STUDIES ON THE FAUNA OF SURINAME
AND OTHER GUYANAS: No. 43.

STUDIES ON SOUTH AMERICAN GOMPHIDAE
(Odonata)

with special reference to the species from Surinam

by

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INTRODUCTION

The present paper deals with some gomphids from South America. Besides descriptions of a number of new species additional notes on several Selysian and other, little-known species, elucidated with illustrations of important details, are offered in order to obtain a better insight into the characteristics of these dragonflies. Lectotypes are selected and confusions in respect to the generic or specific status of some species are unraveled. Of nearly all the gomphids from Surinam the larval stages are described or discussed. The identity of several larvae is ascertained by the actual rearing of some individuals. The discovery of two new Agriogomphine species resulted in a classification of the members of the *Agriogomphus* complex into two genera only instead of four. Undoubtedly of greater importance is the attempt to acquire a satisfactory division of the large genus *Gomphoides* sensu Selysi 1854. In doing so, the erection of a new genus was necessary.

The material from Surinam here recorded has been assembled in the first instance by the author himself during a period of ten years of odonatological research carried out in that country (1955–1965), but a comprehensive and very valuable part is from Dr. D. C. GEIJSKES. I would like to express here my thanks for his consent to describe his gomphid material. This privilege enabled me to clear up several intriguing problems on the regional gomphid fauna.

Important material, of which the greater part has been collected earlier by GEIJSKES in Surinam, came from the Odonata collection of Cornell University, Ithaca, New York. The liberal use of specimens from this source has enabled me to clear up difficult points of identity; my cordial thanks are therefore due to Dr. L. L. PECHUMAN.

The original material of little-known gomphids from South America in the precious collection of the Institut Royal des Sciences Naturelles de Belgique at Brussels was re-examined and was given me on loan for further examination and figuring; my sincerest thanks to Dr. GEORGES DEMOULIN and his collaborators for their aid and friendly reception.

Other parts of the material from South America came from the Rijksmuseum van Natuurlijke Historie, Leiden, through Dr. M. A. LIEFTINCK; the Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, through Dr. U. ROESLER; the Institut für Spezielle Zoologie und Zoologisches Museum der Humboldt-Universität, Berlin, through Dr. KURT K. GÜNTHER; the Natur-Museum und Forschungs-Institut Senckenberg, Frankfurt a/Main, through Dr. HEINZ SCHRÖDER; the Zoologisches Staatsinstitut und Zoologisches Museum, Hamburg, through Professor Dr. H. WEIDNER; the United States National Museum, Washington, through Dr. OLIVER S. FLINT, Jr; the Museum of Comparative Zoology, Cambridge, Massachusetts, through Dr. HOWARD E. EVANS; and The Academy of Natural Sciences of Philadelphia, through Dr. H. RADCLYFFE ROBERTS and his scientific assistants.

My thanks are also due to Mr. D. E. KIMMINS for giving me access to the Odonata collection of the British Museum (Natural History), London, to study some types and for the loan of some other specimens in that collection; and finally, I am obliged to Dr. BASIL ELWOOD MONTGOMERY, Professor Emeritus of Entomology, Purdue University, Lafayette, Indiana, for some copies of the Williamson-Montgomery index on Neotropical Gomphidae.

All material of which no source is mentioned has been collected by the author and is included in his private collection.

Genus **Archaeogomphus** Williamson, 1919

Archaeogomphus nanus Needham, 1944

Fig. 1–5; Pl. Ia–b, IIb

This species was described by NEEDHAM on the basis of two males and one female from Surinam (Trans. Amer. Ent. Soc. *69*, p. 175). It is hitherto known only from Surinam and it has frequently been collected on my trips along the rivers of the jungle in the interior of the country to which part its habitats are nearly entirely confined.

LARVA of ARCHAEOGOMPHUS NANUS (reared)

Dr. GEIJSKES has obtained a male of *Archaeogomphus nanus* in transformation. The teneral imago and the larval cast-off skin from which it had emerged (both preserved in a vial with alcohol) are in the Leiden Museum. The insect is labelled "Surinam, Marowijne, Gonsoetoe-val, 21.X.1953, G.". The accompanying field note indicates that the gomphid was found emerging on a stone in the river at 10 a.m.

Previously, in 1940, NEEDHAM described a libelluline-like larval exuvia of a gomphid from Santa Catarina, Brazil, and he suggested that it might belong to one of the two, then known, gomphid genera having but a single row of posttrigonal cells in the wings, viz., *Archaeogomphus* and *Agriogomphus* (Trans. Amer. Ent. Soc. *65*, p. 386).

The generic reference of this skin to *Archaeogomphus* is self-evident now the larva of *A. nanus* is definite from a reared individual.

The larva of *Archaeogomphus nanus* is very similar to that from Santa Catarina described by NEEDHAM but it departs from it in some respects. In *A. nanus* the third antennal segment is slightly curved inward; the fourth antennal segment is somewhat shorter than the width of the third segment at apex, and it is a conical rudiment which projects downward in an oblique direction; the lateral margin of the fourth abdominal segment is less serrate, bearing five to six small teeth; the lateral margin of the third abdominal segment is also serrate but slightly so, bearing four to five minute teeth; the wing cases reach backward to abdominal segment six; the superior appendage (epiproct) is a trifle shorter than the inferior appendages (para-

procts), the laterals (cerci) are about three-fourths of the length of the inferior appendages. Furthermore, if comparison may be made with the drawings published by NEEDHAM (loc. cit., pl. 21, fig. 33–36), the round tip of the lateral lobe of the labium is more pointed; the dorsal hooks on the abdominal segments 7, 8 and 9 are

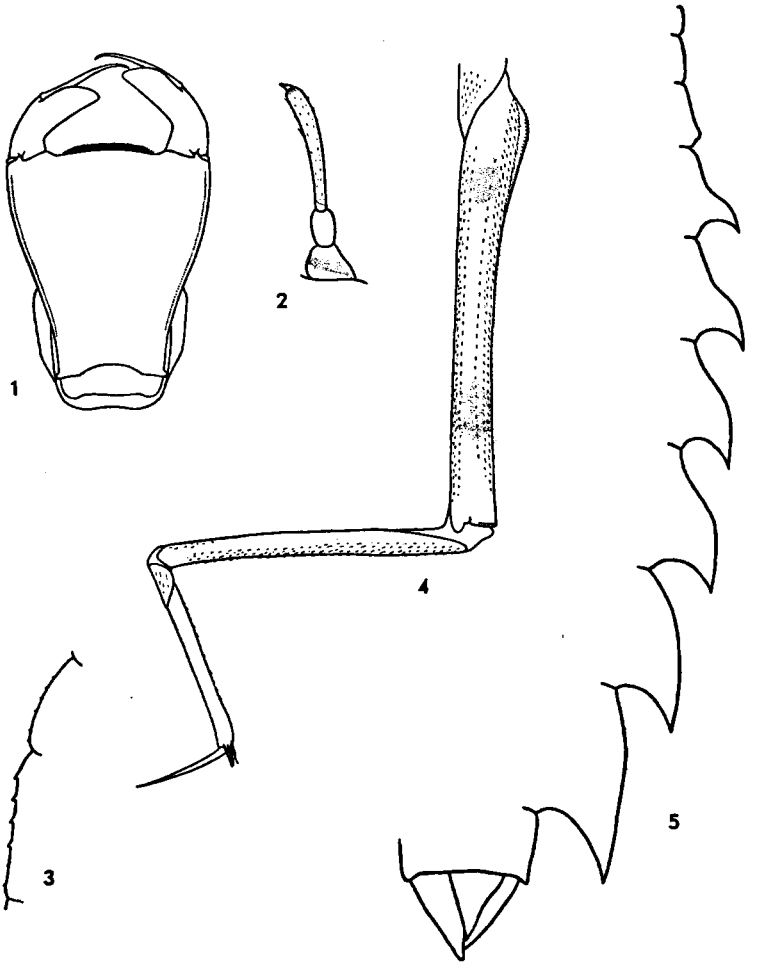


Fig. 1–5. *Archaeogomphus nanus* Needham from Surinam. – 1. Labium of larval exuvia, external view. – 2. Right antenna of larval exuvia, dorsal view. – 3. Left lateral border of third and fourth abdominal segments of larval exuvia, dorsal view. – 4. Left posterior leg of larval exuvia, left lateral view. – 5. Skyline of abdomen and caudal appendages of larval exuvia, left lateral view.

more acute, particularly that on nine; and the lateral spines of the abdominal segments 7, 8 and 9 are somewhat larger and more prominent.

NEEDHAM correctly stated that the tarsi of his imperfect specimen from Santa Catarina are 2-2-2-jointed. The claws of the larva of *A. nanus* are very long. Those of the middle and posterior pairs of legs are about half the length of the tarsus. The claws of the anterior pair of legs are shorter and about one-third of the length of the tarsus.

The photograph of the larval exuvia (Pl. IIb) is that of a specimen taken by Dr. GEIJSKES on 18.X.1953 at the Marowijne River (Poeloegoedoe, "rockpool"). The skin is preserved dry in the Leiden Museum. The dimensions are: Total length 11.5 mm; length of abdomen 8 mm; greatest width of same 4 mm; width of head over the eyes 3 mm; length of posterior femur 4 mm.

SURINAM: Surinam River (Gansee), 27.IX.1957, 2 ♀; Surinam River (Mamadam), 29.V.1959, 1 ♀; Surinam River (Afobakka), 20.IX.1964, 1 ♂ (teneral); Lawa River (Benzdorp), 13.IX.1960, 1 ♂; 15.IX.1960, 1 ♀; 18.IX.1960, 3 ♂, 1 ♀; Lawa River (Stoelmanseiland), 3.IV.1963, 1 ♂; Litani River, 17.X.1960, 1 ♂; Coppename River (Raleigh Falls), 20.IX.1961, 2 ♀; 23.IX.1961, 1 ♂; Nickerie River (Stondansi), 21.IX.1962, 1 ♂. A single female larval exuvia from Upper Para River, 8.IV.1962.

Genus **Epigomphus** Hagen in Selys, 1854

Epigomphus paludosus Hagen in Selys, 1854

Fig. 6–7

In 1965 Dr. GEIJSKES showed me three males and three females of *Epigomphus* from Argentina. One male and one female were presented to me by him. The specimens proved to belong to *E. paludosus* Hagen in Selys (Bull. Acad. Belg. *21*, p. 60), the type-species as fixed by KIRBY in 1890 (Catalogue, p. 74).

On my visit to the Brussels Museum in 1966 I was able to compare these two dragonflies from ARGENTINA with the specimen that FRASER (1947) has pointed out to be the type (Ann. Ent. Soc. Amer. *40* (4), p. 672). The female from Argentina is much smaller than the holotype female from BRAZIL but is undoubtedly conspecific with it. The hairs at the apex of the peculiarly developed lamina supra-analis of the holotype are broken off.

The male from Argentina is very similar to that labelled by FRASER "Allotype". FRASER's figure (fig. 2a) of the anal appendages of this specimen is shown with the branches of the inferior appendage nearly parallel but only the intact left side of the appendage

has served him to furnish this figure. In the male from Argentina the branches of the inferior appendage are much more divaricate than as figured by FRASER (see also Ent. News *14*, p. 187, and Atas Soc. Biol. Rio de Janeiro *11* (4), p. 160). Also the tenth abdominal segment is figured by FRASER without the marked, two-humped, dorsal tubercle. This tubercle is largely crushed in the allotype male. The tenth abdominal segment and the anal appendages of the Argentine male in my collection are shaped as shown in Fig. 6–7. The locality data of this specimen are: Argentina, Depto Aguirre, 1943 (ex coll. Museum Buenos Aires).

From the Museum Alexander Koenig at Bonn (ex coll. BUCHHOLZ) a male of *E. paludosus* taken in PARAGUAY came to me for identification. The superior caudal appendage of this specimen is somewhat shorter and the two-humped tubercle of the tenth abdominal segment is somewhat lower than in my male from Argentina.

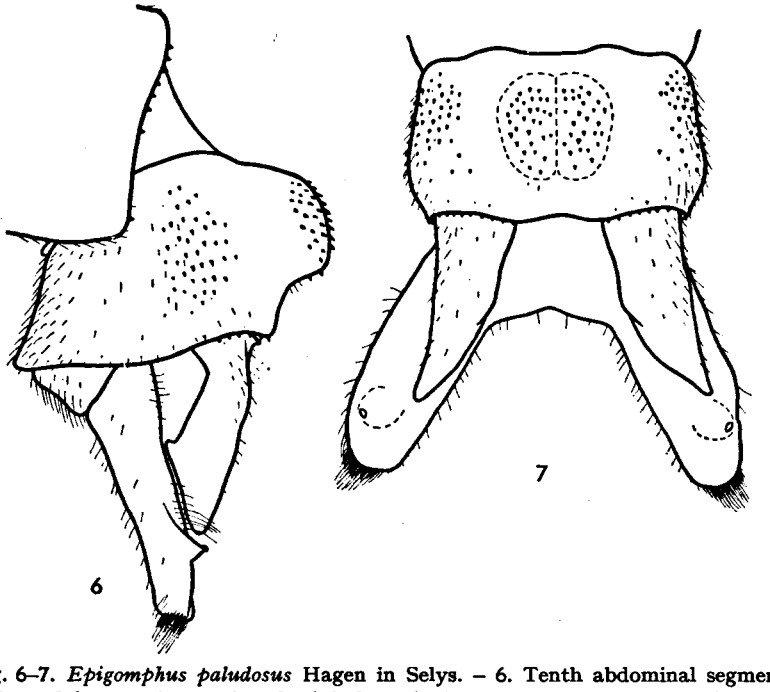


Fig. 6–7. *Epigomphus paludosus* Hagen in Selys. – 6. Tenth abdominal segment and caudal appendages of male, left lateral view. – 7. The same, dorsal view.

Epigomphus hylaeus Ris, 1918

Fig. 8–12; Pl. IIa

In the Leiden Museum a single, teneral male of this species from Surinam taken by Dr. GEIJSKES at the Nassau mountain range (District Marowijne) is present. The important tenth abdominal segment with the anal appendages is partly crushed owing to the fact that the young insect was stored in a triangular envelope.

Epigomphus hylaeus has been described from a single male taken at Mato Grosso, Brazil (Arch. Nat. *82*, p. 153). The holotype in the RIS collection (Senckenberg Museum, No: 15128) was kindly lent to me for comparison (Leiden 1966). The male from Surinam differs somewhat from it in the conformation of the tenth abdominal segment by the entire lack of an apical, mid-dorsal fold. Further, in the male from Surinam the spinules of the median group on the otherwise smooth dorsum are noticeably larger, the branches of the inferior appendage are somewhat more slender, and the tip of each branch beyond the superior tooth is somewhat shorter and not upcurved. Also slight differences are found in the coloration of some details (the pale mesothoracic "half collar" narrower, etc.), and in the armature of the posterior tibia (see also CALVERT 1903, p. 187, for a certain degree of variation of the tibial spines within the species).

Male (teneral; abdomen broken between the segments 4 and 5) – Total length 43 mm; length of abdomen 37 mm (incl. caudal appendages 2.5 mm); length of hind wing 31 mm; costal edge of pterostigma of front wing 2.8 mm, that of hind wing 3.3 mm.

Brownish with yellow stripes and spots. Dorsum of pterothorax with a pair of anteriorly diverging, narrow, yellow, first antehumeral stripes, and with a small, yellow, dorsal juxta-humeral spot each side. Yellow mesothoracic "half collar" narrowly interrupted in median line. First antehumeral stripes not connected with mesothoracic "half collar". Mesepimeron with a narrow, yellow stripe over its entire length. Metepisternum and metepimeron for the greater part yellow. Second lateral brown stripe broad, third lateral brown stripe much narrower and tapering to yellow metinfraepisternum, the two brown stripes confluent at subalar carina.

Femora pale, the ventral sides brownish (in fully mature specimens possibly blackish).

Abdomen preponderantly brown. Side of segments 1 and 2 yellow. Side of segment 3 with a dorso-lateral yellow stripe for entire length of segment, the stripe tapering to apex of segment and interrupted by the submedian transverse carina. Side of segment 4 with a basal, dorso-lateral, subtriangular, yellow spot, followed by a

yellow stripe half way the segment. Side of segments 5 and 6 with a basal, dorsolateral, subquadrangular, yellow spot, each pair of spots of these segments confluent on mid-dorsum. Dorsum of segment 7 with a large, yellow basal spot, extending on mid-dorsum to half the length of segment. Segment 8 broadly yellow along lateral margin. Segments 9 and 10 without any pale marking. Anal appendages brown.

Hump on mesepimeron not noticeably developed.

Abdomen with tenth segment widest. Segment 10 convex, the dorsum smooth and with a median group of spinules. Caudal appendages twice as long as segment 10, the inferior appendage slightly longer than superior appendage. Superior appendage subconical, the apex curving downward and outward, the round inferior margin of extreme tip finely indented (as is the case in the holotype). Inferior appendage widely

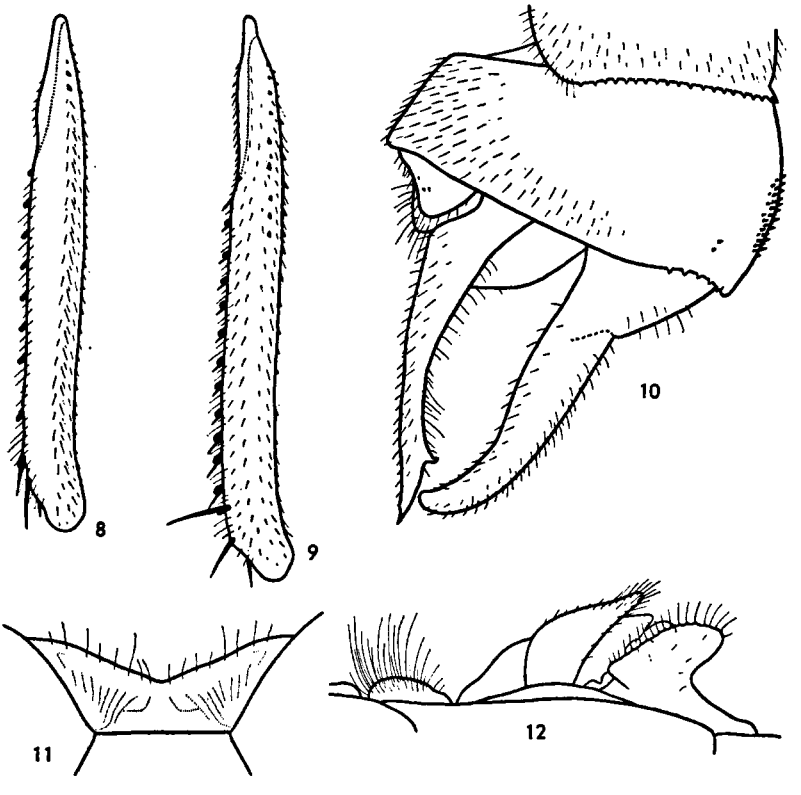


Fig. 8–12. *Epigomphus hylaeus* Ris. – 8. Left posterior tibia of holotype male, left lateral view. – 9. Left posterior tibia of male from Surinam, left lateral view. – 10. Tenth abdominal segment and caudal appendages of male from Surinam, left lateral view. – 11. Occipital plate of male from Surinam, dorsal view. – 12. Genitalia of second abdominal segment of male from Surinam, right lateral view.

bifid in its apical two-thirds, each branch with a superior tooth at four-fifths of length of appendage, the extreme tip of branch acute and without an apical tuft of hairs. The divarication of the branches cannot be studied exactly because the appendages are partly crushed, but it is probably similar to the holotype. The caudal appendages are deformed at their bases, the superiors moreover cracked upward at one-third of the length (Fig. 10).

Occipital plate, posterior tibia and genitalia shaped as shown in the figures. Inner

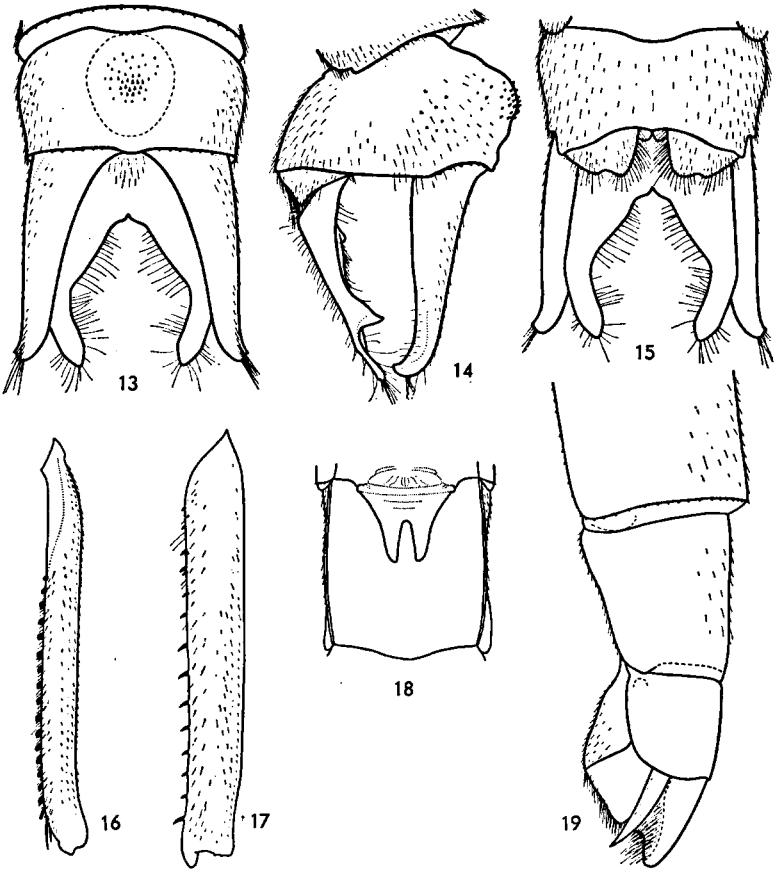


Fig. 13–19. *Epigomphus llama* Calvert. – 13. Tenth abdominal segment and caudal appendages of lectotype male, dorsal view. – 14. The same, left lateral view. – 15. The same, ventral view. – 16. Left posterior tibia of lectotype male, left lateral view. – 17. Left posterior femur of female, left lateral view. – 18. Vulvar scale and ninth abdominal segment of female, ventral view. – 19. Apical segments of abdomen of female, left lateral view.

side of ventral margin of posterior hamule armed with an irregular row of five denticles. Hood of penial peduncle prolonged backwards, the posterior margin with a V-shaped emargination, the bottom of excision round.

Wings hyaline. Venation brown. Basal subcostal cross vein present. Each wing with two cubito-anal cross veins in addition to inner side of subtriangle. Antenodal and postnodal cross veins of first series 12:16–18:14/11:12–12:11 in front and hind wings, respectively. Second primary antenodal cross vein the sixth. Each hind wing with six paranal cells and three postanal cells, the sixth paranal cell is the first postanal cell. Three rows of cells behind Cu 2 in hind wing.

SURINAM: Nassaugebergte (trail km 16.4), 23.III.1949 (GEIJSKES leg.). In the Leiden Museum, No. 9450.

Epigomphus llama Calvert, 1903

Fig. 13–19

From The Academy of Natural Sciences of Philadelphia I studied the male of *E. llama* from BOLIVIA, labelled by CALVERT "Type" (No: 9240). This specimen is the lectotype by present designation. It has served CALVERT to draw his figure of the left side of the tenth abdominal segment and the anal appendages (Ent. News *14*, pl. 8, fig. 7).

The superior caudal appendage of the male has a small, external, subapical tooth, whereas the inferior margin of the extreme tip is not finely indented as is the case in *E. hylaeus*. The dorsum of the tenth abdominal segment of the male of *E. llama* possesses a distinct hump.

A female specimen of CALVERT's original series of *E. llama*, which may be conspecific with the lectotype male, was kindly lent me by the U.S. National Museum. Some structural details of this female and of the lectotype male are shown in Fig. 13–19.

Epigomphus gracilis spec. nov.

Fig. 20–24

Three females of *Epigomphus* taken at Tapajós, Brazil and lent me by the Senckenberg Museum, belong to an undescribed species possibly more closely related to *E. llama* than to *E. hylaeus*. But the female of the latter species is unknown.

The female of the species from Tapajós is distinctly more slender

than that of *E. llama* and its vulvar lamina is much longer, the divided tip reaching to a point at three-fourths of the way along the sternum of the ninth abdominal segment. The colour design of the

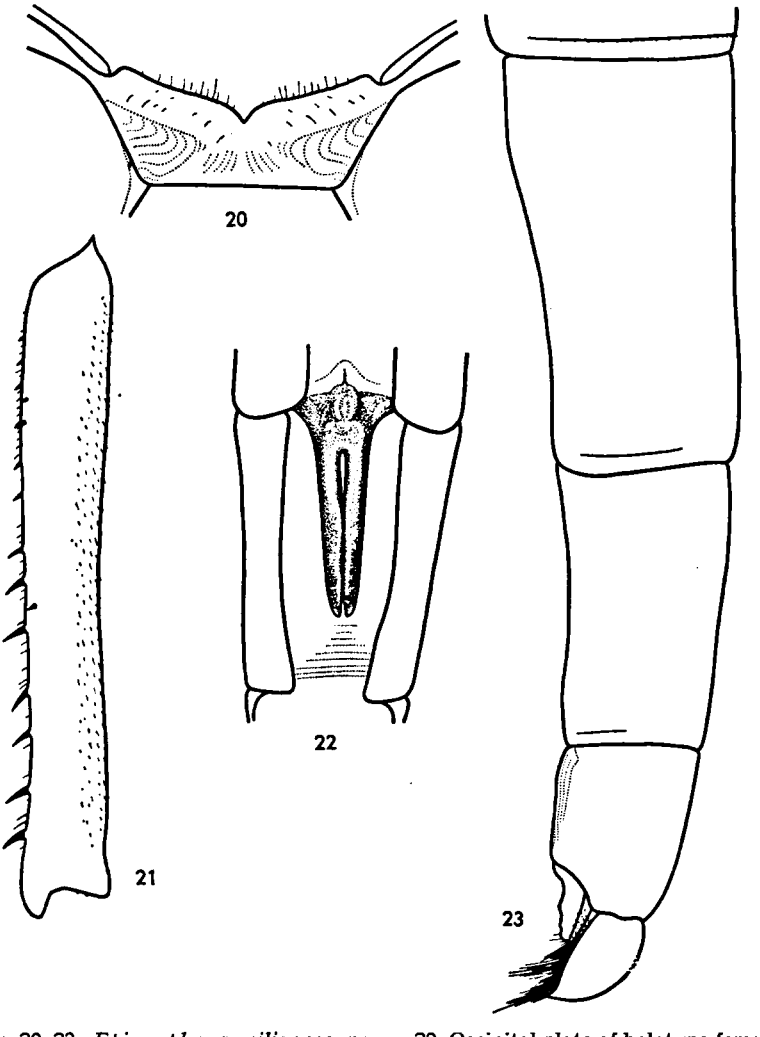
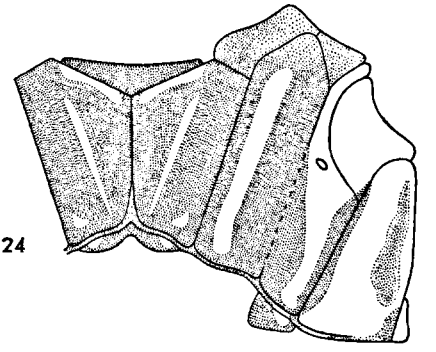


Fig. 20–23. *Epigomphus gracilis* spec. nov. – 20. Occipital plate of holotype female, dorsal view. – 21. Left posterior femur of holotype female, left lateral view. – 22. Vulvar scale and ninth abdominal segment of holotype female, ventral view. – 23. Apical segments and caudal appendages of holotype female, left lateral view.



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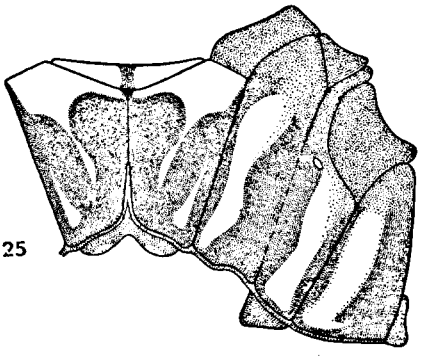

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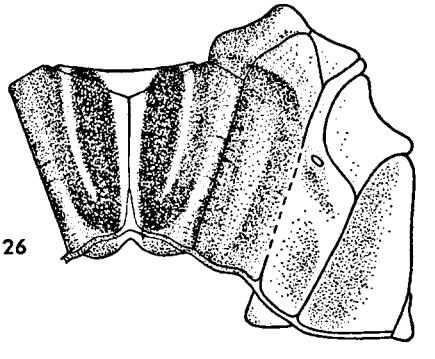

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Fig. 24. *Epigomphus gracilis* spec. nov. from Brazil. – Diagram of pterothorax of holotype female.

Fig. 25. *Cyanogomphus minutus* spec. nov. from Surinam. – Diagram of pterothorax of holotype male.

Fig. 26. *Cyanogomphus uncatus* Fraser from Brazil. – Diagram of pterothorax of female.

pterothorax is very similar to that of *E. llama* but the brown stripe at the slanting hind border of the metepimeron is better developed in the female from Tapajós, and this stripe extends upward, with an interruption, to behind the posterior end of the subalar carina.

Female (holotype; abdomen broken between the segments 3 and 4) – Total length 53 mm; length of abdomen 42 mm; length of hind wing 31.5 mm; costal edge of pterostigma of front wing 3.5 mm.

Colour pattern of pterothorax shaped as shown in the diagram (Fig. 24). A dorsal juxta-humeral spot of green instead of a complete second antehumeral stripe immediately in front of humeral suture. Hump on mesepimeron not noticeably developed.

Third femur brown on dorsal side, yellowish on ventral side. Distal half of antero-inferior row of this femur with seven spines, which are distinctly longer than those on basal half and those on first and second femora, and nearly as long as proximal tibial spines.

Occiput with a median furrow and a shallow dorsal pit on each side against eye border. Rear of head without a distinct pair of pits.

Abdomen more slender than in other species hitherto recorded, widest at apex of segment 7, thence regularly tapering to rear. Lamina supra-analis about two-thirds of length of segment 10 and about twice as long as slender anal appendages. Vulvar lamina of eighth segment exceedingly long and deeply cleft longitudinally for nearly three-fourths its length, the slender divisions parallel.

Venation dark brown, pterostigma brown. No brace vein. Basal subcostal cross vein present. Antenodal and postnodal cross veins of first series 11:18–16:12/10:14–13:11 in front and hind wings, respectively. Second primary antenodal cross vein the seventh in left wings, the sixth in right wings. Intermedian cross veins 6–5/3–3 in front and hind wings, respectively. Three cubito-anal cross veins in addition to inner side of subtriangle in left front wing, two in other wings.

Holotype female: Brazil, Miriti tuba, Tapajós, Amazon, April 1921 (A. H. Fassl leg.). Senckenberg Museum, No. 15122.
Paratypes: With the same locality data as the holotype, 1 ♀; Brazil, Mte Christo, Tapajós, Amazon, January 1921, 1 ♀ (A. H. Fassl leg.). Senckenberg Museum, Nos. 15121 and 15120, respectively.

Epigomphus occipitalis spec. nov.

Fig. 27–36

Along with the three females of *Epigomphus gracilis* sp.n. one male and three females of another new species of *Epigomphus* came from the Senckenberg Museum for examination and description. The four specimens were taken in 1930 at Mishuyacu, Iquitos, Perú, by Klug. They were referred to the genus *Epigomphus* by Ris.

The species is closely related to *E. quadracies* Calvert described

from Guatemala (Ent. News *14*, p. 188) and known also from Panama (Ann. Ent. Soc. Am. *39* (4), p. 162, *quadrices* is a lapsus calami pro *quadracies*).

Male (holotype; abdomen broken into pieces) – Total length 47 mm; length of abdomen 37.5 mm; length of hind wing 31.5 mm; costal edge of pterostigma of front wing 3.1 mm.

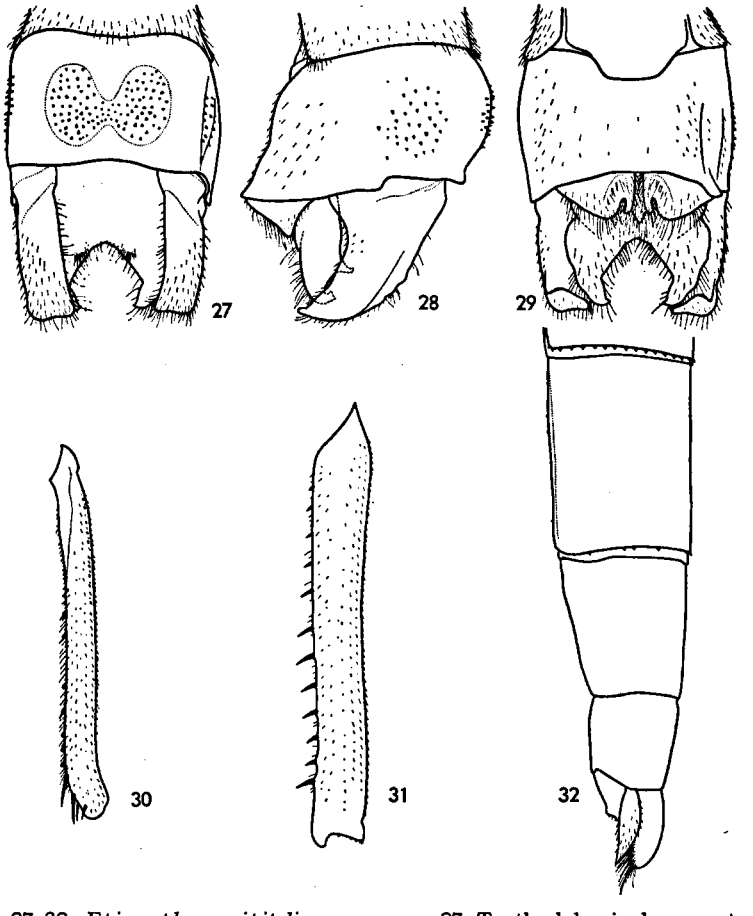


Fig. 27–32. *Epigomphus occipitalis* spec. nov. – 27. Tenth abdominal segment and caudal appendages of holotype male, dorsal view. – 28. The same, left lateral view. – 29. The same, ventral view. – 30. Left posterior tibia of holotype male, left lateral view. – 31. Left posterior femur of allotype female, left lateral view. – 32. Apical segments of abdomen and caudal appendages of allotype female, left lateral view.

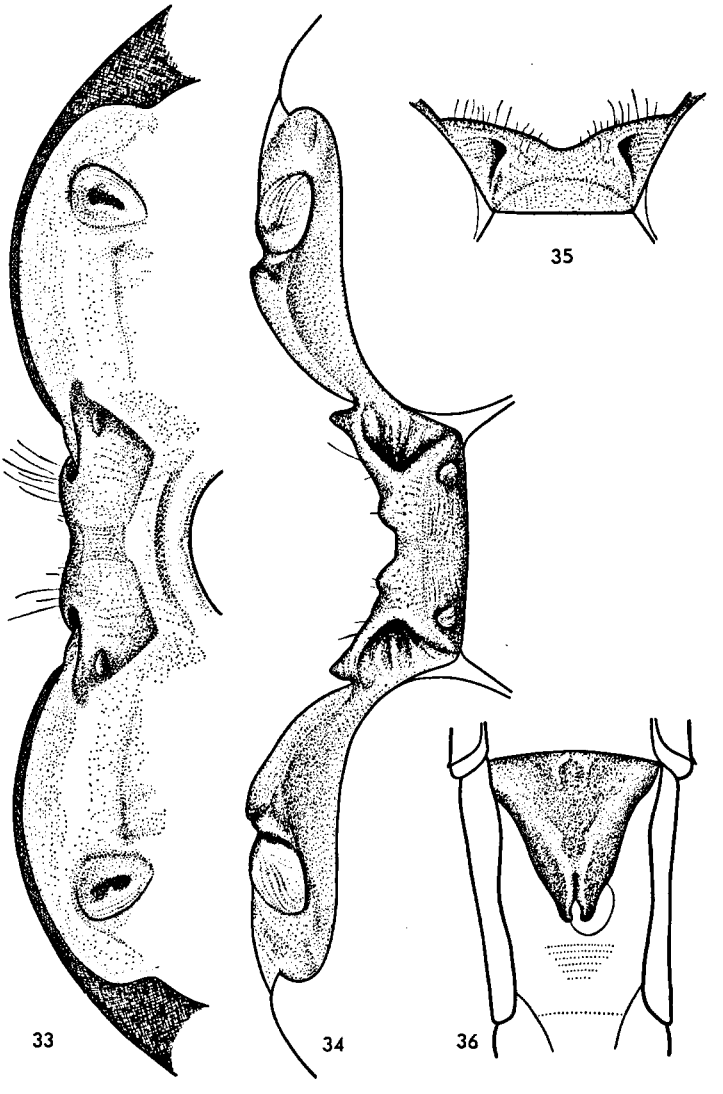


Fig. 33–36. *Epigomphus occipitalis* spec. nov. – 33. Dorsal part of head of female, caudal view. – 34. Posterior part of head of female, dorsal view. – 35. Occipital plate of holotype male, dorsal view. – 36. Vulvar scale and ninth abdominal segment of allotype female, ventral view.

Tenth abdominal segment moderately swollen, the dorsum with a very low "two humped" tubercle armed with black spinules (the holotype male had the tenth abdominal segment somewhat crushed laterally). Superior appendage about as long as tenth segment, extending parallel to rear and regularly curving downward. Inner edge of tip regularly curving outward, the extreme margin of tip crenulate. In profile view this tip rather acute. Superior appendage parallel-sided in dorsal view. A shallow broad groove on upper surface at base of superior appendage. Inferior appendage somewhat shorter than superior appendage, widely bifid in apical half, each branch with an upcurved, truncated apex and with a strong, acute, subapical, superior tooth at two-thirds of length of branch. No apical tuft of hairs on branch.

Occipital plate with a deep groove on each side, resembling in this way the occipital plate of corresponding female.

Dorsum of pterothorax with a pair of anteriorly diverging, narrow, green stripes, and with a dorsal, juxta-humeral spot of green on each side. Lower end of (first) antehumeral stripe remote from transverse, anterior, mesothoracic "half collar" for a distance about one-third of length of this antehumeral stripe. Metepimeron largely green without a trace of brown along slanting hind border. Hump on mesepimeron rather well-developed. Posterior tibia shaped as shown in Fig. 30.

Basal subcostal cross vein present. Front wings with three (left) and four (right) cubito-anal cross veins in addition to inner side of subtriangle. Each hind wing with two cubito-anal cross veins in addition to inner side of subtriangle. Antenodal and postnodal cross veins of first series 12:16–15:14/11:12–13:11 in front and hing wings, respectively. Second primary antenodal cross vein fifth in right front wing, sixth in other wings. Each hind wing with five paranal cells and three postanal cells, the fifth paranal cell is the first postanal cell. Three rows of cells behind Cu2 in hind wing.

Female (allotype; abdomen broken between the segments 3 and 4) – Total length 49.5 mm; length of abdomen 37.5 mm; length of hind wing 32 mm; costal edge of pterostigma of front wing 3.2 mm.

Coloration similar to male. Abdomen slender. Anal appendages large, as long as lamina supra-analis or a trifle shorter. Vulvar lamina about two-thirds of length of ninth sternum. It is a broad triangle with the tip medially excised for about one-seventh of entire length of lamina. Armature of posterior femur as shown in Fig. 31. The pits on the head and other adaptations to the anal appendages of the male are much like those of *E. quadracies* but there is an extra pair of small, deep pits on the anterior slope of the occipital plate.

Three (front wings) and two (hind wings) cubito-anal cross veins in addition to inner side of subtriangle. Antenodal and postnodal cross veins of first series 11:15–12:12/11:13–10:11 in front and hind wings, respectively. Second primary antenodal cross vein the sixth in left hind wing, the fifth in other wings. Each hind wing with five paranal cells and three postanal cells, the fifth paranal cell is the first postanal cell. Three rows of cells behind Cu2 in hind wing.

Holotype male: PERÚ, Mishuyacu, Iquitos (Amazon), 16.VII.1930; allotype female: with the same locality as the holotype, 26.III.1930 (KLUG leg.). Senckenberg Museum, Nos. 15116 and 15118, respectively.
Paratypes: With the same locality as the holotype, 22.VII.1930, 1 ♀; 4.IV.1930, 1 ♀ (KLUG leg.). Senckenberg Museum, Nos. 15117 and 15119, respectively.

Epigomphus pechumani spec. nov.

Fig. 37–41

In the collection of Cornell University there is a single male from Colombia which represents a new species of *Epigomphus*. The

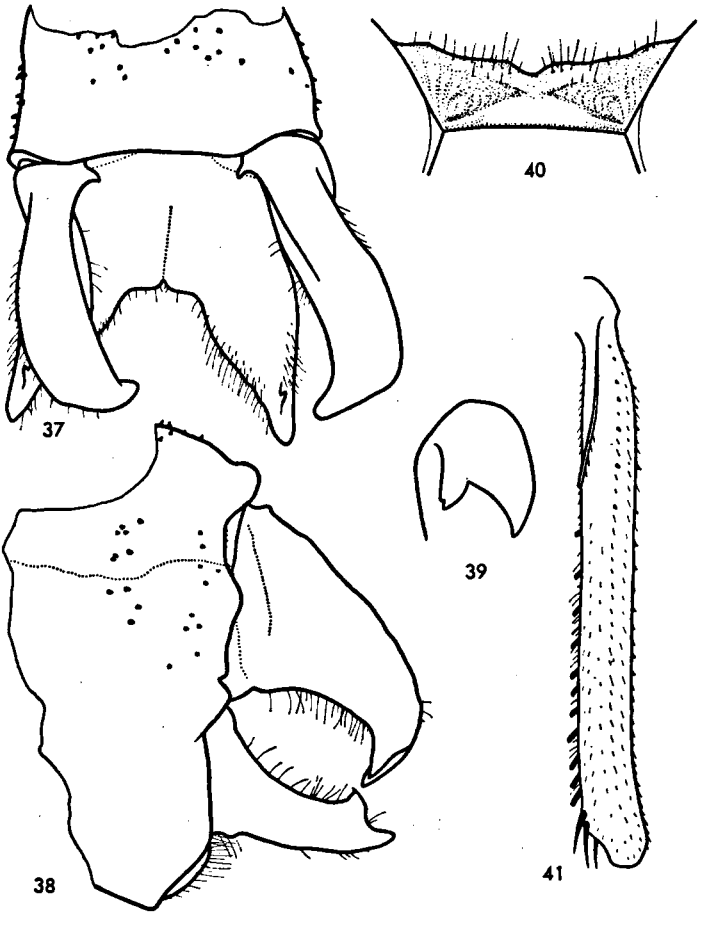


Fig. 37–41. *Epigomphus pechumani* spec. nov. – 37. Tenth abdominal segment and caudal appendages of holotype male, dorsal view. – 38. The same, left lateral view. – 39. Left superior caudal appendage of holotype male, caudal view. – 40. Occipital plate of holotype male, dorsal view. – 41. Left posterior tibia of holotype male, left lateral view.

dragonfly, preserved in a vial with alcohol, is in very poor condition, incomplete and broken into many parts. Fortunately the pieces with the specifically important parts are in rather good condition, and these provide adequate information for recognition. Its nearest ally is *E. crepidus* Kennedy, 1936, known from Mexico (Ann. Ent. Soc. Am. *29*, p. 126). The present male is readily distinguishable from *E. crepidus* by the basal, interno-superior tooth at the superior anal appendage, the much shorter inferior appendage, and the pale, dorsal juxta-humeral spot instead of a complete second antehumeral stripe immediately in front of the humeral suture.

Male (holotype; incomplete and much broken) – Total length about 50 mm; length of abdomen about 38 mm; length of hind wing 31 mm; costal edge of pterostigma of front wing 3.4 mm.

Basal two-thirds of tenth abdominal segment lost. Tenth abdominal segment probably moderately swollen, the dorsum smooth and armed with black spinules, the sides also with black spinules. Anal appendages shaped as shown in the figures. Extreme base of superior appendage with an interno-superior tooth. Branch of inferior anal appendage with a subapical, superior tooth.

Dorsum of pterothorax with a pair of anteriorly diverging, long and narrow, pale (first) antehumeral stripes and a pale, dorsal juxta-humeral spot on each side. Lower end of antehumeral stripe remote from pale, transverse, anterior, mesothoracic "half collar" for a distance equal to the width of the antehumeral stripe itself. Side of pterothorax with the usual colour pattern, the metepimeron posterior to the brown metapleural stripe pale.

Hump on mesepimeron moderately developed. Occipital plate and left posterior tibia shaped as shown in the figures.

Right pair of wings lost. Basal subcostal cross vein present in left pair of wings. Left wings with three (front) and two (hind) cubito-anal cross veins in addition to inner side of subtriangle. Antenodal and postnodal cross veins of first series 14:19/12:13 in left front wing and left hind wing, respectively. Second primary antenodal cross vein the seventh in left front wing, the sixth in left hind wing. Five paranal cells and three postanal cells in left hind wing, the fifth paranal cell is the first postanal cell. Three rows of cells behind Cu2 in left hind wing.

Holotype male: COLOMBIA. Cornell University, Ithaca.

I take great pleasure in naming this species after Dr. L. L. PECHUMAN, who always and most generously enabled me to study the Odonata in the collection of Cornell University.

AGRIOGOMPHUS COMPLEX

Pl. IIIa

The discovery of a new, most extraordinary Agriogomphine dragonfly from Surinam and the knowledge of another new Agrio-

gomphine species from Rio Tapajós, Brazil, are of first importance as they suggest a revision of the present systematic arrangement of the members pertaining to the *Agriogomphus* complex. I was first inclined to consider these two species as being *Ebegomphus* but some of their characters fail to conform to those which I considered essential for this genus. A restudy of the members of the *Agriogomphus* complex learned that in fact only the Selysian genera *Agriogomphus* and *Cyanogomphus* are clearly definable.

In 1943 FRASER transferred *Ischnogomphus jessei* to *Agriogomphus* (Proc. Ent. Soc. Lond. B. *12*, p. 162). *Agriogomphus sylvicola* differs from *Ischnogomphus jessei* and *I. ericae* by the smaller size, the diverse character of the thoracic markings, the structure of the posterior hamule, and the less dense reticulation of the wings, which is accentuated in the front wing by the presence of a single row of posttrigonal cells. In FRASER's amended definition of *Agriogomphus* the number of posttrigonal rows in the front wing is said to be one or two. FRASER regarded this as a generic character on the basis of features observed in genera belonging to another family. I think that such comparisons may not be made.

Ebegomphus demerarae and *E. conchinus* are of comparable size, have very similar male anal appendages and thoracic markings of the same type. My new species from Surinam exhibits the characters of *Ebegomphus* fairly well but is distinguished from the two species already known by the much smaller size, the less dense reticulation of the wings, the quite diverse character of the thoracic markings and the different form of the genital hamules, all differences found also between *Agriogomphus* and *Ischnogomphus* separating the two. Obviously these characters are of no more than specific value. On the other hand the characters which separate *Ebegomphus* from *Cyanogomphus* are not clear. It is to be remembered that only a single male of *Ebegomphus demerarae* together with WILLIAMSON's description and figures of the holotype male of *Cyanogomphus conchinus* served NEEDHAM in establishing the genus *Ebegomphus*. In my new species from Surinam the outer side of the triangle of the front wing is straight, in my specimens of *Ebegomphus* often slightly angulated, also in *Cyanogomphus uncatus*. In the hind wing of my specimens of *Ebegomphus* there are often three rows of cells posterior

to vein Cu2, particularly in the females (Stud. Fauna Suriname *8*, table on page 55). The anal angle of the hind wing of the male becomes gradually more prominent in *Ebegomphus demerarae*, *E. conchinus* and my new species from Surinam, respectively, and in the last one it approaches that of *Cyanogomphus waltheri*. The new species from Rio Tapajós is most nearly related to *Ebegomphus demerarae* but in the hind wing of the (single) male the third paranal cell is not conspicuously enlarged and not even bordered by the veins A2 and A3 (!). In the two males of *Cyanogomphus waltheri* from the Brussels Museum this cell is enlarged markedly enough and distinctly larger than adjacent cells (see Pl. IIIa). Finally, the anterior genital hamule in my new species from Surinam is small and in form much like that of *Cyanogomphus waltheri*. Thus we see, that the proposed generic characteristics for *Ebegomphus* are not positive in all cases and that they do not offer a clear basis for the generic separation of *Ebegomphus* and *Cyanogomphus*. Only a division of the members of the *Agriogomphus* complex into two units, *Agriogomphus* and *Cyanogomphus*, appears to be satisfactory. This division can be based on the following two characters of the male:

Agriogomphus Selys

1. Anal triangle in hind wing absent (ill-defined).

2. Inferior anal appendage not stoutly developed; the two branches short, reaching to a point just beyond the spurs of the superior appendages and armed with a minute, subapical, superior tooth.

Cyanogomphus Selys

1. Anal triangle in hind wing well-defined and three-celled.

2. Inferior anal appendage very stout; the branches long, reaching to a point far beyond the spurs of the superior appendages and not armed with a subapical, superior tooth.

Assuming the present proposal of systematic ranking to be correct, the following species pertain to the genus *Agriogomphus: A. sylvicola* Selys, *Ischnogomphus jessei* Williamson and *I. ericae* Belle; and the following to the genus *Cyanogomphus: C. waltheri* Selys, *C. demerarae* Selys, *C. conchinus* Williamson, *C. uncatus* Fraser, *C. minutus* sp.n., and C. *schroederi* sp.n. The last two species are de-

scribed in the following pages. The generic status of *Cyanogomphus tumens* Calvert still remains doubtful.

Within each of the two genera a reduction of the reticulation proceeds in the wings of smaller species. For instance, in *Agriogomphus ericae* the discoidal field of the front wing begins with two rows of cells from the triangle outward and ends with three to four rows of cells near the wing margin; in the smaller *A. sylvicola* this area begins with a single row of cells from the triangle outward and ends with two to three rows of cells near the wing margin. Thus we see that there is a corresponding agreement in the forming of the triangular interspace of the front wing in these two species. Also in *Cyanogomphus* the reduction is strongest in the smallest species, *C. minutus* sp.n. The number of cell-rows behind vein Cu2 in the front wing is two or three in the male of *C. waltheri*, only one in the male of *C. minutus* sp.n. In the same area of the hind wing there are three to four rows of cells in the male of *C. waltheri*, only two in the male of *C. minutus* sp.n.

Genus **Cyanogomphus** Selys, 1873

Cyanogomphus minutus spec. nov.

Fig. 25, 42–47; Pl. IIIb, IVa–b

When exploring the densely shaded creek Mooi Wanna (Weijneweg) near Albina in April 1965, my attention was suddenly attracted by a small gomphid which hovered on a sunny spot, low over the surface of the quietly flowing water. It was easily netted and appeared to be a female *Cyanogomphus* of an unknown species.

Two hours of further diligent hunting yielded four other females but males were not seen on that occasion. Searching at the same time for larval skins associated with this species, a single Agriogomphine exuvia was found lying flat on a leaf of an aquatic plant. Few centimeters above it a spider's web contained the partly crushed body of a teneral Agriogomphine dragonfly which appeared to be the remainder of the missing male. Obviously the newly emerged dragonfly had fallen to the spider's prey on its first flight. The next

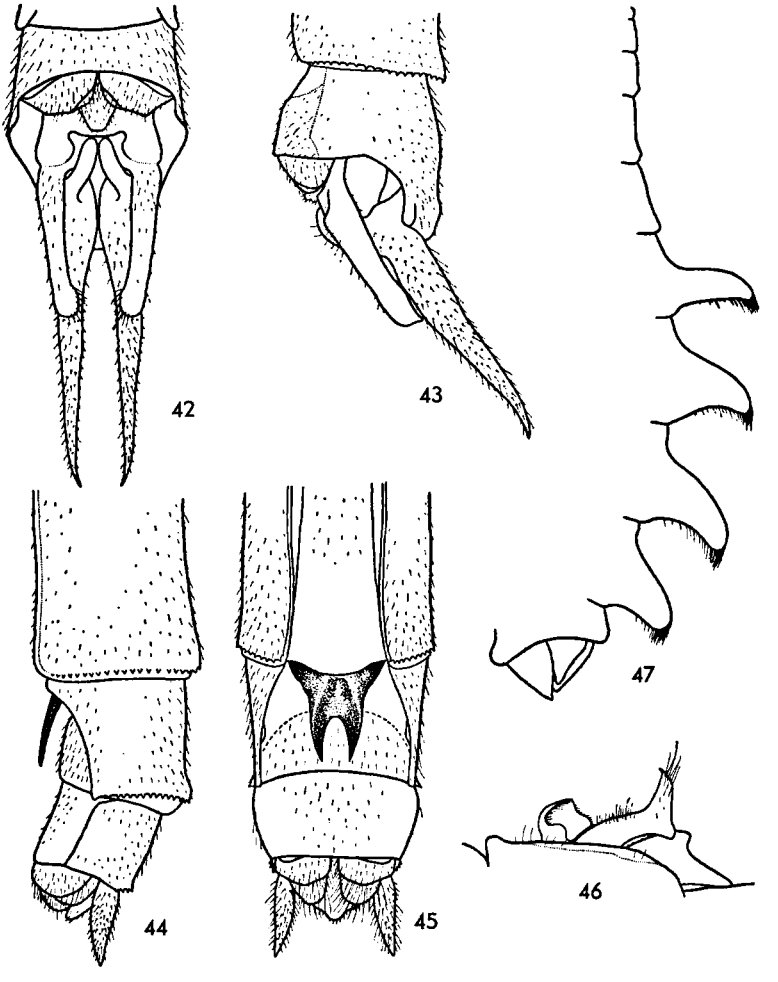


Fig. 42–46. *Cyanogomphus minutus* spec. nov. from Surinam. – 42. Tenth abdominal segment and caudal appendages of holotype male, ventral view. – 43. The same, left lateral view. – 44. Apical segments of abdomen and caudal appendages of allotype female, left lateral view. – 45. The same, ventral view, showing vulvar scale. – 46. Genitalia of second abdominal segment of holotype male, right lateral view.
Fig. 47. *Cyanogomphus minutus* spec. nov.? from Surinam. – Skyline of abdomen and caudal appendages of larval exuvia, left lateral view.

month, at Mooi Wanna, three males and twelve females were collected on three consecutive days, all taken from the same part of the creek.

