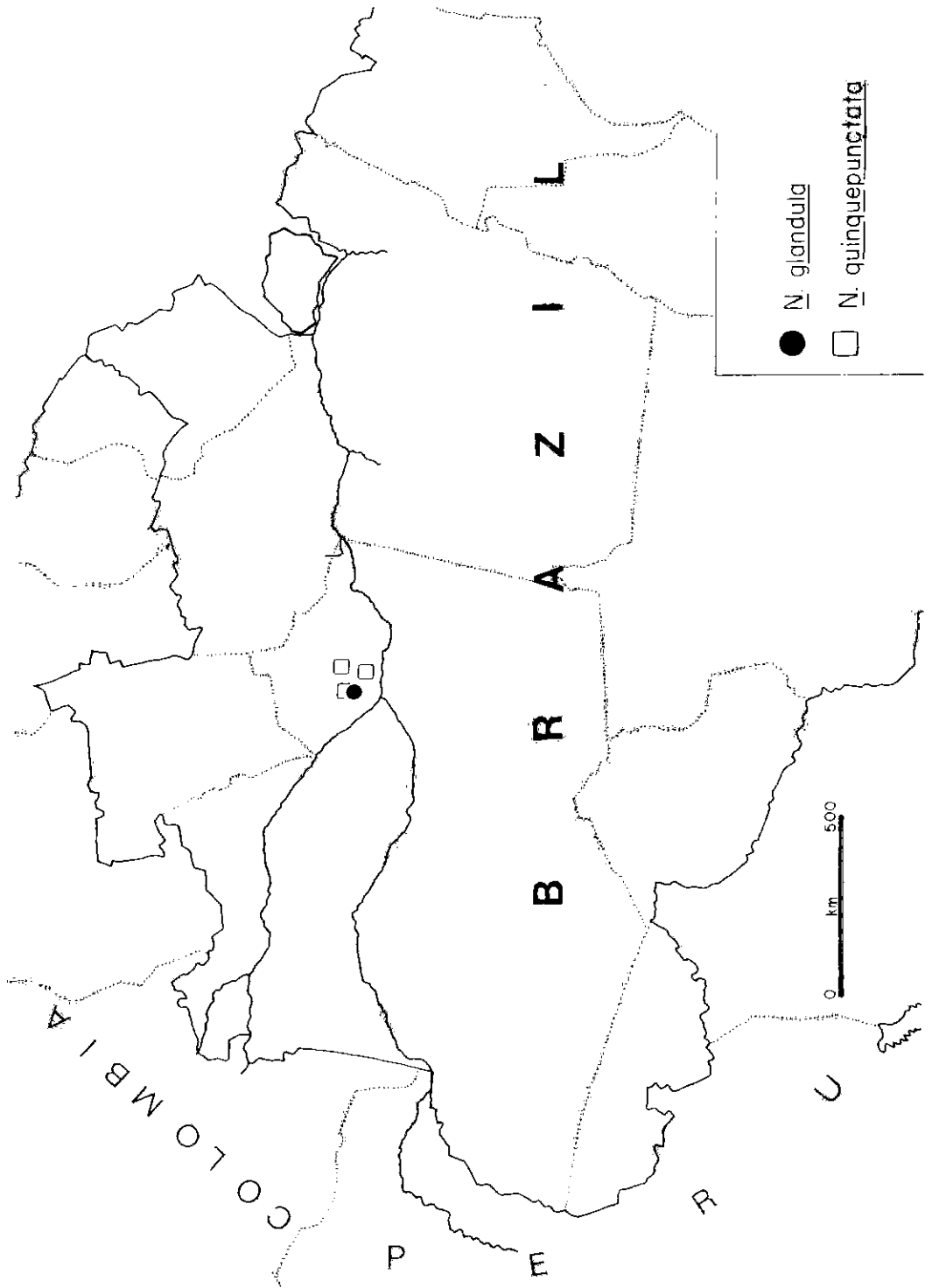
We would like to thank CNPq's Projeto Tópico Úmido grant nº 3224 and ELETRONORTE for financial assistance, the latter through the cooperative assistance of Dr. Roberto Vieira. Drs. Paul Reedy and Michael Miles of the London School of Hygiene and Tropical Medicine are to be thanked for material collected through a cooperative agreement with Instituto Evandro Chagas, Belém. All drawings were made by Artêmio Coelho da Silva. Dr. Lois O'Brien was kind enough to give constructive criticism and loan forewings of two paratypes to improve an early version of the manuscript.