The new species is readily distinguished from its congeners by its smaller size, less dense venation, shorter pterostigma and quite different thoracic markings; in the male by the long, superior caudal appendage and by differences in the conformation of the genital hamules; and in the female by differences in the form of the vulvar lamina.

Male (holotype) – Total length 40 mm; length of abdomen 32 mm (caudal appendages incl.); length of hind wing 21.5 mm; costal edge of pterostigma of front wing 2.5 mm.

When alive the compound eyes are green (not at all bluish). Ocelli green. Head brown, the following green: labrum except for the blackish free border and a brown, mid-basal (posterior) triangular spot; a small median spot at anterior border of anteclypeus; postclypeus except for concave areas and parts behind them; most of frons except for a narrow, anterior band along postclypeus and a broad basal band on superior surface; bases of mandibles externally; genae; upper edges and frontal sides of scapes; vertical parts of vertex below paired ocelli. Pedicels and antennae black. Labium, adjacent mouth parts and lower parts of temporae (lateral sides of rear of head) pale greenish.

Prothorax brown.

Pterothorax very dark brown, nearly black, with bright green stripes. Colour scheme of pterothorax as shown in Fig. 25. Lower parts of pterothorax and coxae pruinose grey.

Femora brown, the inner sides green. Tibiae black, the ventral sides green. Tarsi and claws black.

Abdomen very dark brown, nearly black, with green (-whitish) markings. Segment one with green sides and a green, dorsal hind border. Side of segment two (including auricle) green except for a broad brown band on anterior and posterior border and behind auricle; dorsum of segment two with a green, triangular, basal spot followed by a small green spot. Segments 3 to 6 with green, dorso-lateral, triangular, basal spot. Segment 7 with green, dorso-lateral, subquadrangular, basal spot extending backwards to about half the length of segment, at two-thirds of length of segment two small, mid-dorsal, green spots, and near apex a green lateral spot. Basal spots on segments 3 to 7 as well as mid-dorsal spots on 7 separated by a narrow, blackish, mid-dorsal line. Segment 8 with green, dorso-lateral, subquadrangular, basal spot. Side of segment 9 with a trace of a green spot at mid-length. Upper surface of superior caudal appendage paler on basal half.

Anterior hamule brown, posterior hamule paler but extreme tip of posterior hamule blackish. Peduncle of penis including its hood blackish. Anterior hamule small and ear-shaped. Posterior hamule foot-shaped, the tip with a few long hairs, the postero-internal margin with a row of minute denticles. Penis guard most resembling that of *C. demerarae*.

Wings hyaline. Venation very dark brown, including costa. Pterostigma dark

brown, with 4–4½ underlying cells. Basal subcostal cross vein present. Each wing with one cubito-anal cross vein in addition to inner side of subtriangle. Antenodal and postnodal cross veins of first series 9:12–12:9/9:10–10:8 in front and hind wings, respectively. Second primary antenodal cross vein the fifth. Intermedian cross veins 3–3/2–2 in front and hind wings, respectively. Anal field of front wing proximal to level of triangle one cell wide. Area in front wing posterior to Cu2 also one cell wide. Trigonal interspace starting with two rows of cells but that of right hind wing has a single row for a distance of three cells. Trigonal interspace of hind wing with an extra initial cell next to hind angle of triangle. Subtriangles sagged at conjunctions with veins of anal field. Four paranal cells in hind wing, the third paranal cell greatly enlarged. Three (left) and two (right) postanal cells in hind wings. Two rows of cells behind Cu2 in hind wing. Anal triangle in hind wing three-celled.

Female (allotype) – Total length 40 mm; length of abdomen 30 mm; length of hind wing 28 mm; costal edge of pterostigma of front wing 2.8 mm.

Similar to male but pale markings and stripes less extended. Dorsum below anterior, transverse, mesothoracic "half collar" largely brown. Dorsum of abdominal segment two brown, the side with three large spots: an anterior, subquadrangular spot; a posterior, subtriangular spot; and a third spot bordering submedian, ventral carina. Segment 7 blackish with pale, dorso-lateral, subquadrangular, basal spot. Segment 8 with a trace of a lateral spot. Segment 9 entirely blackish. Tip of anal appendage pale. Sterna and vulvar lamina dark brown. Sternum of segments 1 to 7 slightly pruinose. Vulvar lamina reaching to apex of ninth segment, the tip deeply cleft longitudinally for half the length of lamina, bottom of cleft round.

Antenodal and postnodal cross veins of first series 11:13–12:9/9:11–10:8 in front and hind wings, respectively. Second primary antenodal cross vein sixth in left front wing, fifth in other wings. Intermedian cross veins 5–3/3–2 in front and hind wings, respectively. Anal field of front wing proximal to level of triangle one cell wide. Area in front wing behind Cu2 two cells wide for a distance of two cells counting the anterior row. Discoidal field starting with two rows of cells in all wings. Four paranal cells and three postanal cells in hind wing, the fourth paranal cell is the first postanal cell.

Holotype male: SURINAM, Mooi Wanna, 3.VI.1965; allotype female: same locality and date. Holotype and allotype in author's collection.
Paratypes: 24.IV.1965, 1 ♂ (teneral and crushed), 5 ♀; 1.VI.1965, 1 ♂, 5 ♀; 2.VI.1965, 3 ♀; 3.VI.1965, 1 ♂, 4 ♀.

In all hind wings (100%) of the males the author has found two rows of cells behind vein Cu2. This is also generally the case in the hind wings of the females but three hind wings (8%) have one extra cell and one hind wing (3%) has two extra cells forming a third row behind vein Cu2. The front wings of the males have one row of cells behind vein Cu2, but in one front wing one of these cells is doubled. The females generally have two rows of cells behind vein Cu2 in the front wing. The trigonal interspace of the hind wing starts with one or two rows of cells in either sex.

C. minutus seems to inhabit jungle creeks and has not been encountered elsewhere. Its behaviour in the field also differs in some respects from that of the two congeners from Surinam. The females do not "strike long stripes" on the surface of the water to

oviposit. After flying to and fro they suddenly hover for a fairly long time. Males seldom come down and if so they fly only once over the water's surface for a very short time. The flight of the males is not swift.

I have observed that the species visits the creek during clear moments in cloudy weather or in periods with heavy rains from half past ten in the morning until half past two in the afternoon.

LARVA of CYANOGOMPHUS MINUTUS (supposition)

The larva is much smaller than those of the two other local species of *Cyanogomphus* and is even smaller than that of *Agriogomphus sylvicola*. It shows the characters typical for the genus by the flatness of the body (abdomen widest on fifth segment), the conformation of the median dorsal crest and lateral spines of the abdomen, and the densely haired posterior femora and tibiae. The dorsal hooks on the abdominal segments three, four and five are mere rudiments, those on six to nine high and conspicuous and shaped more or less as in the congeners from Surinam. The tubercles on the rear of the head and pronotum are more produced than in these species.

The dimensions of the only larval skin are: Total length 12.5 mm; length of abdomen 8 mm; greatest width of abdomen 6.5 mm; width of head over the eyes 3.5 mm; length of posterior femur 5.2 mm. Its locality and date: Surinam, Mooi Wanna, 24.IV.1965. In author's collection.

While searching earlier (1964) for mature larvae of *Progomphus approximatus* (Stud. Fauna Suriname *8*, p. 25), at the same stretch of the creek Mooi Wanna, I collected some immature larvae of *Cyanogomphus minutus* by sifting leafy trash taken from the sandy bottom. At that time I could not positively identify the insects because of their diversion with the other larvae of *Cyanogomphus* from Surinam but now these larvae can be named, although tentatively only. They are preserved in alcohol and are also in the author's collection.

Cyanogomphus schroederi spec. nov.

Fig. 48–51

In the Senckenberg Museum a single male of *Cyanogomphus* from Tapajós, Brazil, is present, which represents an undescribed species. The male has been referred to *Cyanogomphus conchinus* by RIS but in fact it is more related to *C. demerarae* than to this species.

The specimen, stored in a triangular envelope, is in very poor

condition, teneral, largely crushed and rather broken but fortunately the genitalia of the second abdominal segment are well preserved, and these provide adequate information for recognition. It is to be remembered that the two closely allied species *C. demerarae* and *C. conchinus* differ mainly in the conformation of the genital hamules. The genital hamules of the male from Tapajós approach those of *C. demerarae*. The most striking difference is found in the form of the anterior hamule, the tooth on the antero-internal border being lower and strongly rounded.

In the wings the forming of the second anal interspace of the hind wing is most striking. This space starts anteriorly with two cells against the anal vein instead of a single large (third) paranal cell as is the case in the male of all other species of *Cyanogomphus* hitherto recorded.

Although the abdomen is largely crushed the great resemblance of the male caudal appendages to those of *C. demerarae* and *C. conchinus* can well be ascertained. Also the penis, penis guard and hood of penial peduncle are very similar in these three species.

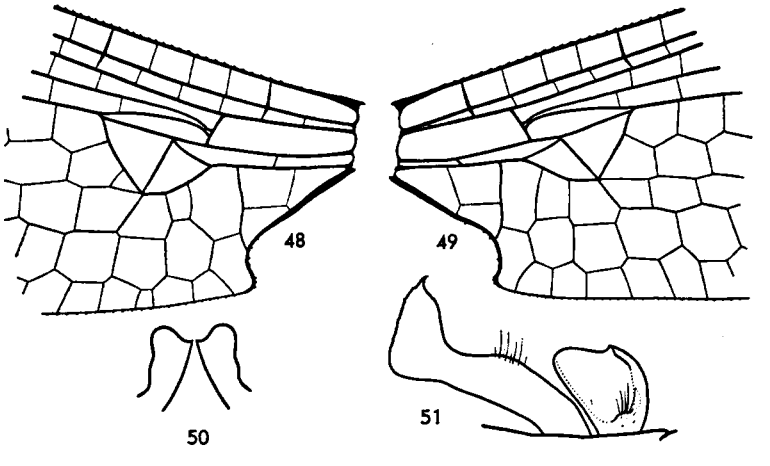


Fig. 48–51. *Cyanogomphus schroederi* spec. nov. – 48. Base of right hind wing of holotype male (transposed). – 49. Base of left hind wing of holotype male (transposed). – 50. Anterior genital hamules of holotype male as seen from front (free-hand sketch). – 51. Genital hamules of second abdominal segment of holotype male, left lateral view.

The colour design is very faintly discernible but it would appear that the extent of the dark markings on the dorsum of the pterothorax is less than in *C. demerarae*.

Male (holotype) – Total length 42.5 mm; length of abdomen 34.5 mm; length of hind wing 22.5 mm; costal edge of pterostigma of front wing 2.8 mm.

Basal subcostal cross vein present. Pterostigma surmounting 4½–5 cells. Antenodal and postnodal cross veins of first series 8:14–15:8/7:11–10:8 in front and hind wings, respectively. Second primary antenodal cross vein fifth. Intermedian cross veins 4–5/3–3 in front and hind wings, respectively. Anal field of front wing proximal to triangle with a single row of 6 (left) and 7 (right) cells. Two rows of cells behind Cu2 in each wing. Five paranal cells and three postanal cells in each wing, the fifth paranal cell is the first postanal cell. Anal triangle in hind wing made up of three cells.

Holotype male: BRAZIL, Tapajós (Amazon), May 1920 (A. H. FASSL leg.). Senckenberg Museum, No. 15235.

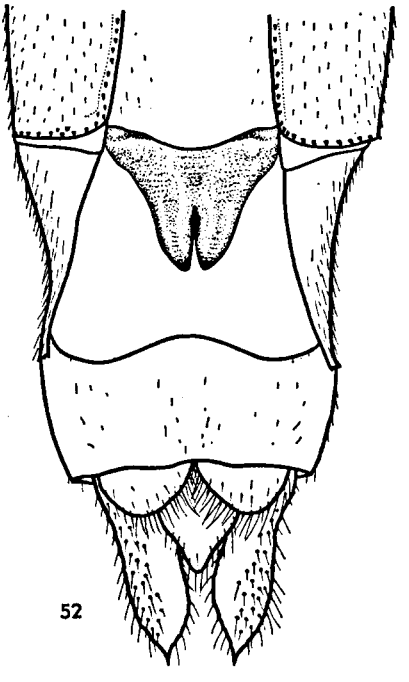


Fig. 52. *Cyanogomphus uncatus* Fraser. – Apical segments of abdomen and caudal appendages of female, ventral view, showing vulvar scale.

The species is dedicated to Dr. HEINZ SCHRÖDER, Curator of Insects, who most generously enabled me to study the gomphid material in RIS' collection.

Cyanogomphus uncatus Fraser, 1947

Fig. 26, 52; Pl. Va

Among the material of *Phyllocycla* in SELYS' collection at Brussels I found (1966) a single female of *Cyanogomphus uncatus* Fraser from Rio Grande do Sul, BRAZIL. This species was described from a single pair taken at Puerto Bemberg, Misiones, Argentina (Act. Zool. Lillo *4*, p. 437). Some figures made from the female in the Brussels Museum are added here (Fig. 26, 52). The photograph of the left pair of wings shows the denser venation when compared with the other females of *Cyanogomphus* including the single female of CALVERT's *C. tumens*. The female of *C. uncatus* has two rows of cells in the trigonal interspace of the hind wing, and there are three rows of cells behind vein Cu2 on the hind wing as well as on the front wing. The three rows of cells behind vein Cu2 of the hind wing are for the entire length of the area posterior to this vein. The outer side of the triangle of the front wing is slightly broken. There are only two intermedian cross veins in the hind wing (three in *C. tumens*). The apical segments of the abdomen of the female of *C. uncatus* are markedly widened in lateral dimension (widest on segment 8) and the anal appendages are broadly flattened.

Cyanogomphus demerarae Selys, 1894

In the collection of the Leiden Museum (ex coll. GEIJSKES) I found two triangular envelopes each containing a reared male of *Cyanogomphus demerarae* and its empty larval skin. Both individuals were collected by Dr. GEIJSKES on 4.VII.1948 at the Coropina Creek (upper part), SURINAM.

The accompanying field notes indicated that the insects were found emerging on floating large leaves, at midday. The larval cast-off skins are identical with those described earlier and referred to this species by me (Stud. Fauna Suriname *8*, p. 59; Troelinde Creek is a rivulet emptying into the upper part of Coropina Creek).

Genus **Desmogomphus** Williamson, 1920

Desmogomphus paucinervis (Selys, 1873)

Pl. Vb

In 1873 Selys described *Progomphus paucinervis* on the basis of a single, teneral female specimen from Bogotá, Colombia (Bull. Acad. Belg. *35*, p. 761). After describing it under the heading "Progomphus? paucinervis, De Selys.", he expressed doubt about its generic placement and justly emphasized that knowledge of the missing male was needed to determine its ultimate allocation (loc. cit.: "Ne connaissant pas le mâle, c'est avec doute que je place parmi les Progomphus cette femelle unique très-jeune et en mauvais état, ... La connaissance du mâle nous apprendra plus tard si le *paucinervis* est véritablement un Progomphus ou s'il doit constituer un groupe nouveau."). However, being acquainted with *Progomphus pygmaeus* from the same locality (Bull. Acad. Belg. *35*, appendix p. 503), he relied too much on the presence of the single row of cells in the anal field of the front wing and he wrongly considered this venational character more or less as evidence of validity of the assignment of the female to *Progomphus*, a mistake in placement that persisted till the present day (loc. cit.: "Il est encore remarquable par l'espace postcostal des ailes supérieures d'*un seul rang* de cellules comme le *Progomphus? paucinervis*, qui est également de Bogota (et non de Quito, comme je l'ai imprimé par erreur, 3mes Add., 66 bis), de sorte que cette double circonstance rend de plus en plus que le *paucinervis* est bien de ce genre."). Since Williamson established the genus *Desmogomphus* in 1920 (Occ. Pap. Mus. Zool. Univ. Mich. *80*, p. 1), there is little doubt about its reference to this genus. The female, which was lent me by the Brussels Museum, fits the diagnosis of *Desmogomphus*: All triangles, subtriangles and supratriangles open, except for the triangle in the hind wing which is two-celled (in the holotype female of *Progomphus paucinervis* the triangle in the left hind wing is also one-celled; obviously the crossed triangle in the hind wing cannot be used as a generic character); basal subcostal cross vein wanting; anal area of front wing proximal to level of triangle one cell wide, that of hind wing three cells wide; area pos-

terior to Cu2 one cell wide in front wing, three cells wide in hind wing; pterostigma of hind wing about one-eighth of length of wing; etc.

Supplemental to SELYS' own information I offer the following data of this very teneral f e m a l e in poor condition and of which the body is crushed over the entire length: Antenodal and postnodal cross veins of first series 11:15–16:12/10:11–11:12 in front and hind wings, respectively. In each hind wing five paranal cells and three postanal cells. Subgenital plate broad and exceedingly long, its divided tip reaching to beyond sternum of ninth segment; it is deeply cleft longitudinally for about three-fifths its length with the acute divisions extended parallel. Distal, antero-inferior row of (small) spines of first two pairs of femora ending with a long, strong spine. On dorsum of pterothorax there is a pair of pale submedian (first antehumeral) stripes discernible running from near the antealer sinus to the pale, transverse, anterior, mesothoracic "half collar", the stripes diverging anteriorly. It is not possible for me to make out whether the pale, second antehumeral stripe immediately in front of the humeral suture is developed or not. The pinlabels are "Bogota" and "Prog. paucinervis ♀ S.", the latter in SELYS' handwriting.

Desmogomphus tigrivensis Williamson, 1920

Fig. 53–59

WILLIAMSON, when describing this species (Occ. Pap. Mus. Zool. Univ. Mich. *80*, p. 3), obviously did not think of SELYS' *Progomphus paucinervis*. The species *D. tigrivensis*, described from Guyana and also encountered in adjoining Surinam, is known only from the male sex and this circumstance arouses doubts as to its specific difference from its Colombian congener. Both species are of comparable size, the wings of the holotype female of *Progomphus paucinervis* slightly larger than those of the male of *D. tigrivensis*, and, perhaps consequently, with more numerous nodal cross veins. But this can be no more than a sexual character. The colour pattern of the very teneral holotype female of *Progomphus paucinervis* is badly developed and, moreover, partly obliterated owing to postmortem changes but as far as the present author could see it differs from that of the male of *D. tigrivensis* by the much longer pale, first antehumeral stripe and the lack of a distinct pale, second antehumeral stripe immediately in front of the humeral suture. But caution must be taken in the use of the form of pale antehumeral markings as criterion for distinguishing species, since a certain

degree of variability in the extent of these markings has been found within some species of related genera. A distance of nearly a 1000 miles separates the localities of both species but the argument of widely separated localities bears little weight in this connection. I believe that, so long as the opposite sex of *D. tigrivensis* is not known from the Guianas (or that of *D. paucinervis* from Colombia), it is not possible to say whether the two species are conspecific or not.

The single male of *D. tigrivensis* from SURINAM recorded by NEEDHAM in 1944 (Trans. Amer. Ent. Soc. *69*, p. 214) remains in the Leiden Museum (ex coll. GEIJSKES). It was kindly lent me for observation. The dragonfly was collected at the Upper Litani River (Waremapan-soela) on 30.VII.1939.

LARVA of DESMOGOMPHUS TIGRIVENSIS (reared)

Dr. GEIJSKES has reared a male of *Desmogomphus tigrivensis* from SURINAM. The larva, collected on March 27th 1958, transformed into an adult in April of the same year. The emerged male and its exuvia (in the Leiden Museum) are preserved in alcohol, with the wings of the adult each apart on a slide. The label in the vial reads: "lijn [trail] Tafelberg kreek 1e kamp, 27.III.1958, G.", that on each of the four slides: "Suriname, Tafelberg, Biervallen, april 1958, Geijskes".

The larva of *D. tigrivensis* is the most extraordinary gomphid larva ever recorded. It is peculiar and most "aberrant" by the pair of submedian, dorsal hooks instead of an usual, single, mid-dorsal hook on each of the abdominal segments 5 to 7.

In 1941 NEEDHAM referred by supposition a larval exuvia from Guyana to *Desmogomphus* (Trans. Amer. Ent. Soc. *67*, p. 242) but this specimen appears to belong to another genus (see p. 150).

Male. – Total length 18 mm; length of abdomen 11 mm (incl. caudal appendages); greatest width of same 5 mm; width of head over the eyes 4 mm; length of posterior femur 3 mm.

Skin nearly of an uniform, pale, sandy-yellow colour. Colour pattern of abdomen weakly developed and shaped as shown in the figure of the entire larval exuvia in dorsal view. Larva scarcely provided with pale hairs on legs and on lateral margins of head, thorax and abdomen.

Head rather small, widest across broadly rounded compound eyes. Postclypeus, frons, and ridges behind antennae densely covered with microscopical warts. Posterior surface of head also covered with microscopical warts and marked with bare scars. Labrum entirely smooth at middle, its free border densely fringed with

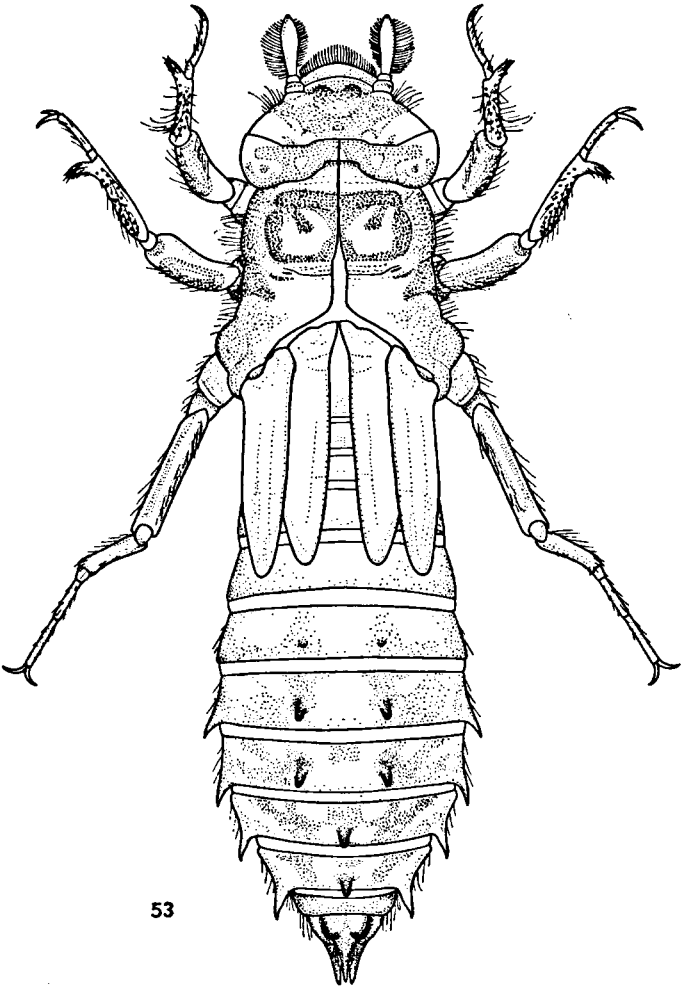


Fig. 53. *Desmogomphus tigrivensis* Williamson from Surinam. – Larval exuvia, dorsal view.

long, forwardly directed hairs. Antenna with the two basal joints short, annular, each with a median ring of microscopical warts. Third joint two and a half times as long as the two basal joints combined, about three times longer than wide, very much flattened and depressed in dorso-ventral direction, the superior surface concave and smooth, the lateral margins round, granulated and fringed with long, pale hairs. Tip of third joint strongly upcurved. Fourth antennal joint vestigial, sub-

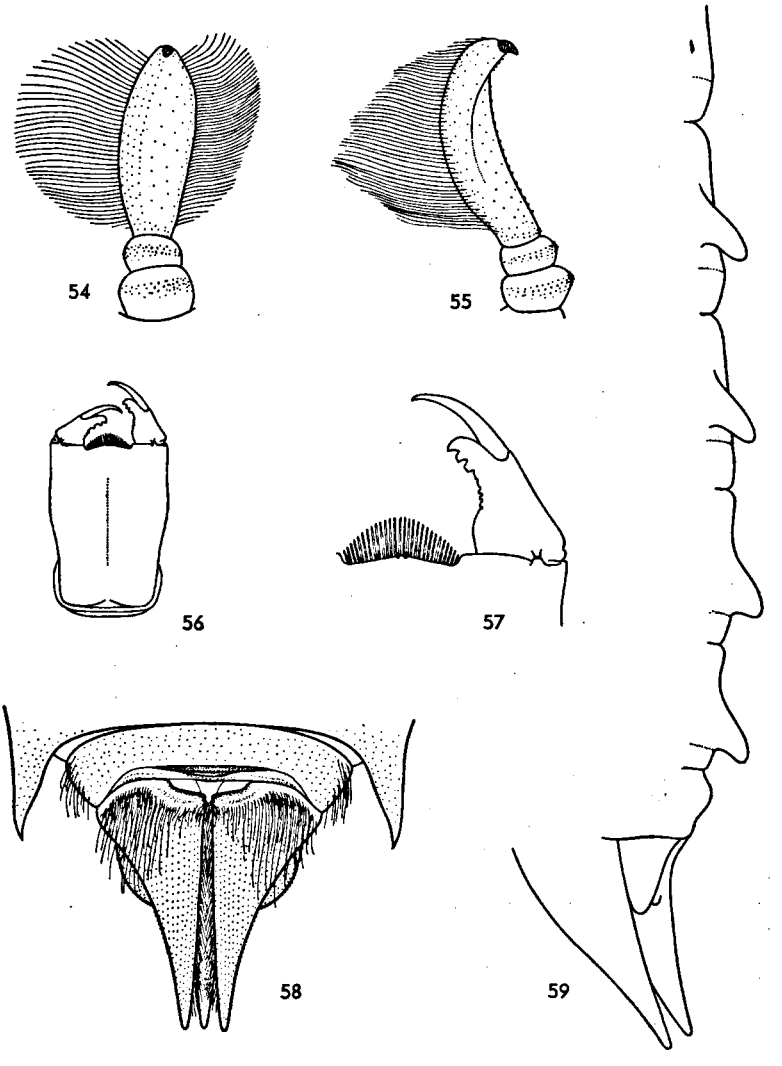


Fig. 54–59. *Desmogomphus tigrivensis* Williamson. – 54. Left antenna of larval exuvia, dorsal view. – 55. The same, left lateral view. – 56. Labium of larval exuvia, external view. – 57. Left lateral and median lobe of labium of larval exuvia, external view. – 58. Tenth abdominal segment and caudal appendages of larval exuvia, ventral view. – 59. Skyline of apical segments of abdomen and caudal appendages of larval exuvia, left lateral view.

conical, erect, and covered with microscopical scales. Labium extending back to just beyond anterior margin of middle coxae. Mentum about twice as long as wide, becoming slightly narrower toward basal hinge. Median lobe covering one-third of frontal breadth of mentum, its blackened front margin slightly convex and subtriangular, densely fringed with scale-like, pale hairs, medially armed with a conspicuous pair of submedian, black, knob-like scales. Lateral lobe broad at base, strongly narrower outward, inner margin of each armed with a row of 8 (left) and 9 (right) blunt teeth (end hook sharp), which decrease in size from apex to base (of each row two teeth are apparently broken off). Movable hook twice as long as portion of lateral lobe beyond base of movable hook, incurved, with a slight increase in curvature just beyond mid-length.

Prothorax a trifle broader than head. Pronotum shield-shaped, with a conspicuous pair of bare scars, the prominences densely covered with microscopical warts.

Meso-metathorax wider than head. Wing-sheaths parallel on the back, reaching well upon fourth abdominal segment. Legs short and strong, darkened toward knees and on tibiae. Middle coxae as far apart as front ones. Front and middle tibiae armed each with a huge burrowing hook, the outer sides of these tibiae moreover armed with black denticles. Granulated outer sides of femora with bare lines and spaces.

Abdomen wider than thorax, widest across apex of segment 6, semi-circular in cross section, granulated on dorsum. The pair of submedian dorsal hooks on segment 5 badly developed but well-marked. The four submedian dorsal hooks on the segments 6 and 7 uniform in height and shape, subconical, bluntly pointed, and slightly curved backwards. Mid-dorsal hook of segment 8 stouter but lower than that of segment 9, the two hooks bluntly pointed, that of segment 9 longer than on segment 8 and resembling submedian dorsal hooks on segments 6 and 7. No dorsal hooks on segments 1 to 4, and on segment 10. Segments 6 to 9 with long, strong, acute, lateral spines, which are upcurved and incurved towards their apices. Spines gradually longer on apical segments, those of segment 9 longest. Ventral tergal margins of abdominal segments 6 to 10, and antero-ventral margins of inferior appendages (paraprocts) provided with long, soft, pale hairs. The bare and granulated pyramid as long as segments 9 and 10 combined dorsally. Superior appendage (epiproct) and inferior appendages blackish, paler at both ends, gradually tapering to apices. Lateral appendages (cerci) blackish, stout, subconical, bluntly pointed, and strongly incurved. There is a pair of black tubercles on superior appendage slightly before apices of incurved cerci. Inferior appendages and superior appendage bluntly pointed. The inferior appendages are of very peculiar form if viewed from beneath. The antero-internal angles of these appendages are forming an arch, which appears to be the entrance of a tube running between the appendages.

Genus **Cacoides** Cowley, 1934

Cacoides latro (Erichson, 1848)

Fig. 60–64; Pl. VIa–b

The holotype female of *Ictinus latro* Erichson 1848 (Schomb. Reis. Brit. Guiana, p. 585) from the Berlin Museum is in fairly good con-

dition but the pattern of the pterothorax is not very distinct owing to postmortem changes, the tips of the wings are damaged, and the right anal appendage is missing. The type bears the pin labels "2334", "Lindenia de Haan" and "Cacus latro (Er.)", and in addition, not attached to the pin, are the labels "latro Erichs Guiana brit Schmb" (doubtless SCHOMBURGK), "Cacus Selys", "Cacus latro Erichson", and a printed museum label "Typus".

Cacoides latro, the type species of the genus, is very well described and illustrated in the *Monographie des Gomphines* by SELYS & HAGEN (p. 294; pl. 16, fig. 1).

A few venational data of the holotype female from GUYANA may be supplied herewith: Eight (left wings) and nine (right wings) cross veins behind pterostigma (brace vein included). Antenodal and postnodal cross veins of first series 17:26–28:14/17:18–20:15 in front and hind wings, respectively. In each front wing first and

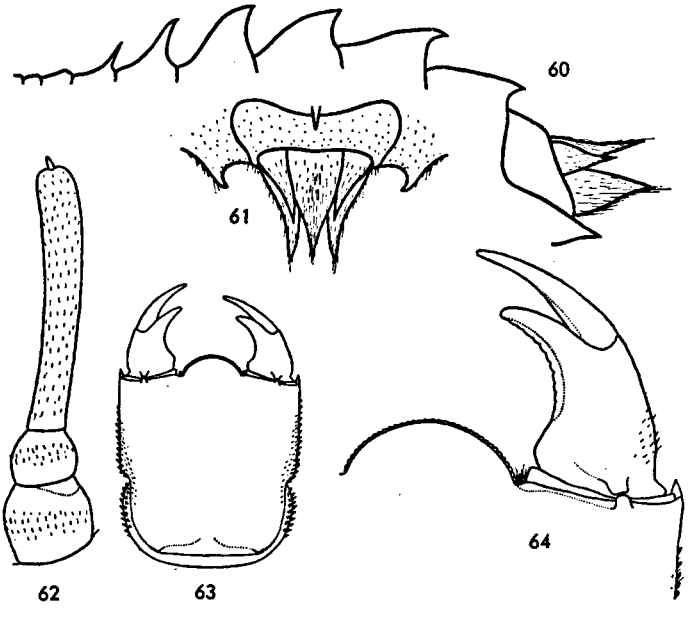


Fig. 60–64. *Cacoides latro* (Erichson) from Surinam. – 60. Skyline of abdomen and caudal appendages of larval exuvia, left lateral view. – 61. Apex of abdomen of larval exuvia, dorsal view. – 62. Right antenna of larval exuvia, right lateral view. – 63. Labium of larval exuvia, external view. – 64. Left lateral and median lobe of labium of larval exuvia, external view.

seventh antenodal cross veins the primaries, in left hind wing first and fifth, in right hind wing first and sixth. Intermedian cross veins in each front wing 13, in each hind wing 8. There are 9 (left) and 8 (right) bridge cross veins in front wings, 7 in each hind wing. Triangle of front wing four-celled, of hind wing three-celled. Subtriangle of front wing three-celled, of hind wing one-celled. Two cross veins in supratriangle except for supratriangle of right hind wing which has one cross vein. Trigonal interspace of front wing starting with four cells against triangle followed by three rows of cells, that of hind wing starting with five cells against triangle followed by two rows of cells for a distance of two cells in right hind wing, for a distance of only one cell in left hind wing. Two cubito-anal cross veins in addition to inner side of subtriangle in right hind wing, three in other wings. Front wings with 9 (left) and 10 (right) paranal cells. Each hind wing with five paranal cells and six postanal cells. Anal loop of hind wing four-celled.

The following specimens of *C. latro* were examined in the European Musea: British Museum (N. H.), London; a single male with the pin labels "Emboine", "Ictinus macrostigma ♂ De Selys 15/125", "Cacus latro Erichs", and "Cacus Latro Er.". Institut Royal des Sciences Naturelles de Belgique, Brussels; two males, one of which with the pin labels "Emboine" and "Cacus latro ♂", the other with the single label "Emboine".

Cacoides latro is recorded from Guyana and Bahia (Brazil). Although exceedingly shy it has frequently been secured by myself in Surinam. Also larval cast-off skins associated with this species were found near the water's edge, lying flat on the sandy banks of ponds.

SURINAM: Paranam, 10.V.1955, 2 exuviae; XI.1956, 1 ♂; 14.XII.1958, 2 ♂; 17.XII.1958, 1 ♂; Overtoom, 8.XII.1957, 1 ♂; 12.XII.1957, 1 ♂; 31.X.1958, 1 ♂; 15.XII.1958, 1 ♂; 16.VIII.1962, 1 ♂; 9.XII.1962, 1 ♂; 23.II.1964, 2 ♂; 1.III.1964, 2 ♂.

LARVA of CACOIDES LATRO (reared)

Dr. GEIJSKES kindly lent me for study a female specimen of *C. latro* reared by himself. The larva was taken from a seasonal pond in the savannah near the airport Zanderij on 3.VII.1952. It transformed to the adult stage on 5.IX.1952. The larval exuvia of the reared female is described below.

Total length 28.5 mm; length of abdomen 17.5 mm (caudal appendages incl.); greatest width of abdomen 13.5 mm; width of head over the eyes 7.8 mm; length of posterior femur 8 mm.

A broadly depressed larva, clean skinned, practically patternless, brownish, nearly bare, scantily provided with long, pale hairs on lateral margins of abdomen and legs (in some other cast-off skins the dorsum of the abdomen has a weakly developed pattern; the bare scars of darker brown, and on each side parallel to the mid-dorsal line a broad, submedian band of darker brown).

Head flat, widest across the round, lateral extentions of cranium below compound eyes. Ridges behind bases of antennae with a strong, lateral protuberance. Projecting

hind angles of cranium less developed than in *Cacoides mungo* (Trans. Amer. Ent. Soc. *69*, p. 191). Third segment of antenna slender, cylindrical and slightly curved. Rear of head with five round scars.

Labium short, mentum about as wide as long, strictly parallel-sided on frontal half, the lateral margins spinulate. There is a sharp spine at outer, frontal angle of mentum. Median lobe prominent, evenly convex, bordered with about 27 quadrate denticles and fringed with upstanding, short scales (in the labium figured not visible in ventral view). Movable hook bluntly pointed about as long as outer side of lateral lobe. End hook round, not at all pointed. Inner margin of lateral lobe with a row of ill-defined crenate denticles for its apical two-thirds portion.

Disc of prothorax flat, lateral protuberances of ridge less developed than in *C. mungo*. Wing cases parallel on the back, reaching backward to abdominal segment 7.

Legs pale, slender, without burrowing hooks on first two pairs of tibiae. Under side of posterior femur without the peculiar patch of microscopical nodules as found in *C. mungo*.

Abdomen longer than wide, broadly depressed, roof-like, elliptical in outline (in particular when seen from beneath), the lateral margins spinulate. Segments 7, 8 and 9 with a sharp, recurved, lateral spine at apical inferior angles. There are well-developed dorsal hooks on segments 4 to 9, increasing in size to 7, those on 8 and 9 successively smaller, that on 4 spine-like, the one on 7 widest when seen in side view of abdomen. Tenth segment not so deeply dovetailed in apex of segment 9 as in *C. mungo*. Superior appendage a trifle shorter than inferior appendages; lateral appendages about three-fifths of length of superior appendage.

Cacoides mungo (Needham, 1940)

Fig. 65–68; Pl. VIIb

This species is known only from SURINAM but it may be distributed at least in the three Guianas. The original description is based on two semi-adult males collected near Moengo at the Cottica River (Trans. Amer. Ent. Soc. *65*, p. 390). The two males in the collection of Cornell University were lent me for study. The specimen used for the accompanying figures in NEEDHAM's description of the species and labelled "Type" by him is the lectotype by present designation.

The lectotype is in very poor condition, the body broken and wholly faded, the right pair of wings separately on a slide and the left pair of wings in a cellophane envelope. The figures of the right pair of wings (loc. cit., fig. 37, 38) were apparently drawn. Some cross veins were forgotten by the drawer, for instance, the cross vein in the large "cell" against the brace vein behind the pterostigma of the front wing, and the cross vein in the large marginal "cell" against vein A2 in the second anal interspace of the hind wing.

The other male, labelled "Paratype" (in NEEDHAM's handwriting) is a pinned specimen in fairly good condition but the abdomen is crushed for nearly its entire length and the left hind wing is broken off at the level of the nodus.

Subsequently NEEDHAM described the larva of this species, although by supposition only, from two cast-off skins, which he acquired from Surinam (Trans. Amer. Ent. Soc. *69*, p. 191). GEIJSKES described the female in 1964 (Stud. Fauna Suriname *7*, p. 37).

Although evidently not rare, dragonflies of this species have seldom been collected. Their habitat is strongly confined to the upper parts of the trees, overhanging the creeks and small rivers of the jungle. Males have never been seen by myself and females only when they visit the creek to put off their eggs. I collected three females (Mooi Wanna Creek (Weijneweg), 2.VI.1965, 2 ♀; 3.VI.1965, 1 ♀). However, larval cast-off skins associated with this species were abundantly found along the banks of the creeks of the savannah zone, whereas immature larvae of various stages were obtained by sifting leafy trash taken from the sandy bottom of these creeks.

LARVA of CACOIDES MUNGO (reared)

A fully mature, male larva was found flatly attached to the under side of floating dead leaves (Pontji Creek near Zanderij, March 26th,

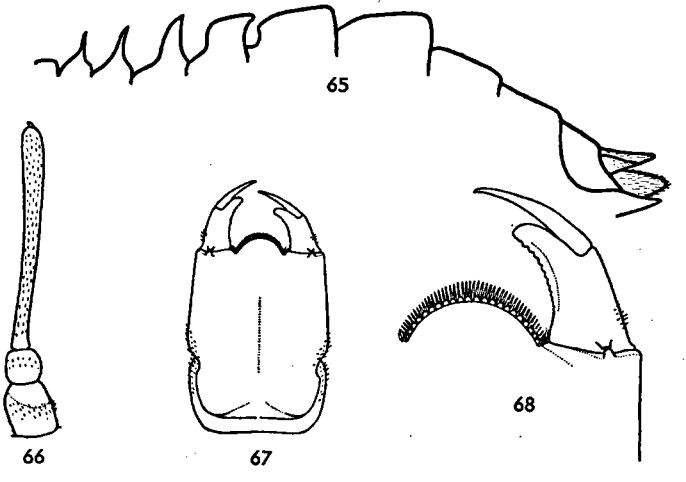


Fig. 65–68. *Cacoides mungo* (Needham) from Surinam. – 65. Skyline of abdomen and caudal appendages of larval exuvia, left lateral view. – 66. Right antenna of larval exuvia, right lateral view. – 67. Labium of larval exuvia, external view. – 68. Left lateral and median lobe of labium of larval exuvia, external view.

1960). In a tin set in subdued light, it transformed to the adult stage of *Cacoides mungo* on May 15th, at mid-night. See Fig. 65–68, Pl. VIIb.

NEGOMPHOIDES COMPLEX

We now come to the large group of Neotropical gomphids referred, or referable, to the genus *Gomphoides* sensu Selysi 1854 (nec Selys 1850). The characters used by SELYS (1854) and NEEDHAM (1940) for separating these dragonflies into three units, show the striking relationship between *Aphylla* and *Cyclophylla* versus *Gomphoides* sensu strictiore. But two characters only appear to be distinctive of the first two units combined, namely the vestigial inferior anal appendage of the adult male, and the extremely long tenth abdominal segment of the larva. I have recently found a third, very essential character for these two units combined not used hitherto: The posterior portion of the tergite of the tenth abdominal segment of the imago forms a rim, which is distinguished from the remaining part of the tergite by a polished surface, by less dense hair, and generally also by a different colour, whereas, in addition, there is sometimes present a well-marked line, groove or ridge accentuating the division into two parts. This dorso-apical rim is often better developed laterally than mid-dorsally. It is also more conspicuous in the male than in the corresponding female, and its median width varies from one-third (in some males) to one-twelfth (in some females) of the total dorsal length of the tenth abdominal segment. In some smaller, darker species the dorso-apical rim is often recognizable only on close inspection. In teneral specimens of these darker species the dorso-apical rim is often well visible.

In the present paper the members pertaining to the genus *Gomphoides* Selys 1854 (*Negomphoides* complex) have been divided firstly into two major groups, the division being based on a combination of three differentiating characters as stated above; each group is subdivided into two genera.

I. The Aphylla group

The distinctive characters of this group are:

1. Tenth abdominal segment of imago with a dorso-apical rim.
2. Inferior anal appendage of adult male vestigial.
3. Tenth abdominal segment of larva excessively elongated being one-fourth of the abdomen or longer.

Genus **Aphylla** Selys, 1854

The distinctive male characters of this genus are

1. Glans of penis pale membranous, in ventral view, subquadrangular and widest at apex, this apex at most with a pair of very short, inconspicuous, pale teeth.
2. Hood of penial peduncle (Needham 1943, p. 202), viewed in profile, acutely pointed ventrad; in rear view, this acute point corresponds to a transverse lamella, whose margin is excised more or less V-shaped; there is no tooth or tubercle on the bottom of the excision.

The distinctive larval characters of this genus are:

1. No lateral spines on abdomen.
2. Inner margin of lateral, labial lobe armed with large, sharply pointed, recurved teeth.

The genus *Aphylla* is further characterized by the following combination of features in the imago: Numerous short spines in distal half of antero-inferior row of posterior femur, the largest spines one-sixth of local width of femur or shorter; in hind wing of male the distal portion of vein A2 parallel with vein A1 or diverging somewhat from it and from vein A3; apical inferior angle of tenth abdominal segment in male as a rule markedly prolonged backward in a point; dorsal posterior margin of tenth abdominal segment of male generally devoid of denticles or nearly so; abdomen in female generally noticeably widened in lateral dimension on apical segments seven to nine.

Type species: *Aphylla brevipes* Selys, 1854, as fixed by Kirby in 1890 (Catalogue, p. 74).

Aphylla brevipes Selys, 1854

Fig. 69–76; Pl. VIIa

Two specimens of the original series which SELYS named *A. brevipes* (Bull. Acad. Belg. *21*, p. 78) were found in the collection of the British Museum (N. H.), London, during my visit on July 4th, 1967. Both are males, and through the abdomen of each specimen a fine skewer has been passed to give it additional support. One of the males lacks the apical end of the left superior caudal appendage but otherwise it is in fairly good condition. This male bears the pinlabels "35", "Para" (and on the reverse "50 2"), and "brevipes De Selys ♂.". This specimen was kindly lent me for study and it is the lectotype by present designation. The other male, which may be conspecific with the lectotype, lacks the head. Attached to the pin were the labels "35", "Para" (and on the reverse "50 2"), "brevipes De Selys ♂." and "Aphylla brevipes".

Two males and one female of the original series were found in the Brussels Museum. They also may be conspecific with the lectotype in the British Museum. One of these two males is in fairly good condition although the pterothorax is broken. The old labels attached to the pin of this specimen are "35", "117", "117", and "Aphylla brevipes S. ♂" (in SELYS' handwriting). The two other specimens are in poor condition, somewhat teneral and less pigmented, partly faded, wings damaged, and terminalia of abdomen shriveled and incomplete. The old pinlabels of the male are "35", "Para" (and on the reverse "50 2"), and "B M" (doubtless British Museum), and those of the female are "Para B.", and "Aphylla brevipes S. ♀" (in SELYS' handwriting).

Male (lectotype) – Total length 58 mm; length of abdomen 45 mm (including caudal appendages 2.4 mm); length of hind wing 33 mm; costal edge of pterostigma of front wing 4 mm.

Venation of wings brown, costa with a narrow, inconspicuous, yellow line on serrate front margin. Wing membrane brownish tinged. Pterostigma surmounting 6 to 7 cells. Basal subcostal cross vein present. Antenodal and postnodal cross veins of first series 12:18–17:13/12:14–14:14 in front and hind wings, respectively. Second primary antenodal cross vein the sixth. Intermedian cross veins 9–10/6–6 in front and hind wings, respectively. All supratriangles two-celled. Triangle in hind wing two-celled, in front wing three-celled, the cross veins tri-radiate from centre. Subtriangle in front wing two-celled, in hind wing open. Trigonal interspace of front

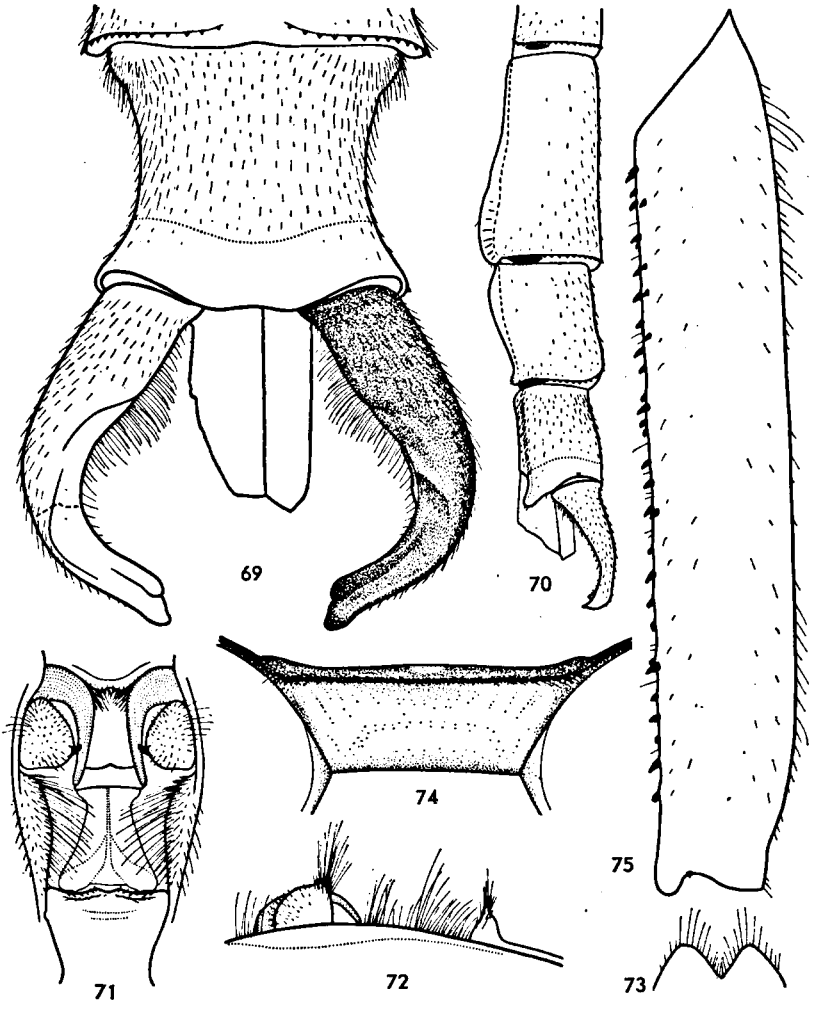
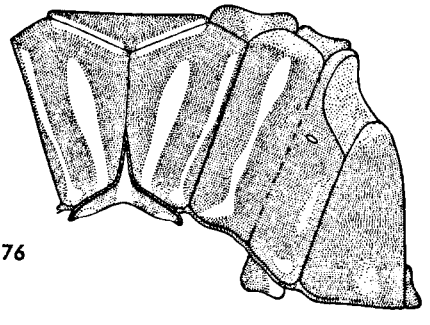


Fig. 69–75. *Aphylla brevipes* Selys. – 69. Tenth abdominal segment and caudal appendages of lectotype male, dorsal view. – 70. Apical segments of abdomen and caudal appendages of lectotype male, right lateral view (transposed). – 71. Genitalia of second abdominal segment of lectotype male, ventral view. – 72. The same, right lateral view. – 73. Hood of penial peduncle of lectotype male, caudal view. – 74. Occipital plate of lectotype male, dorsal view. – 75. Left posterior femur of lectotype male, left lateral view.

wing with two rows of cells starting from triangle, 8 cells long in right front wing, 9 cells long in left front wing. Anal loop of hind wing consisting of two cells. Four paranal cells and four postanal cells in hind wing. Distal portion of A2 of hind wing slightly diverging from A1 and from A3. Three rows of cells behind Cu2 in front wing, four rows of cells behind Cu2 in hind wing. Anal triangle in hind wing made up of four cells.

Labium yellowish. Labrum dark brown, with a symmetric pair of green, oblong spots, free border of labrum yellowish. Tip of mandible black; base of mandible green. Gena with a green spot. Anteclypeus green, its extreme lower part dark brown. Postclypeus dark brown, greenish on sides. Frons dark brown, except for a broad, transverse, green band running over entire width of antero-superior surface of frons, the green band narrower in median. Vertex dark brown, somewhat lighter behind posterior prominences of paired ocelli. Occipital plate green, its hind margin nearly straight, forming a cross ridge which is dark brown and fringed with stiff blackish hairs. Rear of head dark brown, with lower parts of temporae green and with a green, median spot immediately below occipital crest.

Prothorax brown, its middle lobe with a green, dorsal twin-spot, its hind collar blackish.



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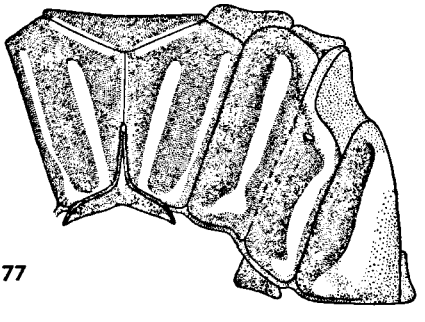

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Fig. 76. *Aphylla brevipes* Selys. – Diagram of pterothorax of lectotype male.
Fig. 77. *Aphylla albinensis* spec. nov. from Surinam. – Diagram of pterothorax of holotype male.

Pterothorax very dark brown, nearly black, the pale stripes green. Its colour scheme shaped as shown in the diagram. The forwardly diverging green, first antehumeral stripes not connected with transverse, anterior, mesothoracic "half collar", which is interrupted in median. Mid-dorsal carina green. Green, second antehumeral stripe immediately in front of humeral suture well-developed, its upper end not confluent with first antehumeral stripe. First, lateral green stripe narrow, second and third lateral green stripes hardly visible.

Femora brown. Antero-inferior margin of posterior femur with numerous, very short spines, the longest spines shorter than one-tenth of local width of femur. Tibiae, tarsi and claws black. Posterior tibia two-thirds of length of posterior femur. Tibial keel (lamina tibialis) of anterior tibia two-fifths of length of tibia.

Abdomen brown, blackish on dorsum of segments 3 to 9 as well as on pleural membranes between segments 3–7. Mid-dorsum of segment two lighter. Auricles with about 20 black denticles. Lamellate expansion of ventral tergal margin of segments 8 and 9 narrow, that of segment 8 gradually widening to rear, that of segment 9 widest on basal half. Edges of exfoliations not armed with denticles. Segment 10 brown, slightly longer than wide, gradually widening in lateral dimension to both ends, sides bulged at base of segment, and apical inferior angles markedly prolonged backward in a point. Dorso-apical rim well-developed, darker in coloration than remaining part of tergite, its surface polished and nearly devoid of hairs, its median width one-fourth of length of tenth segment. Mid-dorsal part of hind margin of segment 10 slightly concave. Dorsal hind margin of segment 10 devoid of denticles except for a single, inconspicuous denticle on right side. Superior caudal appendage somewhat longer than ninth abdominal segment. Tenth segment about three-fourths of length of superior appendage. Relative length of segments 7, 8 and 9 about 13:9:5. Genitalia of second abdominal segment and anal appendages shaped as shown in the figures. The right superior appendage has served me to draw the missing tip of the left superior appendage. In the figure of the genitalia of the second abdominal segment in ventral view the hamules have been drawn in a symmetric position; the drawing is of the right pair of hamules. In the lectotype the left posterior hamule seems to be somewhat dislocated. Genital hamules small and hardly prominent. Anterior hamule slender and strongly curved caudad and dorsad. Posterior hamule, if viewed from beneath, round and thick, its acute tip directed mesad.

Female (allotype; in poor condition) – Total length 52 mm (without anal appendages); length of abdomen 41 mm (without anal appendages); distance on hind wing from base to nodus 15 mm; length of front wing 35 mm; costal edge of pterostigma of front wing 4.4 mm.

Colour design as in male. Lateral dilatation of abdominal segments 8 and 9 about twice as narrow as that of male, the apical portion of dilatation with 4 to 5 denticles. Dorsal hind margin of tenth abdominal segment with a few denticles only at level of bases of stylets. Mid-dorsal part of hind margin of segment 10 convex. Dorso-apical rim of tenth abdominal segment rather broad; its median width seems to be one-fifth of the mid-dorsal length of the segment (The tenth abdominal segment is partly extruded by a skewer, which has been passed through the abdomen). Vulvar scale short, about one-sixth of length of ninth sternum. Its posterior margin V-shaped excised for about two-thirds of length of vulvar lamina, the simple, subtriangular lobes rounded.

Venational characters similar to lectotype male. Antenodal and postnodal cross veins of first series 14:21–20:13/?:13–14:14 in front and hind wings, respectively. Second primary antenodal cross vein the sixth but in left front wing the eighth. Intermedian cross veins 9–?/6–6 in front and hind wings, respectively. Trigonal interspace of front wings starting with a row of two cells against triangle followed by two rows of cells seven (right) and nine (left) cells long in anterior row. Triangles, subtriangles, supratriangles and anal loop as in lectotype male. Five paranal cells and four postanal cells in hind wing. Four (left) and six (right) cells between A3 and hind wing margin.

Lectotype male and allotype female: BRAZIL, Pará. In British Museum (N.H.) and Brussels Museum, respectively.

In the specimens pertaining to the original series the triangle of the front wing is three-celled except in the male from Para of the Brussels Museum; in this specimen the subtriangle of the front wing is two-celled. The trigonal interspace of the front wing starts with two rows of cells against the triangle except in the right front wing of the headless specimen in the British Museum; in this front wing it starts with a row of three cells against the triangle (followed by two rows of cells eight cells long in the anterior row).

Aphylla albinensis spec. nov.

Fig. 77–80; Pl. VIIIa–b, IXb

In April 1964 I took a walk northward along the shore of the Marowijne River near Albina. On arriving at a shaded creek emptying into the river, I discovered a gomphine dragonfly sitting quietly on top of a dead twig on the muddy bank exposed at low water. Next morning I got only one male on several hours diligent hunting. About six specimens were seen but the insects were rather shy and also, owing to the bad local conditions, it was difficult to approach them within net-handle-reach. The following day I collected one teneral female. The dragonflies apparently belonged to an unknown species of *Aphylla*. In the Surinam Museum Dr. GEIJSKES showed me two larval exuviae of an *Aphylla*, which did not belong to one of the three species described in my paper of 1964 (Stud. Fauna Suriname 7, p. 32). The two skins were taken from rivers near the coast and the reference of this exuvial material to my newly discovered species was self-evident.

Later on, collecting again at Albina, I was able to catch three more males.

The species, which I have named *Aphylla albinensis*, agrees in some respects with SELYS' *A. brevipes*. It is of comparable size. The trigonal interspace of the front wing starts with a row of two or three cells against the triangle, followed by two rows of cells as in *A. brevipes*. But the coloration of the body is less dull, and the male has different caudal appendages and a much better developed dorso-apical rim of the tenth abdominal segment.

Male (holotype) – Total length 55.5 mm; length of abdomen 43 mm (including caudal appendages); length of hind wing 33.5 mm; costal edge of pterostigma of front wing 4.5 mm.

When alive compound eyes green. Head brown, the following greenish-yellow: bases of mandibles externally and genae; a spot on eye border at level of postclypeus; a pair of oblong spots on labrum; most of anteclypeus; latero-posterior parts of postclypeus; antero-superior surface of frons for its entire width; upper edges of pedicels and first distaliae; a small spot on vertex behind projecting ridges of paired ocelli; most of occipital plate; rear of head behind occipital plate; a band extending to under side of eye on temporae. Labium pale brown, medially tinged with green. Posterior margin of occipital plate straight and fringed with long, dark brown hairs.

Prothorax brown, yellow on dorsum of middle lobe.

Pterothorax brown, striped with greenish-yellow, the brown on dorsum darker, the brown on sides of pterothorax below stripes and the brown on posterior part of metepimeron less pronounced. Colour pattern of pterothorax shaped as shown in the diagram (Fig. 77). Pale mesepisternal stripe about 0.3 mm wide at mid-height.

Femora brown but ventral sides of first pair of femora greenish. Tibiae, tarsi and claws black.

Abdomen preponderantly brown-orange but blackish on mid-dorsum of segments 3 to 7 and on apical half of segments 8 and 9. Abdomen annulated by the blackish intersegmental articulations between the segments 3–7. Mid-dorsum of segments 1 and 2 yellow. Dorso-apical rim of segment 10 orange. Venter of segments 7 to 10 orange. Inferior lateral margins of segments 8 and 9 dilated to narrow strips, the dilatations orange. Edges of dilatations not armed with denticles. Superior caudal appendages dark brown.

Wings hyaline but extreme bases of wings brownish-yellow tinged. Venation dark brown but costa with a narrow, inconspicuous, yellow line on serrate front margin. Pterostigma brown-yellow, covering 6 cells on front wings, 7 cells on hind wings. Basal subcostal cross vein present. Antenodal and postnodal cross veins of first series 11:18–18:12/14:14–14:11 in front and hind wings, respectively. Second primary antenodal cross vein of right front wing the seventh, of other wings the sixth. Triangle of front wing three-celled, of hind wing two-celled. Subtriangle of front wing two-celled, of hind wing open. Supratriangle of all wings two-celled. Trigonal interspace of wing starting with two rows of cells against triangle, that of hind wing starting with an extra initial cell against triangle. Intermedian cross veins 9–10/6–5 in front and hind wings, respectively. Four paranal cells and four postanal cells in each hind wing. Anal loop two-celled. Anal triangle in hind wing four-celled. In form it resembles that of *A. brevipes* but it is wider anteriorly; the angle of the excavation is about 100°.

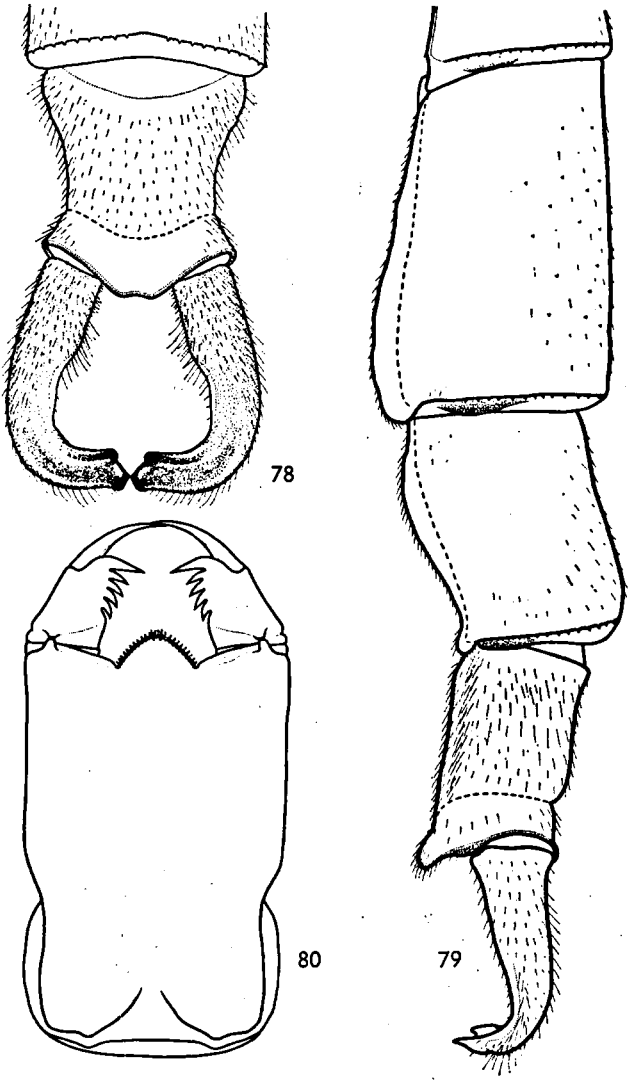


Fig. 78–79. *Aphylla albinensis* spec. nov. from Surinam. – 78. Tenth abdominal segment and caudal appendages of holotype male, dorsal view. – 79. Apical segments of abdomen and caudal appendages of holotype male, left lateral view.
Fig. 80. *Aphylla albinensis* spec. nov. from Surinam. – Labium of larval exuvia, external view.

Dorso-apical rim of segment 10 well-developed and very conspicuous. Its median width about one-fourth of length of segment. Rim nearly devoid of hairs, its surface polished. Dorsal hind margin of segment 10 devoid of denticles, and slightly concave in middle. Apical inferior angles of tenth segment produced backwards in a blunt point. Tip of superior caudal appendage sharply curved downward and acutely pointed, the ante-apical strip of inner margin plainly visible in a side view of the appendage.

Genitalia of second abdominal segment resembling greatly those of *A. brevipes* although the dimensions are smaller.

Female (allotype; teneral) – Total length 52 mm; length of abdomen 40 mm; length of hind wing 34 mm; costal edge of pterostigma of front wing 4.3 mm.

Similar to male but the brown less pronounced and the dark markings of abdomen reduced (possibly due to immaturity). Lateral dilatation of abdominal segments 8 and 9 narrower than that in male, the apical portion of dilatation with denticles. Median width of dorso-apical rim of tenth abdominal segment one-seventh of length of segment. Hind dorsal margin of abdominal segment 10 armed with denticles only at level of bases of anal appendages, the latter a trifle shorter than tenth segment.

Venational characters very similar to those of holotype male. Triangles, subtriangles and supratriangles as in holotype. Antenodal and postnodal cross veins of first series 11:20–21:12/14:15–14:16 in front and hind wings, respectively. Second primary antenodal cross vein the seventh in front wing, the sixth in hind wing. Intermedian cross veins 9–10/7–6 in front and hind wings, respectively.

Holotype male: SURINAM, Albina, 6.IV.1964; allotype female: Same locality, 7.IV.1964. Holotype and allotype in author's collection.
Paratypes: Same locality, 23.VII.1964, 2 ♂; 24.IV.1965, 1 ♂. One paratype in the Leiden Museum.

LARVA of APHYLLA ALBINENSIS (supposition)

Total length 39 mm; length of abdomen 29 mm, of which segment 10 measures 9.5 mm; greatest width of abdomen 5.7 mm; width of head over the eyes 4.8 mm; length of posterior femur 4 mm.

If compared with the larva of the other species of *Aphylla* from Surinam (Stud. Fauna Suriname 7, p. 32) the dorsal hooks of the abdomen are less developed, the one on abdominal segment two is a long, straight spine, and the caudal appendages are about three-fourths as long as segment 10 is wide at apex.

The labial characters are: Mentum one and a half times longer than wide, the sides strictly parallel. Median lobe of mentum recessed in front border, covering distinctly less than one-third of breadth of mentum. Median lobe of mentum prominent and sub-elliptical, the free border rimmed with about 25 sharply pointed scales, and somewhat recessed from free border a pair of extra, submedian scales. End hook of lateral lobe large, sharply pointed and straight. Before end hook of lateral lobe four, large and very sharp teeth diminishing in size and becoming more sharply recurved successively to base.

SURINAM: Saramacca River (Plantation Huwelijkszorg, bank of river), 7.IV. 1961 (GEIJSKES leg.). Another larval exuvia is in the Leiden Museum: Paramaribo (Combé), on stem of tree at bank of river, 8.IX.1950 (GEIJSKES leg.).

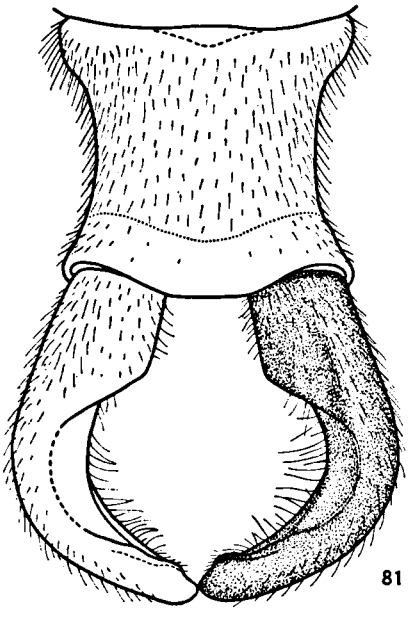
Aphylla brasiliensis spec. nov.

Fig. 81–82

In the Leiden Museum this species is represented (1967) by nine males and three females from Mato Grosso, Brazil. In size it agrees with *Aphylla brevipes* and *A. albinensis* sp.n. but it is darker with the abdomen, including the caudal appendages, nearly black. The pterostigma is smaller than that of these two species. The male caudal appendage is as small as that of *A. albinensis* but it is stouter and of a different shape.

Male (holotype) – Total length 57 mm; length of abdomen 44 mm (including caudal appendages); length of hind wing 32 mm; costal edge of pterostigma of front wing 4 mm.

Colour design of head, thorax and abdomen very similar to that of *A. albinensis*



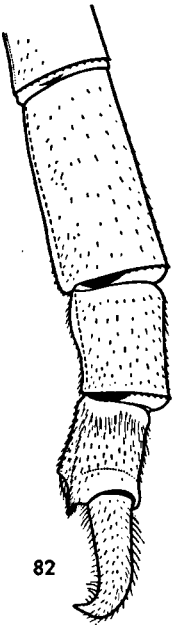


Fig. 81–82. *Aphylla brasiliensis* spec. nov. – 81. Tenth abdominal segment and caudal appendages of holotype male, dorsal view. – 82. Apical segments of abdomen and caudal appendages of holotype male, left lateral view.

sp. n. but posterior border of postclypeus green for its entire width, and green stripes of pterothorax broader. Mesepisternal green stripe about 0.5 mm wide at mid-height.

Lateral dilatation of abdominal segments 8 and 9 twice as narrow as that of *A. albinensis*. Edges of lateral dilatation of abdominal segment 8 with four (left side) and six (right side) conspicuous denticles at apex. Median width of dorso-apical rim of segment 10 one-fifth of length of segment. Median part of dorsal hind margin of segment 10 straight. Dorsal hind margin of segment 10 devoid of denticles. Superior caudal appendage a trifle longer than segment 10, shaped as shown in the figures. Tip of superior appendage acutely pointed and sharply curved downward. Genitalia of second abdominal segment similar to those of *A. albinensis*. Hood of penial peduncle very small.

Venation of wing blackish including anterior margin of costa. Pterostigma rather small, surmounting 6–7½ cells. Basal subcostal cross vein present. Antenodal and postnodal cross veins of first series 13:20–20:14/14:15–15:15 in front and hind wings, respectively. Second primary antenodal cross vein the seventh in front wings, the fifth (right) and sixth (left) in hind wings. Intermedian cross veins 9–9/7–6 in front and hind wings, respectively. Triangle of front wing three-celled, the dividing cross veins tri-radiate from centre. Supratriangle of each wing, subtriangle of front wing and triangle of hind wing two-celled. Subtriangle of hind wing open. Trigonal interspace of front wing starting with three cells against triangle, followed by two rows of cells eight cells long in anterior row. Hind wing with four paranal cells and four postanal cells. Anal loop of hind wing consisting of two cells. Sequence of cells between A1 and A2 behind anal loop 1, 2, 3. Anal triangle in hind wing four-celled.

Female (allotype) – Total length 58 mm; length of abdomen 45 mm; length of hind wing 35 mm; costal edge of pterostigma of front wing 4.2 mm.

Similar to male as regards stature and coloration. Lateral dilatation of abdominal segments 8 and 9 narrower than that of male, the apical portion of dilatation armed with conspicuous denticles. Dorsal hind margin of tenth abdominal segment in middle also armed with denticles. Median width of dorso-apical rim of tenth abdominal segment one-seventh of length of segment. Anal appendage a trifle shorter than tenth abdominal segment. Venational characters very similar to holotype male. Antenodal and postnodal cross veins of first series 13:20–20:13/14:14–14:16 in front and hind wings, respectively. Second primary antenodal cross vein the seventh in each front wing, the fifth in left hind wing and the sixth in right hind wing. Intermedian cross veins 10–10/7–7 in front and hind wings, respectively. Trigonal interspace of front wing starting with three cells against triangle followed by two rows of cells eight cells long in anterior row. Triangles, subtriangles and supratriangles as in holotype. Anal loop two-celled. Four paranal cells and five postanal cells in hind wing.

Holotype male and allotype female (taken in copula): BRAZIL, Mato Grosso, Barre do Tapirapé (forest edge), 11.I.1963 (B. MALKIN leg.). Holotype and allotype in the Leiden Museum.

Paratypes: Same locality as holotype, 12.I.1963, 1 ♂; Brazil, Mato Grosso, Barre do Tapirapé River, Tapirapé village, 3.I.1963, 1 ♀; Brazil, Mato Grosso, Tapirapé, XII.1965, 1 ♀; 30.XII.1965, 1 ♀; 31.XII.1965, 1 ♂; 1.I.1966, 5 ♂. All specimens collected by B. MALKIN. One pair in author's collection; other specimens in the Leiden Museum.

Aphylla producta Selys, 1854

Fig. 83–89; Pl. IXa

Seven specimens pertain to the original series named by SELYS *Aphylla producta* (Bull. Acad. Belg. *21*, p. 79). They were (1967) kindly lent me by the Berlin and Brussels Musea. Four are in the Berlin Museum, viz. one male from "Bahia", and three females from "Surinam", "Guiana brit." and "Brasil", respectively. The specimens in the Brussels Museum are one male with the single pinlabel "Cl 1", one male with the pinlabels "Cl 2", "120", "120", and "Aphylla producta S ♂" (in SELYS's handwriting), and one female with the pinlabels "bresil parz" and "Aphylla producta S ♀ (in SELYS' handwriting). The males labelled "Cl 1" and "Cl 2" are from Brazil (Monogr. Gomph., p. 232). The abbreviations "Cl" and "parz" doubtlessly refer to the names CLAUSEN and PARZUDAKI.

The male from Bahia is the lectotype by present designation. This specimen was used by HAGEN to make the figures as published in the

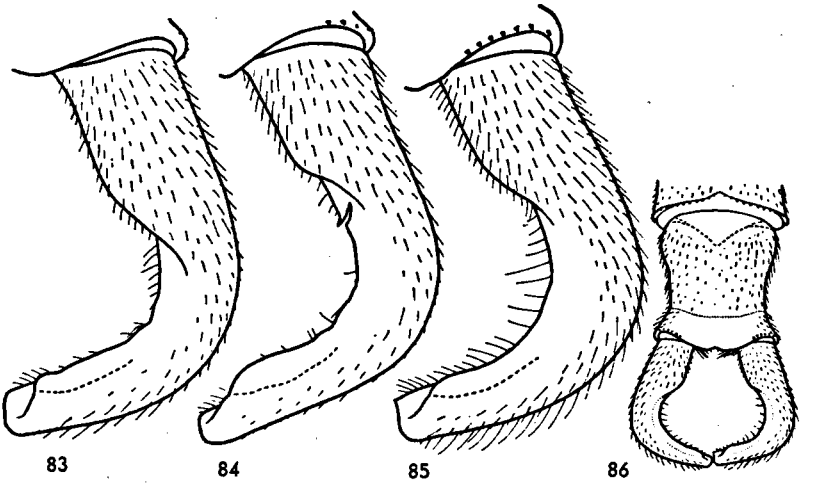


Fig. 83–86. *Aphylla producta* Selys. – 83. Right superior caudal appendage of lectotype male from Bahia, Brazil, dorsal view. – 84. The same of male labelled "Cl 2". – 85. The same of male from Welgedacht A-weg, Surinam. – 86. Tenth abdominal segment and caudal appendages of male from Welgedacht A-weg, Surinam, dorsal view.

Monographie. The genitalia of the second abdominal segment have been removed and they were not re-attached to the specimen.

The males of the original series are not identical. The male from Bahia, BRAZIL, (lectotype) differs from, for instance, the male labelled "Cl 2" in the configuration of the superior caudal appendage by the longer, thickened basal part (shoulder) and by the more blunt tip. Further the male labelled "Cl 2" is stouter bodied than the lectotype. In the lectotype the extreme front margin of the costa is yellow; it is blackish in the male labelled "Cl 2". The lectotype has the pale, first antehumeral stripe confluent below for the outer half of its width only, with the mesothoracic "half collar"; the second lateral pale stripe is badly developed, and the third, lateral pale stripe is reduced to a large, pale marking on the upper part of the metepimeron. It may be said, that the colour pattern of the lectotype is largely obliterated. Its pterothorax is very obscure because of postmortem changes. This applies particularly to the sides of the pterothorax, so that the pale, lateral markings cannot exactly be studied. In the male labelled "Cl 2" the pale, first antehumeral stripe is confluent below for its entire width, with the "half collar"; the second, lateral pale stripe is well-developed, and the third, lateral pale stripe is a well-developed stripe running over the middle of the metepimeron.

Between the males from SURINAM which I have referred earlier to *Aphylla producta* (Stud. Fauna Suriname 7, p. 23) little differences are also found in the configuration of the superior caudal appendage and in the colour pattern of the pterothorax. In their morphology some of these males resemble greatly the male from Bahia (lectotype). In the males from Surinam the pale, first antehumeral stripe is generally not confluent with the "half collar", and the lateral pale stripes are much alike those of the male labelled "Cl 2".

The lamellate expansion of the ninth abdominal segment is convex throughout in the lectotype but, in profile view, this expansion is somewhat concave in its apical half. In the male labelled "Cl 2" and in my males from Surinam this expansion, in profile view is convex in the basal half and distinctly concave in the apical half.

Unfortunately the genitalia of the second abdominal segment of

the lectotype cannot be restudied but between the male labelled "Cl 2" and my males from Surinam differences are found in the conformation of these genitalia. The male labelled "Cl 2" has a stouter posterior hamule, whereas the anterior hamule, if viewed in profile, does not taper so gradually to the apex as is the case in the males from Surinam.

Regarding the females of the original series the following can be noted: The three females in the Berlin Museum have the terminalia of the abdomen in poor condition and incomplete. Those from Surinam and Guyana are apparently identical with my females of *A. dentata* from Surinam. It may be remembered that SELYS described *A. dentata* in 1859 and that his identification of the females was made in 1854. The female from Brazil in the Berlin Museum is

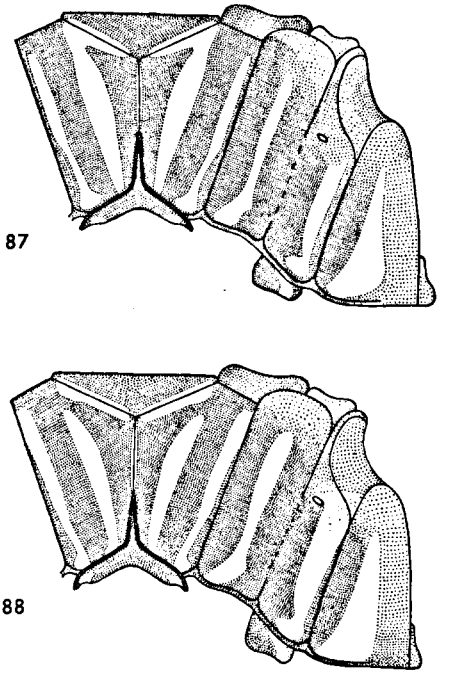


Fig. 87–88. *Aphylla producta* Selys. – 87. Diagram of pterothorax of male labelled "Cl 2". – 88. The same of male from Welgedacht A-weg, Surinam.

possibly also *A. dentata*. Besides differences found in the coloration of some details it differs from the other two females by the longer tenth abdominal segment, by the narrower lamellate expansions of the abdominal segments 8 and 9, and in having the edges of these expansions less denticulated. The female from Brazil in the Brussels Museum is undoubtedly the corresponding female of the males labelled "Cl 1" and "Cl 2". The female is very similar to these two males as regards stature and general coloration. It differs from the female of *A. producta* from Surinam in being stouter but it agrees in the inferior lateral margin of the abdominal segment 8 being practically not expanded and in abdominal segment 9 slightly expanded, and in having the apices of these inferior lateral margins armed with only a few denticles.

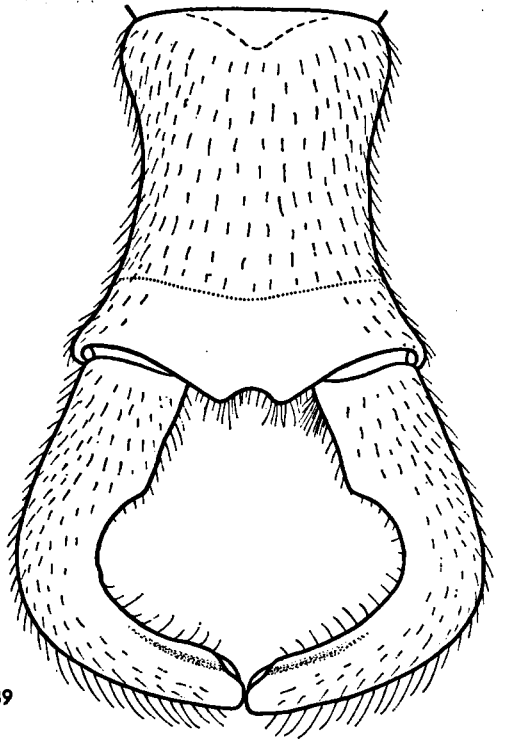


Fig. 89. *Aphylla producta* Selys. – Tenth abdominal segment and caudal appendages of male from São Paulo, dorsal view.

Among further material of *Aphylla* in the Brussels Museum, not belonging to the original series of *A. producta*, I found a single male from "S. Paulo" which may be conspecific with this species. In addition, the label not attached to the pin of the specimen shows "près de producta" (in SELYS' handwriting). The male differs remarkably from the lectotype of *A. producta* by the longer and more slender tenth abdominal segment and by the complete absence of a lamellate expansion on the abdominal segments 8 and 9. The tenth abdominal segment is about as long as the ninth abdominal segment and distinctly longer than the superior anal appendage, whereas in the lectotype it is distinctly shorter than the ninth abdominal segment and about as long as the superior anal appendage. The dorsal hind margin of abdominal segment 10 is devoid of denticles except for two, inconspicuous, small denticles on the right side only. In the lectotype it is distinctly armed with denticles at the level of the bases of the superior appendages. The pale, first antehumeral stripe is not confluent with the mesothoracic "half collar" and the three, pale lateral stripes of the pterothorax are well-developed. The extreme, frontal margin of the costa is black but yellow in the lectotype. At present I would consider the males labelled "Cl 1" and "Cl 2", and the male from São Paulo as belonging to two distinct variations of *Aphylla producta*.

Under the same label "près de producta" I also found a female from "Pernambuco", Brazil, which was referred to *Aphylla producta*. This female is perhaps the corresponding female of the lectotype from adjoining Bahia. The female agrees with the female of *A. producta* from Surinam by the practically entire absence of a lateral dilatation on the abdominal segments 8 and 9, and in having the ventral tergal margins of these segments armed with only a few denticles at their apices. The median width of the dorso-apical rim of the tenth abdominal segment is about one-seventh of the length of the segment, the anal appendage (stylet) about four-fifths of the length of the tenth abdominal segment. The pale, first antehumeral stripe is not confluent with the mesothoracic "half collar" and the extreme, frontal margin of the costa is yellow. This specimen differs however from the females from Surinam by the relatively shorter

abdomen (abdomen 41 mm, hind wing 35 mm against abdomen 45 mm, hind wing 36 mm in one of the females from Surinam). The dorsal hind margin of the tenth abdominal segment is denticulated only at the level of the bases of the stylets, in the female from Surinam along the entire dorsal hind margin. The pale, antero-superior band of the frons is about one-third of the width of the superior surface of the frons, in the female from Surinam about one-third of the width in the median and about two-thirds of the width at the level of the antennae. The metepimeron is largely pale, in the female from Surinam brownish along the slanting hind border.

Aphylla elegans spec. nov.

Fig. 90–92

There is a single male of this species in the collection of the Leiden Museum. The dragonfly was taken at Apure, VENEZUELA on 2.II. 1937. No indication on the accompanying triangular envelope refers to the collector's name. The collector has given the following field notes: "Head white-green with brown design. Pale markings of pterothorax grass-green. Abdominal segments 1 and 2, and base of segment 3 with a mid-dorsal, grass-green stripe; otherwise the abdominal segments 1 to 6 are copper-bronze colored. Abdominal segments 7 to 10 copper-red on the dorsum, orange on the venter".

The species is perhaps as nearly related to *A. producta* as to the Central-American representatives of the genus.

Male (holotype; apical portion of right hind wing broken off and lost) – Total length 61.5 mm; length of abdomen 47.5 mm (including caudal appendages); length of hind wing 35 mm; costal edge of pterostigma of front wing 4.3 mm.

Principal veins of wings dark brown including frontal margin of costa; cross veins pale-brown. Pterostigma yellowish-brown, surmounting 5–6 cells. Basal subcostal cross vein present. Antenodal and postnodal cross veins of first series 11:17–19:11/12:14–13:? in front and hind wings, respectively. Second primary antenodal cross vein the sixth in front wing, the fifth in hind wing. Intermedian cross veins 10–10/6–6 in front and hind wings, respectively. Supratriangle of each wing, subtriangle of front wing, and triangle of hind wing two-celled. Subtriangle of hind wing open. Triangle of front wing three-celled, the cross veins tri-radiate from centre. Trigonal interspace of front wing starting with three cells against triangle, thence followed by two rows of cells 8 cells long in anterior row. Anal loop of hind wing two-celled. Four paranal cells and four postanal cells in hind wing. Distal portion of A2 of hind wing

slightly diverging from A1 and from A3. Anal triangle in hind wing made up of four cells.

Labrum dark brown, with a brownish-yellow free border and a pair of large, green spots touching each other in median of labrum. Mandible black at tip, base yellowish. Genae brown. Anteclypeus green. Postclypeus brown, the sides green. Frons dark brown, with a very broad, transverse, green band running over entire width of antero-superior surface of frons, the green band narrower in median. Vertex dark brown. Occipital plate green, its hind dorsal margin straight, forming a yellowish cross ridge fringed with pale hairs. Rear of head brown, lower part of temporae yellow.

Prothorax with a green, mid-dorsal twin-spot. Colour pattern of pterothorax as shown in the diagram (Fig. 92).

Femora brown, inner sides of first pair yellow. Tibiae, tarsi and claws very dark brown, nearly black.

Caudal appendages brown, shaped as shown in the figures. Genitalia of second abdominal segment of the common type; hood of penial peduncle very small.

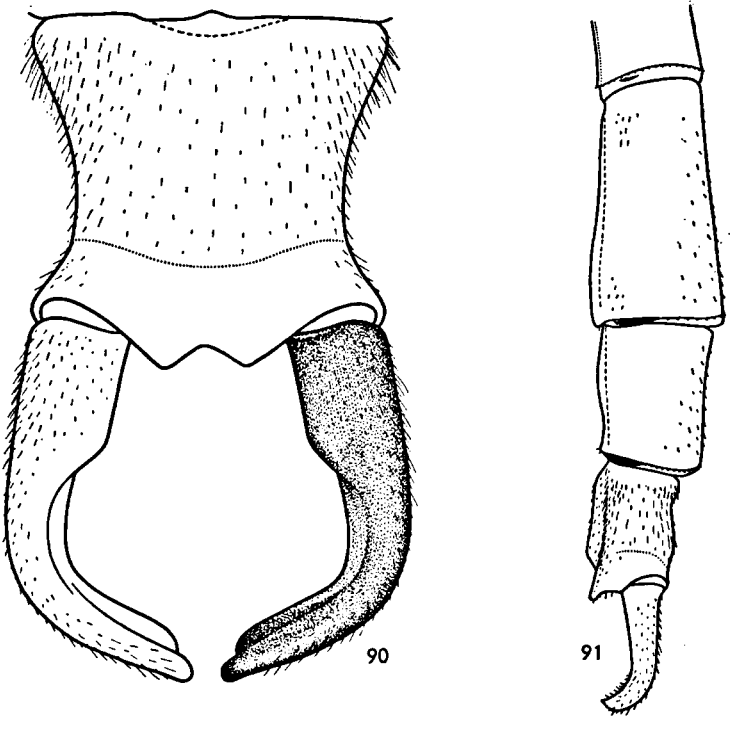


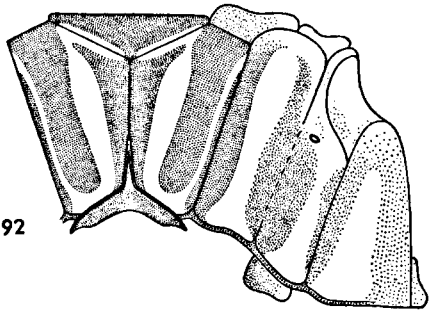
Fig. 90–91. *Aphylla elegans* spec. nov. – 90. Tenth abdominal segment and caudal appendages of holotype male, dorsal view. – 91. Apical segments of abdomen and caudal appendages of holotype male, left lateral view.

Abdomen, including caudal appendages, scarcely provided with hairs. Greatest width of dorso-apical rim of tenth abdominal segment nearly one-third of length of segment. Dorsal hind margin of segment 10 not armed with denticles and medially V-shaped excised. Lateral dilatation of abdominal segments 8 and 9 narrow, the edge of dilatation not armed with denticles.

Aphylla alia Calvert, 1948

Fig. 93

The holotype male of *Aphylla alia* Calvert (Zoologica N.Y. *33*, p. 66) was kindly lent me for study by The Academy of Natural Sciences of Philadelphia. The dragonfly was taken in Guyana (Bartica District). It is incomplete (terminal segments of abdomen lost)



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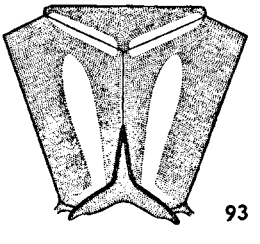

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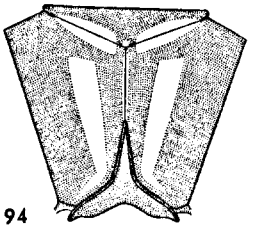

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Fig. 92. *Aphylla elegans* spec. nov. – Diagram of pterothorax of holotype male.
Fig. 93. *Aphylla alia* Calvert. – Diagram of dorsum of pterothorax of allotype female.
Fig. 94. *Aphylla distinguenda* (Campion). – Diagram of dorsum of pterothorax of holotype male.

and in poor condition. The figure given by CALVERT from the hood of the penial peduncle in caudal view (pl. 1, fig. 19) is incorrect. The posterior margin is V-shaped excised, there is no median tooth. Possibly CALVERT was misled by a speck of dust near the bottom of the cleft, which I have cleaned with a paint-brush.

Aphylla alia belongs to the smallest representatives of the genus. It is peculiar by the entire lack of a pale, second antehumeral stripe immediately in front of the humeral suture. The pale, first antehumeral stripe is not confluent with the pale, transverse, mesepisternal "half collar", and at its upper end it is widened laterad and borders the ante-alar sinus.

In the Leiden Museum there is a single female of *Aphylla* from Venezuela, which I consider to be conspecific with *A. alia*. The female agrees with the holotype male of this species as regards stature and general coloration.

Female (allotype; teneral; abdomen broken between the segments 5–6 and 6–7) – Total length 51 mm; length of abdomen 39 mm; length of hind wing 31 mm; costal edge of pterostigma of front wing 4 mm.

Segment 10 as long as wide at base, distinctly wider at base than at apex, dorsum at base laterally swollen, dorso-apical rim one-seventh of length of segment. Dorsal hind margin of tenth abdominal segment in median not armed with denticles. Anal appendages four-fifths of length of tenth segment. Lateral dilatation of segments 8 and 9 very narrow, that of segment 8 as wide as that of segment 9, the dilatation with a few denticles at apex.

Pterostigma surmounting 5½–6½ cells. Antenodal and postnodal cross veins of first series 11:19–17:11/12:14–13:12 in front and hind wings, respectively. Second primary antenodal cross vein the seventh in left wings, the sixth in right wings. Intermedian cross veins 9–10/6–7 in front and hind wings, respectively. Triangle of front wing three-celled. Triangle of hind wing, subtriangle of front wing, and supratriangle of each wing two-celled. Subtriangle of hind wing open. Trigonal interspace of front wings starting with a row of three cells against triangle followed by two rows of cells seven (left) and eight (right) cells long in anterior row. Three (front wing) and four (hind wing) rows of cells in area posterior to Cu2. Four (right) and five (left) paranal cells in hind wing. Four postanal cells in each hind wing. Anal loop consisting of two cells. Sequence of cells between A1 and A2 behind anal loop 1, 2, 3 in each hind wing.

Allotype female: VENEZUELA, Guanoco, Sucre, 25.VIII.1951 (J. RACÉNIS leg.). Leiden Museum.

Aphylla molossus Selys, 1869

Fig. 95–96

The holotype male of *Aphylla molossus* Selys (Bull. Acad. Belg. *28*, p. 196) from BRAZIL (Brussels Museum) was kindly lent me for examination. The male is in a fairly good condition. The tip of the abdomen is bent upward owing to the fact that a fine skewer has been passed through the abdomen to give it additional support. The old labels attached to the pin of the specimen are "35", "35. molossus/race in var de dentata" (in SELYS' handwriting), and "141 (changed to 14L) molossus".

The species is closely allied to *Aphylla dentata* Selys (Bull. Acad.

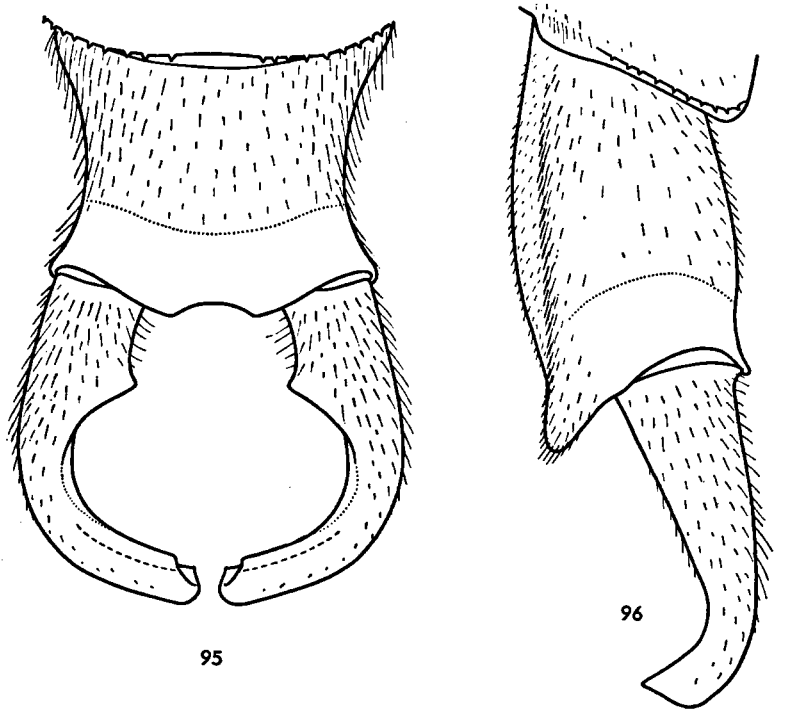


Fig. 95–96. *Aphylla molossus* Selys. – 95. Tenth abdominal segment and caudal appendages of holotype male, dorsal view. – 96. The same, left lateral view.

Belg. (2) 7, p. 547) but it is a more delicate species. The male superior caudal appendage of *A. molossus* is distinctly smaller, with the thickened basal portion (shoulder) shorter and broader, and with the apical one-third portion much more flattened than in *A. dentata*.

Male (holotype) – Total length 62 mm; length of abdomen 47 mm (including caudal appendages); length of hind wing 34 mm; costal edge of pterostigma of front wing 4.2 mm.

Face brownish but base of mandible and anteclypeus yellowish. Superior surface of frons with a broad, anterior, yellowish band occupying half the width of superior surface in median of frons. Vertex dark brown. Occipital plate pale brown. Rear of head behind occipital plate dark brown.

Prothorax brown, hind lobe with a yellowish, mid-dorsal twin-spot and with a yellowish spot each side.

Pterothorax dark brown, the pale markings greenish-yellow. Mid-dorsal carina pale. Pale, anterior, mesothoracic "half collar" interrupted in median. Pale, first antehumeral stripe slightly connected below with "half collar" and broadly confluent dorsally with pale, second antehumeral stripe immediately in front of humeral suture. The two, antehumeral stripes about equal in width. The three, lateral pale stripes on mesepimeron, metepisternum and metepimeron also about equal in width.

Femora brownish. Tibiae and tarsi blackish. Tibial keel of anterior tibia about two-fifths of length of tibia.

Abdomen dark brown, paler on basal segments. Segment two with a distinct, mid-dorsal, pale stripe. Base of segment three with elongated, pale lateral spots. Lateral dilatation of segments 8 and 9 narrow, pale, not armed with denticles. Dorso-apical rim of tenth abdominal segment reddish-brown, its median width one-fourth of length of segment 10. Dorsal hind margin of segment 10 devoid of denticles, in median with a round, evenly concave, notch. Base of segment 10 bulged at sides. Apical inferior angle of segment 10 markedly prolonged backward in a point.

Venation of wing dark brown including frontal margin of costa. Subtriangle of front wing three-celled. Trigonal interspace of front wing starting with a row of three cells against triangle followed by two rows of cells.

There is another male of *A. molossus* in the Brussels Museum. This specimen bears at the pin the old label "Aphylla dentata S. ♂" (in SELYS' handwriting). The (incorrect) specific reference has apparently been based on the fact that in this specimen the subtriangle of the front wing is two-celled and that the pale, first antehumeral stripe is not connected with the "half collar" nor with the pale, second antehumeral stripe.

In the Leiden Museum I found a single male of *A. molossus* which was taken at "San Felise, Orinoco", VENEZUELA on 2.X.1937. The subtriangle of the front wing of this male is also two-celled. The pale, first antehumeral stripe is broadly confluent with the "half collar" as well as with the pale, second antehumeral stripe. This specimen is more yellowish than the holotype and it applies in particular to the apical segments of the abdomen. The superior caudal appendage is somewhat stouter than that of the holotype.

In the three examined males of *A. molossus* the triangle of the front wing is three-celled, the triangle of the hind wing is two-celled, and the subtriangle of the hind wing is one-celled.

Aphylla distinguenda (Campion, 1920)

Fig. 94, 97–98

The holotype male of *Gomphoides distinguendus* Campion (Ann Mag. Nat. Hist. (9) *6*, p. 132) in the Brussels Museum, was taken in Buenos Aires, ARGENTINA. As clearly appears from the accompanying pinlabel it was first referred by RIS to the species *Aphylla dentata* Selys. But the male, superior caudal appendage is much stouter than that of that species, and the pattern of the pterothorax differs considerably from that species by the entire lack of a pale, second antehumeral stripe immediately in front of the humeral suture. In

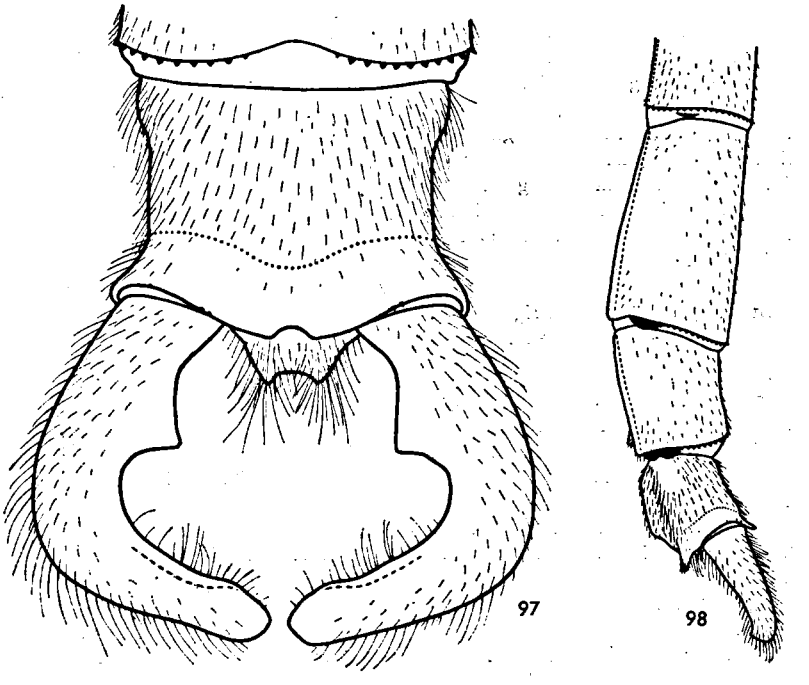


Fig. 97–98. *Aphylla distinguenda* (Campion). – 97. Tenth abdominal segment and caudal appendages of holotype male, dorsal view. – 98. Apical segments of abdomen and caudal appendages of holotype male, left lateral view.

this respect it agrees with *A. alia* from Guyana. The anterior margin of the costa is yellow, blackish in *A. dentata*. The lamellate expansion of the ventral tergal margin of segments 8 and 9 is very narrow and about twice as narrow as in *A. dentata*. The male superior caudal appendage, in profile view, is stout and gradually but slightly tapering towards apex, the tip not noticeably bent downward, in *A. dentata* distinctly curved at two-thirds of the length.

Aphylla edentata Selys, 1869

Fig. 99–100

In the Brussels Museum the original series of *Aphylla edentata* Selys (Bull. Acad. Belg. *28*, p. 196) from Ega (Tefé), BRAZIL, is represented by two males and one female. The specimens are in a fairly good condition. One of the males bears at the pin the old labels "Ega", "116", "116", and "Aphylla edentata S. ♂" (in SELYS' handwriting). This specimen is the lectotype by present designation.

Another male in the Selysian collection, also placed under *A. edentata*, is from "Peba" (doubtless Pebas, Perú). The terminalia of the abdomen of this somewhat teneral specimen are in poor condition. The specifically important apical part of the tenth abdominal segment is broken off and lost with the anal appendages.

A. edentata is a representative of the genus of which the apical inferior angles of the tenth abdominal segment of the male are not markedly prolonged backward in a point.

Male (lectotype; right anterior leg missing, extreme tip of left superior caudal appendage broken and somewhat dislocated) – Total length 60 mm; length of abdomen 45 mm (including caudal appendages 2.5 mm); length of hind wing 35 mm; costal edge of pterostigma of front wing 4.1 mm.

Face brownish, with the following greenish-yellow: base of mandible externally, free border of labrum, anteclypeus, and postero-lateral areas of postclypeus. Superior surface of frons with a broad, greenish-yellow band occupying two-thirds of anterior part of superior surface. Vertex dark brown. Occipital plate greenish-yellow. Occiput dark brown.

Prothorax brown with greenish-yellow spots.

Pterothorax dark brown, the pale markings greenish-yellow. Mid-dorsal carina pale. Pale, anterior, mesothoracic "half collar" about as wide as pale, first and second antehumeral stripes, the "half collar" interrupted in median. Pale, first antehumeral stripe not connected with "half collar" nor with pale, second ante-

humeral stripe. Pale mesepimeral stripe about as wide as pale, second antehumeral stripe immediately in front of humeral suture. Pale stripes on metepisternum and metepimeron somewhat wider than pale mesepimeral stripe.

Femora brown, but inner sides of first two pairs of femora paler. Tibiae and tarsi blackish. Tibial keel of anterior tibia about half the length of tibia. Posterior tibia nearly three-fourths of length of posterior femur.

Abdomen reddish-brown, the intersegmental articulations dark brown. Superior caudal appendage dark brown, blackish at extreme tip. Dorso-apical rim of tenth abdominal segment darker in coloration than remaining part of tergite, its median width about two-sevenths of length of segment. Dorsal hind margin of segment ten devoid of denticles, and with a shallow, median, round notch. Superior caudal appendage a trifle longer than tenth segment and as long as ninth segment. Relative length of segments 7, 8 and 9 as 12:9:5. Abdomen nearly parallel-sided on these segments. Lateral dilatation of segments 8 and 9 very narrow, that of segment 8 with a few denticles at apex, that of segment 9 without any denticle. Superior caudal appendage strongly flattened on apical one-third portion, the tip with a small, internal notch.

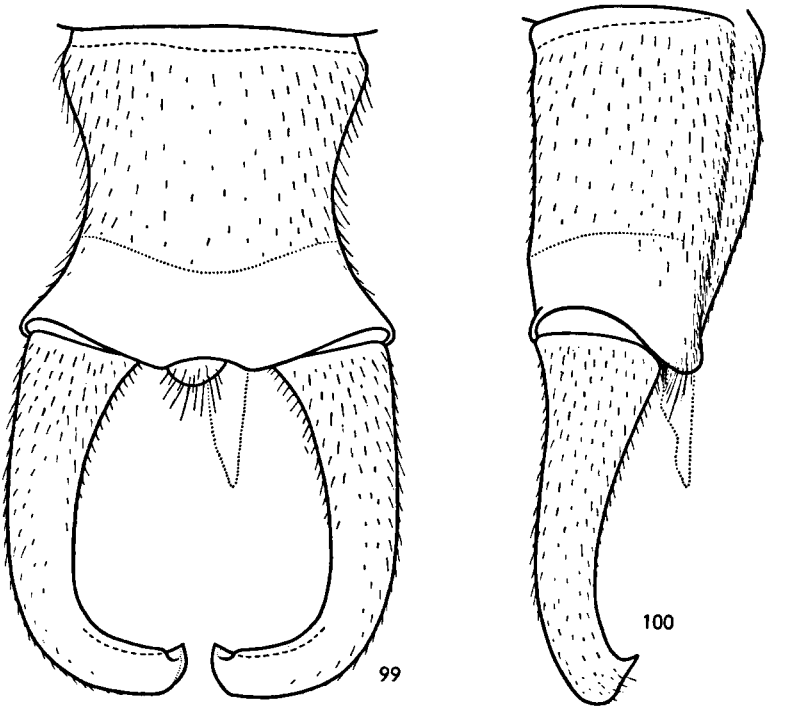


Fig. 99–100. *Aphylla edentata* Selys. – 99. Tenth abdominal segment and caudal appendages of lectotype male, dorsal view. – 100. The same, right lateral view.

Frontal margin of costa dark brown. Trigonal interspace of front wings starting with a row of three cells against triangle followed by two rows of cells 9 (left) and 8 (right) cells long in anterior row (in left front wing of the other male from Ega starting with two cells against triangle).

Female (allotype; right anal appendage broken off and lost) – Total length 62 mm; length of abdomen 46.5 mm; length of hind wing 37 mm; costal edge of pterostigma of front wing 4.7 mm.

Stouter than male. Coloration similar to male but middle portion of pale, antero-superior band of frons narrower (about half the width of superior surface of frons), dorsum of prothorax largely pale, and pale first antehumeral stripe shorter.

Abdomen beyond basal segments nearly cylindric, segments 9 and 10 successively narrower in lateral dimension. Ventral tergal margin of abdominal segments 8 and 9 not dilated, that of segment 8 with a few denticles at apex, that of segment 9 without denticles. Dorsal hind margin of segment 10 denticulated except on concave mid-dorsal portion. Median width of dorso-apical rim of tenth abdominal segment about one-tenth of length of segment, the rim twice as wide laterally as mid-dorsally. Stylet a trifle shorter than tenth segment and in length 1.9 mm. Relative length of segments 7, 8 and 9 about as 11:8:5.

Trigonal interspace of right front wing starting with three rows of cells, two cells long, followed by two rows of cells, of other wings starting with a row of three cells against triangle followed by two rows of cells.

Genus **Phyllocycla** Calvert, 1948

The distinctive male characters of this genus are:

1. Glans of penis with a pair of very long, curled filaments at apex; the convex margin of filaments finely serrate;
2. Hood of penial peduncle medially, deeply cleft into two lobes which largely conceal the filaments when at rest; the lobes, in profile view, more or less subtriangular; the posterior notch of hood forming a more or less round excavation the bottom of which is generally provided with a median protuberance.

The distinctive larval characters of this genus are:

1. Abdomen with short, sometimes minute, lateral spines on segments 5, 6 and 7 to 9;
2. Inner margin of lateral labial lobe smooth and generally with a notch just before end hook; the margin of the notch often with a minute tooth or a row of minute teeth.

Furthermore the genus *Phyllocycla* differs from *Aphylla* by the following features in the imago: spines in distal half of antero-inferior row of posterior femur generally not numerous and longer

than in *Aphylla*, the largest spines generally about one-fourth to one-third of local width of femur; in hind wing of male the distal portion of A2 as a rule strongly convergent with A3; apical inferior angle of tenth abdominal segment of male not prolonged backward in a point; dorsal posterior margin of tenth abdominal segment of male with many denticles, in particular at level of bases of superior caudal appendages; abdomen of female generally not or slightly widened in lateral dimension on apical segments seven to nine.

Type species: *Cyclophylla signata* Hagen in Selys, 1854, as fixed by CALVERT in 1948 (Zoologica N.Y. *33*, p. 62).

Phyllocycla signata (Hagen in Selys, 1854)

Fig. 101–105; Pl. Xa

Dr. GÜNTHER of the Berlin Museum generously enabled me to study the holotype male of *Cyclophylla signata* Hagen in Selys from BRAZIL (Bull. Acad. Belg. (2) *21*, p. 77). At the pin of the type are the labels "2320" (white label), "Brasil Besike" (green label), "signata Hag" (green label), and a printed museum label "Typus" (red label). The dragonfly is in fairly good condition but the genitalia of the second abdominal segment are missing. These have apparently been removed by HAGEN for his figures in the *Monographie* and they were not re-attached to the specimen. I add new drawings of some structural details of the holotype and a photograph of its right pair of wings.