RESUMO

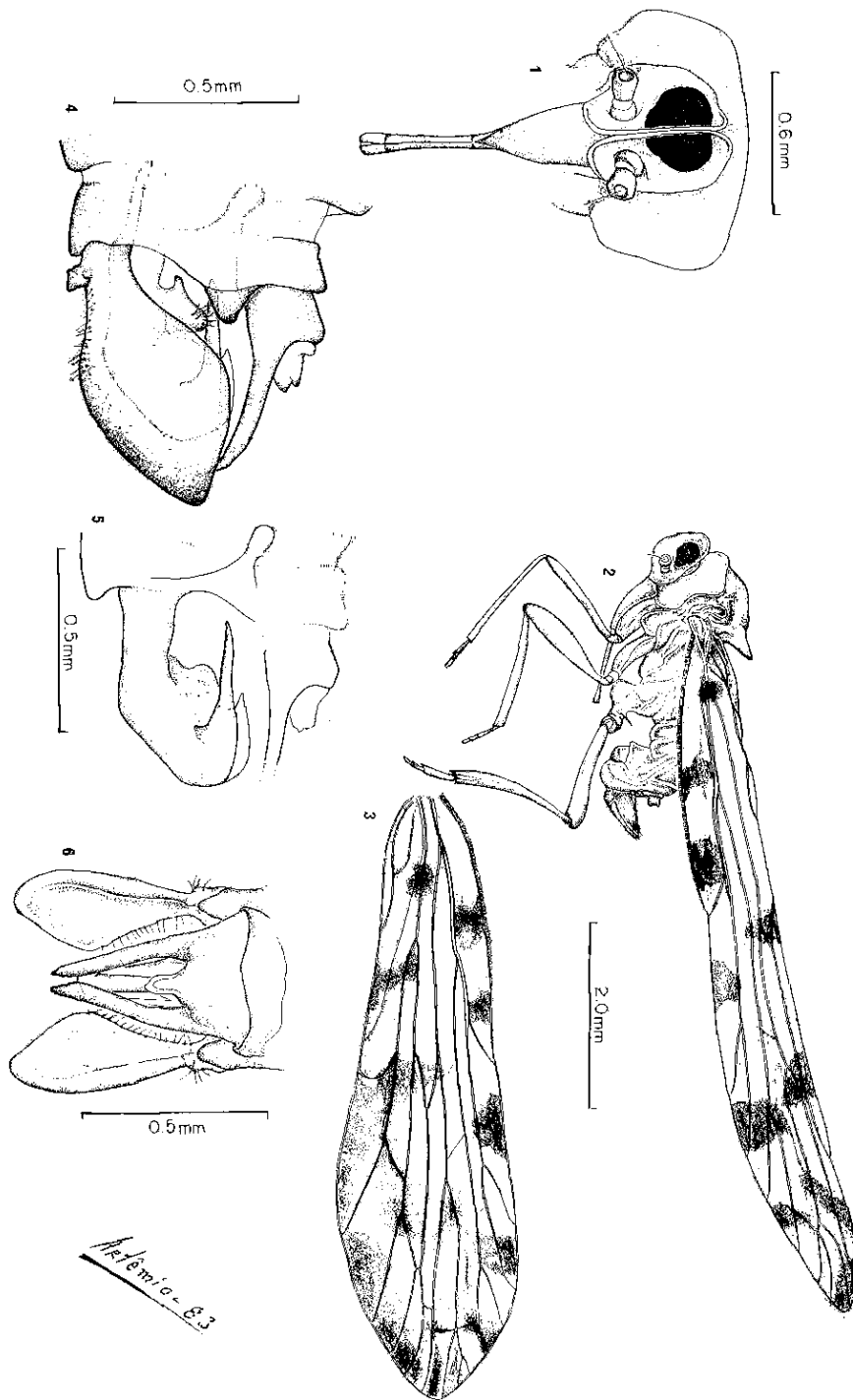
Quatro novas espécies de *Neodawnaria* são descritas, e comparadas com outros membros do gênero. Chaves e distribuições geográficas são dadas para as espécies novas e asas de duas outras espécies são desenhadas.