It may be noted that the superior caudal appendage of the type bears a small, but distinct internal tubercle just before the curvature of the superior appendage at three-fifths of its length. HAGEN's figures of the superior appendages and of the left superior appendage in the *Monographie des Gomphines* (pl. 12, fig. 4a and 4c) do not show this tubercle, whereas SELYS does not mention it in his descriptions. Furthermore, the hind margin of the occipital plate is slightly emarginated and not so distinctly bilobed as figured in the *Monographie* (pl. 12, fig. 4d).

The tenth abdominal segment of the holotype is flattened above. The apical inferior angles are not prolonged backward in a point.

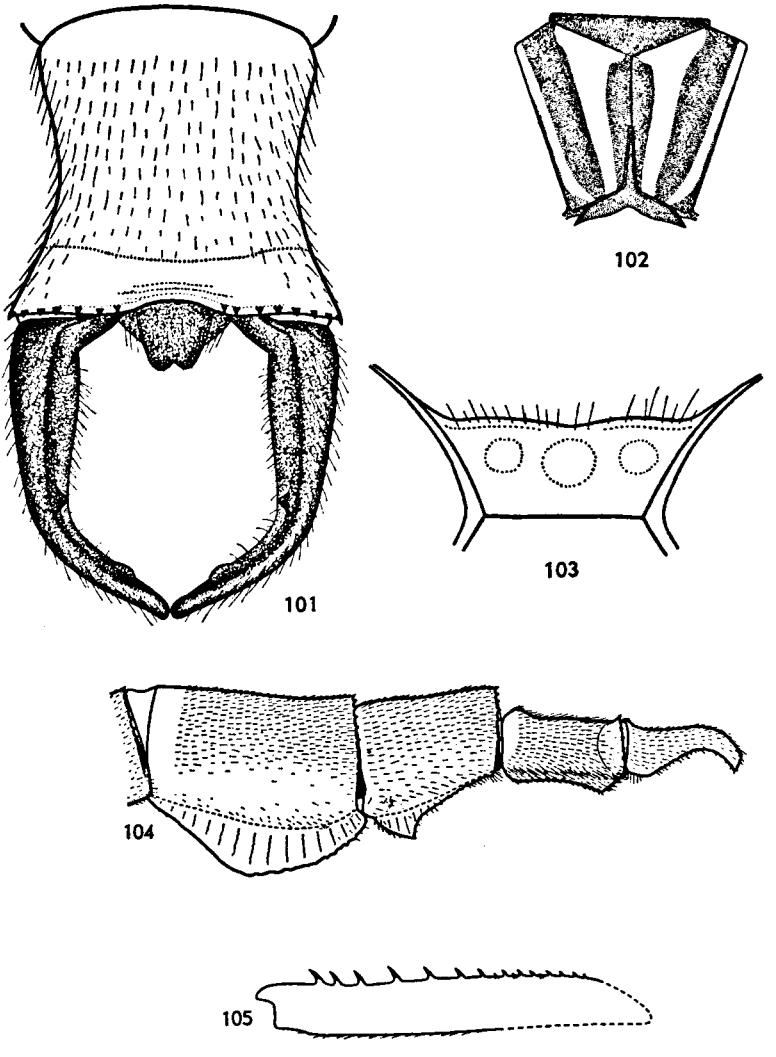


Fig. 101–105. *Phyllocycla signata* (Hagen in Selys). – 101. Tenth abdominal segment and caudal appendages of holotype male, dorsal view. – 102. Diagram of dorsum of pterothorax of holotype male. – 103. Occipital plate of holotype male, dorsal view. – 104. Apical segments of abdomen and caudal appendages of holotype male, left lateral view. – 105. Left posterior femur of holotype male, left lateral view.

The dorso-apical rim is very well-developed and black, the remaining part of the segment is brown. The median width of the rim is about one-sixth of the length of the segment; the lateral width of the rim is nearly one-fourth of the length of the segment. The surface of the rim is distinctly polished; on the mid-dorsum this surface is wrinkled and devoid of hairs.

The spines of the antero-inferior row of the posterior femur are very short on the proximal (basal) half; they are long and about one-fourth of the width of the femur on the distal half. The spines on the posterior femur are not numerous there are about 10 very short spines on the basal half and about 7 long spines on the distal half of the antero-inferior row, the last spine the longest (Fig. 105).

The venational features of the holotype are: Basal subcostal cross vein present. Pterostigma of each front wing surmounting 5½ cells, that of right hind wing 5 cells, and that of left hind wing 6 cells. Antenodal and postnodal cross veins of first series 12:17–16:12/12:11–12:12 in front and hind wings, respectively. Second primary antenodal cross vein the sixth in front wing, the fifth in hind wing. Intermedian cross veins 8–8/6–5 in front and hind wings, respectively. All triangles, subtriangles and supratriangles two-celled except for subtriangle in hind wing, which is open. Trigonal interspace starting with two rows of cells, that of hind wing with an extra initial cell against triangle. A single cubito-anal cross vein in each wing (in addition to inner side of subtriangle). Front wings with 7 (left) and 8 (right) paranal cells. Anal field of front wing proximal to triangle with two rows of cells for a distance of two cells in right front wing, with a single double cell in left front wing. Two rows of cells behind Cu2 with one extra cell for a third row in each front wing. Three rows of cells behind Cu2 in hind wing but right hind wing with an extra cell for a fourth row. Hind wing with four paranal cells and three postanal cells. Anal loop of hind wing two-celled and sharply defined by convergence of A1 and A2 at its rear. Two cells behind anal loop followed by three marginal cells. Distal portion of A2 strongly convergent with A3. Anal triangle in hind wing made up of four cells.

The dimensions measured by myself and which depart from those stated in the *Monographie* are: Total length 50 mm; length of abdomen 38 mm (including caudal appendages); costal edge of pterostigma of front wing 3.5 mm.

Phyllocycla modesta spec. nov.

Fig. 106–111; Pl. Xb, XIa, XIIb

This species is most closely related to the type species of the genus *Phyllocycla signata* recorded from adjoining Brazil. The loan of the holotype male of *Cyclophylla signata* Hagen in Selys for study enabled me to assure myself of its specific distinctness. My species from

Surinam is smaller (abdomen of male 33–37 mm; hind wing of male 25–27 mm). The most striking morphological differences in the male are found in the conformation of the superior caudal appendage. It is smaller and more slender in my species, and the ante-apical strip of the superior margin is more extended than in *Ph. signata*. Furthermore, the outer margin of the superior appendage is not so sharply incurved at three-fifths of the length as in *Ph. signata*, and there is no trace of a small, internal tubercle just before this curvature. There are also differences in the contours of the exfoliations of the eighth and ninth abdominal segments of the male; the lateral dilatation of segment nine is rounded and not acutely angulated as is the case in *Ph. signata*. The tenth abdominal segment of the male is not noticeably flattened on dorsum, and the dorso-apical rim is narrower than in *Ph. signata*, its median width is about one-ninth of the length of the segment. The most striking difference in the colour design of the pterothorax is found in the pale, 7-shaped markings on the dorsum; these are less extended in my male from Surinam. I could find no clear differences in the genitalia of the second abdominal segment of the male compared with HAGEN's figures in the *Monographie des Gomphines* (pl. 12, fig. 4e–m).

Male (holotype) – Total length 46 mm; length of abdomen 36.5 mm (including caudal appendages); length of hind wing 26.5 mm; costal edge of pterostigma of front wing 3.2 mm.

Colour pattern resembling that of *P. signata* very much but pale markings of pterothorax less extensive. When alive the compound eyes and ocelli are brown, anteclypeus greenish-yellow, postclypeus with a greenish-yellow spot on each side, superior surface of frons with a broad anterior band of greenish-yellow for its entire width, scapes and first distalia with yellowish upper edges. Hind margin of occipital plate nearly straight.

Prothorax dark brown. Pterothorax very dark brown, nearly black, the pale stripes greenish-yellow; its colour pattern shaped as shown in the diagram (Fig. 107).

Legs brown, inner sides of first pair of femora greenish-yellow. Tibiae, tarsi and claws blackish.

Abdomen preponderantly very dark brown, reddish-brown on sides of segments 8, 9 and 10. Dorso-apical rim of tenth abdominal segment black. Upper side of auricles greenish-yellow. Segments 1 to 7 with a greenish-yellow, longitudinal stripe on mid-dorsum, the stripe widening on segments 1 and 2, and on basal fourth of segment 3, thence being very fine to apex of segment 7. A short, mid-dorsal pale stripe on base of segment 8. A dorso-lateral, greenish-yellow basal spot on segments 3 to 7 reaching to submedian, transverse carina, that on 3 to 6 triangular, on 7 subquadrangular.

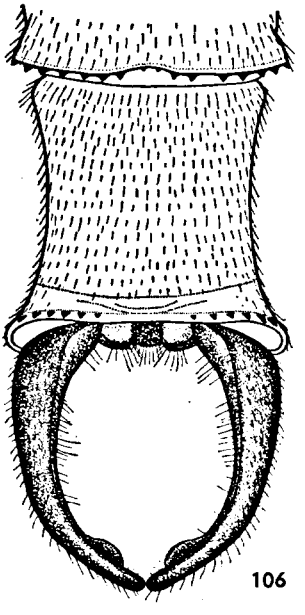
Wings hyaline, at extreme bases slightly brown-tinged. Pterostigma brown.

Venation blackish, including frontal margin of costa. Basal subcostal cross vein present. Antenodal and postnodal cross vein of first series 11:17–16:10/12:12–12:12 in front and hind wings, respectively. Second primary antenodal cross vein the sixth in front wing, the fifth in hind wing. Intermedian cross veins 8–8/5–5 in front and hind wings, respectively. All triangles, subtriangles and supratriangles two-celled except for subtriangle of hind wing, which is open. Trigonal interspace starting with two rows of cells, that of hind wing starting with an extra initial cell against triangle. Anal loop of hind wing two-celled, the proximal cell smaller. Distal portion of A2 strongly convergent with A3. Four paranal cells and three postanal cells in hind wing. Anal triangle in hind wing four-celled.

Female (allotype; abdomen broken between the segments 4 and 5) – Total length 45 mm; length of abdomen 33 mm; length of hind wing 30 mm; costal edge of pterostigma of front wing 3.7 mm.

Coloration similar to that of male with the exception of abdomen, which is brown. Segments eight and nine with no trace of lateral dilatations. Vulvar scale short, its posterior margin V-shaped excised, the interval between the lobes 110°–120°.

Antenodal and postnodal cross veins of first series 13:20–18:12/12:14–15:13 in front and hind wings, respectively. Second primary antenodal cross vein the fifth. Triangle of front wing three-celled, the dividing cross veins tri-radiate from centre. Subtriangle of front wing and triangle of hind wing two-celled. Intermedian cross



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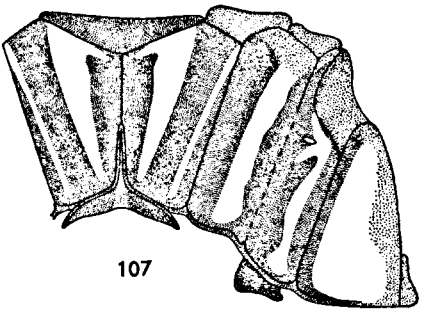

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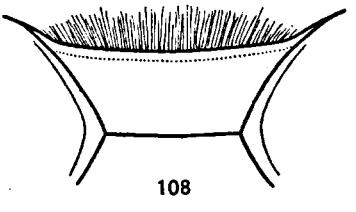

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Fig. 106–108. *Phyllocycla modesta* spec. nov. from Surinam. – 106. Tenth abdominal segment and caudal appendages of holotype male, dorsal view. – 107. Diagram of pterothorax of holotype male. – 108. Occipital plate of holotype male, dorsal view.

veins 11–11/7–7 in front and hind wings, respectively. Three rows of cells behind Cu2 in front wing, four rows of cells behind Cu2 in hind wing. Anal loop two-celled in left hind wing, three-celled in right hind wing. Four paranal cells in each hind wing. Postanal cells in left hind wing four, in right hind wing three. Second anal interspace starting anteriorly with A2 and A3 slightly divergent to the rear and with a single cell against anal vein.

Holotype male: SURINAM, Surinam River (Afobakka), 28.XII.1963; author's collection; allotype female: Surinam, Saramacca River, Rechter Toekoemoetoe (Tafelbergkreek), 6.X.1944 (L. SCHMIDT leg.); Leiden Museum.

Paratypes: Surinam, Corantijn River (near Lucie River), 26.VIII. 1964, 1 ♂ (coll. of author); Saramacca River, Rechter Toekoemoetoe (Tafelbergkreek), 6.X.1944, 1 ♂ (L. SCHMIDT leg.); Leiden Museum). Cornell University, Ithaca, New York, a single pair from Surinam: Palumeu River, 28.VII.1941, 1 ♀ (L. SCHMIDT leg.); Upper Litani River (Waremapansoela), not dated, 1 ♂ (GEIJSKES leg.).

I have not seen the male from adjoining Guyana which CALVERT referred to *Ph. signata* (Zoologica N.Y. *33*, p. 62) but the specimen may also belong to *Ph. modesta* sp.n.

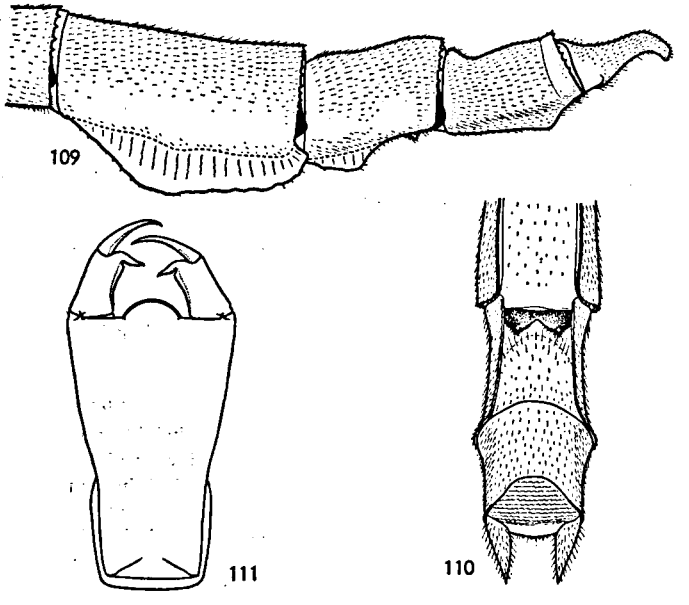


Fig. 109–111. *Phyllocycla modesta* spec. nov. from Surinam. – 109. Apical segments of abdomen and caudal appendages of holotype male, left lateral view. – 110. Apical segments of abdomen and caudal appendages of allotype female, ventral view, showing vulvar scale. – 111. Labium of larval exuvia, external view.

LARVA of PHYLLOCYCLA MODESTA sp.n. (reared)

Two reared specimens of *Ph. modesta* sp.n. from SURINAM were presented to me by Dr. GEIJSKES. The two, a male and a female, have been stored in triangular envelopes with the right pair of wings of the female separately on a slide. The dragonflies were found emerging on the muddy bank of the river at 10 p.m. The locality data of both specimens are: Coeroeni River at Coeroeni Island, 26.IX.1959. The larval skin of the male is somewhat damaged and crushed owing to the fact that it was stored in an envelope (together with the adult male), that of the female lacks the right anterior leg.

The larva of *Ph. modesta* bears a very considerable resemblance to that of NEEDHAM's *Phyllocycla* larva No. 6 from adjoining Guyana (Trans. Amer. Ent. Soc. *65*, p. 379) but it is smaller, has no pair of interrupted, blackish, longitudinal bands on abdominal segments 3 to 9, and no lateral spines on abdominal segment 5.

Exuvia of female – Total length 33.5 mm; length of abdomen 25 mm, of which segment 10 measures 11 mm; greatest width of abdomen 3.5 mm; length of posterior femur 3.5 mm; width of head over the eyes 3.9 mm.

A slender, partly silt-coated larva, preponderantly pale, becoming brownish on apical segments of abdomen, dark brown on apical half of tenth segment. Lateral margins of body scantily furnished with hairs. Wing cases parallel on the back, reaching to well beyond third abdominal segment. There are no distinct burrowing hooks on the first two pairs of tibiae. Antenna very slender, 2.5 mm long; first two joints short, annular; third joint roughly three times as long as the two basal joints combined, finger-shaped and slightly upcurved, the lateral margins fringed with long hairs; fourth joint rudimentary, slender, spine-like, naked, slightly curved and reflexed upward.

Labium pale, tip of end hook and of movable hook brownish. Mentum of labium rather long, twice as long as it is wide anteriorly. It is distinctly widened forwardly. Median lobe not recessed in front border of mentum, evenly convex, covering one-third of breadth of mentum, the free border with about 40 upcurving, short scales as figured by NEEDHAM for his *Phyllocycla* larva No. 6. End hook slender, sharply incurved and sinuous. Movable hook a little shorter than outer border of lateral lobe, and with a slight increase in curvature just before its tip. Notch between end hook and convex inner border of lateral lobe small, that of right lateral lobe with a minute tooth on bottom (in larval exuvia of reared male the notch of each lateral lobe with a minute tooth).

Abdomen with dorsal hooks on segments 3 to 9; that on 3 highest, narrow and curved caudad; those on 4 to 9 gradually decreasing in height and length to rear, being minute and nearly rudiments on 8 and 9. Lateral spines on abdominal segments 6 to 9 short and acute, very small on 6, well-developed and of the same size on 7 and 8, being again a little smaller on 9. Caudal appendages somewhat longer than tenth segment is wide at apex, dark brown at bases, pale at apical halves but acute points of lateral appendages brown. Lateral appendage somewhat longer than superior appendage and somewhat shorter than inferior appendage.

Phyllocycla malkini spec. nov.

Fig. 112–115

This species is most closely related to *Phyllocycla modesta* but is much smaller. It is the smallest representative of the genus hitherto recorded. Besides the great difference in size, which is most striking,

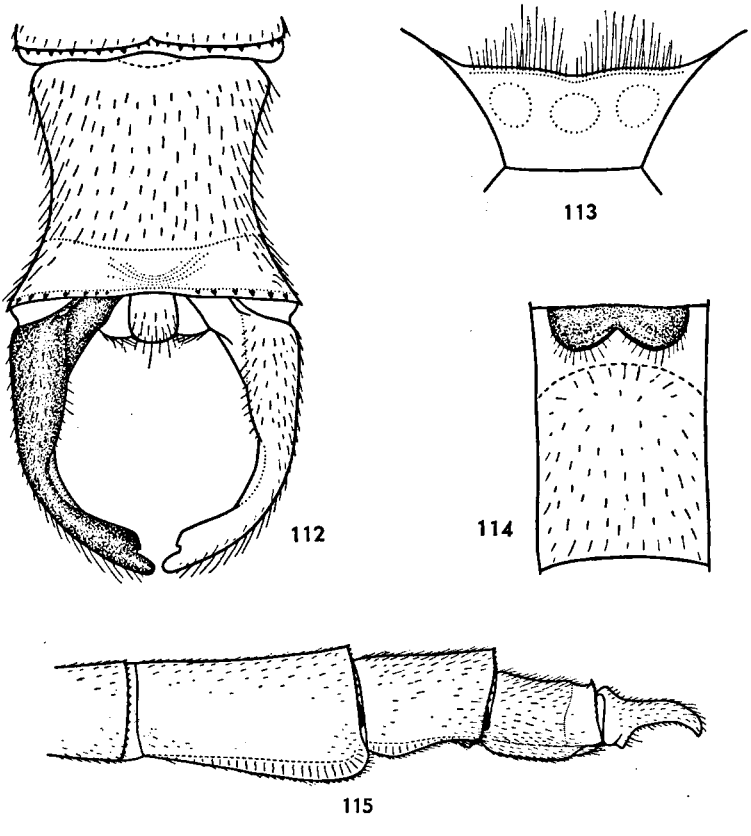


Fig. 112–114. *Phyllocycla malkini* spec. nov. – 112. Tenth abdominal segment and caudal appendages of holotype male, dorsal view. – 113. Occipital plate of holotype male, dorsal view. – 114. Vulvar scale and ninth sternum of allotype female, ventral view. – 115. Apical segments of abdomen and caudal appendages of holotype male, left lateral view.

the male can readily be distinguished from that of *Ph. modesta* by the much narrower, lateral foliaceous expansion of the eighth and ninth abdominal segments, and the female is peculiar by the unusually long lamina supra-analis.

Male (holotype) – Total length 40 mm; length of abdomen 31.5 mm (including caudal appendages); length of hind wing 23 mm; costal edge of pterostigma of front wing 2.7 mm.

Face dark brown but lateral edges of labrum and edges of facial lobes yellowish, base of mandible, anteclypeus and sides of postclypeus green. Superior surface of frons greenish, blackish in the middle and at the sides. Vertex dark brown. Occipital plate blackish, its posterior margin slightly bilobed. Rear of head blackish behind occipital plate, dark brown on temporae.

Prothorax dark brown, its hind collar black.

Pterothorax dark brown with grass-green stripes as follows: on dorsum a pair of 7-marks, which are more or less broad triangles reaching to beyond anterior, mesothoracic ridge; a well-developed, second antehumeral stripe immediately in front of humeral suture; three well-developed, lateral stripes running over mesepimeron, metepisternum and metepimeron, respectively.

Femora brown, becoming blackish towards knees. Tibiae, tarsi and claws blackish. Tibial keel distinctly shorter than one-third of length of tibia (in *Ph. modesta* distinctly longer than one-third of length). Longest spines in distal half of anteroinferior row about one-fourth of local width of femur.

Abdomen predominantly blackish. Segments 1 and 2 yellowish on lower parts. A pair of inconspicuous, yellowish, basal spots on segments 3 to 7. Sides of segments 8 to 10 yellowish-brown. Anal appendages blackish. Dorso-apical rim of tenth abdominal segment one-fifth of length of segment. Posterior genital hamule relatively stouter than in *Ph. modesta*. Its blackened tip strongly curving inward and thence dorsad. The hood of the penial peduncle differs greatly from that of *Ph. modesta*. There is no median tubercle on the bottom of the posterior cleft, and the two lobes are large and strongly rounded (in *Ph. modesta* very small and distinctly triangular).

Wings clear, venation blackish including frontal margin of costa. Pterostigma brown, surmounting 4½–5½ cells. Basal subcostal cross vein present. Antenodal and postnodal cross veins of first series 10:16–16:11/10:13–12:9 in front and hind wings, respectively. Second primary antenodal cross vein the sixth in left front wing, the fifth in other wings. Intermedian cross veins 6–8/6–5 in front and hind wings, respectively. All triangles, subtriangles and supratriangles two-celled except for subtriangle of hind wing, which is open. A2 convergent with A3. Anal loop wanting. Hind wing with four paranal cells and three postanal cells. Two to three rows of cells behind Cu2 in hind wing. Anal triangle in hind wing made up of four cells.

Female (allotype) – Total length 40 mm; length of abdomen 31.5 mm; length of hind wing 26 mm; costal edge of pterostigma of front wing 3.1 mm.

Somewhat stouter than male.

Face brownish but lateral edges of labrum and edges of facial lobes yellowish. No green spots on mandible, face and superior surface of frons. Vertex brown, yellowish along its borders. Occipital plate brown, paler along its posterior ridge, the posterior margin slightly bilobed as in male.

Prothorax brown, including hind collar.

The brown of pterothorax and legs not so dark as in male.

Abdomen predominantly dark brown. Segment 1 largely yellowish, the posterior dorsal part dark brown. Segment 2 with a yellow, mid-dorsal line, lower parts of segment largely yellowish. Segments 3 to 7 with yellowish basal spots, those of segments 3, 4 and 5 strongly elongated, those of segments 6 and 7 small. Sides of segments 8 and 10 pale. Anal appendage (stylet) dark brown, its length three-fifths of tenth segment. Ventral tergal margin of segments 8 and 9 not expanded at all. Vulvar scale about one-fifth of length of ninth sternum. Lamina supra-analis two-thirds of length of stylet. Dorso-apical rim of tenth abdominal segment nearly one-twelfth of length of segment.

Pterostigma with 5½–7 underlying cells. Antenodal and postnodal cross veins of first series 11:18–17:12/11:13–13:11 in front and hind wings, respectively. Second primary antenodal cross vein the sixth in left front wing, the fifth in other wings. All triangles, subtriangles and supratriangles two-celled except for subtriangle in hind wing, which is open. Intermedian cross veins 9–9/6–7 in front and hind wings, respectively. No anal loop in hind wing. Three rows of cells behind Cu2 in hind wing. Five paranal cells in left hind wing, four in right hind wing. Each hind wing with four postanal cells.

Holotype male: BRAZIL, Maranhão, Aldeia Yavaruhu (Aracu), 50 km east of Canindé, 11–25.II.1966 (B. MALKIN & José CELIO PINHEIRO leg.); allotype female: With the same locality data as the holotype (B. MALKIN leg.). Holotype male and allotype female in the Leiden Museum. Paratypes: Two males with the same locality data as the holotype (B. MALKIN & José CELIO PINHEIRO leg.); one in the Leiden Museum, the other in the author's collection. The paratype in the Leiden Museum has open triangles in the left pair of wings.

Phyllocycla pegasus (Selys, 1869)

Fig. 116–119

This species from BRAZIL was described by SELYS on the basis of a single pair from "Rio Tapajos, Amazone, par M. Bates" (Bull. Acad. Belg. *28*, p. 195). The two specimens in the Brussels Museum are in fairly good condition although the coloration is faded. A fine skewer has been passed through the abdomen of each specimen to give it additional support.

The wings are peculiar by the more or less yellowish venation, in particular near the arculus and the fused portion of the veins A1 and Cu2 in the hind wing. The front margin of the costa is markedly yellow from base to pterostigma. The antero-inferior edge of the posterior femur is armed with about 9 short spines on the basal one-third portion followed by about 7 spines on the distal two-thirds

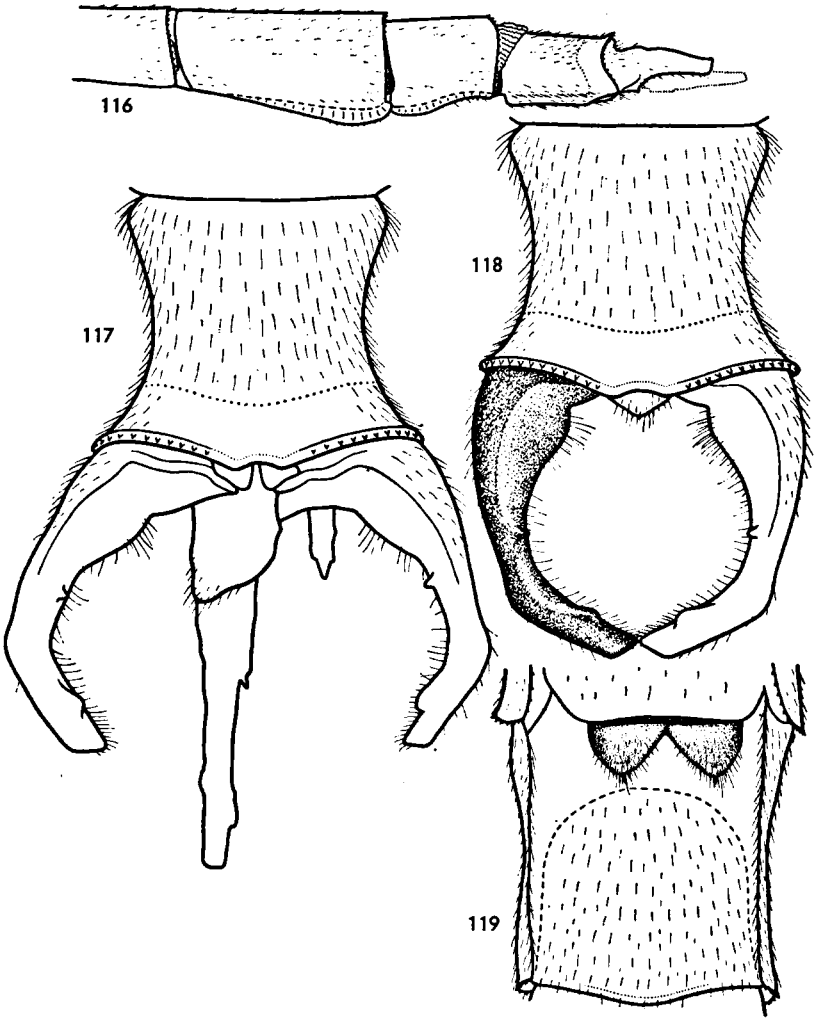


Fig. 116–119. *Phyllocycla pegasus* (Selys). – 116. Apical segments of abdomen and caudal appendages of holotype male, left lateral view. – 117. Tenth abdominal segment and caudal appendages of holotype male, dorsal view. – 118. The same, restored. – 119. Vulvar scale and ninth abdominal segment of allotype female, ventral view.

portion, the largest spines are about one-third of the local width of the femur. The ventral side of the tibiae is yellow.

The reticulation in the anal field of the hind wing of the holotype male is peculiar in having vein A2 divergent with vein A3 instead of strongly convergent. The foliaceous expansions of the eighth and ninth abdominal segments of the male are narrow. The median tubercle on the bottom of the posterior cleft of the hood of the penial peduncle is rather well-developed. The dorso-apical rim of the tenth abdominal segment is yellowish; its median width is about one-fifth of the length of the segment in the male, about one-tenth in the corresponding female.

The anal appendages of the male are dislocated by the skewer which has been passed through the abdomen; the superior appendages are widely spread out and the vestigial inferior appendage is largely extruded (Fig. 117). A reconstruction of the appendages in a normal position is also given (Fig. 118).

Holotype male: length of abdomen 42 mm; length of hind wing 27 mm; allotype female: length of abdomen 39 mm; length of hind wing 30 mm.

Phyllocycla diphylla (Selys, 1854)

Fig. 120–128, 148

This species was described by SELYS from BRAZIL (Bull. Acad. Belg. *21*, p. 76). It is represented in the Brussels Museum by three males; one of which bears a pinlabel in SELYS' handwriting "Cycl. diphylla S. ♂". This specimen is the lectotype by present designation. Figures of some structural details of this specimen and some data supplemental to SELYS' own information are added here.

The lectotype is in a rather poor condition. The partly damaged wings are broken off and glued on the pterothorax. The first and second legs on the right side and the posterior leg on the left side are missing. The remaining legs on the right side are also glued on the thorax. The colour has largely faded, in particular on the sides of the pterothorax. Fortunately the anal appendages and the genitalia of the second abdominal segment are well preserved. In the figure of the genitalia of the second abdominal segment in ventral view (Fig. 123) the hamules have been drawn in a symmetric position; the left pair of hamules was used in drawing this figure.

Male (lectotype) – Total length 56 mm; length of abdomen 42 mm; length of hind wing 34 mm; costal edge of pterostigma 4.5 mm.

Basal subcostal cross vein present. Antenodal and postnodal cross veins of first

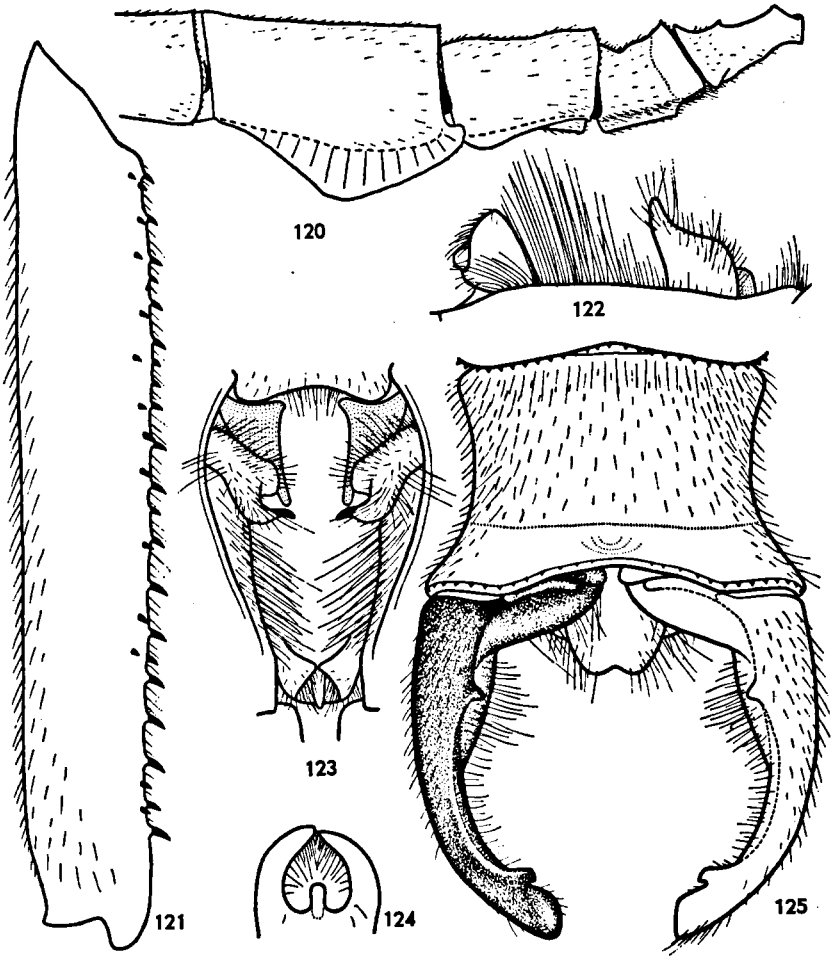


Fig. 120–125. *Phyllocycla diphylla* (Selys). – 120. Apical segments of abdomen and caudal appendages of lectotype male, left lateral view. – 121. Right posterior femur of lectotype male, right lateral view. – 122. Genitalia of second abdominal segment of lectotype male, left lateral view. – 123. The same, ventral view (restored). – 124. Hood of penial peduncle of lectotype male, caudal view (free-hand sketch). – 125. Tenth abdominal segment and caudal appendages of lectotype male, dorsal view.

series 9:15–19:9/10:12–12:9 in front and hind wings, respectively. Second primary antenodal cross vein the seventh in front wing, the fifth in hind wing. Intermedian cross veins 9–10/5–6 in front and hind wings, respectively. All triangles, subtriangles and supratriangles two-celled, except for subtriangle in hind wing, which is open. Trigonal interspace starting with two rows of cells, that of hind wings and of right front wing with an extra initial cell at hind angle of triangle. Four (right) and three

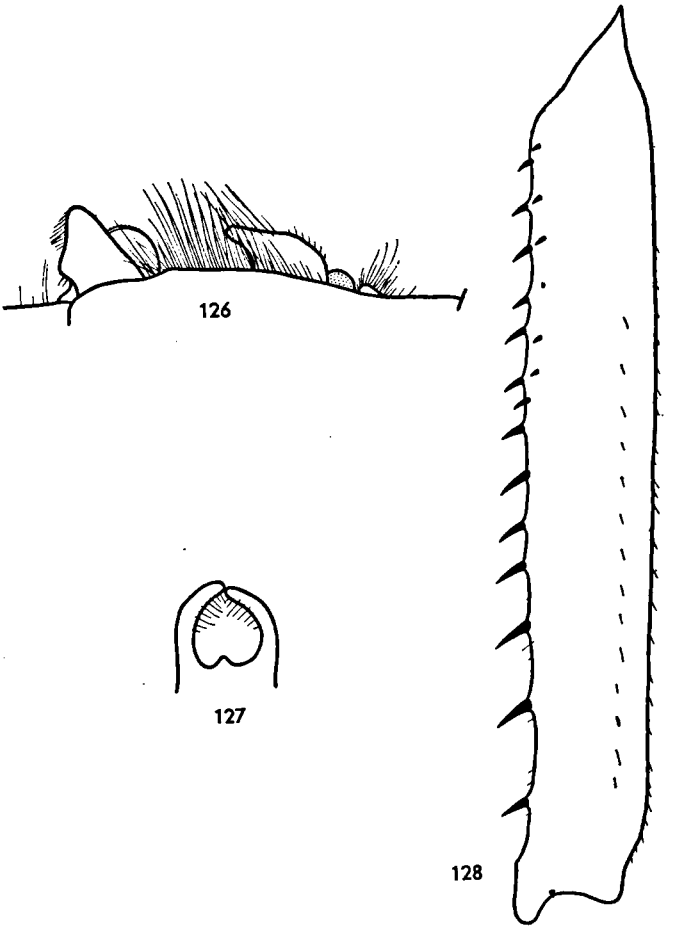


Fig. 126–128. *Phyllocycla diphylla* (Selys). – 126. Genitalia of second abdominal segment of male from Piracicaba, left lateral view. – 127. Hood of penial peduncle of male from Piracicaba, caudal view (free-hand sketch). – 128. Left posterior femur of male from Piracicaba, left lateral view.

(left) postanal cells in hind wings. Each hind wing with four paranal cells. Anal loop of hind wing two-celled. In hind wing the distal portion of A2 strongly convergent with A3. Anal triangle in hind wing made up of four cells. Area posterior to Cu2 three cells wide in front wing, three (proximal) to four (distal) cells wide in hind wing. Venation dark brown, but front margin of costa yellow.

Pale, first antehumeral stripe on dorsum of pterothorax gradually widening forward (downward), united with the pale, transverse, anterior, mesothoracic "half collar"; the two, first antehumeral stripes diverging forward, the pale mesothoracic "half collar" interrupted in median. Pale, second antehumeral stripe immediately in front of humeral suture complete and rather broad, not connected with pale, first antehumeral stripe.

Spines of antero-inferior row of (remaining right) posterior femur rather numerous and short, the longest spines about one-sixth of local width of femur.

Tip of posterior hamule stout, bending sharply inward, and thence slightly curving rearward in an oblique direction. Hood of penial peduncle deeply cleft into two subtriangular plates. Bottom of cleft with a huge, median swelling which is produced rearward, the posterior end of the swelling is well visible in profile view.

Leaf-like, lateral dilatation of abdominal segment eight well-developed; it is widest in middle and dark brown. Lateral dilatation of ninth abdominal segment much narrower and yellowish.

One of the two other males of the original series lacks the left pair of hamules, penis and penis guard, and hood of the penial peduncle. These have apparently been removed by HAGEN for his figures in the *Monographie* and they were not re-attached to the specimen. In the other male the median swelling in the cleft of the hood of the penial peduncle is not visible in profile view.

In the collection of the Leiden Museum there is a single, teneral male from Piracicaba, Brazil, which I have referred to *Phyllocycla diphylla* with some hesitation. The male differs from the lectotype by the longer pterostigma (costal edge of pterostigma of front wing 5.3 mm), by the smaller hood of the penial peduncle, and in having the median protuberance of the posterior cleft of this hood low. Also the armature of the posterior femur is different from that of the lectotype; the posterior femur is less dense spinulate and the spines are longer. There are 6 to 7 rather long spines on the distal half of the antero-inferior row, the largest spines are about one-third of the local width of the femur. The colour design of the pterothorax is shaped as shown in Fig. 148. The pale, first antehumeral stripe is widest at mid-height, and narrowest at junction with the pale, transverse, anterior, mesothoracic "half collar".

Phyllocycla gladiata (Hagen in Selys, 1854)

Fig. 129–132

In the Selysian collection at Brussels there is a single male of *Phyllocycla* which may belong to this species (Bull. Acad. Belg. *21*, p. 77). The dragonfly is from Pernambuco, BRAZIL, as shown by the accompanying pinlabel. There is also a pinlabel in SELYS' handwriting "Cyclophylla elongata S ♂" but the determination is incorrect. In

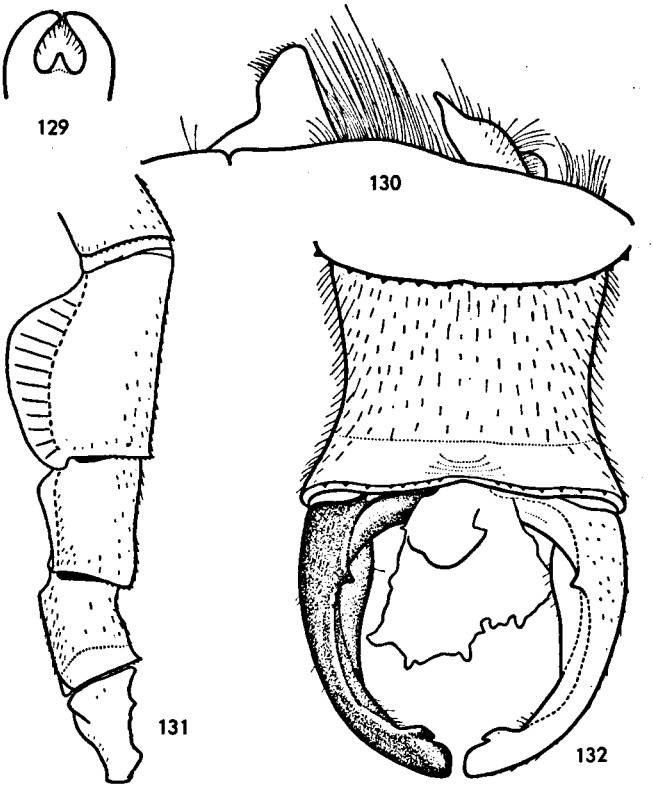


Fig. 129–132. *Phyllocycla gladiata* (Hagen in Selys). – 129. Hood of penial peduncle, caudal view (free-hand sketch). – 130. Genitalia of second abdominal segment of male, left lateral view. – 131. Apical segments of abdomen and caudal appendages of male, left lateral view. – 132. Tenth abdominal segment and caudal appendages of male, dorsal view.

fact the male belongs to a species, which is most closely related to *Ph. diphylla*. It differs from it by its smaller size and in having the leaf-like, lateral expansion of the eighth abdominal segment distinctly more developed, and widest on its basal half (Fig. 131).

The male is in a fairly good condition but the middle and posterior pairs of legs are missing. The tips of the right pair of wings are broken off. The abdomen has been strenghtened by a string but it would appear that an extra skewer has largely extruded the vestigial inferior appendage.

Male – Total length 50 mm; length of abdomen 37 mm; length of hind wing 28 mm; costal edge of pterostigma of front wing 4 mm.

Colour design resembling that of *Ph. diphylla* but pale 7-marks on dorsum of pterothorax somewhat narrower and pale markings on sides of abdominal segments more elongated, those on segments 3 to 7 reaching to near apex of segment. Margin of posterior cleft of hood of penial peduncle distinctly trifid, median tooth stout but posterior end not visible in side view. Genitalia of second abdominal segment and caudal appendages resembling those of *Ph. diphylla*.

Reticulation of wings brown, the principal veins dark brown but frontal margin of costa yellow. Pterostigma brown. Wing membrane slightly brown-tinged. Basal subcostal cross vein present. Antenodal and postnodal cross veins of first series 10:17–17:10/11:12–12:11 in front and hind wings, respectively. Second primary antenodal cross vein the sixth in front wing, the fifth in hind wing. All triangles, subtriangles and supratriangles two-celled except for subtriangle in hind wing, which is open. Intermedian cross veins 8–9/6–6 in front and hind wings, respectively. Trigonal interspace starting with two rows of cells, that of hind wing with an extra initial cell at hind angle of triangle. Hind wing with four paranal cells and four postanal cells. Anal loop of hind wing two-celled. Distal portion of A2 convergent with A3. Anal triangle in hind wing made up of four cells.

Phyllocycla argentina (Hagen in Selys, 1878)

Fig. 133–134

The single pair of this species from ARGENTINA discussed and figured by RIS in 1913 (Mem. Soc. Ent. Belg. *22*, p. 74) was kindly lent me by the Senckenberg Museum (No. 14477, ♂; No. 14484, ♀). The two specimens are teneral and broken but they can be studied very well.

The close relative of *Phyllocycla argentina* is *Ph. diphylla*. The male can be readily distinguished from this species in having the leaf-like expansion of the ventral tergal margin of abdominal segment 8 more developed and widest in the apical half, whereas the superior caudal appendage bears an extra superior tooth just before the subapical,

inner strip of the upper margin. This strip, moreover, is very acutely pointed at its apex. The incurved tip of the posterior hamule is truncate; its apex is black and has two points (one anterior and one posterior). The hood of the penial peduncle is very similar to that of the male of *Ph. diphylla* from Piracicaba. The posterior cleft of this hood has a small, median tubercle. Also the spines of the antero-inferior row of the posterior femur are much alike those of this male; the largest spines are about one-third of the local width of the femur. The colour design of the pterothorax of the male differs from that of the male of *Ph. diphylla* from Piracicaba in having the nearly parallel-sided, pale, first antehumeral stripe not narrowed at the junction with the pale, mesothoracic "half collar", and by the much narrower pale, second antehumeral stripe immediately in front of the humeral suture.

The dorso-apical rim of the tenth abdominal segment of the male of *Ph. argentina* is much better developed laterally than mid-dorsal-

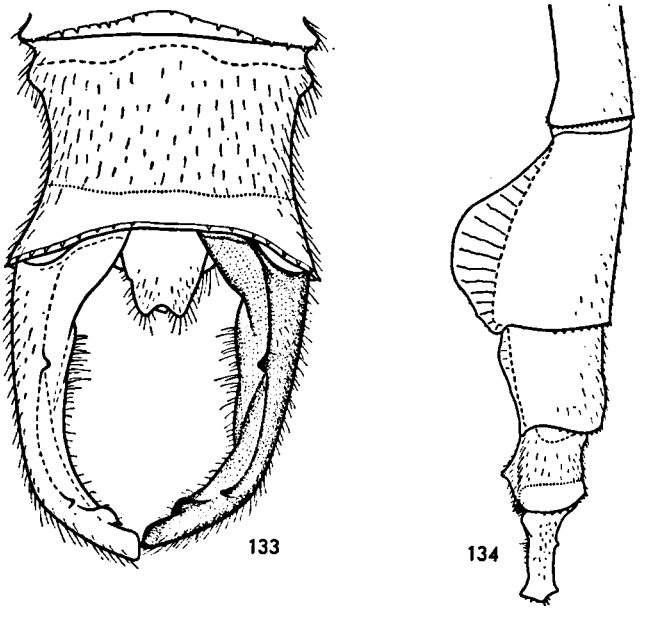


Fig. 133–134. *Phyllocycla argentina* (Hagen in Selys). – 133. Tenth abdominal segment and caudal appendages of male, dorsal view. – 134. Apical segments of abdomen and caudal appendages of male, left lateral view.

ly; medially its width is about one-fifth of the length of the segment but laterally about one-third of the length of the segment. In the corresponding female the dorso-apical rim is much narrower and its width is about one-eighth of the length of the segment.

The pale markings on the pterothorax in the female are slightly more extended than those in the male. The lateral dilatation of the eighth abdominal segment of the female is a narrow strip, the apical half of the strip is armed with black denticles. The armature of the posterior femur in the female is similar to that in the male. The pterostigma is somewhat larger than in the male; the costal edge of the pterostigma in the female is 4.5 mm, in the male 3.9 mm.

The male of *Ph. argentina* from the Senckenberg Museum (Fig. 133–134) has the subtriangle of the front (and hind) wing open but there is an undeveloped cross vein in the subtriangle of the left front wing. The female has the subtriangle in the front wing two-celled and that in the hind wing open. In the hind wing of the male the distal portion of vein A2 is strongly convergent with vein A3.

Another male of *Ph. argentina* is in the Brussels Museum. It is a fully mature specimen in good condition. Attached to the pin are the labels "109", "109", "Buenos Aires 1–91", "Buenos Aires Dr. Ris.", and "Cyclophylla argentina Hagen ♂ Buenos Aires Dr. Ris". This male differs in its venational characters from that from the Senckenberg Museum in having the distal portion of vein A2 in the hind wing not strongly convergent with vein A3 but slightly diverging from it and from vein A1. The subtriangle of the front wing is two-celled.

Phyllocycla sordida (Selys, 1854)

This species was briefly described by SELYS from a single male taken at Pará, BRAZIL (Bull. Acad. Belg. *21*, p. 78). The male, which SELYS has obviously never seen (Bull. Acad. Belg. *28*, p. 194), was in a good condition when I studied it during my visit to the British Museum (Natural History) on July 4th, 1967. It bears at the pin the labels "Para" (and on the reverse "49 2"), "Cyclophylla sordida", "Gomp. sordidus De Selys" and a printed museum label "Type H.T." (H.T. means Holo-Type).

The male of *Phyllocycla sordida* differs from all other species of *Phyllocycla* by the form of the foliaceous expansion of the ventral tergal margin of the eighth abdominal segment. This expansion is widest at mid-length of the segment, and in shape it is an isosceles triangle with a vertical angle of about 120°. The lateral dilatation of the ninth abdominal segment is of the usual form, narrow and widest at about two-fifths of the length of the segment. The dorso-apical rim of the tenth segment is medially about one-sixth of the length of the segment, laterally about one-fourth. The superior anal appendage resembles somewhat that of *Ph. diphylla* but it is more slender and the superior tooth at one-third of the length is much smaller than in that species. Also the tenth abdominal segment is (relatively) longer than that of *Ph. diphylla*, its length is about four-fifths of the length of the superior anal appendage. The median tooth of the posterior cleft of the hood of the penial peduncle is small. The spines of the distal half of the antero-inferior row of the posterior femur are not numerous, about 7 in number. In length these spines are one-fourth to one-third of the local width of the femur. The rear margin of the occipital plate is nearly straight and fringed with hairs. The dorsum of the pterothorax bears a pair of pale 7-marks, the pale, first antehumeral stripe narrower at its conjunction with the pale, transverse, anterior, mesothoracic "half collar". The pale, second antehumeral stripe immediately in front of the humeral suture is developed only on the anterior (lower) two-thirds part of the dorsum. There is no pale, dorsal juxta-humeral spot.

Phyllocycla ophis (Selys, 1869)

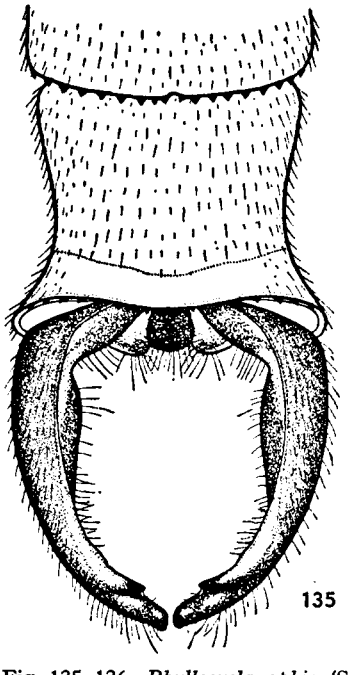
Syn.: *Ph. pachystyla* (Needham, 1944)

Fig. 135–139; Pl. XIIa

The holotype male of *Cyclophylla pachystyla* Needham from Cornell University (Cornell Holotype No. 3087) was lent me for observation. The specimen was received in a vial with alcohol. The species was described by NEEDHAM in 1944 from specimens collected by GEIJSKES in Surinam (Trans. Amer. Ent. Soc. *69*, p. 204). The holotype is in a very poor condition, much broken (incl. caudal appen-

dages) and minus the right pair of wings. The sketch given by NEEDHAM from its caudal appendages is inaccurate and misleading. The superior appendages shows a well-developed, internal tubercle near the apex, which is in fact "a thin inturned strip of the upper margin" as stated in the description.

On several collecting trips along the rivers of SURINAM a species of *Phyllocycla* was collected of which the males after careful comparison proved to be identical with this male from Cornell University. On the other hand I was able (1966) to compare these males with the holotype male of *Cyclophylla ophis* Selys (Bull. Acad. Belg. *28*, p. 193) in the Brussels Museum. This species was described from a single male taken at Rio Tapajós, BRAZIL. The males from Surinam do not differ from this Brazilian male in their morphology. By this it becomes evident, that *Ph. pachystyla* (Needham) is a synonym of *Ph. ophis* (Selys).



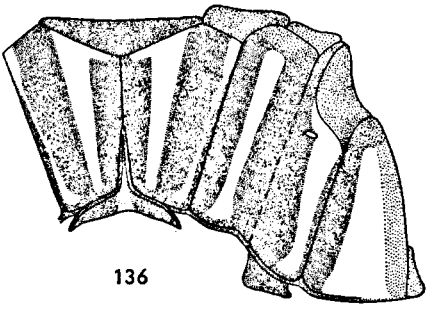


Fig. 135–136. *Phyllocycla ophis* (Selys) from Surinam. – 135. Tenth abdominal segment and caudal appendages of male, dorsal view. – 136. Diagram of pterothorax of male.

The holotype male of *Cyclophylla ophis* Selys in the Brussels Museum is in fairly good condition, although the thoracic markings have partly faded. The wings are somewhat damaged at the tips, and the superior anal appendages are cracked near the apices but complete. Further the type seems to be somewhat immature and less pigmented. In view of the bad condition of the anal appendages of the holotype I made drawings of a male in my own collection. This male has the locality data "Surinam, Coppename River (Raleighvallen), 23.IX.1961, No. 1". I also add a diagram of the pattern of the pterothorax of this male.