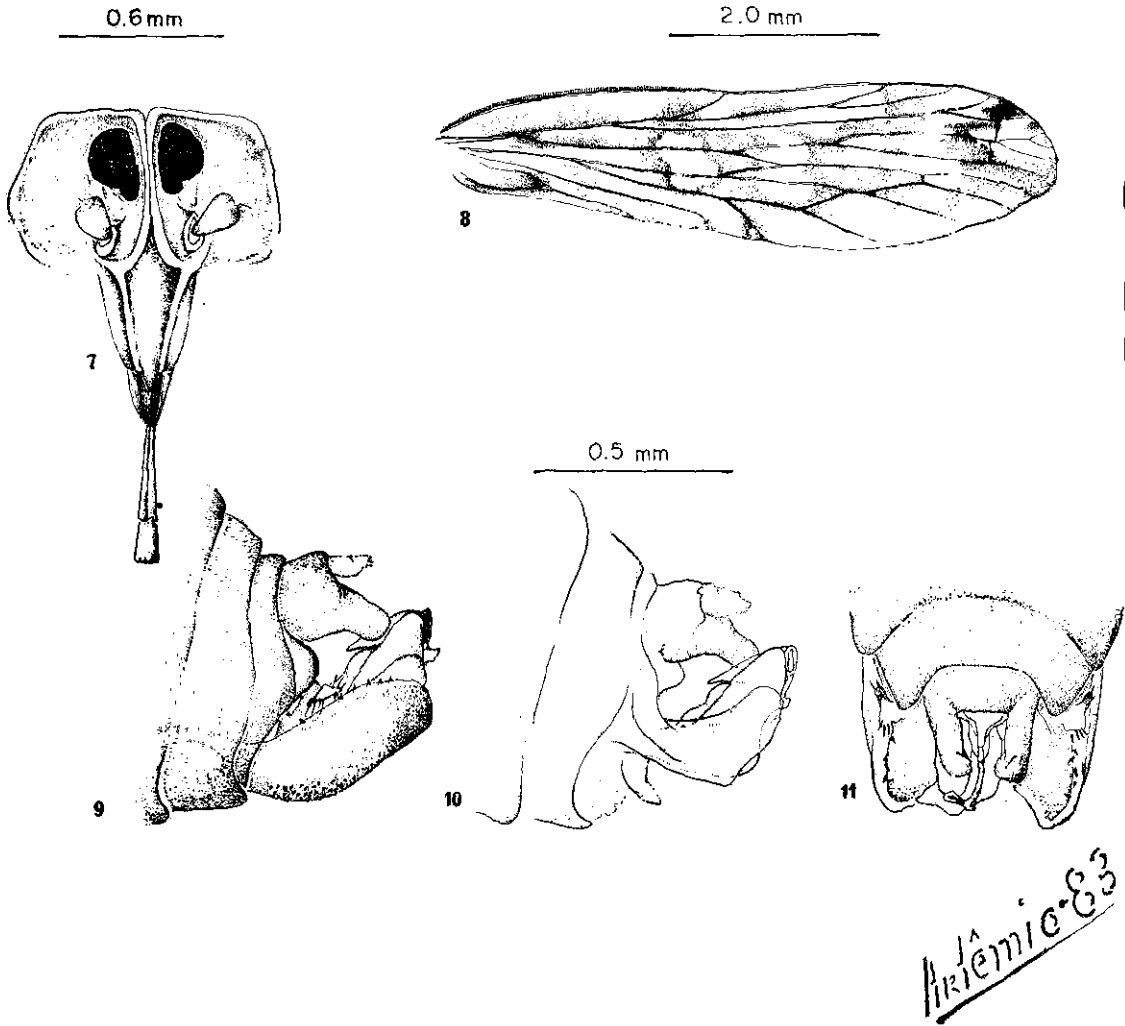
Map 1. Distribution of *N. amazonica* and *N. obriena*, n. sp.