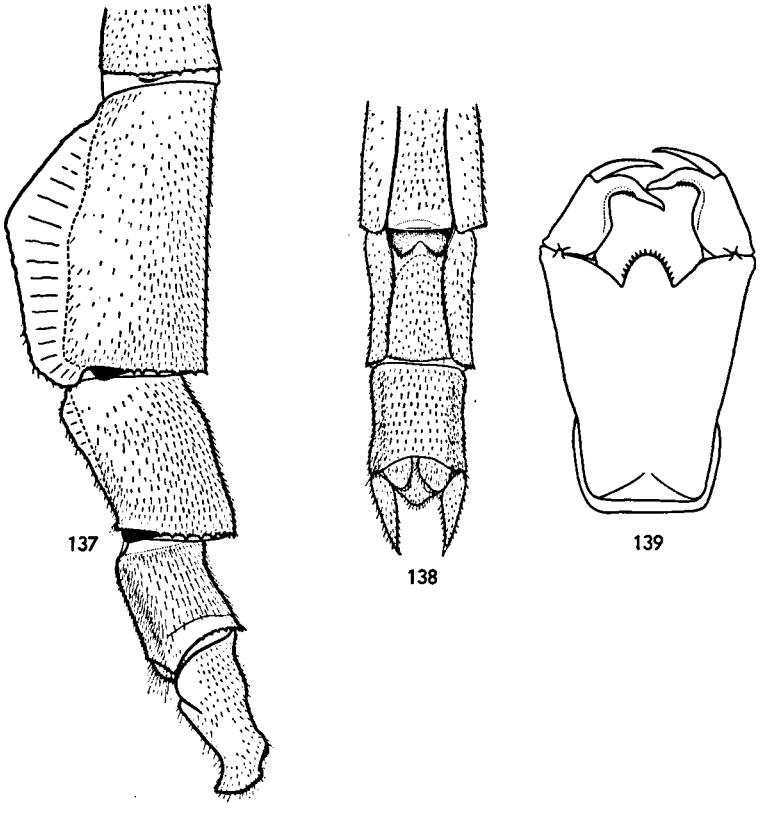


Fig. 137–139. *Phyllocycla ophis* (Selys) from Surinam. – 137. Apical segments of abdomen and caudal appendages of male, left lateral view. – 138. Apical segments and caudal appendages of female, ventral view, showing vulvar scale. – 139. Labium of larval exuvia, external view.

In the British Museum (Natural History) I found (1967) a single male of *Ph. ophis*. Attached to the pin of the specimen was the label "Manaos Brazil. 11-11.96. E. E. Austen. 96–80". The male is also somewhat immature, like the type.

Another male of *Ph. ophis* is in the Senckenberg Museum under No. 14504. It was lent me for identification. The dragonfly was collected at Tumatumari, Guyana, by B. J. RAINEY and it was only referred to the genus by RIS.

Obviously the watershed of Serra Acaraí and Toemak Hoemak mountains offer no barrier for the distribution of this species in the Guianas.

LARVA of PHYLLOCYCLA OPHIS (reared)

Several larvae of *Phyllocycla ophis* were obtained by sifting bottom mud dredged from the submerged banks of the Surinam River near Afobakka. One of them, a female collected on September 20th, 1964, transformed to the adult stage on the 23th of the same month.

NEEDHAM in his paper of 1944 described a larval cast-off skin of *Phyllocycla* from Surinam, which he doubtfully referred to his species *Ph. pachystyla* (= *Ph. ophis*) but this skin is specifically distinct from that of the female reared by myself.

The average larva of *Ph. ophis* is much larger than that of *Ph. modesta* sp.n., and it is at once recognizable from it by the labium. The form of the labium differs considerably from all *Phyllocycla* larvae known to me by the exceedingly large end hook of the lateral lobe and by the row of minute teeth along the margin of the notch between the end hook and the inner border of the lateral lobe. The dorsal hooks on abdominal segments 3 to 9 are very well-developed, and there are lateral spines on abdominal segments 5 to 9.

The larval skin of the reared female is described below; the adult female and its empty larval skin are in the author's collection.

Total length 37 mm; length of abdomen 27 mm, of which segment 10 measures 11.5 mm; greatest width of abdomen 4 mm; length of posterior femur 3.9 mm; width of head over the eyes 4.5 mm.

A partly silt-coated larva, preponderantly pale, becoming brownish on apical segments of abdomen, being dark brown on apical three-fourths of tenth segment.

No distinct burrowing hooks on first two pairs of tibiae. Antennae similar to those of *Ph. modesta* sp.n. Wing cases parallel on the back and reaching to beyond third abdominal segment.

Dorsal hooks on abdominal segments 3 to 9, well-developed, acute, decreasing in height and length to the rear, the ones on 8 and 9 small, not rudiments. Lateral spines on segments 5 to 9, small, acute, increasing in size successively on segments 5 to 8, those on segment 5 minute, on segment 9 smaller than those on segment 8. Caudal appendages as in *Ph. modesta* sp.n., bases of appendages dark brown, the apical halves pale.

Labium pale, apical three-fourths of end hook of lateral lobe dark brown, apical half of movable hook brownish. Mentum one and a half times longer than wide anteriorly, on front one and a half times as wide as at middle hinge. Median lobe deeply recessed in front border of mentum, very prominent, sub-elliptical, base covering one-fourth of frontal breadth of mentum, the free border rimmed with 16 slightly upcurved, acutely pointed, brown scales. End hook of lateral lobe huge, about as long as movable hook, incurved, sinuous and bluntly pointed. There is a row of eight (left) and nine (right) teeth along the margin of the large notch between end hook and convex inner margin of lateral lobe (In other exuviae the number of teeth along the margin of the notch varies from 4 to 11, the number of scales at the free border of the middle lobe of mentum varies from 16 to 21).

On February 1st, 1964, the barrage of Afobakka was closed. In September of the same year I secured some larvae and larval exuviae of *Ph. ophis* at the local ponds on the bottom of the emptied river. Obviously the larvae reached maturity in these ponds during a period of about six months. The disturbance of the natural balance resulted here in a decreased development of these larvae. The cast-off skins left behind at transformation into the adult stage varied in length from 33 mm to 37 mm. The length of the exuviae taken from elsewhere varies from 37 mm to 43 mm. The larval exuvia photographed (Pl. XIIa) is not of the reared individual but of a well-developed specimen collected at the Kabalebo River on 4.IX.1962. Its total length is 42 mm.

Phyllocycla bartica Calvert, 1948

Fig. 140–141

The holotype male of *Phyllocycla bartica* Calvert (Zoologica N.Y. *33*, p. 63) from The Academy of Natural Sciences of Philadelphia (No. 9277) was kindly lent me for examination. The species is known from GUYANA and BRAZIL (Para) but it has not yet been found in Surinam.

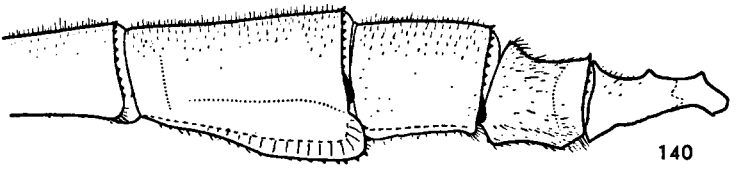
The male superior anal appendage agrees with that of *Ph. argentina* by the possession of a superior tooth just before the subapical inner strip, although this tooth is more blunt in *Ph. bartica*. The foliaceous expansions of the eighth abdominal segment, however, are

much narrower than those of *Ph. argentina*. In side view the tip of the superior anal appendage of the holotype male is much more directed caudad than is figured by CALVERT (Zoologica N.Y. *33*, pl. 1, fig. 7). The tip of the left superior anal appendage of the holotype male was broken off but glued on the remaining basal part of the appendage very well. Possibly it was dislocated, when CALVERT drew it. I present here a new drawing of the apical end of the abdomen in lateral view, and a figure of the intact, right superior appendage.

The holotype lacks the posterior pair of legs so that the spines of the posterior femur cannot be studied.

The male of *Ph. bartica* is peculiar in having the dorsum of the abdominal segments 3 to 9 covered with stiff, upright standing hairs, a character which I have not yet found in any other species of *Phyllocycla*. The dorso-apical rim of the tenth abdominal segment is medially about one-fourth of the length of the segment and laterally about one-third of the length of the segment.

In the British Museum (Natural History), I found (1967) two males of *Ph. bartica*. One of them, placed under *Ph. diphylla*, bears the pinlabels: "British Guiana. coll. Richards & Smart. B. M. 1937–



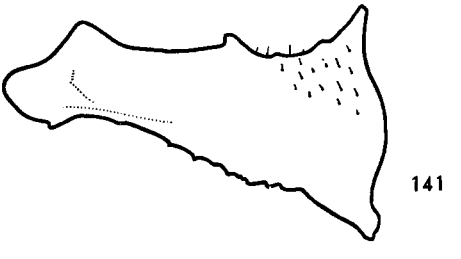


Fig. 140–141. *Phyllocycla bartica* Calvert. – 140. Apical segments of abdomen and caudal appendages of holotype male, left lateral view. – 141. Right superior appendage of holotype male, right lateral view.

776.", "Mazaruni: 2nd. Growth. (Low Forest) 26.IX.1937", and "C. diphylla diphylla Hag. ♂. det. F.C.F.". In this specimen the posterior end of the median swelling of the cleft of the penial peduncle is well-visible if viewed in profile. The other male, placed under *Phyllocycla* only, is a teneral specimen with the pinlabel "Para. Brazil 8.I.96. E. E. Austen 96–80". In this specimen the median swelling of the cleft of the hood of the penial peduncle is not noticeably produced backwardly.

Phyllocycla anduzei (Needham, 1943)

Fig. 142–146, 149; Pl. XIb, XIIIa

The holotype male of *Cyclophylla anduzei* Needham (Bolet. Entom Venezol. *2*, p. 199) from the collection of Cornell University (Cornell Holotype No. 3536) is a complete specimen but broken in several parts, and with the right pair of wings separately on a slide. The pattern of the pterothorax is largely obliterated owing to postmortem changes except on the dorsum of which I give here a diagram. The loose abdomen was broken between the third and fourth segments. The genitalia of the second abdominal segment (cleaned by KOH), the penis and the anal appendages were very well preserved. The left hind wing was broken between the nodus and the pterostigma. Some more data of the allotype female (Cornell Paratype No. 3536 I), also from VENEZUELA, are given below.

Pale antehumeral stripe as a broad triangle with the upper end bordering antealar sinus; vulvar scale deeply V-shaped excised, the interval between lobes about 90°; triangles and subtriangles of wings two-celled except for subtriangle in hind wing, which is open; trigonal interspace starting with two rows of cells, that of hind wing with an extra, initial cell at hind angle of triangle; five paranal cells and three postanal cells in each hind wing; second anal interspace of hind wing starting anteriorly with A2 and A3 nearly parallel and with two cells against anal vein; two rows of cells behind Cu2 in front wing and three rows of cells behind Cu2 in hind wing; anal loop one-celled in each hind wing; antenodal and postnodal cross veins of first series 10:16–16:10/10:?–12:10 in front and hind wings, respectively; intermedian cross veins 9–9/6–7 in front and hind wings, respectively.

NEEDHAM in his paper of 1943 justly remarks about the female referred to *Phyllocycla signata* by HAGEN (and by SELYS): "The first of these, a single Venezuelan female, was associated, I believe in-

correctly, with the male type of *Cyclophylla signata* from Brazil. I have not seen the specimen, but the description given by DE SELYS, especially as amended by him in 1857 (Monogr. Gomph. p. 221, 222) fits much better the female of *Cyclophylla anduzei* sp.n., hereinafter described". (loc. cit., p. 198). HAGEN's supposed female of *Ph. signata* was kindly lent me by the Museum of Comparative Zoology, Cambridge (MCZ No. 12380). The abdomen cannot be studied because of its very dilapidated condition but the remaining part of the insect provides adequate information for recognition. I have compared the specimen with the female of *Ph. anduzei* and I have found no differences in the colour pattern of the pterothorax, the conformation of the occiput, vertex, frons, legs, etc. which may justify a racial distinction.

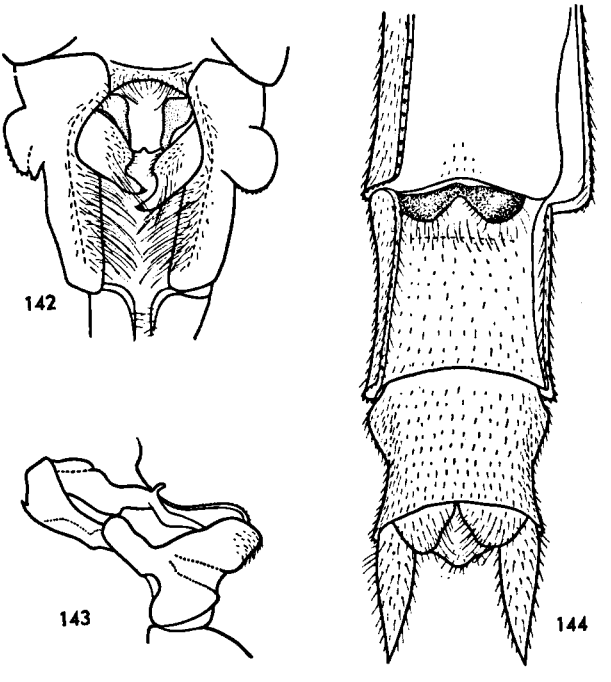


Fig. 142–144. *Phyllocycla anduzei* (Needham). – 142. Genitalia of second abdominal segment of holotype male, ventral view. – 143. Penis of holotype male, right lateral view. – 144. Apical segments of abdomen and caudal appendages of allotype female, ventral view, showing vulvar scale.

In SELYS' collection at Brussels I found (1966) three males and two females of *Phyllocycla anduzei*. One of the males, placed under "Cyclophylla andromeda" is in a very poor condition. The other four specimens are well-preserved, each with a printed pinlabel

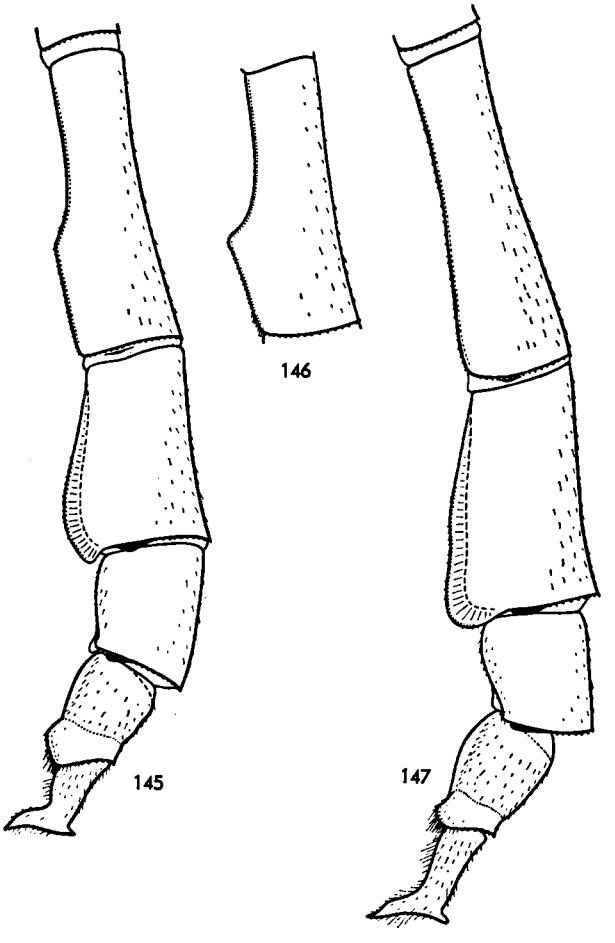


Fig. 145–146. *Phyllocycla anduzei* (Needham). – 145. Apical segments of abdomen and caudal appendages of holotype male, left lateral view. – 146. Seventh abdominal segment of male from Bolivia, left lateral view.
Fig. 147. *Phyllocycla neotropica* spec. nov. from Surinam. – Apical segments of abdomen and caudal appendages of holotype male, left lateral view.

"Venezuela, Dr. Habuel", and all placed under an apparently old label "Cyclophylla signata".

In the collection of the Leiden Museum there are (1966) two males and one female of *Phyllocycla anduzei* from the Huallaga River area, PERÚ. The dragonflies were collected by L. GÓMEZ ALONSO in October and November 1962. In the female the anal loop is two-celled in each hind wing; in one of the males it is one-celled in right hind wing and two-celled in left hind wing; in the other male the anal loop is ill-defined and three-celled. In this specimen the pale, first and second antehumeral stripes are confluent at their upper ends.

Another male of *Ph. anduzei* in the Leiden Museum was collected on 15.VII.1929 in Mt. St. Benedict ravine, Tunapuna, Trinidad by Dr. GEIJSKES. The specimen is small (abdomen 31 mm; hind wing 23 mm); its ill-defined anal loop is one-celled in the right hind wing and two-celled in the left hind wing.

Four other specimens of *Phyllocycla anduzei*, three males and one female, came (1967) from the Senckenberg Museum for identification. One of the males (No. 14507) was collected at Río Trío, COLOMBIA, by J. H. & E. B. WILLIAMSON on 7.I.1917. The collectors have furnished this male with the note "Notice lower lateral border of abd. seg. 7". In this specimen the anal loop is three-celled in the left hind wing and two-celled in the right hind wing. The other three specimens were collected at Valencia, Venezuela, by ZOBRYS in 1911. They are in the Senckenberg Museum under the Nos. 14490 (♂), 14491 (♂), and 14492 (♀). In all the hind wings of these specimens the anal loop is one-celled.

Two males and one female of *Phyllocycla anduzei* came (1967) from the Museum Alexander Koenig in Bonn (ex coll. BUCHHOLZ). The specimens are from BOLIVIA: Region Chapare (400 m), 8.XI. 1948, 1 ♀; 5.XI.1949, 1 ♂ (ZISCHKA leg.), and Rurrenabaque, Río Beni (50 m), 1.XI.1951, 1 ♂ (G. NIETHAMMER leg.). In the males from Bolivia the lateral keel of the abdominal segment 7 is much more widened on the apical two-fifths portion than in the males from Venezuela and Colombia (Fig. 146). In the male from Río Beni the anal loop of the hind wing is two-celled; in the male and female from Chapare the anal loop of the hind wing is very ill-defined and one-celled.

Phyllocycla neotropica spec. nov.

Fig. 147, 150–153; Pl. XIIIb

In the Odonata collection of Dr. GEIJSKES the male of *Phyllocycla*, placed under *Cyclophylla anduzei* Needham, proved to be specifically distinct from this species. The male is from Surinam. It is obviously closely allied to *Ph. anduzei* but can be distinguished from it by differences in the coloration of some details, the contours of the inferior lateral margins of the apical segments of the abdomen, and the configuration of the superior caudal appendage. The labrum is entirely brown, and the green on the superior surface of the frons is medially widely interrupted by brown; in *Ph. anduzei* there is a pair of large, green spots on the labrum, and the green on the superior surface of the frons is interrupted at best by a narrow brown stripe in the median. The most striking morphological difference is found on the seventh abdominal segment of which the lateral keel widens gradually to the apex, while in *Ph. anduzei* this keel widens suddenly on the apical two-fifth portion of the segment. Also the apical angle of the exfoliation of abdominal segment eight is more developed than in *Ph. anduzei*. The dorso-apical rim of the tenth abdominal segment is well-developed and on the sides it changes into the rounded, apical fold of the inferior lateral border; this apical fold is here less developed than in *Ph. anduzei*.

Male (holotype) – Total length 46 mm; length of abdomen 35 mm (including caudal appendages); length of hind wing 27.5 mm; costal edge of pterostigma of front wing 3.3 mm.

Face, vertex and occiput brown with the following green: middle part of anteclypeus, latero-superior surface of frons, a spot on outer side of mandible, and a spot on each side of postclypeus. Median brown band on superior surface of frons posteriorly about one-third of width of frons, anteriorly about one-fifth. Antennae dark brown, paler at apices. Scapes, pedicels and first distalia pale around upper edges. Hind margin of occiput slightly undulate, thinly fringed with long brown hairs.

Prothorax entirely brown (in *Ph. anduzei* the "hind collar" is for the greater part tawny).

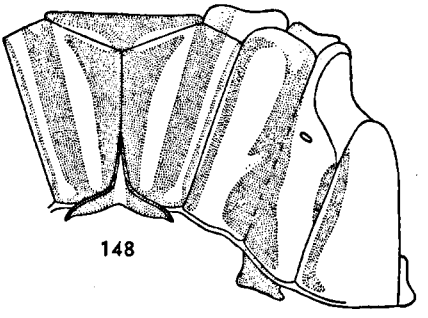
Pterothorax very dark brown with green stripes, its pattern shaped as shown in diagram Fig. 150.

Femora dark brown. Tibiae, tarsi and claws blackish.

Abdomen preponderantly blackish. Foliaceous expansion of segments 8 and 9 blackish, ventral tergal margin of segments 3 to 7 pale, dorsum of segments 1 and 2 greenish, a fine mid-dorsal line of brown on segments 3 to 6 widening at base of

segments 3 to 5, side of segments 1 and 2 for the greater part brownish, a dorso-lateral basal spot of brown on segments 3 to 7, that on 3 extending rearward to about one-third of length of segment. Median width of dorso-apical rim of segment 10 about one-fifth of dorsal length of segment. Genitalia of second abdominal segment very similar to those of *Ph. anduzei*.

Wings hyaline but base slightly brown-tinged. Pterostigma brown. Venation nearly black including costa. Basal subcostal cross vein present. Antenodal and postnodal cross vein of first series 13:18–16:12/14:13–14:12 in front and hind wings, respectively. Second primary antenodal cross vein the fifth in right front wing and left hind wing, the sixth in other wings. Intermedian cross veins 9–9/6–6 in front and hind wings, respectively. All triangles two-celled. Subtriangle in front wing two-celled, in hind wing one-celled. Trigonal interspace starting with two rows of cells, in hind wing with an extra, initial cell against triangle. Anal loop one-celled. A1 and A2 parallel. Four paranal cells and four postanal cells in each hind wing. Anal triangle in hind wing made up of four cells.



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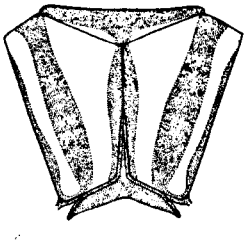

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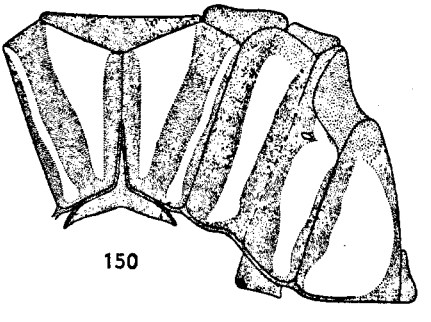

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Fig. 148. *Phyllocycla diphylla* (Selys). – Diagram of pterothorax of male from Piracicaba.

Fig. 149. *Phyllocycla anduzei* (Needham). – Diagram of dorsum of pterothorax of holotype male.

Fig. 150. *Phyllocycla neotropica* spec. nov. from Surinam. – Diagram of pterothorax of holotype male.

Holotype male: SURINAM, Brownsweg (Makambi-kreek), 11.VI.1961 (D. C. GEIJSKES leg.). In the Leiden Museum. The insect was taken at a bush creek near Makambi Creek, at 10 o'clock in the morning, while resting on a leaf in the sunlight.

LARVA of PHYLLOCYCLA NEOTROPICA (supposition)

Two of the three known, local species of *Phyllocycla* have been reared and for this reason the larval exuvia of *Phyllocycla* from Surinam described by NEEDHAM in 1944 (Trans. Amer. Ent. Soc. *69*,

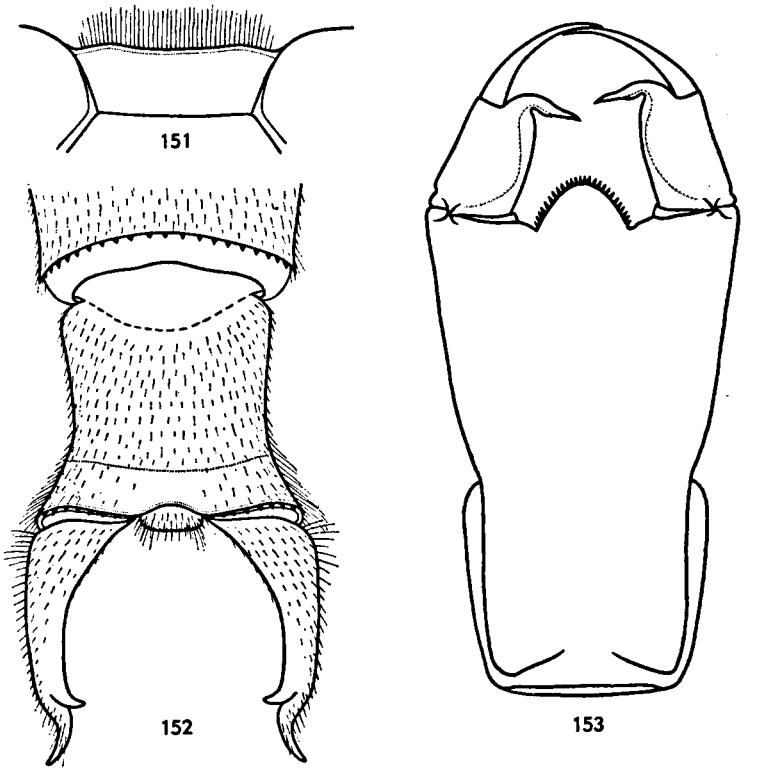


Fig. 151–152. *Phyllocycla neotropica* spec. nov. from Surinam. – 151. Occipital plate of holotype male, dorsal view. – 152. Tenth abdominal segment and caudal appendages of holotype male, dorsal view.
Fig. 153. *Phyllocycla neotropica* spec. nov.? from Surinam. – Labium of larval exuvia, external view.

p. 207) has been referred to *Ph. neotropica* sp.n. But the reference to this species is not without great hesitation. *Ph. neotropica* has never been encountered along the rivers. It seems to have its habitats at the creeks of the dense jungle. The larval exuvia described by NEEDHAM was, together with three others, picked off from a trunk of a tree washed ashore on the sandy bank of the large Marowijne River at Albina. The locality of these four exuviae is nearly a 100 miles distant from that of the single male of *Ph. neotropica*. The exuviae were found 20 miles from the coast, the male was collected 70 miles from the coast. On the other hand, the scarce adult material of *Phyllocycla* was collected more or less by chance along the rivers, where the insects rest on leaves of overhanging trees, a habit which renders them very inconspicuous. Some of these gomphids were luckily secured during their swift sallies low to the surface of the water. Thus, there is always a possibility that *Ph. neotropica* also occurs along the rivers but till now it has not been observed in that habitat.

The exuviae from Albina are characterized by the clean-skinned, pale, colourless body, the relatively short tenth abdominal segment, the better development of the lateral spines on the abdominal segments 5 to 9, and the entire lack of a tooth or teeth along the margin of the notch between the end hook and the inner border of the lateral lobe. These characters may serve to distinguish them readily from the larva of the two other known, local species of this genus. In the form of the labium the exuviae resemble *Ph. modesta* sp.n. by the slender, incurved end hook of the lateral lobe, and the small notch between this end hook and the inner border of the lateral lobe, but they differ considerably from this species and approach *Ph. ophis* by the sub-elliptical median lobe, which is recessed in the front border of the mentum, and which is rimmed with scales similarly to that found in *Ph. ophis*.

Phyllocycla titschacki (Schmidt, 1952)

Fig. 154–155

Dr. ERICH SCHMIDT described *Phyllocycla titschacki* (under the generic name *Gomphoides*) on the basis of a single male from Perú

(Beitr. Faun. Peru *3*, p. 234). This species is more closely related to *Ph. anduzei* (Needham) and *Ph. neotropica* sp.n. than to CALVERT's *Ph. volsella*. The males of these four species agree in having the genitalia on the second abdominal segment, the tenth abdominal segment, and the superior caudal appendage of the same type. The tip of the superior caudal appendage is longest in *Ph. titschacki*, shortest in *Ph. volsella*.

In the Leiden Museum there were (1966) five males of *Ph. titschacki* also from Perú. One of the males was presented me by Dr. LIEFTINCK. The insects were taken at the Río Rondos (Huallaga River area) by L. GÓMEZ ALONSO, October 1962 till February 1963. In the hind wing of these males the anal loop is ill-defined and consists normally of two cells. The dorso-apical rim of the tenth ab-

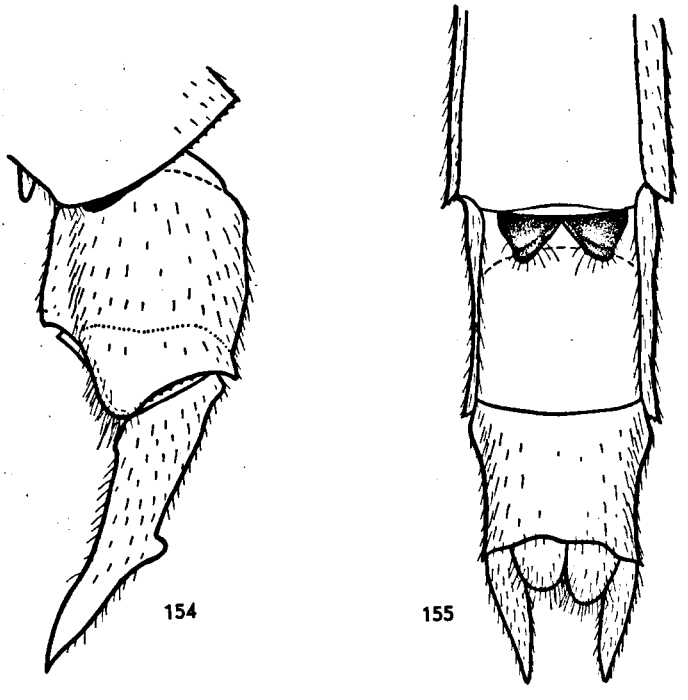


Fig. 154–155. *Phyllocycla titschacki* (Schmidt). – 154. Tenth abdominal segment and caudal appendages of male, left lateral view. – 155. Apical segments of abdomen and caudal appendages of allotype female, ventral view, showing vulvar scale.

dominal segment is very narrow on the mid-dorsum, but it becomes much wider laterally, being on the inferior margin nearly half the entire length of the segment. The inferior fold of the dorso-apical rim of the tenth abdominal segment is here less developed than in *Ph. anduzei* and *Ph. neotropica*. Of one of the males borrowed from the Leiden Museum I add a drawing of the apical end of the abdomen showing the dorso-apical rim of the tenth segment and caudal appendages in side view.

In addition to the five males there is a female of *Phyllocycla* from the same locality. I consider this female to be conspecific with the males of *Ph. titschacki*. It is described below.

Female (allotype; abdomen broken between the segments 4 and 5; right posterior leg broken off at coxa and glued on the left side of the venter of the pterothorax). – Total length 41 mm; length of abdomen 31 mm (including caudal appendages); length of hind wing 27 mm; costal edge of pterostigma of front wing 3 mm.

Somewhat smaller and more slender than male. Coloration similar to male but green markings somewhat less extended. Pale, second antehumeral stripe immediately in front of humeral suture reduced to a long, dorsal spot, tapering downwards and reaching to mid-height of humeral suture. Spines in distal half of antero-inferior row of posterior femur not numerous and somewhat shorter than one-fourth of local width of femur (this is also the case in the corresponding male). Vulvar scale reaching backward to a point one-fourth of way along ninth sternum, its hind margin deeply, V-shaped excised, the interval between the lobes nearly 90°. Median width of dorso-apical rim of tenth abdominal segment about one-eighth of length of segment. Anal appendage bluntly tipped and short, shorter than tenth segment. The relative length of the three apical segments of the abdomen is about as 17:13:10, width the anal appendage 8 on the same scale.

Venation blackish. Pterostigma yellowish-brown, surmounting 4½–5 cells. Basal subcostal cross vein present. Antenodal and postnodal cross veins of first series 12:16–16:11/11:12–13:13 in front and hind wings, respectively. Second primary antenodal cross vein the fifth. All triangles, subtriangles and supratriangles two-celled except for subtriangle in hind wing, which is open. Intermedian cross veins 9–8/6–5 in front and hind wings, respectively. Anal loop ill-defined and one-celled in left hind wing, wanting in right hind wing. Five paranal cells and four postanal cells in each hind wing, the fifth paranal cell is the first postanal cell. Third anal interspace of hind wing consisting of four cells.

Allotype female: PERÚ, Río Rondos (Huallaga River area), X.1962–II.1963 (L. GÓMEZ ALONSO leg.). In the Leiden Museum.

Phyllocycla viridipleuris (Calvert, 1909)

Fig. 156–167; Pl. XIVa–b

This species was first described by CALVERT under the generic name *Gomphoides* (Ann. Carnegie Mus. *6*, p. 217). The description was based on three males taken at Sapucay, PARAGUAY.

By the courtesy of Dr. OLIVER S. FLINT, Jr, U.S. National Museum, Washington, I was able to re-examine two males of the original series. One of the males was labelled "Type" (in CALVERT's handwriting); this specimen is the lectotype by present designation. I present here drawings of some structural details of this male, and some data supplemental to CALVERT's own information. The third male of the original series could be traced in The Academy of Natural Sciences of Philadelphia.

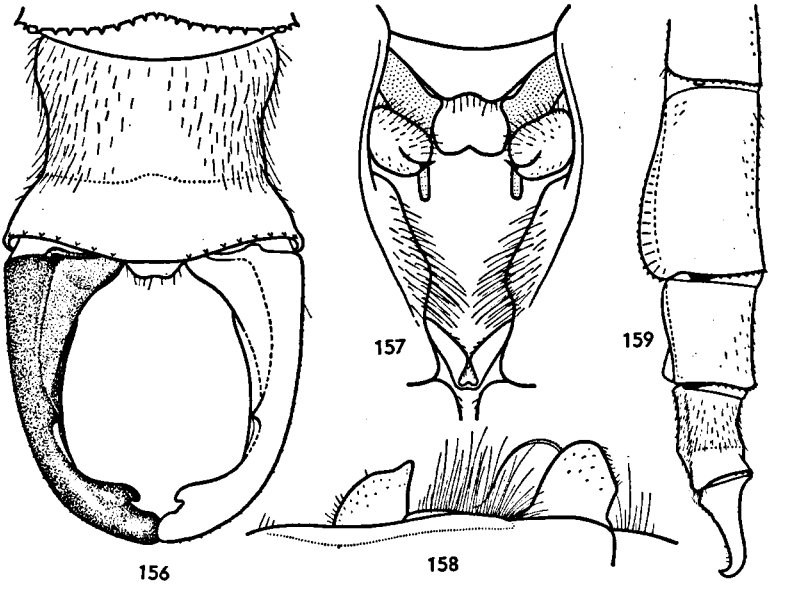


Fig. 156–159. *Phyllocycla viridipleuris* (Calvert). – 156. Tenth abdominal segment and caudal appendages of lectotype male, dorsal view. – 157. Genitalia (except penis) of second abdominal segment of lectotype male, ventral view. – 158. Genitalia of second abdominal segment of lectotype male, right lateral view. – 159. Apical segments of abdomen and caudal appendages of lectotype male, left lateral view.

Male (lectotype) – Total length 52 mm; length of abdomen 39 mm; length of hind wing 28 mm; costal edge of pterostigma of front wing 4 mm.

Basal subcostal cross vein present. Pterostigma surmounting 6 to 7 cells. Antenodal and postnodal cross veins of first series 12:18–19:11/12:13–14:12 in front and hind wings, respectively. Second primary antenodal cross vein the seventh in right wings, the sixth in left wings. Intermedian cross veins 10–9/6–6 in front and hind wings, respectively. Triangle two-celled except for triangle in left front wing, which is three-celled, the dividing cross veins tri-radiate from centre. Frontal side of triangle of hind wing as long as inner side. Subtriangle of front wing two-celled, of hind wing open but there is an undeveloped cross vein in subtriangle of left hind wing. Thus there is a tendency to have the subtriangle of the hind wing crossed. Supratriangles in left wings three-celled, in right wings two-celled. Trigonal interspace starting with two rows of cells from triangle, with an extra initial cell at hind angle of triangle in all four wings. Anal loop of right hind wing two-celled, of left hind wing not developed. A2 with a tendency to have its distal portion forked. Second anal interspace of hind wing anteriorly broad and filled with two rows of cells. Anal triangle in hind wing made up of five cells in each hind wing. Left hind wing with 6

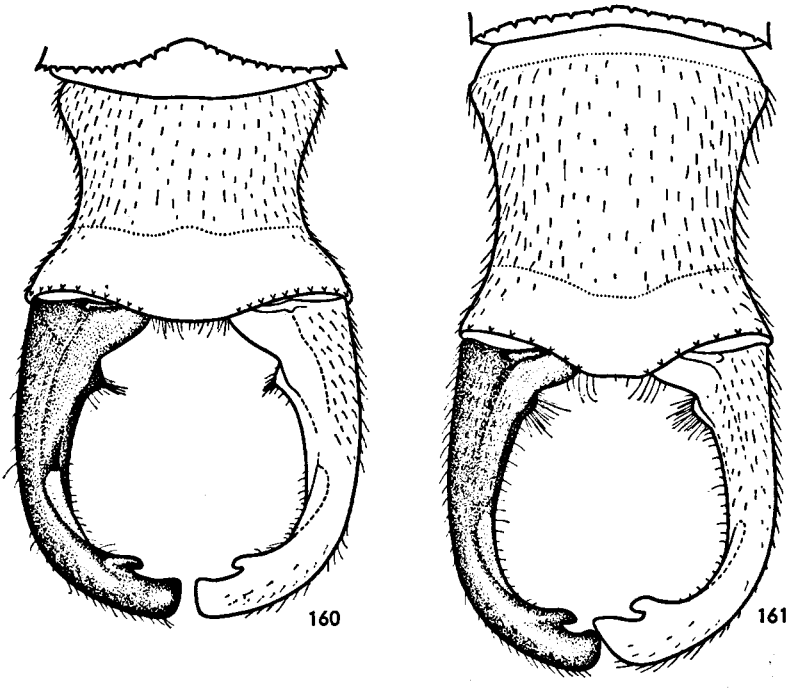


Fig. 160–161. *Phyllocycla viridipleuris* (Calvert). – 160. Tenth abdominal segment and caudal appendages of male from Rio Grande do Sul, dorsal view. – 161. The same of male from Rio de Janeiro.

paranal cells and 6 postanal cells, right hind wing with 5 paranal cells and 4 postanal cells.

Median width of dorso-apical rim of tenth abdominal segment one-third of mid-dorsal length of segment; rim paler than remaining part of segment. Posterior cleft of hood of penial peduncle with a median tubercle. Spines in distal half of antero-inferior row of posterior femur rather long and not numerous, the longest spines nearly one-third of local width of femur, and seven spines in distal half.

In the other two males pertaining to the original series the anal triangle in the hind wing is four-celled, and the anal loop is two-celled. In the other male from the Smithsonian Institution the distal portion of vein A2 is more or less forked in the left hind wing, running straightly to the wing margin in the right hind wing. In the male from The Academy of Natural Sciences of Philadelphia the distal portion of vein A2 in the hind wing is nearly parallel with vein A3 for the greater part but near the wing margin it is suddenly convergent with vein A3.

I have not seen the adults from Santa Catarina (Nova Teutonia), BRAZIL, as referred by CALVERT (Trans. Amer. Ent. Soc. *65*, p. 378) but from the Museum Alexander Koenig in Bonn I received fourteen males and seven females from that area, which may be identical with CALVERT's individuals. The specimens differ, however, from the three males from Paraguay in the following points:

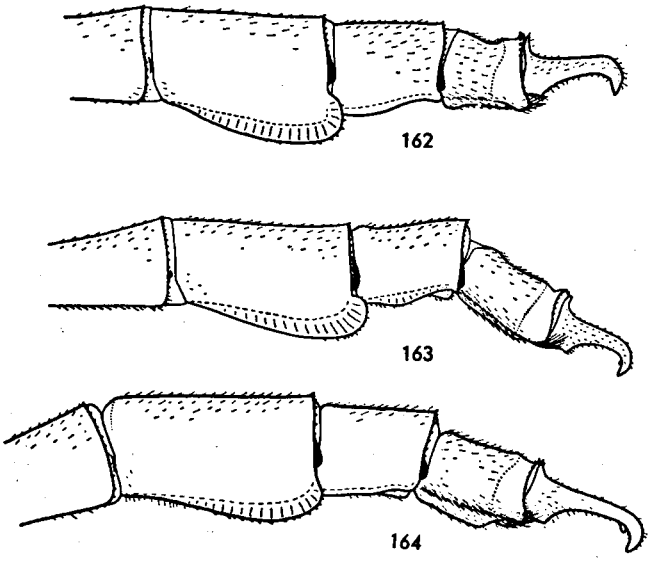


Fig. 162–164. *Phyllocycla viridipleuris* (Calvert). – 162. Apical segments of abdomen and caudal appendages of male from Rio Grande do Sul, left lateral view. – 163. The same of male from Santa Catarina. – 164. The same of male from Rio de Janeiro.

1. Second, lateral brown stripe of pterothorax partly developed; always represented by a distinct, brown marking near subalar crest and at level of spiracle. Third, lateral brown stripe very weakly developed; on metepimeron it is generally represented by an ill-defined, brown stripe along femoral (metapleural) suture. I am adding a diagram of the pterothorax of one of the males from Santa Catarina with the most complete development of these stripes (Fig. 167). In the male from Paraguay these stripes are not developed at all.

2. Tibiae entirely blackish, in teneral specimens brown. In the male from Paraguay the outer side of the tibiae is largely yellow.

3. Superior caudal appendage of male more slender and more acute at tip, and near the upper surface at about half length of the inner surface, there is only a low hump to mark the place of the small, but distinct tubercle, which is present in the male from Paraguay.

Also the tenth abdominal segment of the male from Santa Catarina is distinctly longer than that of the male from Paraguay.

In the fourteen males from Santa Catarina the second anal interspace of the hind wing is generally filled with a single row of cells. The dorsum of the abdominal segments 8, 9 and 10 in some males is largely yellow. The lateral dilatation of the abdominal segments 8 and 9 of the males is blackish for its entire length and width; the lateral dilatation of the eighth segment is denticulated along its apical margin and on the inner surface of the exfoliation, that on the ninth segment not denticulated.

The seven females are similar to the males of that area as regards stature and general coloration but the face and the middle portion of the superior surface of the frons are pale. The lateral dilatation of the eighth abdominal segment is moderately developed, pale at the base, and densely denticulated along the margin and on the outer surface of the exfoliation; the lateral dilatation of the ninth abdominal segment is very narrow, entirely pale and only denticulated at the apical angle. The eighth sternum is largely blackish in its apical half. The median width of the dorso-apical rim of the tenth abdominal segment is about one-eighth of the length of the segment. The stylets (caudal appendages) are as long as the dorsal side of the tenth abdominal segment. In one of the females (collected on 7.XI. 1945) the subtriangle of the left hind wing is two-celled.

In the specimens from Santa Catarina the distal portion of the wing beyond the pterostigma is often more prominent than in the male from Paraguay.

Phyllocycla viridipleuris is also recorded from Rio Grande do Sul by ST. QUENTIN (Beitr. Neotr. Fauna 5 (2), p. 147). I have not seen his specimens but I have studied a single pair of that species from this area in the Brussels Museum. The two specimens show the same deviations mentioned for the individuals from Santa Catarina but

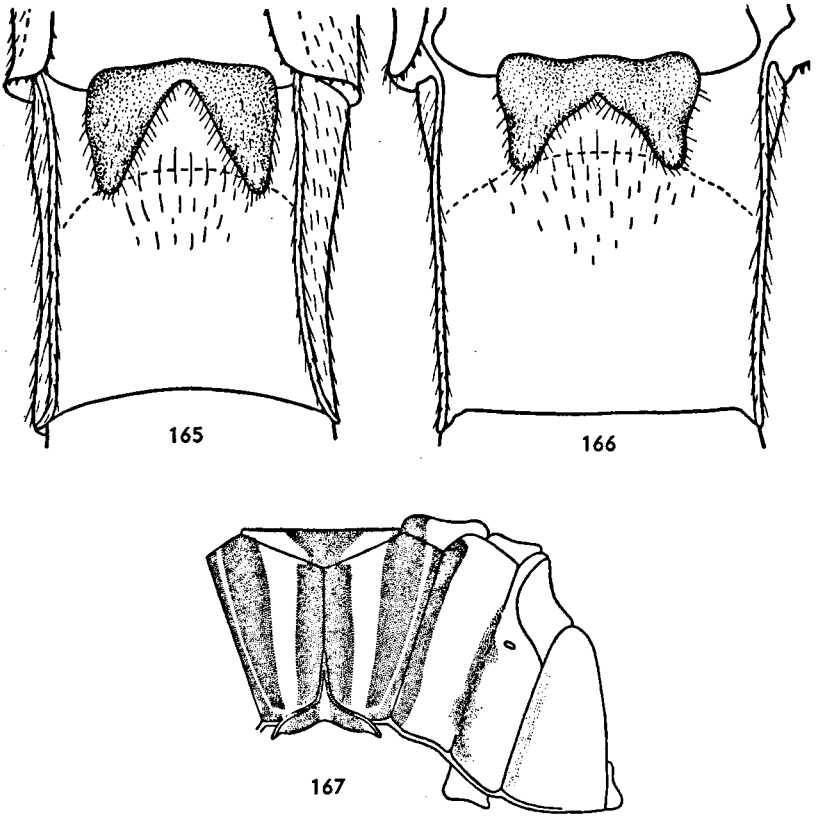


Fig. 165–167. *Phyllocycla viridipleuris* (Calvert). – 165. Vulvar scale and ninth abdominal segment of female from Rio Grande do Sul, ventral view. – 166. The same of female from Santa Catarina. – 167. Diagram of pterothorax of one of the males from Santa Catarina.

the tenth abdominal segment in the male is shorter and the superior caudal appendage of the male is stouter. In this respect the male from Rio Grande do Sul resembles greatly the male from Paraguay. In the two specimens from Rio Grande do Sul the lateral dilatations are yellow. Also the lateral portion of the antealar crest is yellow, in the specimens from Paraguay and Santa Catarina brown. The distal portion of the wing beyond the pterostigma is more prominent than in the male from Paraguay. The vulvar lamina of the female is longer than that of the female from Santa Catarina. It is deeply and widely V-shaped excised for nearly three-fourths of its length, the subtriangular lobes bluntly pointed and extending to the rear to a point about two-fifths of the way along the ninth sternum.

Two other males from Brazil in the Brussels Museum may also be conspecific with *Phyllocycla viridipleuris*. They were collected at the end of November in Rio de Janeiro (Jardin Botanique) by M. WALTHÈRE DE SELYS. I found the two males under the labels "Cyclophylla gladiata, Hag." and "gladiata Hag. diffère de celui de Walther" (in SELYS' handwriting) (Bull. Acad. Belg. *35*, p. 766). SELYS correctly ascertained that the two males are not identical with the male of *Phyllocycla gladiata* in the HAGEN-collection. HAGEN's figures of the male of *Ph. gladiata* (Monogr. Gomph., p. 12, fig. 3) show striking morphological differences with *Ph. viridipleuris*. Most conspicuous are the presence of a superior tooth at one-fourth of the length of the superior caudal appendage, and the much broader, foliaceous expansions of the eighth and ninth abdominal segments.

The two males from Rio de Janeiro are somewhat intermediate between the males from Santa Catarina and from Rio Grande do Sul but the foliaceous expansion of the eighth abdominal segment is less developed backward and the tenth abdominal segment is longer or as long as in the male from Santa Catarina. The low hump at about half-length the superior caudal appendage is apparently wanting, the lamellate expansion of the eighth abdominal segment is pale on the basal and apical ends, and that of the ninth abdominal segment is entirely pale. Unfortunately the colour design of the pterothorax is wholly obliterated in one of the males and for the most part in the other male.

The differences as noted here for the specimens from Santa Catarina, Rio Grande do Sul and Rio de Janeiro may illustrate the variable characters of this species.

Phyllocycla pallida spec. nov.

Fig. 168–170

A single male of this species came from the Museum Alexander Koenig at Bonn (ex coll. BUCHHOLZ) for identification and description. The specimen is from Santa Catarina (Nova Teutonia), Brazil. It belongs to a species that is perhaps more related to *Ph. viridipleuris* from Paraguay than to *Ph. hesperus* (Calvert) from Ecuador (Ann. Carnegie Mus. *6*, p. 215). The pterothorax is very pale. Its pattern, done in pale-brown and pale-green, is only faintly discernible. There is no pale, second antehumeral stripe immediately in front of the humeral suture. The apical inferior angles of the tenth abdominal segment are less developed than in *Ph. viridipleuris* and not distinctly folded under and applied against the sternum. The superior caudal appendage is stouter than that of *Ph. viridipleuris*, the tip is more blunt and not so strongly curved downward as in that species. There is no tubercle or hump of any kind nearer the upper edge at about half length the superior caudal appendage, and the ante-apical process is not distinctly finger-like but more or less a rounded strip. If viewed in profile, the superior caudal appendage resembles somewhat that of *Ph. hesperus* but is distinctly more slender than in this species. *Ph. hesperus*, however, is readily recognizable from my new species by the well-developed pattern of the pterothorax which is done in blackish-brown and green.

Male (holotype) – Total length 51 mm; length of abdomen 38 mm (including caudal appendages); length of hind wing 30.5 mm; costal edge of pterostigma of front wing 3.9 mm.

Face and head (except compound eyes) pale-brownish, somewhat darker on base of superior surface of frons, vertex and occipital plate, more darkened around ocelli. Scape and pedicel very dark brown but upper edge of scape pale.

Prothorax pale-brownish, darkened on dorsum. This dorsum with an ill-defined, median, pale twin-spot. Pterothorax pale-brownish. Dorsum with a pair of pale-yellow, submedian (first) antehumeral stripes running from antealar crest to beyond transverse, anterior, mesothoracic ridge, the stripes regularly widening to below, being on anterior, mesothoracic ridge about twice as wide as near antealar crest, the

inner side of these stripes parallel with mid-dorsal carina. There is no antehumeral, pale-yellow marking of any kind immediately in front of humeral suture but there is a narrow stripe of darker brown immediately posterior to humeral suture. Mesepimeron with a broad, pale-yellow stripe running over its entire length. Metepimeron largely pale-yellow, pale-brownish only along femoral suture.

Femora pale-brownish, outer side darkened toward knees, dorsal side with longitudinal, yellowish stripes. Tibiae, tarsi and claws blackish. Spines in distal half of antero-inferior row of posterior femur short, the largest spines nearly one-sixth of local width of femur.

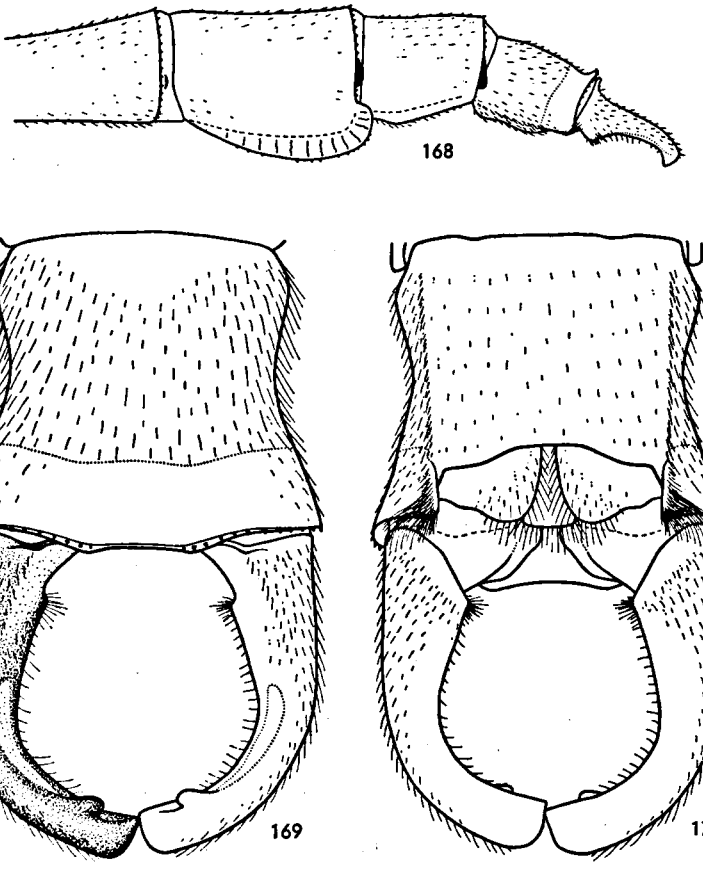


Fig. 168–170. *Phyllocycla pallida* spec. nov. – 168. Apical segments of abdomen and caudal appendages of holotype male, left lateral view. – 169. Tenth abdominal segment and caudal appendages of holotype male, dorsal view. – 170. The same, ventral view.

Abdominal segment 1 largely pale-yellow, becoming brownish on dorsum. Side of segments 2 to 7 very dark brown, pale-yellow along inferior border. Auricle of segment 2 also pale-yellow, the posterior margin armed with about 15 black denticles. Dorsum of segment 2 to 7 with a broad brownish-yellow, mid-dorsal stripe, which becomes gradually narrower to apex of segment. Intersegmental articulations between segments 2–6 dark brown. Abdominal segments 8, 9 and 10 on mid-dorsum and on sides brownish-yellow. Lamellate expansion of segment 8 blackish but pale on both ends, of segment 9 largely brownish-yellow but darkened on its middle portion. Lamellate expansion of segment 8 denticulated along margin for nearly its entire length, on segment 9 not denticulated. Dorso-apical rim of tenth abdominal segment pale, brownish-yellow. Its median width about one-fourth of length of tenth segment. Superior caudal appendage dark brown, paler towards base. Segments 9 and 10 and superior caudal appendage about equal in length. Genitalia of second abdominal segment pale-yellowish, in conformation greatly resembling those of *Ph. viridipleuris*. Hood of penial peduncle dark brown.

Venation of wing dark brown, frontal margin of costa yellowish. Pterostigma brownish-yellow, surmounting 5–5½ cells. Basal subcostal cross vein present. Antenodal and postnodal cross veins of first series 11:16–16:9/10:13–13:10 in front and hind wings, respectively. Second primary antenodal cross vein the sixth in left front wing, the seventh in other wings. Intermedian cross veins 8–9/6–6 in front and hind wings, respectively. All triangles, subtriangles and supratriangles two-celled, except for subtriangle of hind wing, which is open. Anal field of front wing proximal to triangle two cells wide for a distance of two cells. Trigonal interspace starting with two (right front wing) and three (other wings) cells against triangle followed by two rows of cells. Anal loop of right hind wing two-celled. Distal portion of A2 behind anal loop strongly convergent with A3. No anal loop in left hind wing. Four to five rows of cells behind Cu2 in hind wing. Four (left) and five (right) paranal cells in hind wing. Four postanal cells in each hind wing. Anal triangle in hind wing four-celled.

Holotype male: BRAZIL, Santa Catarina (Nova Teutonia), 4.XII.1949. In the Museum Alexander Koenig at Bonn.

II. THE PHYLLOGOMPHOIDES GROUP

The representatives of this group are distinguished from those pertaining to the *Aphylla* group by the following features:

1. Tenth abdominal segment of imago without a trace of a dorso-apical rim.
2. Inferior anal appendage of adult male well-developed, although sometimes relatively small, and its apical portion distinctly bifid.
3. Larva of the usual *Gomphus*-like appearance, tenth abdominal segment but a little longer than ninth segment.

Genus **Phyllogomphoides** gen. nov.

Gomphids of large size, short-legged and hyaline-winged although the wings are flavescent at the extreme bases. Body coloration in the usual gomphid-pattern, blackish marked with yellow stripes and spots, the abdominal segments 3 to 7 with yellow markings at base. Foliaceous expansion of abdominal segments 8 and 9 well-developed and leaf-like. Triangle of front wing long and narrow, the anterior side about half the length of the other sides. Triangle and subtriangle of front wing normally made up of four cells, those of hind wing normally made up of three cells. Anal loop of hind wing normally made up of two cells.

The male characters are: Anterior genital hamule of a very complicated form, its structure is described by NEEDHAM (1944): "It is transversely and deeply divided into two parts, the rear one of which stands erect, with its blunt black tip plainly visible from the side. The front part is bulbous at the base and then suddenly tapers into a long, thin, linear, backwardly directed point and runs around and inside the rear part. The two tips of this pair [of anterior hamules] extend far forward and become slightly convergent and curved toward the sternum at their blackened and pointed ends." Superior caudal appendages strong and forcipate, each superior appendage with a superior process on inner margin before its tip, and with an inferior process at about one-third of the length. Hind wing with a strongly forked vein A2. Second anal interspace of hind wing filled with a single row of large cells which diminish in size to rearward. Anal triangle in hind wing made up of four cells.

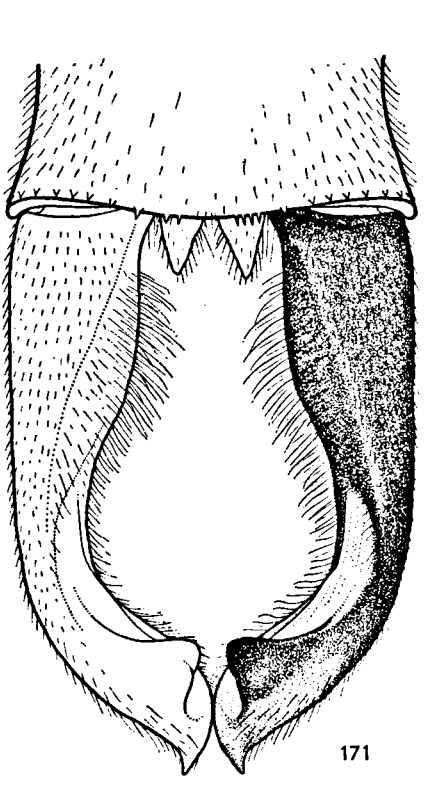
The larval characters are: Body of the usual *Gomphus*-like appearance with well-developed, lateral spines on abdominal segments 7 to 9, the tips of the spines upcurved and incurved. There are dorsal hooks on abdominal segments 2 to 9. End hook of lateral, labial lobe large, sinuously pointed and sharply incurved. Inner margin of lateral, labial lobe smooth, the apical half slightly expanded. Median lobe of mentum prominent and broad, convex at sides but more or less concave on the middle third portion of the free margin.

Type species: *Gomphoides fuliginosa* Hagen in Selys, 1854 (Bull. Acad. Belg. (2) *21*, p. 74).

Phyllogomphoides fuliginosus (Hagen in Selys, 1854)

Fig. 171–175, 181; Pl. XVa, XVIa

This species was recorded from Surinam by NEEDHAM in his paper of 1944, in which he also more fully characterized the male (Trans. Amer. Ent. Soc. *69*, p. 195). I made new drawings of the caudal appendages of the male and took a photograph of its right pair of wings.



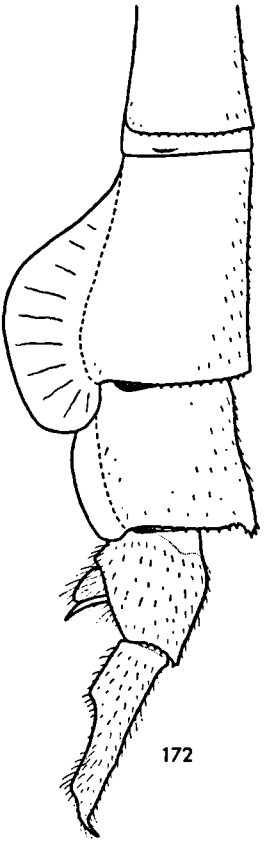


Fig. 171–172. *Phyllogomphoides fuliginosus* (Hagen in Selys) from Surinam. – 171. Caudal appendages of male, dorsal view. – 172. Apical segments of abdomen and caudal appendages of male, left lateral view.

In my collection there is a large number of adults and larval exuviae pertaining to this species. They were assembled from nearly all rivers and their tributaries in SURINAM. The identification of these exuviae was by exclusion of its allies so far as known and it has been more evidenced now by some individuals of this species in transformation obtained at Coeroeni by Dr. GEIJSKES. Two reared specimens, a male and a female, preserved dry in triangular envelopes together with their empty larval skins, were presented me. The insects were found emerging against a trunk of a tree on the bank of the river at 10 p.m. (Coeroeni River, Coeroeni Island, 27.VIII.1959). Two other reared females, also secured by him at Coeroeni Island, were lent to me for observation and comparison.

LARVA of PHYLLOGOMPHOIDES FULIGINOSUS (reared)

In labial characters the larva of *Ph. fuliginosus* differs considerably from the larval exuvia described and doubtfully referred to this species by NEEDHAM in 1944 (Trans. Amer. Ent. Soc. *69*, p. 197 and Zoologica N.Y. *33*, p. 62) by the large, sinuously pointed incurved end hook of the lateral lobe, the toothless inner margin of the lateral lobe, the expanded apical half of the inner margin of the lateral lobe, and the broad, prominent, median lobe of the mentum, the frontal margin of the median lobe being more or less concave.

The larval skin described below is that of a reared female.

Total length 47 mm; length of abdomen 32 mm; greatest width of abdomen 7.5 mm; width of head over the eyes 6 mm; length of posterior femur 5 mm. (There is a range in the length of the larval cast-off skins studied by the author from 41 mm to 47 mm).

A big, brownish, patternless, larva of the usual *Gomphus*-like appearance with the tenth abdominal segment a little longer than the ninth one. The relative mid-ventral length of the ninth and tenth abdominal segments is 10:12, with the inferior anal appendages 9 on the same scale.

Head slightly narrower than pronotum, flat above, roughly triangular in outline, somewhat longer than wide, scurfy pubescent between and behind eyes and antennae. Rear of head with three conspicuous, bare, scars, the outer scars rounded. Labrum four times wider than long, bare, the free border fringed with long, forwardly directed, yellow hairs. Head fringed with long yellow hairs behind eyes and between eyes and bases of antennae. Antennae long; third joint two and a half times as long as the two basal joints combined, sub-cylindrical, the lateral margins

fringed with long hairs; fourth segment a conical rudiment, reflexed upward and not longer than third joint is wide at tip.

Labium strong, mentum one and a half times as long as wide, the proximal half strictly parallel-sided, middle hinge reaching to bases of middle pair of legs. Median lobe covering nearly one-third of breadth of mentum, the edge fringed with a dense row of flat scales. Movable hook as long as lateral lobe, with a slight increase in curvature at base near one-fourth of the length.

Disc of prothorax scurfy pubescent except for a pair of large, sub-quadrangular, bare scars. Meso-metathorax scurfy pubescent on all prominences. Wing cases parallel, extending to rear well upon third abdominal segment.

Abdomen slightly widening to middle segments, thence regularly tapering, hairy on lateral margins. Segments scurfy pubescent except for the usual (clusters of) scars on each side. Segments 7, 8 and 9 with lateral spines; those on 7 upcurved and sharply incurved; on 8 and 9 much larger, somewhat prominent and with the acute tips upcurved and incurved. There are hairy dorsal hooks on segments 2 to 9, that on 2 merely a low hump, on 3 well-developed, on 3 to 7 very small and gradually increasing in size on apical segments, on 8 and 9 large, on 9 larger than on 8, the hooks on 8 and 9 projecting backward to well beyond their corresponding segments. Superior anal appendage a trifle shorter than inferior appendages and somewhat longer than lateral appendages.

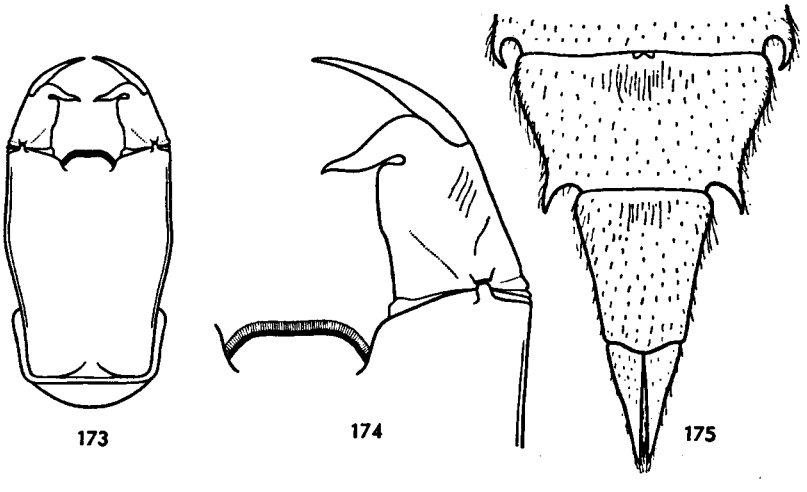


Fig. 173–175. *Phyllogomphoides fuliginosus* (Hagen in Selys) from Surinam. – 173. Labium of larval exuvia, external view. – 174. Left lateral and median lobe of labium of larval exuvia, external view. – 175. Apical segments of abdomen and caudal appendages of larval exuvia, ventral view.

Phyllogomphoides audax (Hagen in Selys, 1854)

Fig. 176–180, 182–185; Pl. XVb, XVIb

Exploring the banks of the river Kabalebo, I had the good fortune to collect nine males of *Phyllogomphoides* that HAGEN and SELYS named *Gomphoides audax* (Bull. Acad. Belg. (2) *21*, p. 75). The species was described after a single female from Pará, Brazil, but later, in 1894, SELYS recorded it from Guyana as well (Ann. Soc. Ent. Belg. *38*, p. 176).

Phyllogomphoides audax is closely related to *Ph. fuliginosus* but it is readily distinguished from it by the characters listed by SELYS at the end of his description of the male in 1894 (Ann. Soc. Ent. Belg. *38*, p. 178), viz.:

1. Smaller size and less dense reticulation of wings.
2. Shorter pterostigma.
3. Less developed exfoliation of eighth abdominal segment in both sexes.
4. Longer and upcurving branches of inferior appendage of male.
5. Rectangularly, V-shaped excised vulvar scale of female (the excision semicircular in *Ph. fuliginosus*).

The male also differs considerably from *Ph. fuliginosus* in the configuration of the superior appendage by the much longer inferior tooth at one-third of the length. In *Ph. fuliginosus* this tooth is much shorter but well-marked; it is not visible in a side view as well as in a dorsal view of the superior appendage but if viewed from the venter, and in particular in an oblique direction, it is well to see.

The male genitalia of the second abdominal segment of the two species are very similar, the base of the posterior hamule relatively stouter in *Ph. fuliginosus* if viewed from beneath.

LARVA of PHYLLOGOMPHOIDES AUDAX (supposition)

Together with the nine males of *Phyllogomphoides audax* a single, complete skin, that may belong to the same species, was taken from the bank of the Kabalebo River (4.IX.1963). This exuvia is very similar to that of *Ph. fuliginosus* but it is smaller and has relatively longer and more sharply upcurved lateral spines on the abdominal segments 7, 8 and 9 (and this applies particularly to the spines on 8).

If viewed from beneath, the ninth abdominal segment is about as long as the tenth abdominal segment and as long as the inferior anal appendages. Total length 37.5 mm; length of abdomen 25.5 mm;

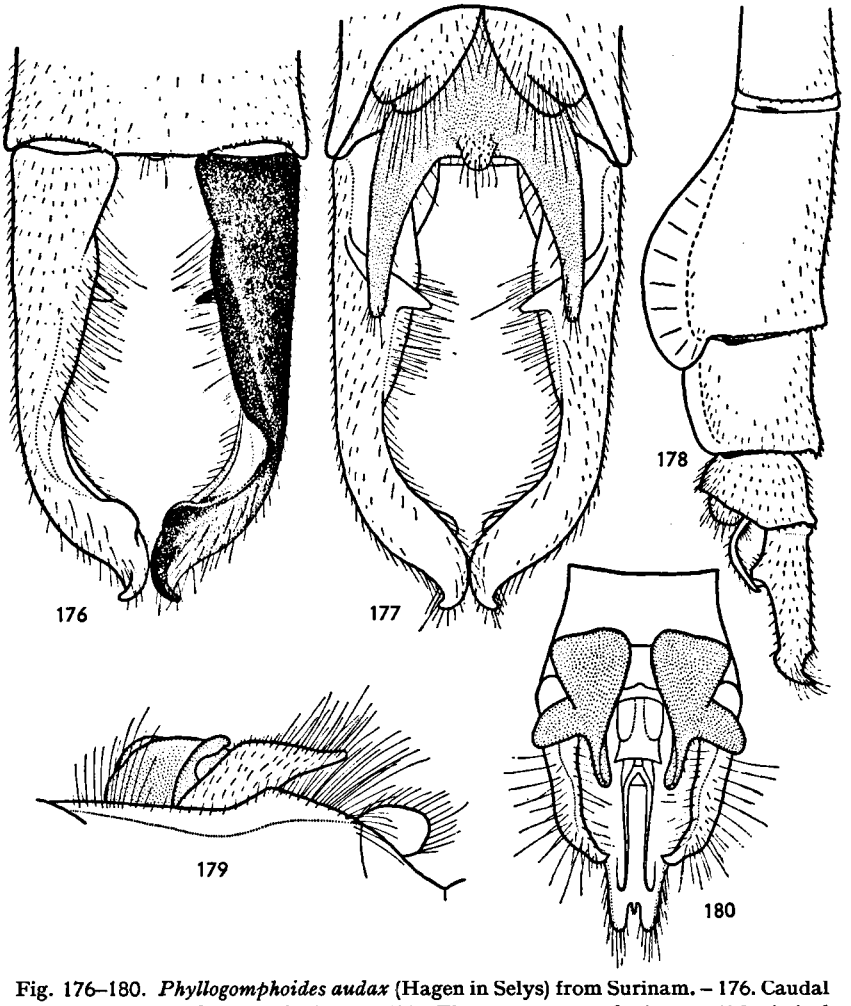


Fig. 176–180. *Phyllogomphoides audax* (Hagen in Selys) from Surinam. – 176. Caudal appendages of male, dorsal view. – 177. The same, ventral view. – 178. Apical segments of abdomen and caudal appendages of male, left lateral view. – 179. Genitalia of second abdominal segment of male, right lateral view. – 180. The same, ventral view.

greatest width of abdomen 6 mm; width of head over the eyes 5.2 mm; length of posterior femur 4 mm.

NEEDHAM in his paper of 1944 demurred to establish a new genus for the two closely allied species *Phyllogomphoides fuliginosus* and *Ph. audax*, because the larva of *Ph. fuliginosus* was known only by supposition (Trans. Amer. Ent. Soc. *69*, p. 199). The larval exuvia, which he described under *Gomphoides fuliginosus*, did not belong to this species. The finding of some larvae of *Ph. fuliginosus* in transformation and the knowledge of the larva of *Ph. audax* (although by supposition only) now justify a generic separation.

Some of the venational characters of these two species summarized earlier by NEEDHAM (Trans. Amer. Ent. Soc. *69*, p. 197) are verified in the Table below.

VARIATION OF VENATIONAL CHARACTERS IN MALES OF *Phyllogomphoides fuliginosus* AND *Phyllogomphoides audax* FROM SURINAM

fw(s) means front wing(s) hw(s) means hind wing(s)

Species of *Phyllogomphoides* Specimens examined			*fuliginosus* 45		*audax* 9	
Front wing	Triangle	3-celled	14 fws	16%	3 fws	17%
		4-celled	74 fws	82%	15 fws	73%
		5-celled	2 fws	2%	—	—
	Subtriangle	3-celled	3 fws	3%	1 fw	6%
		4-celled	83 fws	92%	17 fws	94%
		5-celled	4 fws	5%	—	—
Hind wing	Triangle	3-celled	82 hws	91%	17 hws	94%
		4-celled	8 hws	9%	1 hw	6%
	Subtriangle	2-celled	3 hws	3%	6 hws	33%
		3-celled	87 hws	97%	12 hws	67%
Anal loop in hind wing		2-celled	86 hws	96%	16 hws	89%
		3-celled	4 hws	4%	2 hws	11%

The specimens taken for the compilation of the table are the following:

Ph. fuliginosus: Surinam River, 26.XI.1955, 1 ♂ (L. Schmidt leg.); Surinam River, Gansee, 21.IX.1957, 1 ♂; 27.IX.1957, 2 ♂; 28.IX.1957, 2 ♂; 29.IX. 1958, 1 ♂; 2.X.1958, 3 ♂; 5.X.1958, 1 ♂; Surinam River, Afobakka, 28.XII. 1963, 15 ♂; Surinam River, Aroesobanja Falls, 5.I.1959, 1 ♂ (taken in copula); Zanderij, Bos Bivak, 17.X.1958, 1 ♂; Marowijne River, 7.IX.1960, 1 ♂; Coppename River, Raleigh Falls, 23.IX.1961, 2 ♂; Corantijn River, 26.VIII. 1964, 2 ♂; Sipaliwini River, 4.II.1961, 1 ♂ (D. C. Geijskes leg.); Kabalebo River, 2.IX.1963, 1 ♂; 3.IX.1963, 4 ♂; 4.IX.1963, 6 ♂.
Ph. audax: Kabalebo River, 3.IX.1963, 2 ♂; 4.IX.1963, 7 ♂. One of the males has been deposited in the Leiden Museum.

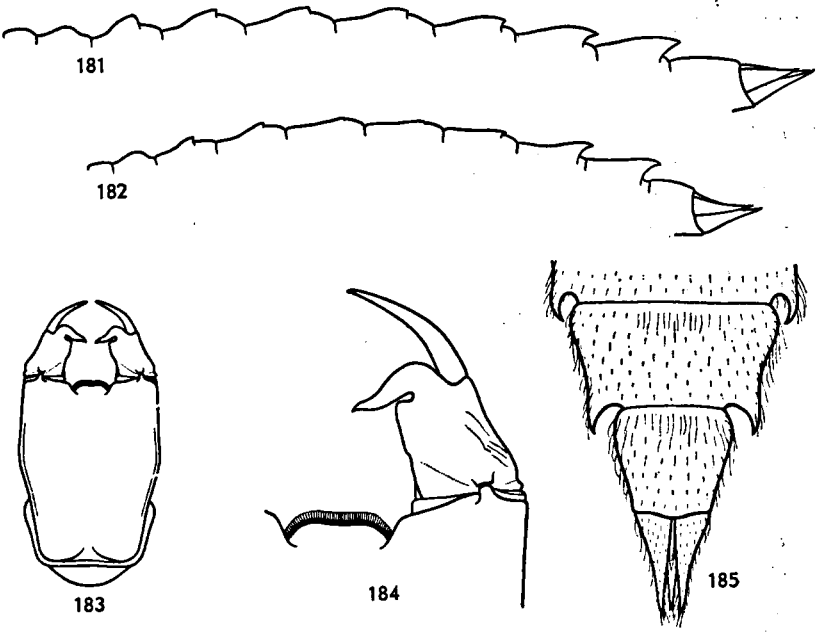


Fig. 181. *Phyllogomphoides fuliginosus* (Hagen in Selys) from Surinam. – Skyline of abdomen and caudal appendages of larval exuvia, left lateral view.
Fig. 182–185. *Phyllogomphoides audax* (Hagen in Selys)? from Surinam. – Skyline of abdomen and caudal appendages of larval exuvia, left lateral view. – 183. Labium of larval exuvia, external view. – 184. Left lateral and median lobe of labium of larval exuvia, external view. – 185. Apical segments of abdomen and caudal appendages of larval exuvia, ventral view.

Genus **Negomphoides** Muttkowski, 1910

Triangle of front wing with the anterior side generally distinctly longer than half the length of the other sides. Triangle and subtriangle of front wing made up of 2–4 cells. Triangle of hind wing made up of 2–3 cells. Subtriangle of hind wing made up of 1–4 cells. Anal loop in hind wing generally well-defined and consisting of 2–5 cells. Foliaceous expansion of abdominal segments 8 and 9 often well-developed and leaf-like, in particular in the male.

The male characters are: Anterior genital hamule not of the complicate form as found in typical *Phyllogomphoides* species. Hind wing with the distal portion of vein A2 generally convergent with vein A3, the vein A2 generally not forked. Second anal interspace of hind wing filled with one row or two rows of cells. Anal triangle in hind wing consisting of 4 or more cells.

The larval characters are: Abdomen with lateral spines on abdominal segments 7 to 9. Inner margin of lateral, labial lobe armed with low, sometimes minute, blunt teeth or with a single low, blunt tooth. End hook of lateral, labial lobe not strongly incurved. Median lobe of mentum moderately prominent and more or less evenly convex.

Type species: *Diastatomma infumatum* Rambur, 1842, as fixed by MUTTKOWSKI in 1910 (Cat. Od. N. Amer., p. 81).

Negomphoides infumatus (Rambur, 1842)

Fig. 186–193, 255; Pl. XVIIa

The holotype male of *Diastatomma infumatum* Rambur from SELYS' collection at Brussels was kindly lent me for examination and figuring. It is an incomplete specimen in a very dilapidated condition. The type lacks the specifically important terminal segments of the abdomen, whereas the first abdominal segment is retracted in the pterothorax owing to the fact that a fine skewer has been passed through the remaining segments of the abdomen. Further the right pair of genital hamules, the hood of the penial peduncle, the penis and penis guard were missing. These have ap-

parently been removed by HAGEN for his drawings in the *Monographie* and they were not re-attached to the specimen. Fortunately the colour pattern of the pterothorax can well be studied, although the colouring is faded (Fig. 255). The pale, first antehumeral stripes diverge from above downward; they do not attain to the pale, transverse, anterior, mesothoracic "half collar". The latter is interrupted in the median. The pale, second antehumeral stripe immediately in front of the humeral suture as well as the three lateral pale stripes are well-developed; the pale, second antehumeral stripe is not confluent with the pale, first antehumeral stripe. The posterior, pale lateral stripe largely covers the metepimeron. A basal subcostal cross vein is present. All pterostigmata with $6\frac{1}{2}$ underlying cells. Antenodal and postnodal cross veins of first series 12:19–20:10/14:15–15:12 in front and hind wings, respectively. Second primary antenodal cross vein the eighth in the left front wing, the seventh in the other wings. Intermedian cross veins 9–10/7–7 in front and hind wings, respectively. All supratriangles with two cross veins. All triangles and subtriangles three-celled, the dividing cross veins triradiate from the centre except for those of the subtriangle of the front wing. Discoidal field of front wing starting with a row of three

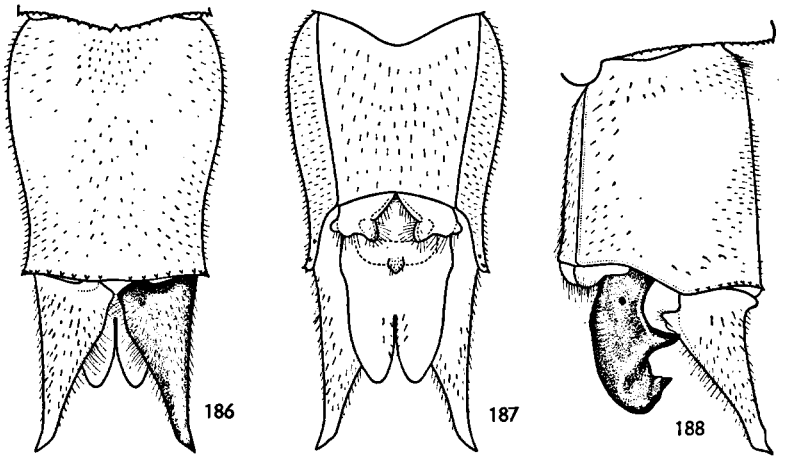


Fig. 186–188. *Negomphoides infumatus* (Rambur). – 186. Tenth abdominal segment and caudal appendages of male, dorsal view. – 187. The same, ventral view. – 188. The same, left lateral view.

cells against the triangle followed by two rows of cells. Anal loop of hind wing made up of three cells, the dividing cross veins tri-radiate from the centre. The anal loop is well-defined by convergence of the veins A1 and A2 at its rear. Distal portion of vein A2 not forked and

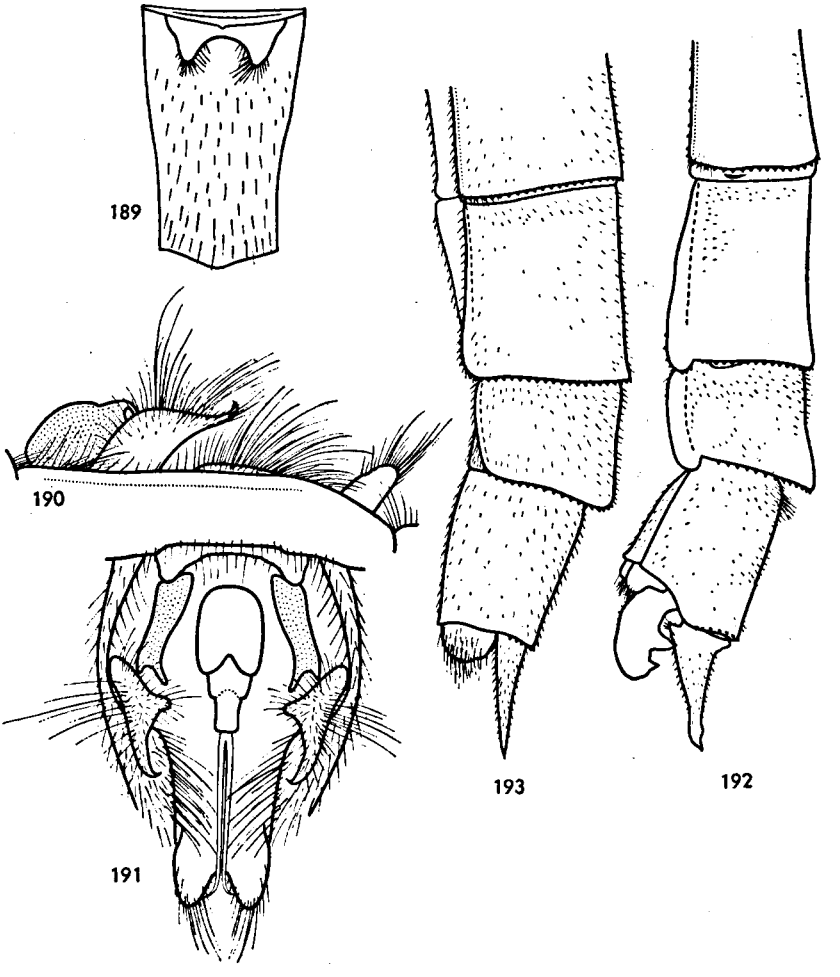


Fig. 189–193. *Negomphoides infumatus* (Rambur). – 189. Vulvar scale and ninth sternum of female, ventral view. – 190. Genitalia of second abdominal segment of male, right lateral view. – 191. The same, ventral view. – 192. Apical segments of abdomen and caudal appendages of male, left lateral view. – 193. Apical segments of abdomen and caudal appendages of female, left lateral view.

diverging somewhat from vein A1 and from vein A3 (as is the case in *Aphylla*). There are 5 paranal cells and 5 postanal cells in each hind wing. The second anal interspace (between the veins A2 and A3) starts with a long (third paranal) cell against the anal vein, and ends with a marginal row of four cells. Anal triangle in hind wing made up of four cells. Length of pterostigma of front wing 4.5 mm; length of abdominal segments two, three and four 15 mm; length of hind wing 34.5 mm. The type specimen bears the pinlabels "Gomphoides infumata R.", "Brésil", and "Ramb.".

The material in the Hamburg Museum, which Ris (1911) referred to *Negomphoides infumatus* (Mem. Soc. Ent. Belg. *19*, p. 103) consists of two complete males, a complete female and an incomplete female (terminal segments of abdomen lost). After comparative examination I found the two males to be identical with the holotype. The dorsum of the abdominal segments of the specimens from the Hamburg Museum is covered with upright standing, stiff hairs, a character which also struck me in the males of *Phyllocycla bartica* Calvert. In *N. infumatus* the spines of the posterior femur are numerous and rather short. There are about 10 spines on the distal half of the antero-inferior row, the longest spines are about one-sixth of the local width of the femur.

The male of *Negomphoides infumatus* is peculiar by the unexpectedly "aberrant" form of the caudal appendages, the superior appendages not forcipate but straight, the inferior appendage very stout and each of the branches armed with a strong, submedian, superior tooth. These characters together with those found in the reticulation of the wings (the regular division of the triangles and subtriangles of the front and hind wings into three cells) perhaps justify a generic separation of this species and its near ally *N. praevia* (St. Quentin) from the other members of the genus. But the larva of *N. infumatus* is known only by supposition (Trans. Amer. Ent. Soc. *65*, p. 368), and a further division of the genus *Negomphoides* may well wait on collecting and rearing of this larva.

Some structural details of one of the males and the complete female from the Hamburg Museum are given in Fig. 186–193.

Negomphoides praevia (St. Quentin, 1967)

Fig. 194–201

This species was described by ST. QUENTIN from four males taken at Nova Teutonia (Santa Catarina), Brazil (Beitr. Neotr. Fauna 5 (2), p. 134). Eleven males and two females of this species in the Museum Alexander Koenig (ex coll. BUCHHOLZ) were also taken at Nova Teutonia. The female, which was hitherto unknown, is described below.

Female (allotype) – Total length 61 mm; length of abdomen 47 mm (including caudal appendages 2 mm); length of hind wing 37 mm; costal edge of pterostigma of front wing 5 mm.

Face and mandibles yellow, the following dark brown or blackish: tip of mandible, a median, posterior spot on labrum, lower part of anteclypeus, middle part of postclypeus, and vertical part of frons except frontal ridge. Antero-superior surface of frons yellow for its entire width; the yellow stripe in middle as wide as the frontal ridge, becoming gradually wider laterally, being at level of antennae about half the local width of superior surface of frons. Base of superior surface of frons and vertex blackish. Occipital plate blackish along posterior, transverse ridge and lateral borders, yellowish-brown in middle, becoming yellow on median fold near posterior ridge. Rear of head blackish but temporae yellowish, and with a yellow spot behind occipital plate.

Prothorax blackish. Pterothorax brown with green stripes. Mid-dorsal carina green. First antehumeral stripe confluent with anterior, mesothoracic "half collar", the latter interrupted in the median. Second antehumeral stripe immediately in front of humeral suture well-developed and at mid-height as wide as first antehumeral stripe. Three well-developed stripes running over the entire length of mesepimeron, metepisternum and metepimeron. That on metepimeron broad and extending to slanting hind border. Metapostepimeron also green. Mesinfraepisternum and metinfraepisternum yellow.

Femora yellow, blackened towards knees. Tibiae, tarsi and claws black.

Abdomen predominantly very dark brown. Segments 1 and 2 largely greenish on sides and below. Segments 3 to 7 yellowish along ventral tergal margin and with a pair of baso-lateral, subquadrangular, yellow spots, segment 7 with the spots confluent on mid-dorsum, the other segments with a mid-dorsal yellow, basal stripe. Segments 8 and 9 yellowish at extreme base, the ventral tergal margin moderately expanded. Segment 10 yellowish except for a blackish, mid-dorsal, basal spot, and the blackish, posterior, lateral margin. Posterior margin of tenth segment denticulated at level of bases of stylets (caudal appendages). Stylet nearly as long as tenth segment, bright-yellow but extreme base blackish. Vulvar scale short, medially V-shaped excised for about three-fourths its length, the subtriangular lobes reaching to a point about one-fifth of way along ninth sternum.

Wings brownish. Principal veins blackish, including frontal margin of costa. Cross veins predominantly blackish but those of costal and subcostal spaces pale brown. Pterostigma yellowish-brown, surmounting 7–8½ cells. Basal subcostal cross vein

present. Antenodal and postnodal cross veins of first series 12:20–20:13/12:15–15:12 in front and hind wings, respectively. Second primary antenodal cross vein the seventh, in right front wing the eighth. Intermedian cross veins 10–10/6–6 in front and hind wings, respectively. Supratriangle two-celled. Triangle and subtriangle of front wing four-celled, but triangle of right front wing three-celled. Triangle and

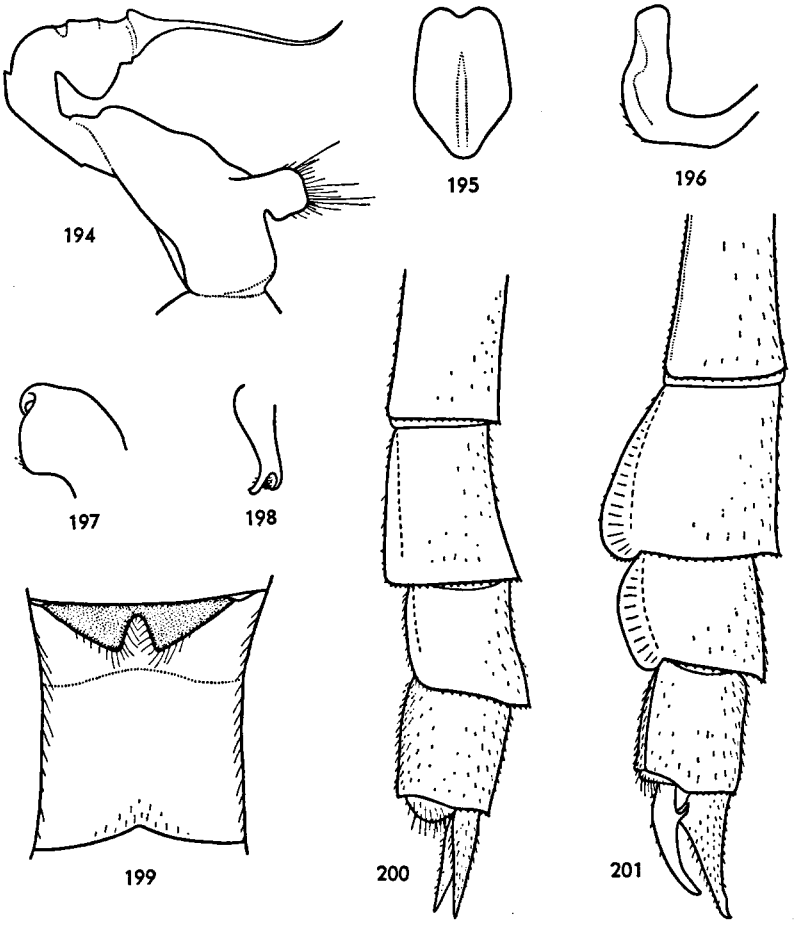


Fig. 194–201. *Negomphoides praevia* (St. Quentin). – 194. Penis, right lateral view. – 195. Penis guard, as seen from front. – 196. The same, right lateral view. – 197. Right anterior hamule of second abdominal segment of male, right lateral view. – 198. The same, ventral view. – 199. Vulvar scale and ninth sternum of allotype female, ventral view. – 200. Apical segments of abdomen and caudal appendages of allotype female, left lateral view. – 201. Apical segments of abdomen and caudal appendages of male, left lateral view.

subtriangle of hind wing three-celled. Anal loop in hind wing four-celled. Six paranal cells in hind wing. Six (right) and seven (left) postanal cells in hind wings. Six rows of cells behind Cu2 in hind wing.

Allotype female: BRAZIL, Santa Catarina (Nova Teutonia), 12.II.1949. In the Museum Alexander Koenig in Bonn.

The other female in the Museum Alexander Koenig is in a poor condition. Of this female the extent of the yellow markings is greater, the lower part of the anteclypeus yellow, the occipital plate largely yellow, etc. The triangle and subtriangle of all wings are three-celled, and the anal loop in the hind wing is four-celled.

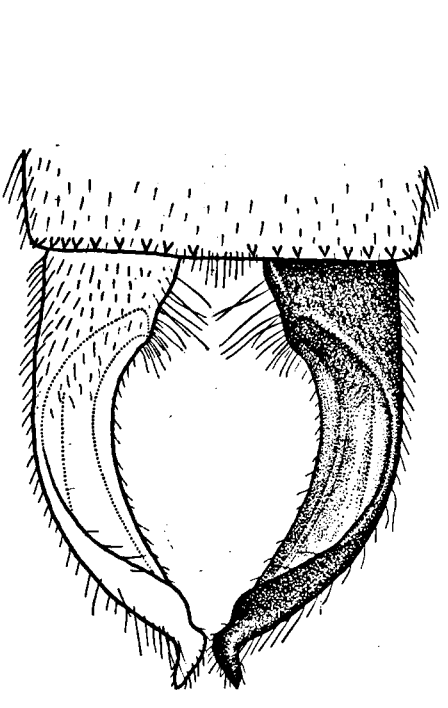
Of the eleven males examined the triangle is four-celled in 2 wings (5%), three-celled in 41 wings (93%), and two-celled in 1 wing (2%); the subtriangle is four-celled in 2 wings (5%), three-celled in 30 wings (68%), and two-celled in 12 wings (27%); the anal loop is four-celled in 21 hind wings (95%) and three-celled in 1 hind wing (5%).

Negomphoides cristatus (Needham, 1944)

Fig. 202–210; Pl. XVIIb, XVIIIa, XXIa

Studying NEEDHAM's descriptions of *Negomphoides undulatus* and *N. cristatus* (Trans. Amer. Ent. Soc. *69*, p. 199) I found that the females which I had referred to *N. undulatus* fitted the short description of the female of *N. cristatus* in all respects. After examination of the allotype female of *Gomphoides cristatus* Needham from Cornell University, it proved to be identical with the allotype female of *Gomphoides undulatus* (Stud. Fauna Suriname *7*, p. 40) in the Leiden Museum. The specific reference of the latter female to *N. undulatus* is beyond all doubt. Twice I collected a mating pair of this species at the upper part of the Para River in Surinam; the two females are identical with the allotype female of *Gomphoides undulatus*. Of each of the two species the sexes are very similar in their coloration. *Negomphoides cristatus* is a darker species than *N. undulatus*, the black mid-basal spot on the superior surface of the frons more extensive, the prothorax without a greenish-yellow twin-spot, the posterior femur entirely black, etc. The two species also differ markedly in the character of the armature of the posterior femur; the spines in the distal half of the antero-inferior row are less numerous and much larger in *N. cristatus* than in *N. undulatus*. The females of both species are larger than the corresponding males, with

larger wings and a stouter abdomen. But *N. cristatus* is the larger of the two species so that the female of *N. undulatus* approaches in dimensions the male of *N. cristatus*. I think, that this agreement in size has misled NEEDHAM, when he wrongly classified the female of *N. undulatus*. Also the female of *N. cristatus* differs from the female of *N. undulatus* by the form of the abdomen, which is not noticeably widened in lateral dimension on the terminal segments, and of which the segments 8 and 9 have no trace of a lateral dilatation. Finally, in the female of *N. cristatus* the second anal interspace of



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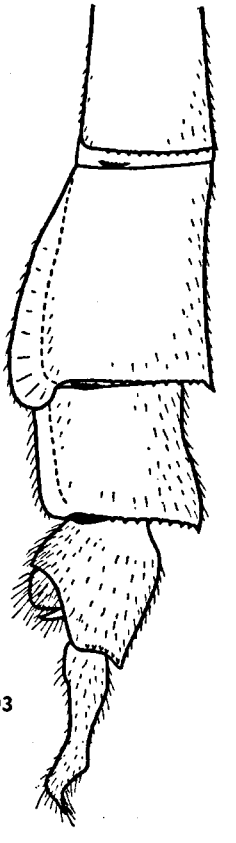

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Fig. 202–203. *Negomphoides cristatus* (Needham) from Surinam. – 202. Caudal appendages of male, dorsal view. – 203. Apical segments of abdomen and caudal appendages of male, left lateral view.

the hind wing (area between the veins A2 and A3) starts with two cells against the anal vein (except in one hind wing, 26 females examined), in the female of *N. undulatus* with a single cell (except in one hind wing, 35 females examined).

Female (allotype) – Total length 62 mm; length of abdomen 47.5 mm (including caudal appendages 2.2 mm); length of hind wing 39 mm; costal edge of pterostigma of front wing 5 mm.

Colour pattern done in black and green and similar to that of corresponding male. When alive the compound eyes are green. Green, antero-superior band of frons interrupted by the semicircular, mid-basal, black spot. Posterior femur entirely

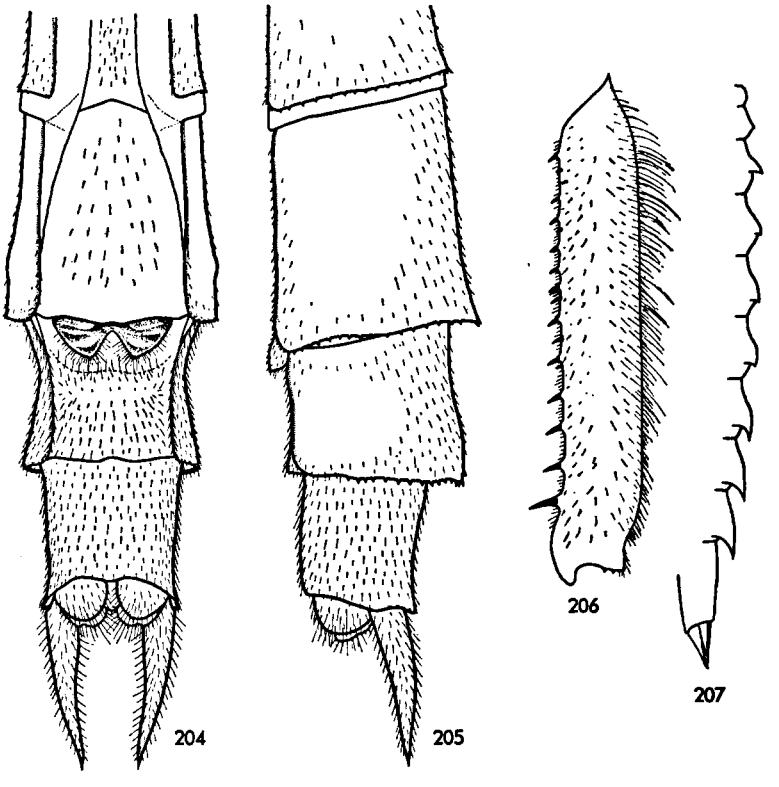


Fig. 204–207. *Negomphoides cristatus* (Needham) from Surinam. – 204. Apical segments of abdomen and caudal appendages of female, ventral view, showing vulvar scale. – 205. The same, left lateral view. – 206. Left posterior femur of allotype female, left lateral view. – 207. Skyline of abdomen and caudal appendages of larval exuvia, left lateral view.

black. Abdominal segments 8, 9 and 10 entirely black. Anal appendage black except for upper surface, which is green on its two-, three-, and four-fifths portions.

Abdomen stouter than that of male, the two basal segments swollen, thence narrow and very slightly widening in lateral dimension to apex of segment 8, being almost parallel-sided on segments 6, 7 and 8. Segment 9 noticeably narrowed in lateral dimension on basal one-third portion. Abdomen becoming conspicuously higher on apex of segment 7 and on segments 8 and 9. The relative length of the three apical segments of the abdomen is about 3:2:2, with the anal appendages 2 on the same scale. Vulvar scale extending rearward to a point about one-fourth of way along ninth sternum, its hind margin deeply V-shaped excised (more sharply than in female of *N. undulatus*), the lobes subtriangular and largely visible in a side view of the abdomen.

Pterostigma braced, surmounting 7½–8½ cells. Antenodal and postnodal cross veins of first series 18:23–23:18/16:18–20:18 in front and hind wings, respectively. Second primary antenodal cross vein the eighth in left front wing and right hind wing, the seventh in other wings. Intermedian cross veins 13–11/8–8 in front and hind wings, respectively. All triangles, subtriangles and supratriangles three-celled, except for subtriangle in right front wing, which is four-celled, and subtriangle in right hind wing, which is two-celled. Six paranal cells in each hind wing. Six postanal cells in left hind wing and five postanal cells in right hind wing. Anal loop in hind wing three-celled.

Allotype female: SURINAM, Para River, 4.I.1959. In the author's collection.

SURINAM, Coropina Creek (Dauwdropkamp), 26.XII.1959, 1 ♂, 1 ♀; 27.XII. 1959, 2 ♂, 1 ♀; 28.XII.1959, 1 ♀; 29.XII.1959, 1 ♂; 30.XII.1959, 1 ♂, 1 ♀; 3.I.1960, 3 ♂, 4 ♀. Sipaliwini (Viergebroederskreek), 24.II.1961, 1 ♀ (GEIJSKES leg.). Para River, 25.III.1962, 1 ♂, 2 ♀; 1.IV.1962, 1 ♂, 1 ♀; 8.IV.1962, 2 ♂, 1 ♀; 23.IV.1962, 1 ♀; 24.II.1963, 1 ♀; 24.III.1963, 2 ♂, 3 ♀; 14.IV.1963, 1 ♀; 15.IV.1963, 2 ♂, 1 ♀; 28.IV.1963, 2 ♂; 30.IV.1963, 1 ♂, 1 ♀; 23.XI.1963, 2 ♂, 4 ♀; 28.III.1965, 1 ♀. A male and a female were sent to Cornell University.

LARVA of NEGOMPHOIDES CRISTATUS (reared)

A full grown, male larva of *Negomphoides cristatus* was obtained by sifting mud dredged from near the bank of the Para River in Surinam. The larva, collected on the 18th August 1963 and caged, transformed to the adult stage on September 23rd 1963.

In structure the larva of *N. cristatus* is superficially very similar to that of *Phyllogomphoides fuliginosus* but it is much smaller, and the labium is quite diverse in its characters.

The exuvia of the reared male is described below.

Total length 35 mm; length of abdomen 25 mm; greatest width of abdomen 6.5 mm; width of head over the eyes 5 mm; length of posterior femur 4 mm.

Body brownish, patternless, largely devoid of hairs, and with conspicuous bare scars. Wing cases parallel on the back, the tips reaching to fourth abdominal

segment. Antennae long, third joint two and a half times longer than the two basal joints combined, fourth joint a conical rudiment, reflexed upward and not longer than third joint is wide at tip.

Legs with bare scar-lines and bordered with long, yellow hairs. First two pairs of tibiae armed with a strong burrowing hook.

Labium strictly parallel-sided on its proximal half, mentum about one and a half times longer than wide, hinge reaching to bases of second pair of legs. Median lobe slightly prominent, rounded, occupying two-sevenths of breadth of mentum, its edge fringed with a dense row of flat scales. Lateral lobe tapering gradually to base of movable hook, the latter as long as lateral lobe. End hook of lateral lobe strong, incurving, slightly sinuous. Proximal to this there is a well-defined, blunt tooth, followed by a much broader, low, blunt tooth on inner margin of lateral lobe.

Abdomen hairy on lateral margins, widest on middle segments. Segments 7, 8 and 9 with strong, slightly upcurving lateral spines, those on 8 and 9 somewhat larger than that on 7 and nearly equal in size. There are dorsal hooks on segments 2 to 9, obsolete on 2, well-developed on 3, low on 4,5 and 6, large and acutely pointed on 7, 8 and 9, those on 8 and 9 larger than that on 7 and nearly equal in size. The mid-ventral, relative length of the ninth and tenth abdominal segment is 10:15, with the inferior anal appendage 8 on the same scale. Lateral anal appendages slightly shorter than superior anal appendage, the latter nearly as long as inferior anal appendages.

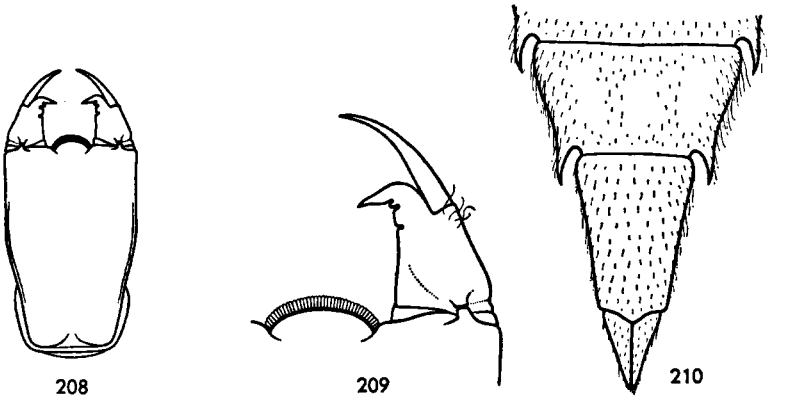
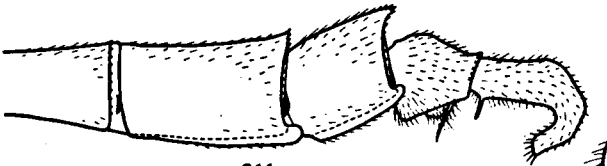


Fig. 208–210. *Negomphoides cristatus* (Needham) from Surinam. – 208. Labium of larval exuvia, external view. – 209. Left lateral and median lobe of labium of larval exuvia, external view. – 210. Apical segments of abdomen and caudal appendages of larval exuvia, ventral view.

Negomphoides undulatus (Needham, 1944)

Fig. 211–217; Pl. XVIIIb, XIXa, XXIb

The holotype male of *Gomphoides undulatus* Needham (Trans. Amer. Ent. Soc. *69*, p. 199) from Cornell University (Cornell Holotype No. 3069) was studied. It is preserved in alcohol and rather broken. The right pair of wings is mounted on a slide.



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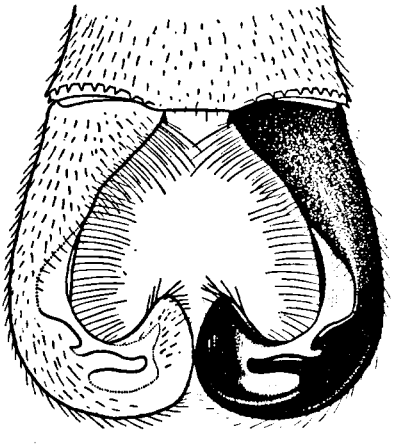

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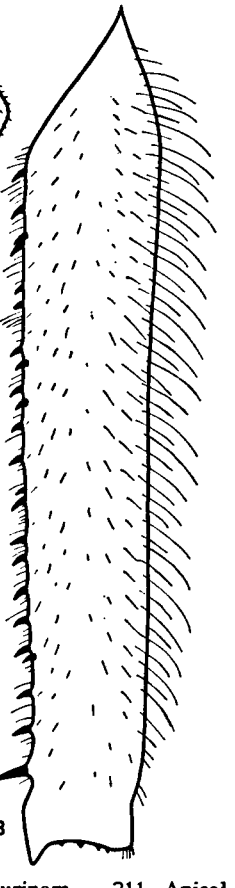

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Fig. 211–213. *Negomphoides undulatus* (Needham) from Surinam. – 211. Apical segments of abdomen and caudal appendages of male, left lateral view. – 212. Caudal appendages of male, dorsal view. – 213. Left posterior femur of female, left lateral view.

SURINAM, Coropina Creek (Dauwdropkamp), 28.VIII.1958, 3 ♂, 1 ♀; 30.VIII. 1958, 1 ♂; 2.IX.1958, 4 ♂, 1 ♀; 5.IX.1958, 2 ♂; 25.X.1958, 1 ♀; 26.XII.1959, 2 ♂; Zanderij, Troelinde Creek, 25.VI.1958, 2 ♂; 26.VI.1958, 3 ♂; 6.VII.1958, 2 ♂; 1.VIII.1959, 6 ♂; 5.VIII.1962, 2 ♂; 19.VIII.1962, 4 ♂; 2.IX.1962, 6 ♂; Zanderij, weg naar Matta, 17.I.1957, 1 ♂; Zanderij, Bos Bivak, 3 ♂; Carolina Creek, 25.IX.1963, 1 ♂; Mamma Creek, 5.XI.1961, 1 ♂; 15.IX.1963, 13 ♂; Surinam River (Afobakka), 28.XII.1963, 1 ♂; Corantijn River (Sisa Creek), 31.VIII.1964, 2 ♂; Kabalebo River, 3.IX.1963, 3 ♂; Nickerie River (Stondansi), 21.IX.1962, 2 ♂; Para River, 11.X.1958, 4 ♂; 28.X.1958, 1 ♂; 4.X. 1959, 2 ♂ and 2 ♀ in copula, 3 ♀; 10.X.1959, 1 ♀; 3.VIII.1960, 4 ♀; 20.VIII. 1960, 1 ♀; 13.X.1960, 2 ♀; 15.X.1961, 1 ♂, 1 ♀; 28.X.1961, 2 ♂; 25.III.1962, 2 ♂; 1.IV.1962, 1 ♂; 8.IV.1962, 1 ♂; 17.IV.1962, 3 ♂, 1 ♀; 23.IV.1962, 1 ♂; 4.IX.1962, 9 ♂; 8.IX.1962, 5 ♀; 21.X.1962, 1 ♂, 11 ♀; 24.III.1963, 2 ♀; 30.IV.1963, 1 ♀; 18.VIII.1963, 1 ♂, 1 ♀; 24.XI.1963, 4 ♂.