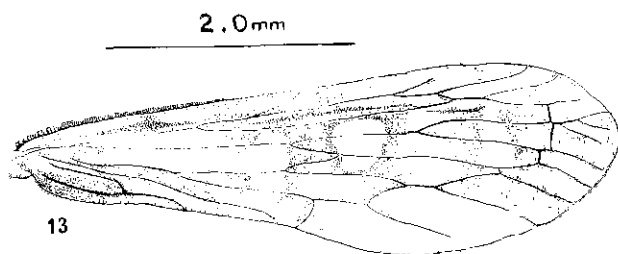
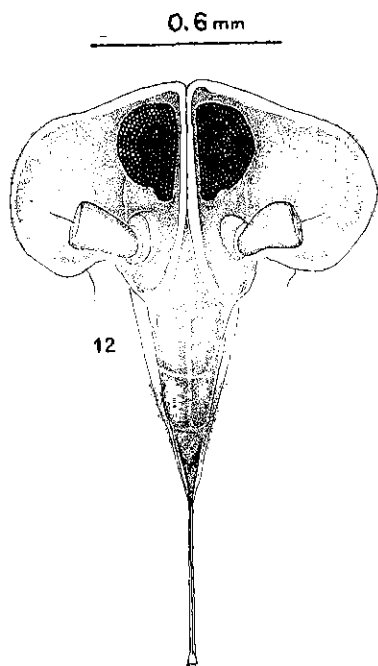
Map 2. Distribution of *N. glandula* and *N. quinquepunctata*, n. sp.



FIGS. 1-6. *Neodawnaria amazonica*, n.sp. 1) frontal view of head and pronotum, 2) Habitus lateral view, 3) right forewing, 4) male genitalia, lateral view, 5) male genitalia with style removed, lateral view, 6) male genitalia, dorsal view.