LARVA of NEGOMPHOIDES UNDULATUS (supposition)

Two species of *Negomphoides*, namely *N. undulatus* and *N. cristatus*, occur at the upper part of the Para River, Surinam. They have been collected there in large numbers, whereas larval cast-off skins associated with these two species were found in great abundance, attached to twigs of the lower bank vegetation and to roots or trunks of the trees on the bank. Since the larva of *N. cristatus* has been identified by a reared individual the reference of the

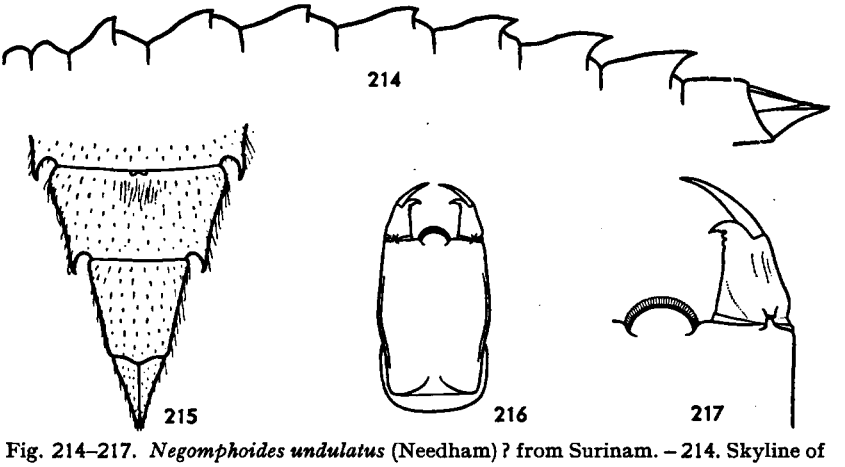

Fig. 214–217. *Negomphoides undulatus* (Needham) ? from Surinam. – 214. Skyline of abdomen and caudal appendages of larval exuvia, left lateral view. – 215. Apical segments of abdomen and caudal appendages of larval exuvia, ventral view. – 216. Labium of larval exuvia, external view. – 217. Left lateral and median lobe of labium of larval exuvia, external view.

numerous, other larval cast-off skins of *Negomphoides* from that environment of the Para River is evident. Larvae of *N. undulatus* practically in the last instar were frequently secured by sifting bottom mud taken from near the banks of the Para River and the nearby Carolina Creek but the insects died in captivity after some weeks before any ecdysis.

The larva of *Negomphoides undulatus* is readily distinguished from that of *N. cristatus* by the smaller size, the relatively shorter tenth abdominal segment and by differences in the labial armature. The labium is shaped as shown in Figs. 216 and 217. It differs from *N. cristatus* by the smaller size, the more prominent median lobe of the mentum, the shorter end hook of the lateral lobe, and the less developed (generally ill-defined), small (the second tooth sometimes broader), low, rounded teeth on the apical inner margin of the lateral lobe. The skyline of the abdomen differs from *N. cristatus* by the shorter dorsal hooks on the segments 7, 8 and 9. The mid-ventral relative length of the ninth and tenth abdominal segments is 10:11, with the inferior anal appendage 8 on the same scale.

The dimensions of a female larval cast-off skin, apparently left behind at transformation to the adult stage and taken from the upper part of the Para River on 18.VIII.1963, are: Total length 28 mm; length of abdomen 19.5 mm; greatest width of abdomen 6 mm; width of head over the eyes 5 mm; length of posterior femur 4 mm.

Negomphoides atlanticus spec. nov.

Fig. 218–222; Pl. XXb

Dr. GEIJSKES kindly allowed me the privilege to place on record an undescribed species of *Negomphoides* represented in his collection by two males from Surinam. The species is closely related to *N. undulatus*. It is similar to it in stature and body coloration, but the superior caudal appendage of the male is different by the upcurved tip, and the hood of the penial peduncle is much more elongated backwards than in that species. The armature of the posterior femur, however, is much alike that of *N. cristatus*.

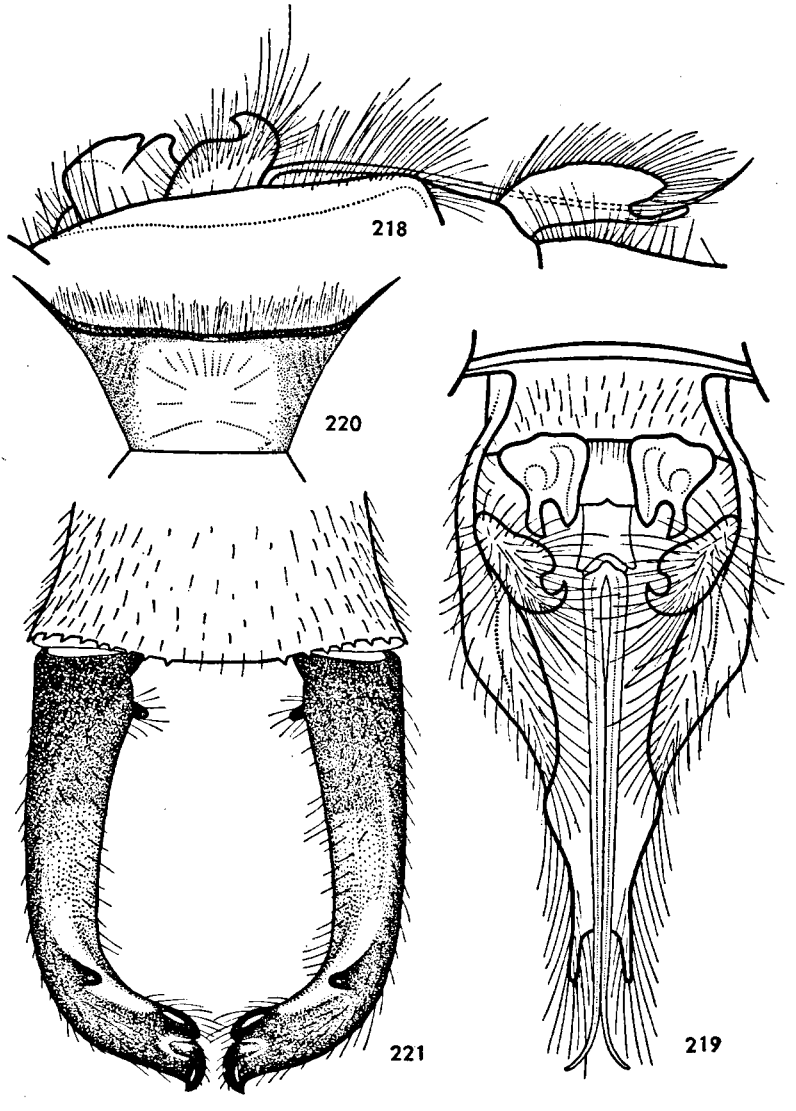

Fig. 218–221. *Negomphoides atlanticus* spec. nov. from Surinam. – 218. Genitalia of second abdominal segment of holotype male, right lateral view. – 219. The same, ventral view. – 220. Occipital plate of holotype male, dorsal view. – 221. Caudal appendages of holotype male, dorsal view.

Male (holotype) – Total length 58 mm; length of abdomen 44 mm (including caudal appendages 2.8 mm); length of hind wing 33.5 mm; costal edge of pterothorax of front wing 4.5 mm.

A blackish species with greenish-yellow stripes and markings.

Head: A greenish-yellow spot on each side of labrum. Anteclypeus, sides of postclypeus, base of mandibles, and genae greenish-yellow. Antero-superior surface of frons with a greenish-yellow band for its entire width, narrowed in middle. Scape of antennae with greenish-yellow upper edge. A small greenish-yellow spot behind and between posterior prominences of lateral ocelli. Occipital plate with a large median, subquadrangular, greenish-yellow spot extending from frontal margin to posterior margin, the latter fringed with long, brown hairs. Rear of head greenish-yellow behind occipital plate, the temporae black.

Prothorax: Middle lobe with a greenish-yellow twin-spot on dorsum.

Pterothorax: Greenish-yellow, first antehumeral stripes on dorsum diverging anteriorly, the upper ends touching antealar sinus, the lower ends not confluent with transverse, anterior, mesothoracic "half collar", the latter interrupted in the median. Mid-dorsal carina greenish-yellow. Greenish-yellow, second antehumeral stripe immediately in front of humeral suture well-developed and about equal in width as first antehumeral stripe. The three, greenish-yellow stripes on side of pterothorax well-developed.

Abdomen: Preponderantly blackish. Segments 2 to 5 with a dorso-basal, subtriangular, greenish-yellow spot. Segment 7 with a dorso-lateral, subquadrangular greenish-yellow basal spot each side, the two spots confluent on the mid-dorsum. Side of segment 1 greenish-yellow on lower parts. Segment 2 greenish-yellow along submedian ventral carina; auricle entirely greenish-yellow, its hind margin armed with 20–25 minute, black denticles.

Legs: Inner side of anterior femur greenish-yellow for basal three-fourths portion. Outer side of posterior femur with a yellowish stripe on basal half. Knee-caps (joints between femora and tibiae) of legs greenish-yellow. Tibiae, tarsi and claws black. Tibial keel of anterior tibia about one-fourth of length of tibia.

Wings hyaline, the extreme bases brownish-yellow tinged. Venation dark brown, nearly black, including costa. Pterostigma brown, covering 6½–7½ cells in front wing, 8 cells in hind wing. Basal subcostal cross vein present. Antenodal and postnodal cross veins of first series 14:21–21:15/15:18–16:15 in front and hind wings, respectively. Second primary antenodal cross vein the sixth on front wing, the seventh on hind wing. Intermedian cross veins 12–13/9–9 in front and hind wings, respectively. All triangles, subtriangles and supratriangles three-celled, except for subtriangle of

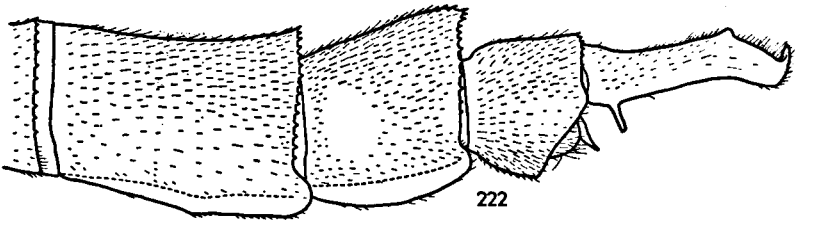

Fig. 222. *Negomphoides atlanticus* spec. nov. from Surinam. – Apical segments of abdomen and caudal appendages of holotype male, left lateral view.

right front wing and left hind wing, which is two-celled. Trigonal interspace starting with a row of three cells against triangle, followed by two rows of cells for a distance of 8 cells in front wing and for a distance of 6 cells in hind wing. Anal crossing of hind wing distant by less of its own length from subtriangle. Number of paranal cells of front wings 7 (left) and 8 (right). Five paranal cells and five postanal cells in hind wing, the fifth paranal cell is the first postanal cell. Anal loop of hind wing three-celled (two in front, one cell behind), A1 and A2 approximating sharply at its rear, thence diverging to hind margin of wing. Sequence of cells between A1 and A2 and behind anal loop 1, 2, 3 (left) and 1, 2, 2 (right). Anal triangle in hind wing four-celled.

Genitalia of second abdominal segment shaped as shown in Figs. 218 and 219. Pleural edges of genital pocket very hairy. Penial peduncle of very peculiar form; its hood exceedingly elongated and reflexed backward almost parallel with abdomen; posterior margin of hood deeply cleft, and with a very long, median tooth at bottom of cleft. Hamules brown, hood of penial peduncle blackish. Penis ending in two very long, slender cornua, which reach to beyond hood of penial peduncle.

Inferior lateral margins of abdominal segments 8 and 9 dilated to narrow strips; the dilatation of segment 9 less produced backwards at apex than in *N. undulatus*. Tenth segment nearly twice as long mid-dorsally as mid-ventrally.

Anal appendages shaped as shown in Figs. 221 and 222. Superior appendage dark brown, entirely black on processes, brownish-yellow on inner side for its apical two-thirds portion. Superior appendage with a long, thin, basal spine projecting downward and inward from inferior margin of appendage; at two-thirds of the length there is a superior, blunt tooth projecting upward and inward, and immediately before the acute, sharply upcurved apex the superior, inner margin is incurved, and thence notched lengthwise to form a well-developed tooth, which is directed mesad. Inferior appendage black. It is about one-fourth of length of superior appendage, thin, flat, and deeply V-shaped cleft, the divisions widely divergent and projecting downward.

Holotype male: SURINAM, Coppename River (Raleigh Falls, first small creek in forest, 1 km from river), 21.VIII.1957 (D. C. GEIJSKES leg.). In the Leiden Museum.
Paratype male: Surinam, Brownsberg (small creek in forest), 11.VIII. 1958 (GEIJSKES leg.). In the author's collection.

Negomphoides atlanticus sp.n. is apparently a rare species in Surinam. It has never been encountered on my frequent researches in the field. Its habitat seems to be confined to the creeks of the dense jungle. The two males were taken from widely separated localities.

The female and larva are unknown.

Negomphoides ictinia (Selys, 1878)

Fig. 223

This species is still represented (1966) in the Brussels Museum by the single female from Pernambuco, BRAZIL, described by SELYS in

1870 (Bull. Acad. Belg. *46*, p. 664). The holotype female is in a rather poor condition. The wings are damaged, in particular the hind wings, the abdomen is broken between segments 3 and 4 and somewhat distorted at its apex, whereas the anal appendages are broken off and lost. A fine wire has been passed through the abdomen.

The species belongs to the largest members of the genus. The female is peculiar by the large pterostigma (costal edge of pterostigma of front wing 6 mm), by the two broad, yellow-green bands on the side of the pterothorax (in other congeners generally three stripes), and by the extra-ordinary form of the vulvar lamina. This is deeply cleft for nearly its entire length, the strong divisions divaricate, tapering at apices, and extending backward over near the whole length of the ninth sternum (Fig. 223). Dorsum of pterothorax with

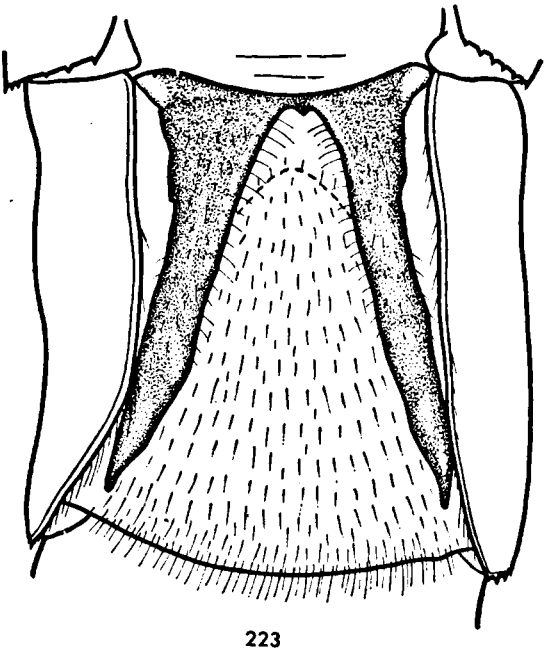

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Fig. 223. *Negomphoides ictinia* (Selys). – Vulvar scale and ninth abdominal segment of holotype female, ventral view.

a pair of broad, pale, (first) antehumeral stripes, the stripes strongly diverging forward and downward, the upper ends tapering and reaching to antealar sinus, the lower ends confluent with the transverse, mesepisternal stripe. Mid-dorsal carina pale. A pale, dorsal, juxta-humeral spot on each side of the dorsum. Abdominal segments 2 to 9 with large, subtriangular, baso-lateral, yellow spots, interrupted by the submedian transverse carina. A mid-dorsal, yellow line on segments 2 to 7, which is broad on 2, broad at base and tapering to apex on 3 to 5, and narrow on 6 and 7. Mid-dorsum of segments 3 to 7 armed with black denticles. Tergite of segments 3 to 8 devoid of hairs, base of segments 2 and 9 scarcely haired, segment 10 moderately haired. Wings broad, with a rather dense reticulation. Intermedian cross veins 14–13/9–9 in front and hind wings, respectively. Anal loop in hind wing ill-defined by slight convergence of the veins A1 and A2 at its rear and made up of four cells. Hind wings with 5 (left) and 6 (right) paranal cells. Each hind wing with 7 postanal cells. Principal veins of wings dark brown, the cross veins on the basal half of the wings much paler. Frontal margin of costa yellow.

The near ally of the species is *Negomphoides demoulini* (St. Quentin) described from Santa Catarina, Brazil (Beitr. Neotr. Fauna *5* (2), p. 136), but this species is readily distinguished from *N. ictinia* by the peculiar, yellow, frontal band on the wings.

Negomphoides annectens (Selys, 1869)

Fig. 224–227

A century ago this species gave SELYS much trouble by its single celled subtriangle of the hind wing (Bull. Acad. Belg. *28*, p. 192: "Ce caractère la ferait placer parmi les *Cyclophylla*, mais la forme compliquée des appendices supérieurs du mâle, et surtout la présence d'un appendice inférieur fourchu assez long, me semblent décider que c'est bien une Gomphoïde dont, en réalité, il y a lieu de réunir les trois sous-genres, car nous verrons plus bas des espèces qui rendent impossible une séparation rigoureuse entre les *Cyclophylla* et les *Aphylla*."). Of all *Negomphoides* species three seem to have a

strong, one-celled subtriangle in the hind wing, and six have this subtriangle open or crossed.

Negomphoides annectens is known only from BRAZIL. The specimens of the original series are still in SELYS' collection at Brussels. One of the specimens is a male with the pinlabels "Brésil" (green label), "Gomphoides annectens S. ♂" (white label, in SELYS' hand-

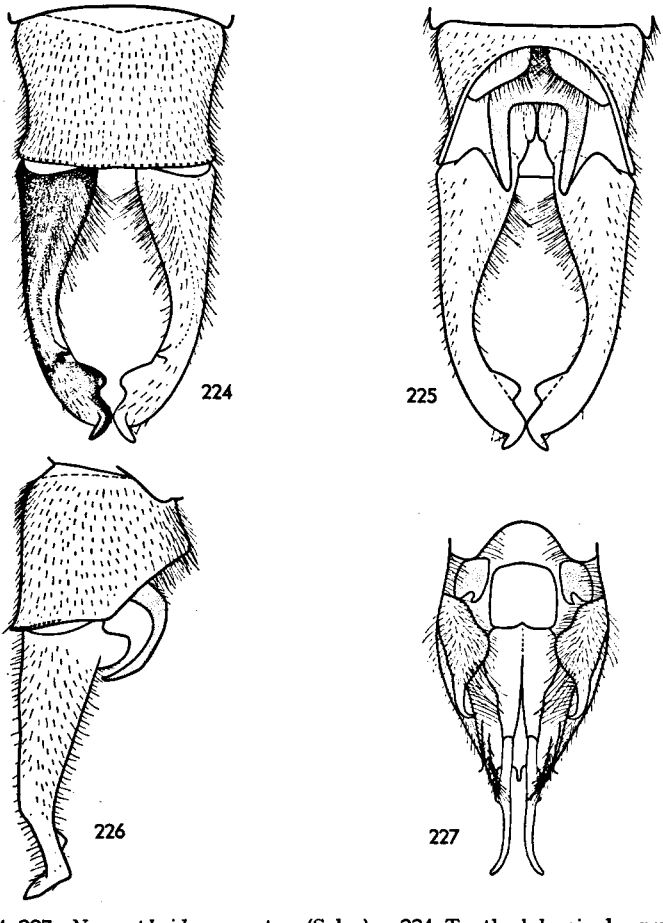


Fig. 224–227. *Negomphoides annectens* (Selys). – 224. Tenth abdominal segment and caudal appendages of lectotype male, dorsal view. – 225. The same, ventral view. – 226. The same, right lateral view. – 227. Genitalia of second abdominal segment of lectotype male, ventral view.

writing), "det. Selys Gomphoides annectens Selys" (white label, in an unknown handwriting), and a printed museum label "Typus" (red label). This specimen is the lectotype by present designation. It is the same specimen, which ST. QUENTIN considered as being the holotype (Beitr. Neotr. Fauna 5 (2), p. 140). The lectotype is in a good condition except for the wings of which the tips are broken off.

The male of *Negomphoides annectens* is very well described by SELYS except for the genitalia of the second abdominal segment which were not mentioned at all.

Some data of the lectotype are: Pale, first antehumeral stripe straight and very slightly widening downwards, reaching antealar sinus above, diverging slightly from above downward from mid-dorsal carina where it is united with the transverse, anterior, mesothoracic "half collar". The latter interrupted in the median. Complete, pale, second antehumeral stripe immediately in front of humeral suture not connected with pale, first antehumeral stripe. The three, lateral pale stripes of the pterothorax well-developed, the posterior one is broad and covers nearly the whole metepimeron.

Genitalia of second abdominal segment shaped as shown in Fig. 227. Anterior hamule small and rounded, its posterior margin has a small excision. Posterior hamule large, bulbous in middle, thence tapering caudad, the extreme tip acutely pointed and sharply incurved. Hood of penial peduncle deeply cleft into two subtriangular plates, in middle of bottom of cleft a strong, long spine. Penis guard broad, its tip slightly, V-shaped emarginated in median. Tip of penis with a pair of long cornua that extend straight and parallel rearward to well beyond hood of penial peduncle. Cornua channeled lengthwise on ventral side for nearly the entire length but the tips flat and curved.

Abdomen markedly clubbed on apical segments, widest on segment 8. Lateral dilatation of segments 8 and 9 narrow.

Venation of wings blackish but costa with a very narrow and inconspicuous yellow line on serrate front margin. Length of costal edge of pterostigma of front wing 4.2 mm. Basal subcostal cross vein present. Antenodal and postnodal cross veins of first series 12:20–20:11/14:13–13:12 in front and hind wings, respectively. Second primary antenodal cross vein the seventh in left front wing, sixth in other wings. Intermedian cross veins 8–9/6–5 in front and hind wings, respectively. All supratriangles two-celled. All triangles three-celled, the dividing cross veins tri-radiate from centre. Outer side of triangle strongly angulated in front wing as well as in hind wing. Subtriangle of front wing two-celled. Five paranal cells and six postanal cells in hind wing. Anal loop in hind wing well-defined by strong convergence of A1 and A2 at its rear, and made up of three cells, the dividing cross veins tri-radiate from centre. Distal portion of A2 strongly convergent with A3. Anal triangle in hind wing four-celled.

Another male of *Negomphoides annectens* from the Museum Alexander Koenig (ex coll. BUCHHOLZ) was taken on 25.XII.1946 in Santa Catarina (Nova Teutonia), Brazil. It differs slightly from the lectotype in having the tip of the posterior genital

hamule, the apical half of the superior caudal appendage (if viewed in profile), and the inferior basal tooth of this appendage somewhat stouter, and in having the pale, first antehumeral stripe not connected with the anterior, mesothoracic "half collar". But these differences I would consider no more than an individual variation.

Negomphoides regularis (Selys, 1873)

Fig. 228–236

This species was described by SELYS from a single, teneral pair taken in Minas Gerais, Brazil (Bull. Acad. Belg. *35*, p. 765). At the end of the description SELYS correctly ascertained its close relationship with *Negomphoides annectens* but demurred to draw a final conclusion about its specific difference from this species, because his single pair of *N. regularis* was in a poor condition. Now I have before me some fully mature specimens of this species from Santa Catarina (Nova Teutonia) and these individuals can be compared very well with a fully mature male of *N. annectens* from the same locality. The most striking morphological differences in the male of these two species are found in the configuration of the caudal appendages and the tip of the penis. The superior caudal appendage of *N. regularis* is much stouter as clearly appears from the accompanying figures. The branches of the inferior appendage and the cornua of the penis are shorter than those of *N. annectens*. The pterothorax of the specimens of *N. regularis* from Santa Catarina has a very peculiar colour pattern: blackish with brown and white-green stripes. In this respect *N. regularis* differs considerably from *N. annectens*.

The specimens of *Negomphoides regularis* from Santa Catarina differ in some details from the holotype male and allotype female of this species in the Brussels Museum. The following differences are found: In the male from Santa Catarina the branches of the inferior caudal appendage and the basal tooth of the end segment of the penis are stouter. The tibial keel of the anterior tibia is distinctly longer than one-third of the length of the tibia, in the holotype distinctly shorter than one-third of the length of the tibia. The pale markings of the pterothorax are more extended in the holotype than in the specimens from Santa Catarina. In the holotype the mesothoracic "half collar" is very broad, the mid-dorsal carina and the

areas along this carina are pale, and the metepimeron is largely pale. I think that these extensions are not due to immaturity. In the specimens from Santa Catarina the mesothoracic "half collar" is narrow, the mid-dorsal part of the pterothorax is pale only on the

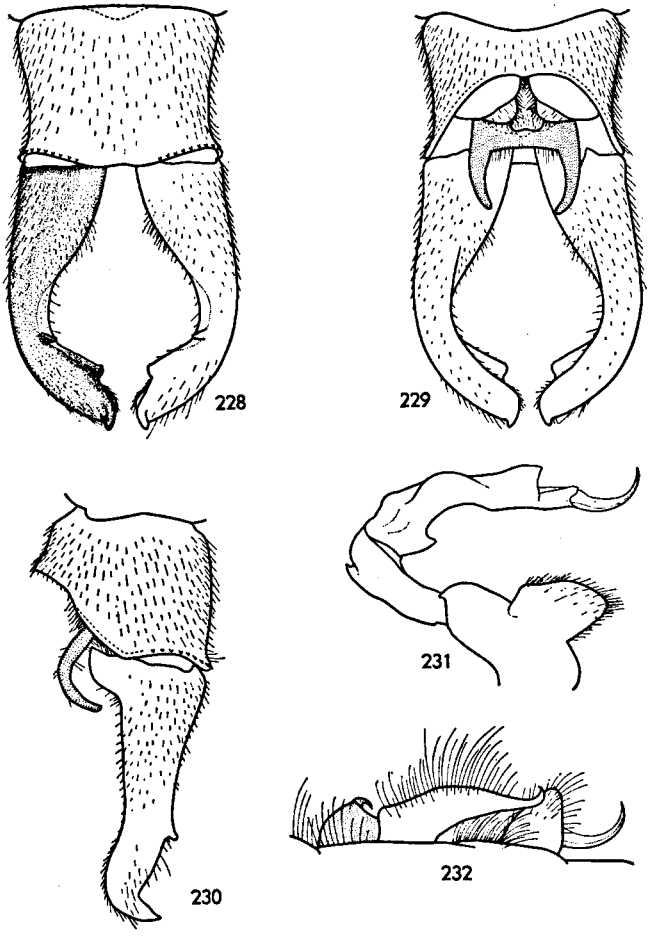
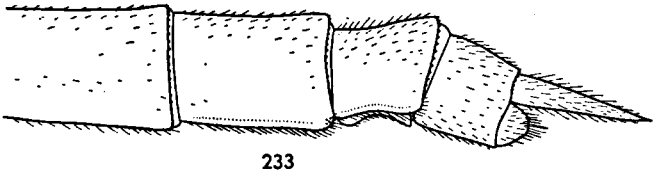


Fig. 228–232. *Negomphoides regularis* (Selys). – 228. Tenth abdominal segment and caudal appendages of male from Santa Catarina, dorsal view. – 229. The same, ventral view. – 230. The same, left lateral view. – 231. Penis of male from Santa Catarina, right lateral view. – 232. Genitalia of second abdominal segment of male from Santa Catarina, right lateral view.

extreme margin of the mid-dorsal carina, and the pale stripe on the metepimeron is about as wide as the blackish stripe along the slanting hind border. But the allotype female differs from the holotype male by the much narrower, pale, second antehumeral stripe immediately in front of the humeral suture, and by the incomplete, pale stripe on the metepisternum. The latter stripe is well-developed and very broad in the holotype. Thus we see that there is some variability in the extent of the pale stripes.

The subtriangle of the hind wing of the holotype male and allotype female is two-celled; it is open in the six specimens from Santa Catarina before me, except in the right hind wing of one of the males. This subtriangle is two-celled. The tendency to have an open subtriangle in the hind wing is apparently great in the specimens from Santa Catarina.

The species *Negomphoides regularis* is redescribed below from a fully mature pair.



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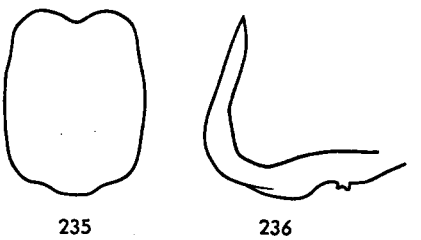

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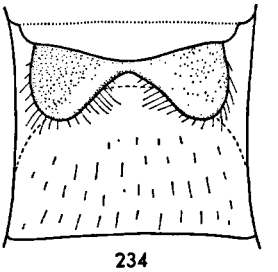

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Fig. 233–236. *Negomphoides regularis* (Selys). – 233. Apical segments of abdomen and caudal appendages of female from Santa Catarina, left lateral view. – 234. Vulvar scale and ninth sternum of female from Santa Catarina, ventral view. – 235. Penis guard of male from Santa Catarina, as seen from front. – 236. The same, right lateral view.

Male – Total length 55.5 mm; length of abdomen 42 mm (including caudal appendages 3 mm); length of hind wing 33.5 mm; costal edge of pterostigma of front wing 3.5 mm.

Mandible brown at tip, pale-greenish at base. Labrum and postclypeus brown in middle, pale-greenish laterally. Anteclypeus pale-greenish. Vertical part of frons brown, pale-greenish near frontal ridge. Superior surface of frons brown, with a broad, pale-greenish frontal band running over entire width of frons. Vertex very dark brown, the area behind post-ocellar ridges pale. Occipital plate dark brown, in the median pale. Posterior margin of occipital plate nearly straight, fringed with brown hairs which are longer than width of occipital plate. Rear of head very dark brown, pale behind occipital plate, yellow on temporae.

Prothorax blackish above, yellowish-green on inferior lateral parts. Dorsum of pterothorax blackish, the white-green, first antehumeral stripes confluent with the white-green, anterior, transverse, mesothoracic "half collar", the latter interrupted in the median. Second antehumeral stripe immediately in front of humeral suture well-developed and brown. Side of pterothorax with a black posthumeral stripe, a white-green stripe in middle of mesepimeron, a black stripe running over interpleural suture, a brown stripe on metepisternum along femoral suture; metepimeron with a black stripe along femoral suture, a white-green stripe in middle and a black stripe along slanting hind border. Metapostepimeron white-green. The stripes are about equal in width, the black stripe along femoral suture somewhat narrower, the brown stripe along this suture somewhat wider. Mesinfraepisternum and metinfraepisternum yellowish.

Femora yellowish-brown, blackened towards knees. Tibiae, tarsi and claws black.

Abdomen predominantly blackish. Mid-dorsum and sides of segments one and two yellowish. Genital hamules yellowish, blackish at tips. Hood of penial peduncle yellowish. Segments three to seven with baso-lateral, subquadrangular, yellowish spots. Side of segments eight and nine with brown-yellow, the narrow, lateral dilatation black. Segment ten predominantly yellowish-brown but mid-dorsum very dark brown. Segment ten deeply excavated below and nearly three times as long mid-dorsally as mid-ventrally. Superior caudal appendage yellowish-brown, the inner surface pale at level of superior tooth, tip of basal inferior tooth yellow. Inferior appendage also yellowish-brown.

Venation of wing dark brown but frontal margin of costa with an inconspicuous yellow line. Pterostigma yellowish-brown, surmounting 5½–6½ cells. Antenodal and postnodal cross veins of first series 11:17–17:13/13:13–13:14 in front and hind wings, respectively. Second primary antenodal cross vein the sixth in right front wing, seventh in other wings. Intermedian cross veins 8–8/5–5 in front and hind wings, respectively. Distal side of triangle angulated. Triangle of front wing three-celled, the cross veins tri-radiate from centre. Supratriangle of each wing, subtriangle of front wing and triangle of hind wing two-celled. Subtriangle of hind wing open. Trigonal interspace starting with three cells against triangle, followed by two rows of cells. Anal loop in hind wing well-defined by convergence of A1 and A2 at its rear and three-celled, the cross veins tri-radiate from centre. Distal portion of A2 forked and strongly convergent with A3. Four rows of cells behind Cu2 in hind wing. Five paranal cells in hind wing. Six (left) and five (right) postanal cells in hind wing. Anal triangle in hind wing made up of five cells (one of the cells small).

Female (abdomen broken between the segments 1–2 and 5–6) – Total length

55 mm; length of abdomen 41.5 mm (including caudal appendages 2.7 mm); length of hind wing 34 mm; costal edge of pterostigma of front wing 3.8 mm.

Coloration similar to male but face entirely pale, the 7-marks on dorsum of pterothorax light green, the apical segments of abdomen more yellowish, and the caudal appendages (stylets) yellow. Sides of abdominal segments 8 and 9 yellowish-brown. Ventral tergal margin of abdominal segment 8 dilated to a very narrow strip of which the apical two-thirds dark brown. Ventral tergal margin of abdominal segment 9 yellowish. Abdominal segment ten yellowish-brown, its hind margin armed with black denticles at level of bases of stylets. Stylet about one and a half times as long as abdominal segment ten, its acutely pointed tip darkened. Vulvar scale deeply V-shaped excised for about four-fifths of its length, the rounded lobes reaching backward to a point nearly half way along ninth sternum.

Venational features very similar to male. Antenodal and postnodal cross veins of first series 12:15–17:14/14:11–12:15 in front and hind wings, respectively. Second primary antenodal cross vein the sixth in left wings, seventh in right wings. Intermedian cross veins 8–7/5–5 in front and hind wings, respectively. Trigonal interspace starting with three cells against triangle, followed by two rows of cells. Supratriangle of each wing two-celled. Triangle of front wing three-celled, the cross veins tri-radiate from centre. Subtriangle of front wing and triangle of hind wing two-celled. Subtriangle of hind wing open. Anal loop in hind wing four-celled. Five rows of cells behind Cu2 in hind wing. Six paranal cells and six postanal cells in hind wing.

BRAZIL: Santa Catarina (Nova Teutonia), 6.XII.1950, ♂, and 18.XII.1948, ♀; material described above. Other specimens from the same locality: 18.XII. 1948, 1 ♂; 8.XI.1949, 1 ♀ (teneral); 3.XII.1950, 1 ♂; 16.I.1951, 1 ♂. Specimens in the Museum Alexander Koenig in Bonn.

Negomphoides andromeda (Selys, 1869)

Fig. 237–247, 256; Pl. XIXb, XXa, XXIc

This species was described from BRAZIL by SELYS under *Cyclophylla andromeda* (Bull. Acad. Belg. *28*, p. 194) and it has not again appeared in the literature until the pattern of its thorax was compared with that of *Phyllocycla bartica* by CALVERT in 1948 (Zoologica N.Y. *33*, p. 66; *andromache* is a lapsus calami pro *andromeda*). The description was based on a single female taken at "Caripi sur l'Amazone, par M. Bates" in the Brussels Museum. The generic reference to *Negomphoides* is self-evident now the corresponding male and larva are known from Surinam. The holotype female, which I have been able to examine and to compare with similar specimens from Surinam, is in a fairly good condition, although the left hind wing is missing, whereas the apex of the abdomen has been destroyed by a skewer which has been passed from the rear through the abdomen to

give it additional support. The apical segments 9 and 10 are retracted in the abdomen and the important vulvar scale of the eighth sternum is broken off. The segments 9 and 10 (and the right anal appendage) are only partly visible in a side view of the abdomen, segment 9 more than segment 10.

The antenodal and postnodal cross veins of the first series of the holotype female are 9:17–17:8/?:?–12:11 in front and hind wings, respectively. The second primary antenodal cross vein is the sixth. The intermedian cross veins are 8–9/?–6 in front and hind wings, respectively. The pterostigma has 5 to 6 underlying cells. All triangles, subtriangles and supratriangles are two-celled except for the subtriangle of the hind wing, which is open. The remaining right hind wing has 4 paranal cells, 4 postanal cells and no distinct anal

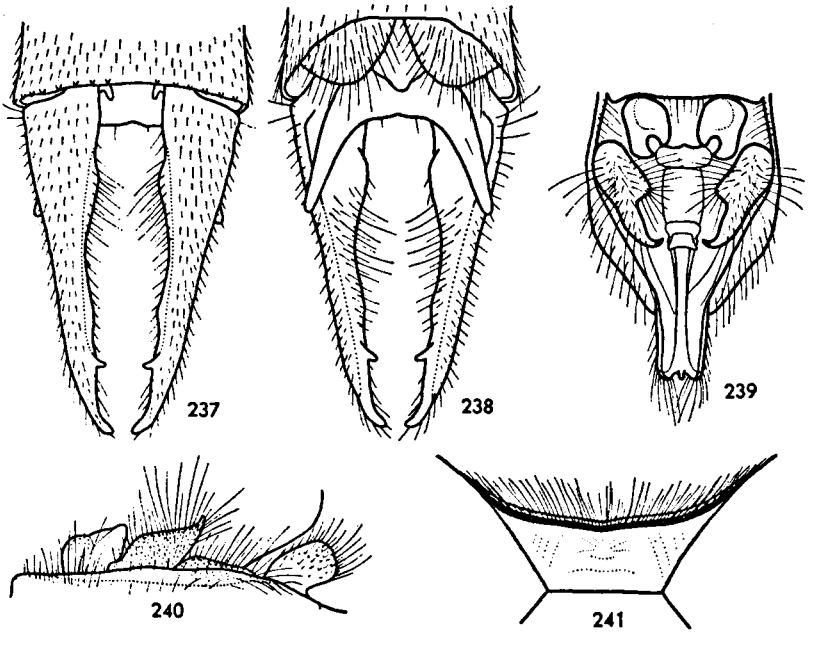


Fig. 237–241. *Negomphoides andromeda* (Selys) from Surinam. – 237. Caudal appendages of allotype male, dorsal view. – 238. The same, ventral view. – 239. Genitalia of second abdominal segment of allotype male, ventral view. – 240. The same, right lateral view. – 241. Occipital plate of allotype male, dorsal view.

loop. The holotype female bears the pinlabels "80" and "Cycl. andromeda ♀ S.", the latter in SELYS' handwriting.

Negomphoides andromeda is the smallest representative of the genus *Negomphoides* hitherto recorded. In colour pattern it differs from all other *Negomphoides* species by the almost entire or entire absence of the pale, transverse, anterior, mesepisternal stripe. The superior caudal appendage of the male is peculiar because of the bulbous, basal, inferior swelling.

Male (allotype; abdomen broken between the segments 4 and 5) – Total length 50 mm; length of abdomen 39 mm (including caudal appendages); length of hind wing 26 mm; costal edge of pterostigma of front wing 3.6 mm.

Head brown, the following greenish-yellow: base of mandibles and adjacent part of genae, lateral border of labrum, facial lobes of anteclypeus, antero-superior surface of frons for its entire width, upper edge of scapes and of pedicels. Posterior margin of occiput, slightly emarginated in the median and fringed with long brown hairs.

Prothorax brown, the hind collar darker brown.

Pterothorax brown (the dorsum darker brown), striped with greenish-yellow; its pattern is as shown in the diagram (Fig. 256). There is no pale marking immediately in front of humeral suture.

Femora brownish, the inner sides of first pair of femora greenish-yellow. Tibiae, tarsi and claws black.

Abdomen brownish on segments 1 and 2; these segments with greenish-yellow along inferior lateral margins, with a mid-dorsal, posterior spot of yellow on 1, and with superior surface of auricles on 2 greenish-yellow. Segments 3 to 10 blackish, the following greenish-yellow: a subquadrangular basal spot on each side of segment 3 reaching to submedian, transverse carina, the spots confluent on mid-dorsum; segments 4 to 7 with baso-lateral, subtriangular spot, that on 4 and on 7 about one-sixth of length of segment, that on 5 about one-seventh of length of segment and that on 6 about one-eighth of length of segment. There is a trace of yellow on side of segments 8 and 9. Inferior lateral margin of segments 8 and 9 dilated to narrow strips. Anal appendages blackish.

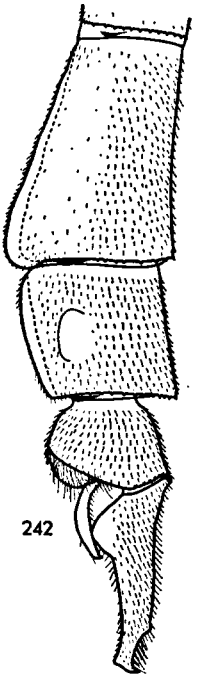
Genitalia of second abdominal segment and anal appendages shaped as shown in accompanying figures. Penis guard with a small, apical, median notch. Tip of penis ending in two, slender cornua. Posterior cleft of hood of penial peduncle with a long, slender, median tooth on bottom. Inferior anal appendage strong; it is deeply U-shaped excised with the strong branches divergent. Upcurved tip of branches reaching to just beyond inferior basal swelling of superior appendage.

Wings hyaline, the extreme bases brownish-yellow tinged. Venation dark brown including costa and nodus. Pterostigma brown, surmounting five cells. Basal subcostal cross vein present. Antenodal and postnodal cross veins of first series 10:17–17:12/11:12–12:10 in front and hind wings, respectively. Second primary antenodal cross vein the sixth in right front wing, the fifth in other wings. All triangles, subtriangles and supratriangles two-celled except for subtriangle in hind wing, which is open. Anal field of front wing proximal to triangle with one doubled cell. Front wing with area posterior to Cu2 two cells wide. Intermedian cross veins 8–8/6–7 in front

and hind wings, respectively. Four paranal cells and four postanal cells in hind wing. Three rows of cells behind Cu2 in hind wing. Anal loop ill-defined and two-celled. Anal triangle in hind wing four-celled.

F e m a l e – Total length 49 mm; length of abdomen 38.5 mm; length of hind wing 28 mm; costal edge of pterostigma of front wing 3.8 mm.

Colour pattern similar to that of male but pale markings of abdomen more extensive and side of abdominal segments 1 and 2 largely greenish-yellow. Posterior margin of occiput also slightly emarginated in the median and fringed with long brown hairs. Abdomen stouter than that of male, the two basal segments swollen, thence slightly widening to apex of segment 8, segments 9 and 10 successively narrower. Inferior lateral margin of segments 8 and 9 dilated to a very narrow strip, that of segment 9 narrower. Vulvar scale reaching to a point about one-fifth of way along ninth sternum, its posterior margin deeply V-shaped excised, the excision about two-thirds of length of vulvar scale. Pterostigma covering 5–5½ cells. Antenodal and postnodal cross veins of first series 12:18–19:12/11:12–13:12 in front and hind wings, respectively. Second primary antenodal cross vein the fifth in left



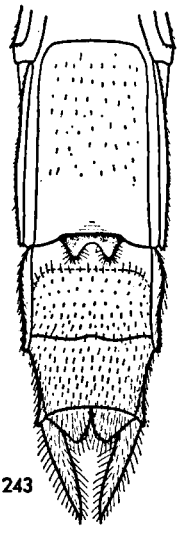


Fig. 242–243. *Negomphoides andromeda* (Selys) from Surinam. – 242. Apical segments of abdomen and caudal appendages of allotype male, left lateral view. – 243. Apical segments of abdomen and caudal appendages of female, ventral view, showing vulvar scale.

hind wing, the sixth in other wings. All triangles, subtriangles and supratriangles two-celled except for subtriangle in hind wing, which is open. Anal field of front wing proximal to triangle with a doubled cell, the area posterior to Cu2 two or three cells wide. Intermedian cross veins 8–10/6–7 in front and hind wings, respectively. Four paranal cells in each hind wing. Three postanal cells in left hind wing, four in right hind wing. Three rows of cells behind Cu2 in hind wing, but left hind wing with two extra cells forming a fourth row. Anal loop of hind wing i^{1}-defined and two-celled.

SURINAM: Sipaliwini River, 4.II.1961 (D. C. GEIJSKES leg.), allotype male, described above; Lawa River (Stoelmanseiland), 7.IV.1963, 1 ♀, described above; Sipaliwini River, 4.II.1961 (GEIJSKES leg.), 2 ♂♂, 1 ♀. One of the males in the author's collection, the other ones in the Leiden Museum.

In all specimens from Surinam the subtriangle of the hind wing is open as in the holotype female. In the British Museum (N.H.) there is a single female of *N. andromeda* which has this subtriangle two-celled in the right hind wing and open in the left hind wing. I found this specimen placed under *Phyllocycla* without any reference to its specific status. The female bears the pinlabel "Breves Lower Amazon. 12.I.96 E. E. Austen. 96–80".

LARVA of NEGOMPHOIDES ANDROMEDA (reared)

A fair number of larval cast-off skins in my collection and brought together from nearly all Surinam rivers pertain to *Negomphoides*

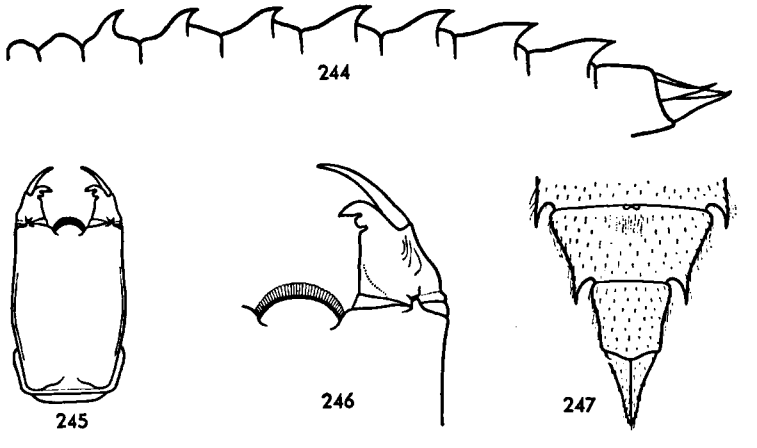


Fig. 244–247. *Negomphoides andromeda* (Selys) from Surinam. – 244. Skyline of abdomen and caudal appendages of larval exuvia, left lateral view. – 245. Labium of larval exuvia, external view. – 246. Left lateral and median lobe of labium of larval exuvia, external view. – 247. Apical segments of abdomen and caudal appendages of larval exuvia, ventral view.

andromeda. The specific reference of these exuviae to this species was determined by the small size of the specimens and by exclusion of its allies so far as known, and later confirmed when I examined some individuals that were taken in transformation by Dr. GEIJSKES; one of which, a male specimen (the adult dried preserved in a triangular envelope together with the empty larval skin from which it came) was added to my collection. The insect was found emerging against the outer side of a wooden boat through which the larva had been able to climb for its transformation, at 9 p.m. Locality data: Surinam, Coeroeni River (Coeroeni Island), 24.IX.1959.

The exuvia of *Negomphoides andromeda* is identical with the exuvia collected by WILLIAMSON in 1912 in adjoining Guyana (Tumatumari) and which was described by NEEDHAM in 1941 under *Desmogomphus* Williamson (Trans. Amer. Ent. Soc. *67*, p. 242). The skin from Tumatumari (Cornell University) was preserved in alcohol, with its labium separately on a slide. Two additional larval skins of *N. andromeda* and several others belonging to *N. cristatus* and *N. undulatus*, all from Surinam and all labelled *Desmogomphus* or *Desmogomphus tigrivensis*, also came from Cornell University. They undoubtedly belong to the lot of Gomphine material which NEEDHAM obtained from Surinam in 1943, but were classified wrongly.

The larva of *Negomphoides andromeda* approaches that of *N. undulatus*; it is distinguished by the somewhat smaller size, the form of the tenth abdominal segment, and the relative longer anal appendages. In labial characters it differs by the more thick-set lateral lobe of the mentum of which the inner margin is armed with generally a single, blunt tooth. Of the 25 larval skins of *N. andromeda* which I have examined, one lateral lobe has no tooth, 45 lateral lobes have one tooth, and 4 lateral lobes have two teeth.

Negomphoides cornutifrons (Needham, 1944)

Fig. 248–250

NEEDHAM described *Aphylla cornutifrons* on the basis of a single female specimen from TRINIDAD, collected by Dr. GEIJSKES (Trans.

Amer. Ent. Soc. *69*, p. 194). Another female of this peculiar species is in the Leiden Museum. The specimen is also from Trinidad. It was collected by G. F. MEES at Tacarigua on 23.X.1953. The generic reference of the female to *Aphylla* was presumably based on the following characters: 1) The subtriangle of the hind wing is open; 2) the pterostigma is rather long; 3) vein A2 in the hind wing is nearly parallel with vein A1. But such characters are not distinctive of this genus. The female has no trace of a dorso-apical rim on the tenth abdominal segment, and moreover, the armature of the posterior femur does not resemble that of typical *Aphylla* species, the longest spines in the distal half of the antero-inferior row are in length about one-third of the local width of the femur. I think that the taxonomic position of the female in the genus *Negomphoides* is beyond all doubt. It may later be confirmed by further collecting of the corresponding male and larva.

The female of *Negomphoides cornutifrons* in the Leiden Museum is somewhat smaller than the holotype. Its dimensions are: Total length 49 mm; length of abdomen 37 mm (caudal appendages included); length of hind wing 30 mm; distance on front wing from nodus to pterostigma 9.5 mm; costal edge of pterostigma of front wing 4.2 mm.

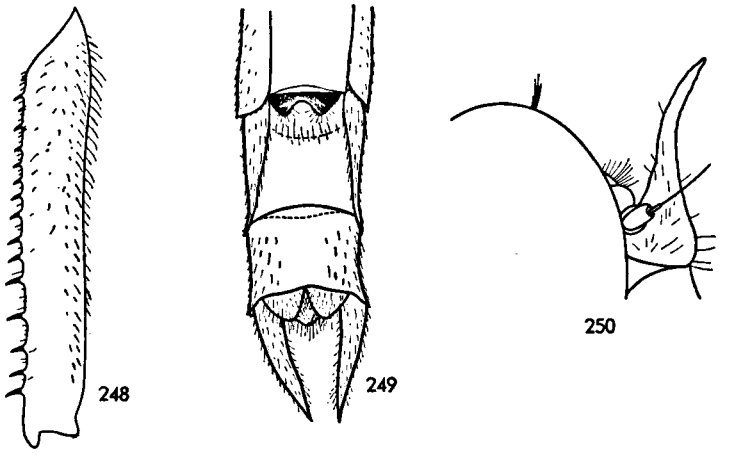


Fig. 248–250. *Negomphoides cornutifrons* (Needham). – 248. Left posterior femur of female, left lateral view. – 249. Apical segments of abdomen and caudal appendages of female, ventral view, showing vulvar scale. – 250. Dorsal part of head of female, right lateral view.

Negomphoides semicircularis (Selys, 1854)

Fig. 251–254, 257

This species is still represented in the Brussels Museum by the single male described by SELYS (Bull. Acad. Belg. *21*, p. 76). Its locality is unknown but the male is in all probability from the western South American, neotropical zone.

The holotype is in a fairly good condition. Its coloring is not faded. The tip of the wings are somewhat damaged except for that of the

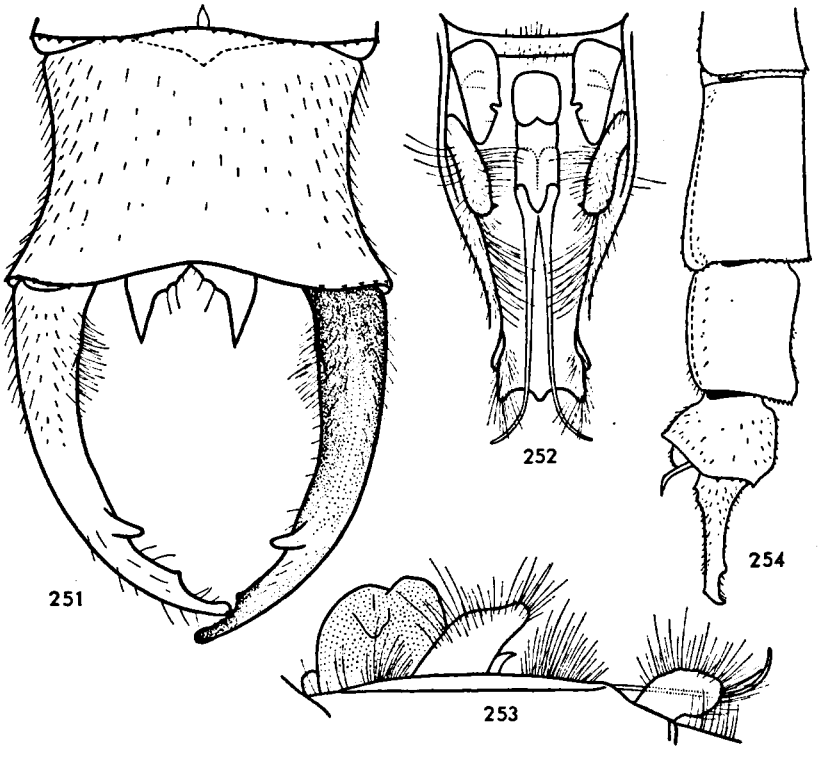
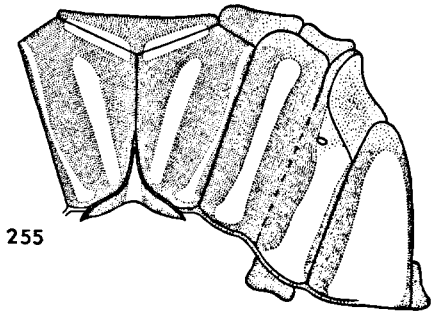


Fig. 251–254. *Negomphoides semicircularis* (Selys). – 251. Tenth abdominal segment and caudal appendages of holotype male, dorsal view. – 252. Genitalia of second abdominal segment of holotype male, ventral view. – 253. The same, right lateral view. – 254. Apical segments of abdomen and caudal appendages of holotype male, left lateral view.