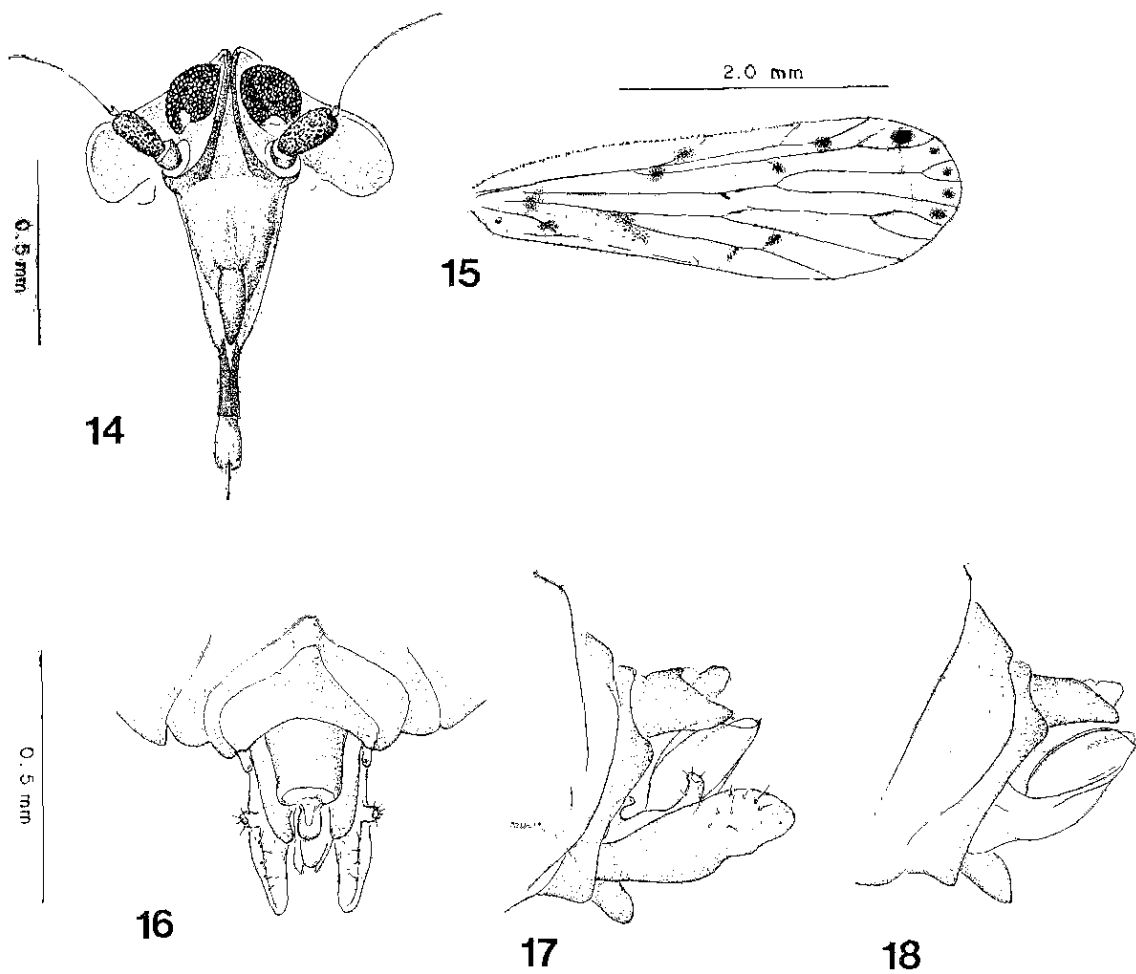


FIGS. 7-11. *Neodawnaria obrienaie*, n. sp. 7) frontal view of head and pronotum, 8) right forewing, 9) male genitalia, lateral view, 10) male genitalia with style removed, lateral view, 11) male genitalia, dorsal view.

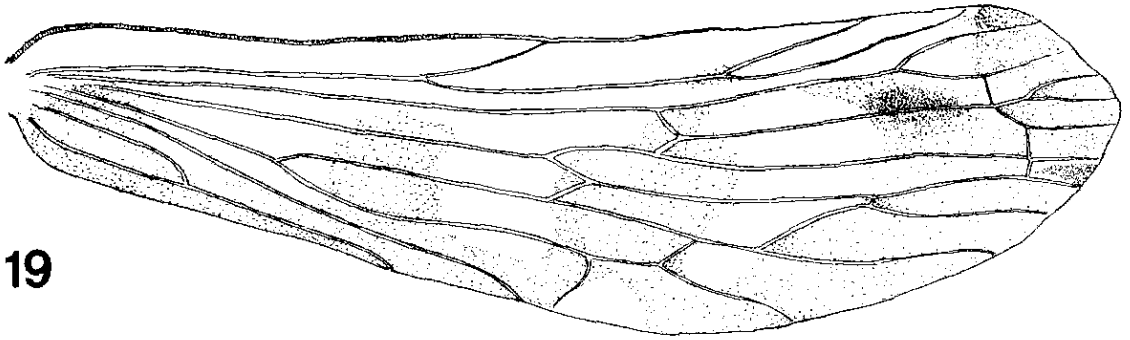


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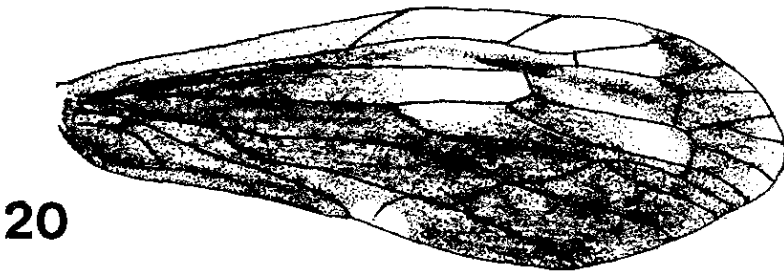
FIGS. 12-13. *Neodawnaria glandula*, n. sp. 12) frontal view of head and pronotum, 13) right forewing.



FIGS. 14-18. *Neodawnaria quinquepunctata*, n. sp. 14) frontal view of head and pronotum, 15) right forewing, 16) male genitalia, dorsal view, 17) male genitalia, lateral view, 18) male genitalia with style removed, lateral view.



2.0 mm



FIGS. 19-20. Right forewing of 19) *Neodawnaria ecuadorensis* O'Brien, 20) *Neodawnaria hondurensis* O'Brien.

References

- O'Brien, Lois B. - 1982. Two Neotropical derbid genera with observations on wing rolling (Fulgoroidea:Homoptera). *Florida Entomologist*, 65(3): 306-321.

(Aceito para publicação em 20/02/84)