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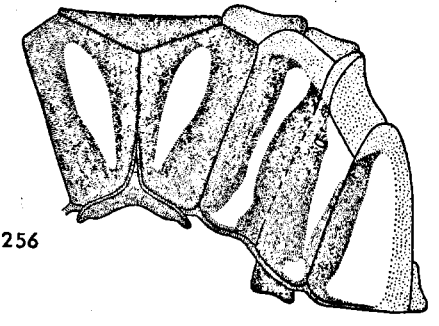

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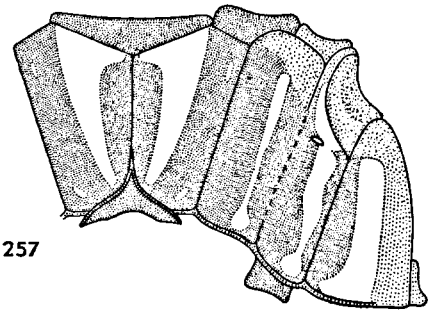

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Fig. 255. *Negomphoides infumatus* (Rambur) from Brazil. – Diagram of pterothorax of holotype male.

Fig. 256. *Negomphoides andromeda* (Selys) from Surinam. – Diagram of pterothorax of allotype male.

Fig. 257. *Negomphoides semicircularis* (Selys). – Diagram of pterothorax of holotype male.

left hind wing. The abdomen, through which a fine wire has been passed, lacks the fourth segment. This segment seems to be broken off. The genitalia of the second abdominal segment and the caudal appendages are well preserved. I made figures of some structures of the holotype and a diagram of the colour design of the pterothorax. If viewed from beneath the inner border of the anterior hamule is slightly curved and possesses a small but rather deep, subapical notch. The tip of the posterior hamule bends slightly inward and ends in a short tooth. The tip of the penis guard is medially emarginated. The tip of the penis bears a pair of long cornua, which reach to well beyond the hood of the penial peduncle. The holotype male was not used by FRASER for the figure of the penis of this species (Tr. Ent. Soc. Lond. *90*, pl. 6, fig. 5). The hood of the penial peduncle is deeply cleft at its rear; from the bottom of the cleft rises a rather strong tooth.

Some venational features of the holotype male are: Basal subcostal cross vein present. Antenodal and postnodal cross veins of first series 14:20–22:13/13:16–16:14 in front and hind wings, respectively. Second primary antenodal cross vein the seventh. Intermedian cross veins 12–12/7–9 in front and hind wings, respectively. Triangle of left front wing two-celled, of other wings three-celled, the dividing cross veins tri-radiate from centre. Subtriangle two-celled but that of left front wing three-celled with the dividing cross veins parallel. Supratriangle with two cross veins. Trigonal interspace starting with two rows of cells, and with an extra initial cell at hind angle of triangle in hind wing but with none in front wing. Anal loop of hind wing well-defined by strong convergence of A1 and A2 at its rear and three-celled, the dividing cross veins tri-radiate from centre. Distal portion of A2 strongly convergent with A3 and forked. Hind wing with 5 paranal cells and 6 postanal cells. Anal triangle in hind wing made up of four cells.

Negomphoides lieftincki spec. nov.

Fig. 258–264

Five males and thirteen females of a new species of *Negomphoides* were kindly lent me for examination and description, viz.: two males and one female from Perú by the Leiden Museum; another Peruvian male by the Senckenberg Museum; and two males and eleven females from Bolivia by the Museum Alexander Koenig (ex coll. BUCHHOLZ) in Bonn.

The male of this species superficially shows considerable resem-

blance to the male of *N. semicircularis* but it can readily be distinguished from it by having the anterior, genital hamule much smaller and of a different form, and by having the green marking on the metepimeron extending rearward to the slanting hind border (in *N. semicircularis* a green stripe passes through the median part of the metepimeron).

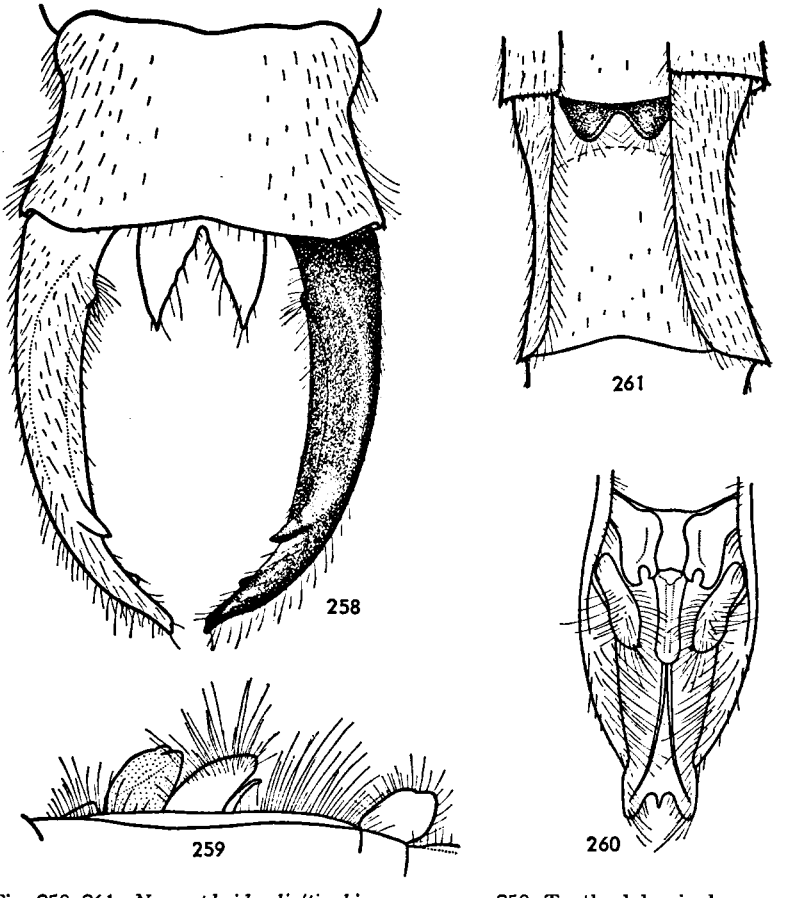


Fig. 258–261. *Negomphoides lieftincki* spec. nov. – 258. Tenth abdominal segment and caudal appendages of holotype male, dorsal view. – 259. Genitalia of second abdominal segment of holotype male, right lateral view. – 260. The same, ventral view. – 261. Vulvar scale and ninth abdominal segment of allotype female, ventral view.

The subtriangle in the hind wing is open or crossed. In four males and five females it is open in both hind wings, in three females open in one hind wing and two-celled in the other, and in one male and five females two-celled in both hind wings. The subtriangle of the hind wing is three-celled in one of the Bolivian females.

In the single male of *N. camposi* (Calvert) from adjoining Ecuador (Ann. Carnegie Mus. *6*, p. 219) the subtriangle of the hind wing is also open but this gomphid has a long, strong, acute inferior spine at two-fifths of the length of the superior caudal appendage of the male; no such spine is present in the male of my new species.

Male (holotype) – Total length 53 mm; length of abdomen 41.5 mm (including caudal appendages 2.7 mm); length of hind wing 33 mm; costal edge of pterostigma of front wing 3.8 mm.

Face preponderantly dark brown, the following yellow: basal half of mandibles, a pair of spots on labrum, upper part of anteclypeus, and lateral sides of postclypeus. Superior surface of frons largely yellow including anterior transverse ridge, base of superior surface with a narrow band of dark brown. Vertex with the low ridges posterior to each of lateral ocelli anteriorly united by a transverse ridge, and there is a broad, transverse fold immediately in front of occipital plate. Vertex dark brown but concavity between paired, post-ocellery ridges yellow. Occipital plate largely yellow, the lateral borders brown; posterior margin fringed with blackish hairs which are about as long as three-fourths of width of occipital plate. Rear of head dark brown but yellow behind occipital plate and on lower parts of temporae.

Prothorax brown, with a greenish-yellow twin-spot in middle of median lobe.

Pterothorax blackish with greenish-yellow stripes; its pattern shaped as shown in diagram Fig. 263. Pale, first antehumeral stripe not connected with transverse, anterior, mesothoracic "half collar", thus not forming the figure "7". Green marking on metepimeron extending rearward to slanting posterior border. Mid-dorsal carina with a greenish-yellow median line running over its entire length. Pterothorax greenish-yellow below.

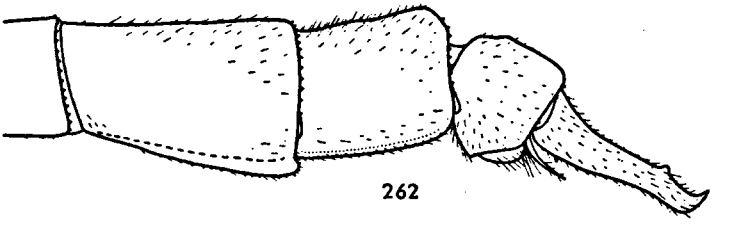
Femora brownish, the inner sides of first two pairs of femora yellowish. Tibiae, tarsi and claws black. Tibial keel of anterior tibia one-fifth of length of tibia.

Wings clear. Venation blackish, including frontal margin of costa. Pterostigma clear brown, surmounting 5½ cells in hind wing and 6½ cells in front wing. Basal subcostal cross vein present. Antenodal and postnodal cross veins of first series 15:20–21:14/16:15–15:16 in front and hind wings, respectively. Second primary antenodal cross vein the seventh. Intermedian cross veins 10–12/7–7 in front and hind wings, respectively. Supratriangle of left wings two-celled, of right wings three-celled. Each wing with a three-celled triangle and a two-celled subtriangle. Anal loop in hind wing consisting of 3 cells and sharply defined by convergence of A1 and A2 at its rear. A1 and A2 strongly divergent behind anal loop, the distal portion of A2 strongly convergent with A3. Second anal interspace of hind wing filled with a single row of four cells which rearward diminish in size. Five paranal cells and five postanal cells in each hind wing. Anal triangle in hind wing made up of four cells.

Abdomen moderately expanded on the two basal segments, from near the base of

segment 3 to middle of segment 7 thin, thence again gradually widening in lateral dimension to apex of segment 8. Coloration of abdomen black, marked with yellow as follows: Segments 1 and 2 with a longitudinal, mid-dorsal spot, the side of the segments mainly yellow including auricle. A fine mid-dorsal line on segments 3, 4 and 5. Sides of segments 3 to 6 with a subtriangular basal spot, that on 3 about two-fifths of length of segment, the spots on the segments thereafter successively diminishing in length, being on 6 less than one-fifth of length of segment. Side of segment 3 with an extra posterior spot. Side of segment 7 with a subquadrangular basal spot extending from base to a point at one-third of way along segment. Segment 8 narrower in lateral dimension on its basal one-fifth portion, the side of this part washed with yellow. Baso-lateral spots on all segments not united on mid-dorsum. Sides of segments 8 and 9 with yellow; the narrow lateral dilatation of segment 8 yellow on its basal three-fifths portion. Posterior margin of segments 7, 8 and 9 with a mid-dorsal excision, which is largest on segment 9. Segment 10 with a mid-dorsal ridge. Caudal appendages black, the superiors yellowish on inner side at and near internal tooth. Superior caudal appendage with a small but distinct, inferior basal spine. Genitalia of second abdominal segment and caudal appendages shaped as shown in accompanying figures.

Female (allotype; antennae wanting) – Total length 52 mm; length of abdomen 38.5 mm (including caudal appendages 1.9 mm); length of hind wing 34.5 mm; costal edge of pterostigma of front wing 4.1 mm.



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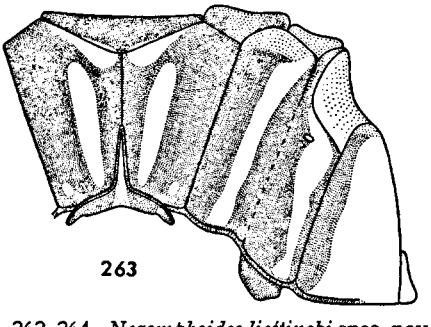

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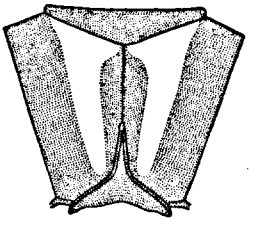

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Fig. 262–264. *Negomphoides lieftincki* spec. nov. – 262. Apical segments of abdomen and caudal appendages of holotype male, left lateral view. – 263. Diagram of pterothorax of holotype male. – 264. Diagram of dorsum of pterothorax of paratype male from Iquitos, showing the inconstancy of the colour pattern.

Similar to male except for abdomen. This stouter than that of male, from near the base of segment 3 to apex of segment 7 very little widened in lateral dimension, the segments thereafter successively narrower. Basal marking of segments 2 to 6 continuous, that on segment 7 extending to beyond mid-length of segment. Side of segment 8 with a distinct yellow spot, the very narrow, lateral dilatation pale on its basal three-fifths. Segment 10 with touches of yellow on dorsum. Stylet blackish and about as long as ninth segment. Vulvar scale about one-sixth of length of ninth sternum, and not visible in a side view. It is deeply cleft by a V-shaped notch into two bluntly rounded lobes, bottom of notch round.

Pterostigma surmounting 5½ cells in front wing and 6½ cells in hind wing. Antenodal and postnodal cross veins of first series 12:19–19:13/15:14–14:14 in front and hind wings, respectively. Second primary antenodal cross veins the seventh in left front wing and right hind wing, the sixth in other wings. Intermedian cross veins 9–8/6–6 in front and hind wings, respectively. Supratriangle, subtriangle and triangle two-celled except for triangle in left front wing, which is three-celled, and subtriangle of right hind wing, which is open. Anal loop of hind wing two-celled. Second anal interspace of hind wing filled with two rows of cells. Five (right) and six (left) paranal cells in hind wings. Four postanal cells in each hind wing.

Holotype male: PERÚ, Environs of Tingo Maria on Guayaga R. (700 m), 1962 (L. GÓMEZ ALONSO leg.); allotype female: Perú, Dept. Huanuco, Huallaga R. area (6–700 m), Río Rondos, X.62–XI.63 (L. GÓMEZ ALONSO leg.). Holotype male and allotype female in the Leiden Museum.
Paratypes: Perú, Dept. Huanuco, Huallaga R. area (6–700 m), Tingo Maria, II–IV.1964, 1 ♂ (L. GÓMEZ ALONSO leg.), Leiden Museum; Perú, Mishuyacu, Iquitos (Amaz.), 18.III.1930, 1 ♂ (KLUG leg.), Senckenberg Museum (No. 14475); BOLIVIA tropica, Región Chaqare, 400 m, 2.IV.1949, 1 ♂; 25.IV. 1949, 1 ♀; 5.V.1951, 1 ♂, 11 ♀ (R. ZISCHKA leg.), Museum Alexander Koenig in Bonn.

There is some variability within this species. In the male from Iquitos the character of the thoracic markings is quite different and much alike that of the male of *N. semicircularis*. In the specimen from Iquitos the pale, first antehumeral stripe is broadly confluent with the anterior, mesothoracic "half collar", and the green marking on the metepimeron does not extend rearward to the slanting posterior border. The inferior basal spine of the superior caudal appendage of the male from Iquitos is not developed. The posterior genital hamule of the two Bolivian males is somewhat more slender than in the males from Perú.

The species has been named in honor of my excellent colleague Dr. M. A. LIEFTINCK, in appreciation of his encouragement and help in my study of the Odonata.

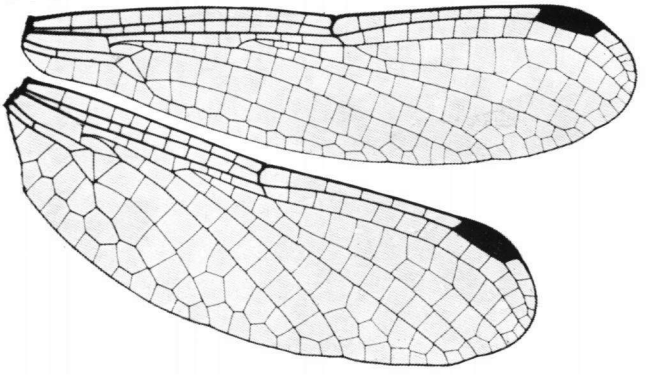


Plate Ia. *Archaeogomphus nanus* Needham from Surinam. Right pair of wings of male.

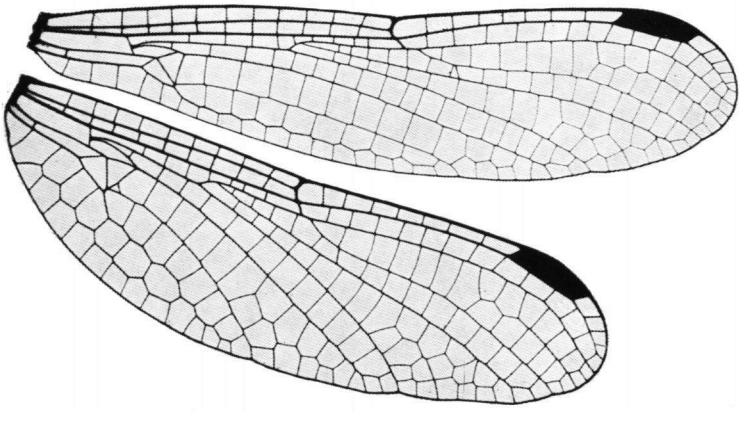


Plate Ib. *Archaeogomphus nanus* Needham from Surinam. Right pair of wings of female.

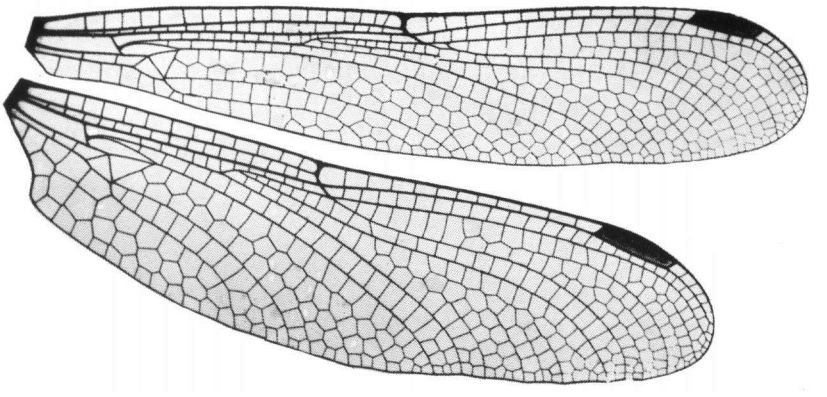


Plate IIa. *Epigomphus hylaeus* Ris from Surinam. Right pair of wings of male.

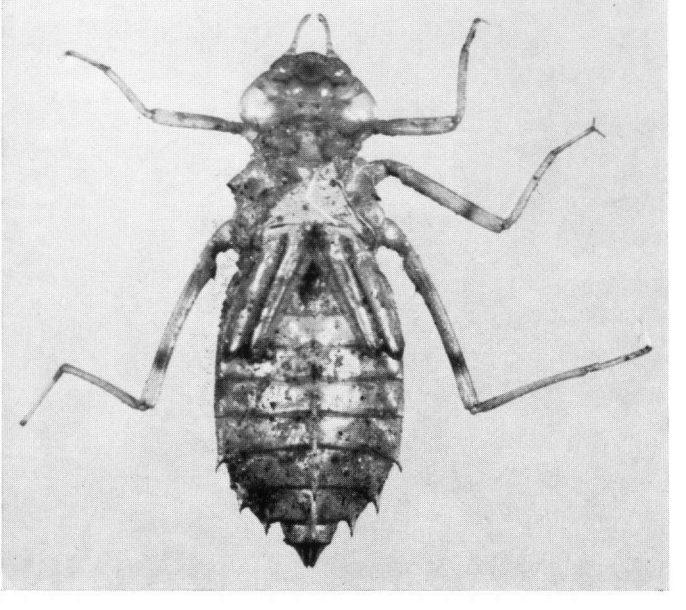


Plate IIb. *Archaeogomphus nanus* Needham from Surinam. Dorsal view of larval exuvia.

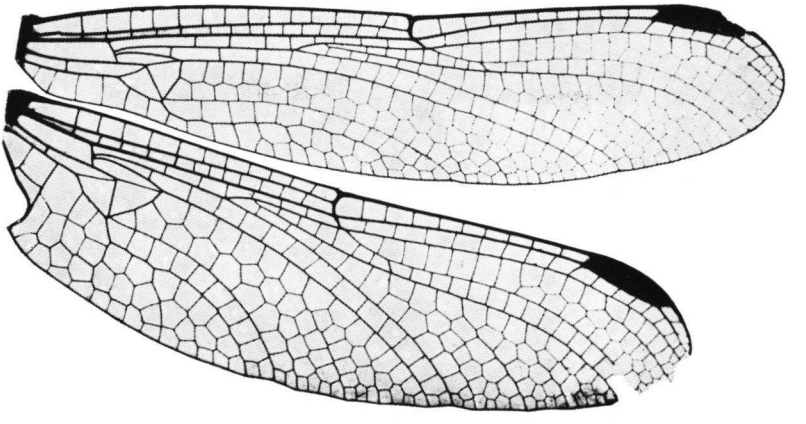


Plate IIIa. *Cyanogomphus waltheri* Selys. Right pair of wings of holotype male.

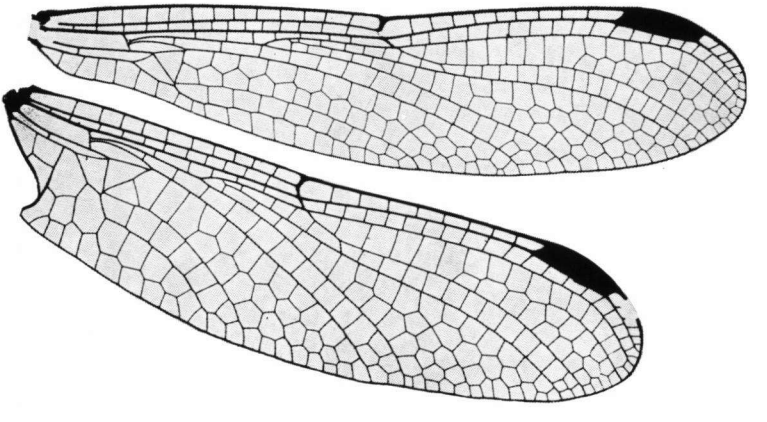


Plate IIIb. *Cyanogomphus minutus* spec. nov. from Surinam. Right pair of wings of holotype male.

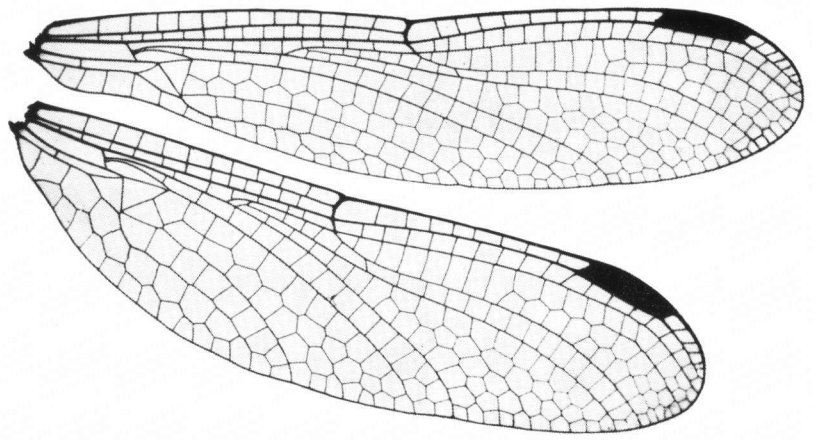


Plate IVa. *Cyanogomphus minutus* spec. nov. from Surinam. Right pair of wings of allotype female.

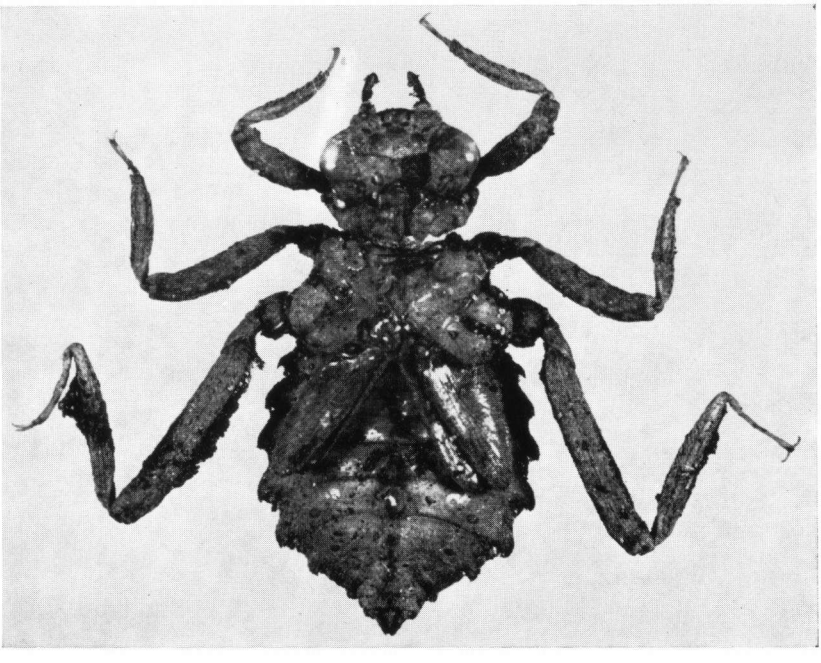


Plate IVb. *Cyanogomphus minutus* spec. nov.? from Surinam. Dorsal view of larval exuvia.

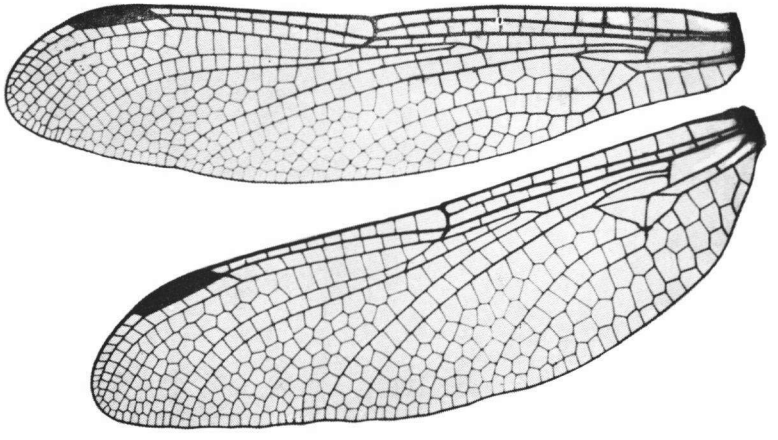


Plate Va. *Cyanogomphus uncatus* Fraser. Left pair of wings of female.

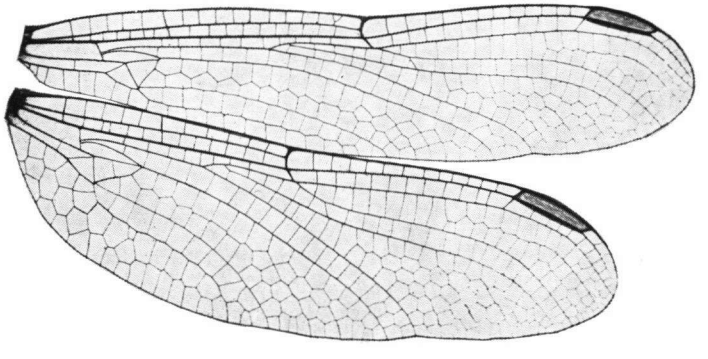


Plate Vb. *Desmogomphus paucinervis* (Selys). Right pair of wings of holotype female.

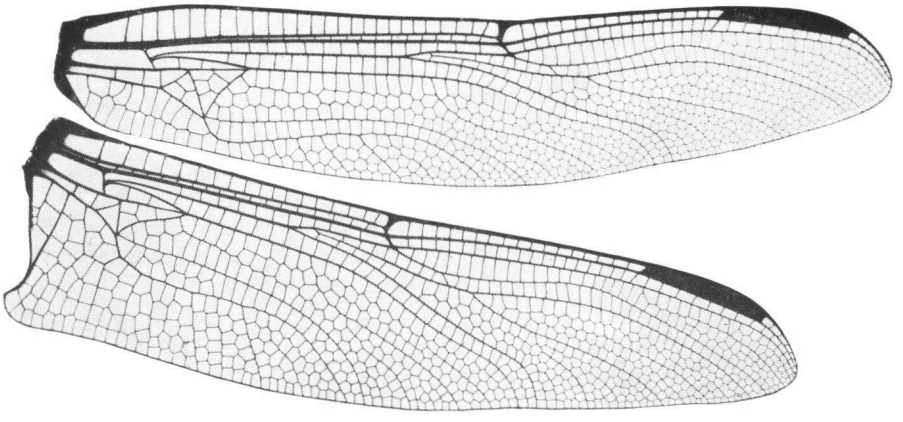


Plate VIa. *Cacoides latro* (Erichson) from Surinam. Right pair of wings of male.

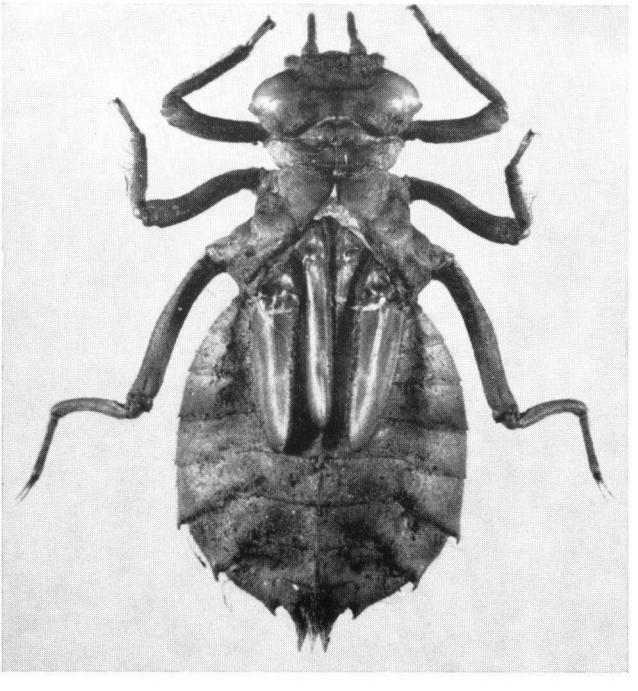


Plate VIb. *Cacoides latro* (Erichson) from Surinam. Dorsal view of larval exuvia.

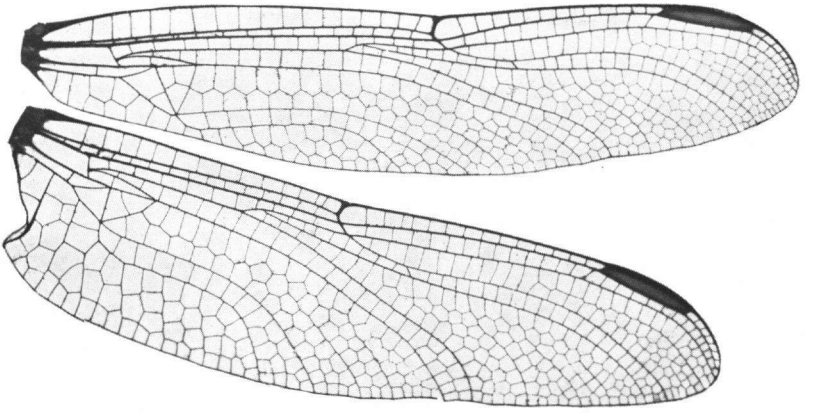


Plate VIIa. *Aphylla brevipes* Selys. Right pair of wings of lectotype male.

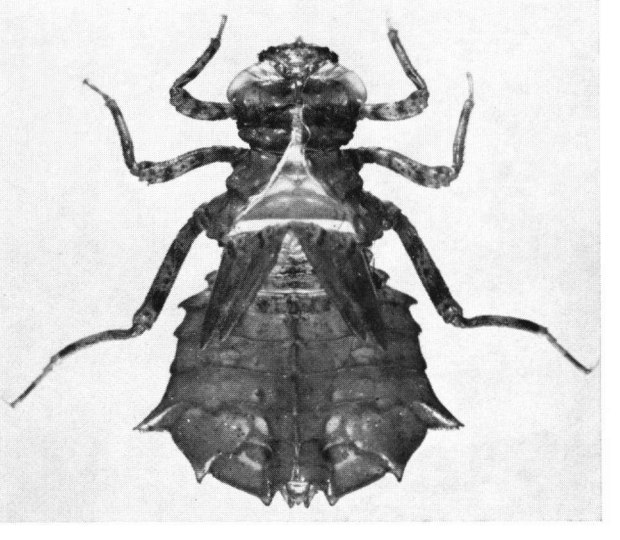


Plate VIIb. *Cacoides mungo* (Needham) from Surinam. Dorsal view of larval exuvia.

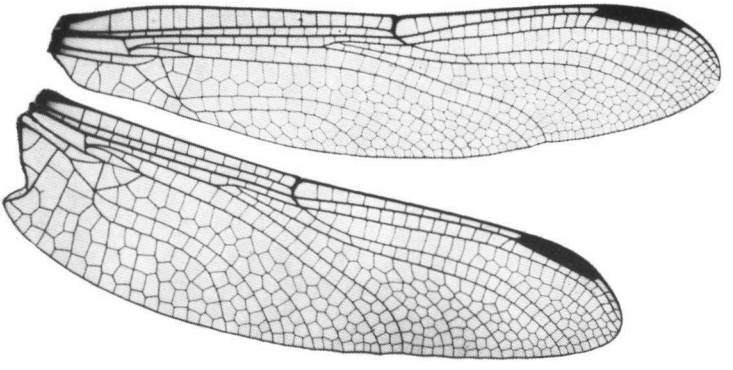


Plate VIIIa. *Aphylla albinensis* spec. nov. from Surinam. Right pair of wings of holotype male.

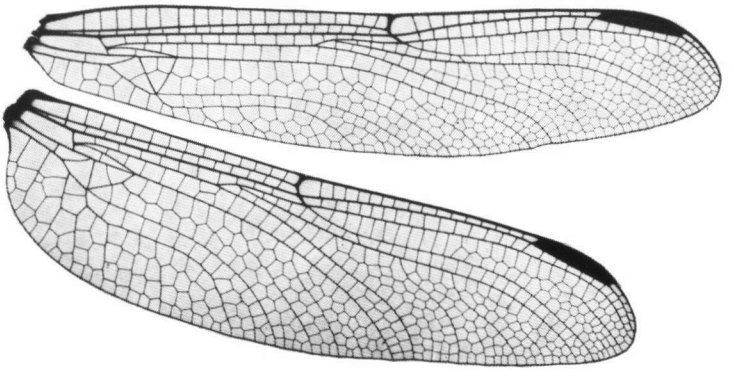


Plate VIIIb. *Aphylla albinensis* spec. nov. from Surinam. Right pair of wings of allotype female.

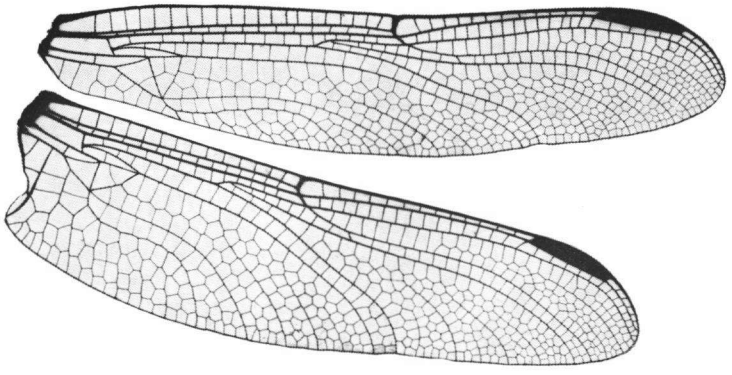


Plate IXa. *Aphylla producta* Selys from Surinam. Right pair of wings of male from Welgedacht A-weg.

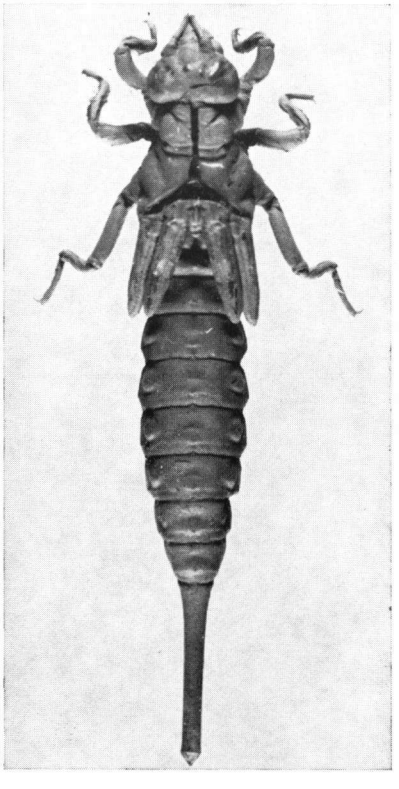


Plate IXb. *Aphylla albinensis* spec. nov.? from Surinam. Dorsal view of larval exuvia.

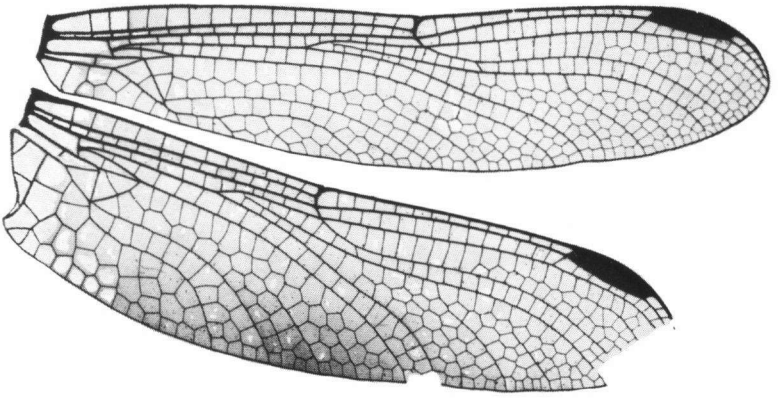


Plate Xa. *Phyllocycla signata* (Hagen in Selys). Right pair of wings of holotype male.

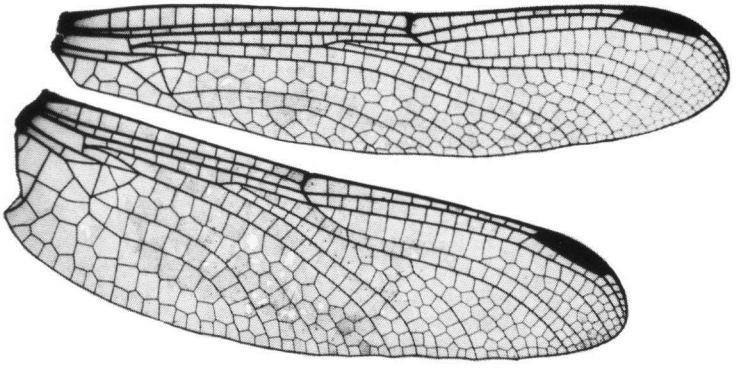


Plate Xb. *Phyllocycla modesta* spec. nov. from Surinam. Right pair of wings of holotype male.

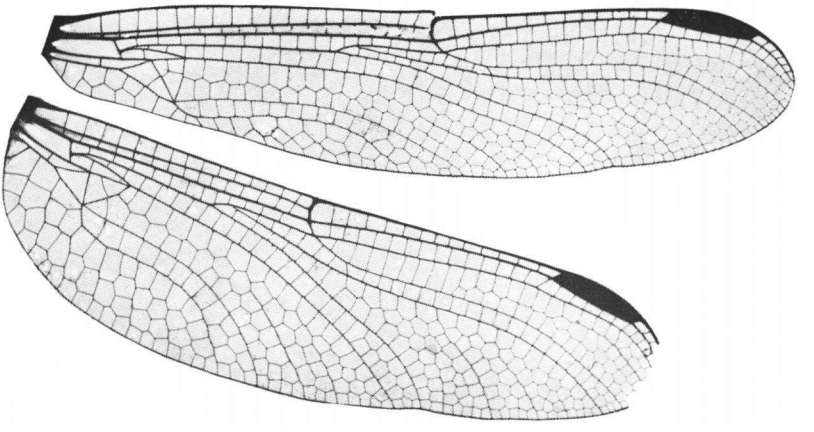


Plate XIa. *Phyllocycla modesta* spec. nov. from Surinam. Right pair of wings of allotype female.

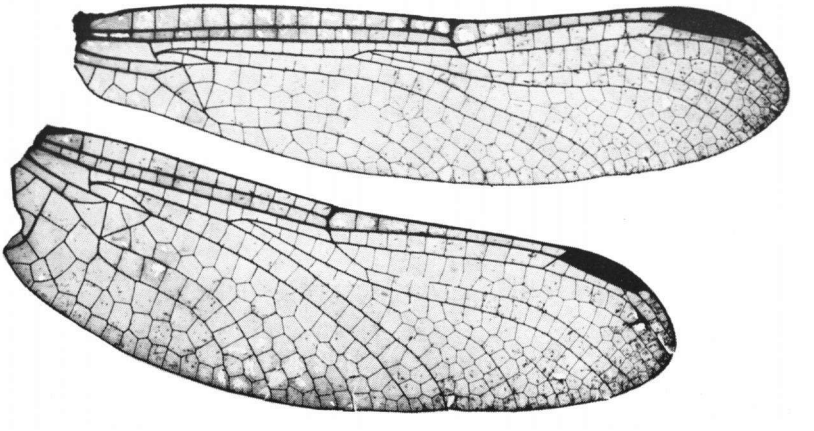
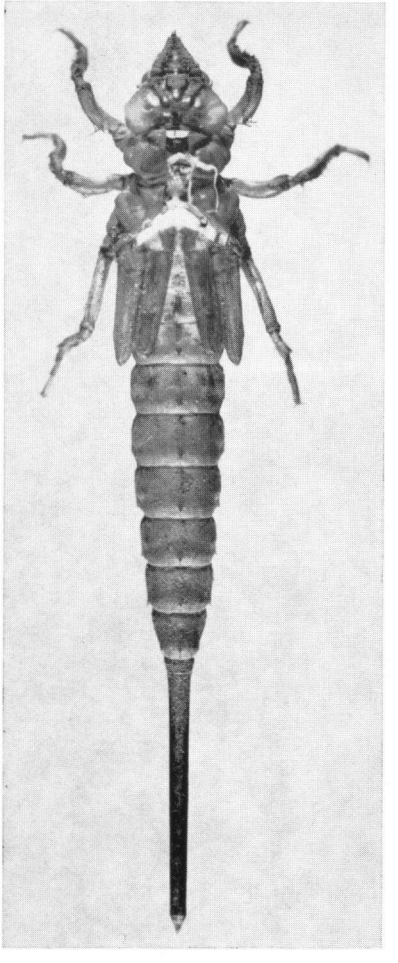


Plate XIb. *Phyllocycla anduzei* (Needham). Right pair of wings of holotype male.



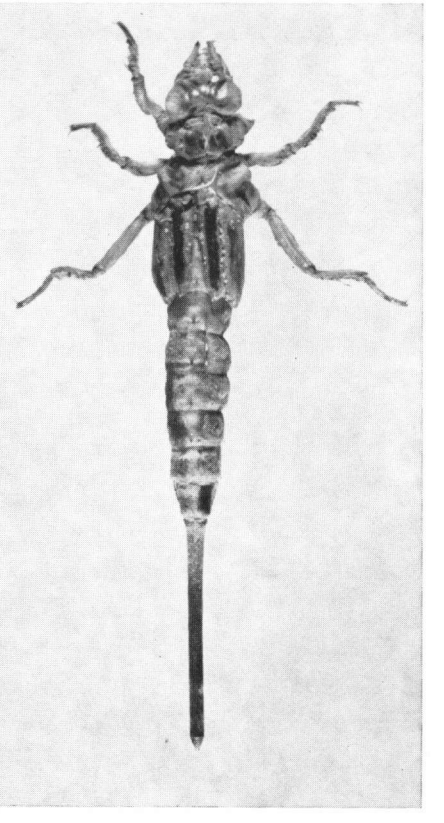


Plate XIIa. *Phyllocycla ophis* (Selys) from Surinam. Dorsal view of larval exuvia.
Plate XIIb. *Phyllocycla modesta* spec. nov. from Surinam. Dorsal view of larval exuvia.

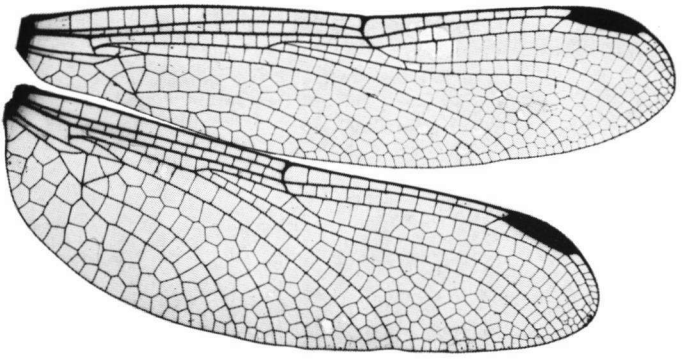


Plate XIIIa. *Phyllocycla anduzei* (Needham). Right pair of wings of allotype female.

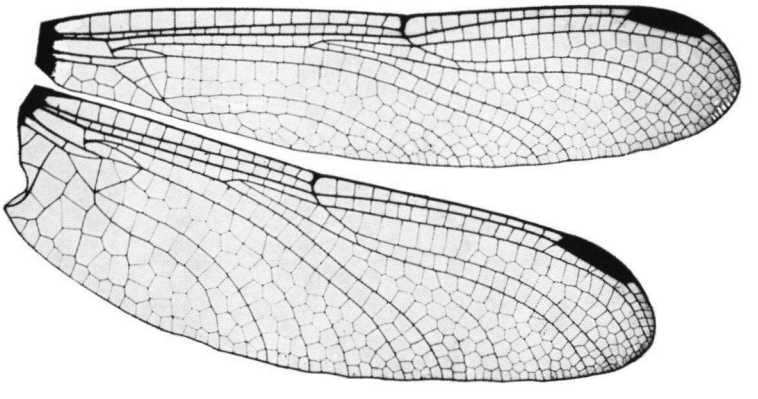


Plate XIIIb. *Phyllocycla neotropica* spec. nov. from Surinam. Right pair of wings of holotype male.

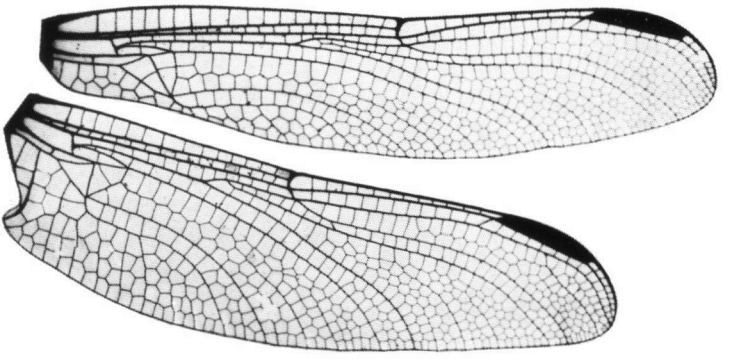


Plate XIVa. *Phyllocycla viridipleuris* (Calvert). Right pair of wings of lectotype male.

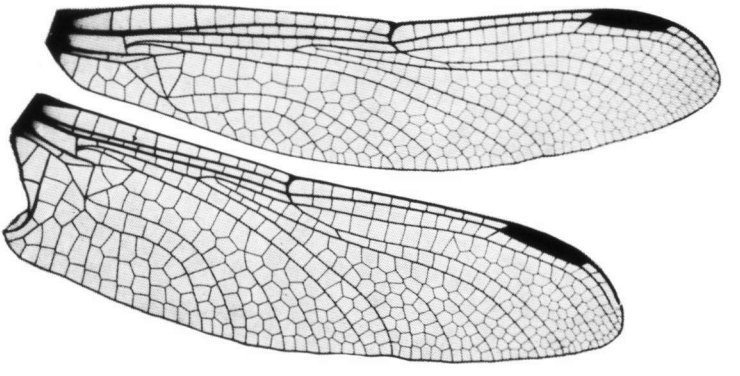


Plate XIVb. *Phyllocycla viridipleuris* (Calvert). Right pair of wings of male from Rio Grande do Sul.

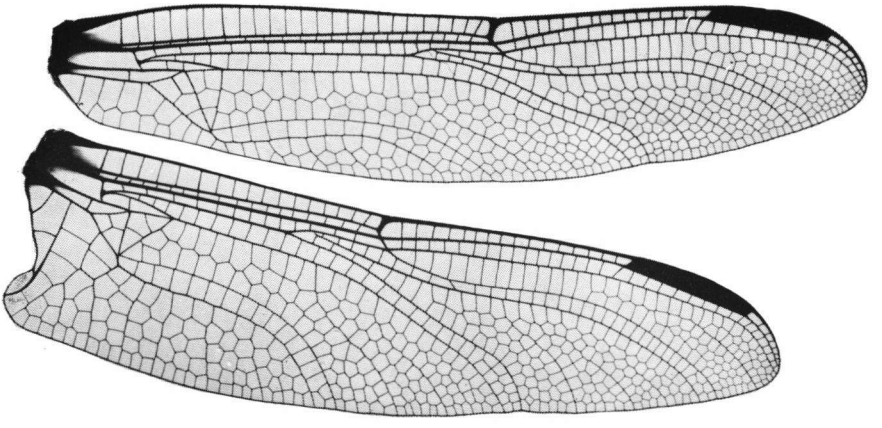


Plate XVa. *Phyllogomphoides fuliginosus* (Hagen in Selys) from Surinam. Right pair of wings of male.

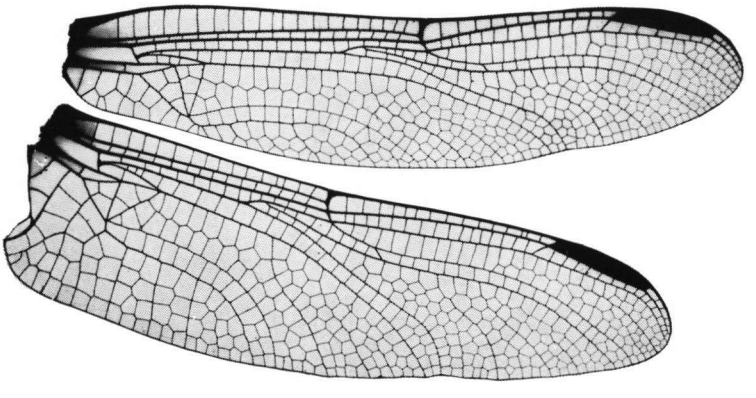
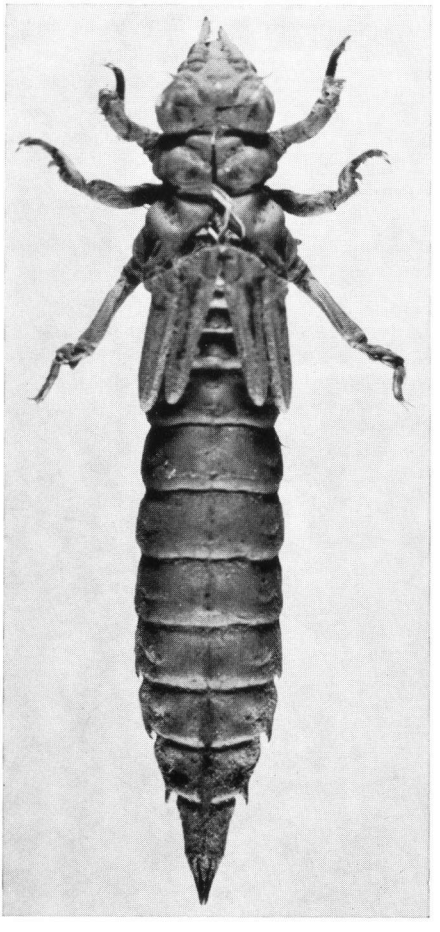


Plate XVb. *Phyllogomphoides audax* (Hagen in Selys) from Surinam. Right pair of wings of male.



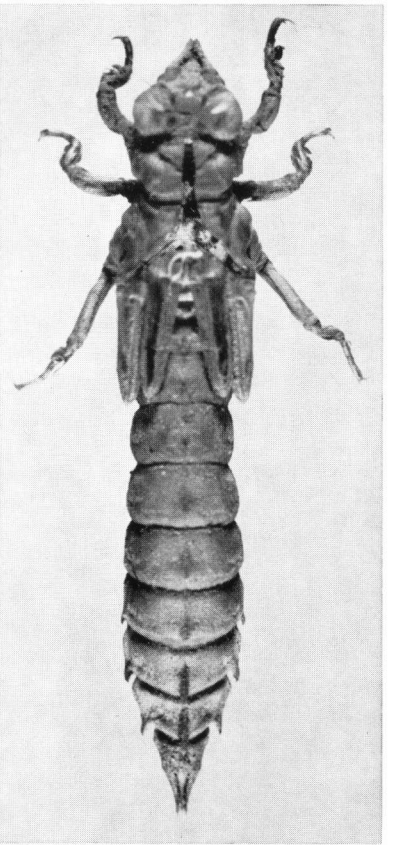


Plate XVIa. *Phyllogomphoides fuliginosus* (Hagen in Selys) from Surinam. Dorsal view of larval exuvia.

Plate XVIb. *Phyllogomphoides audax* (Hagen in Selys) ? from Surinam. Dorsal view of larval exuvia.

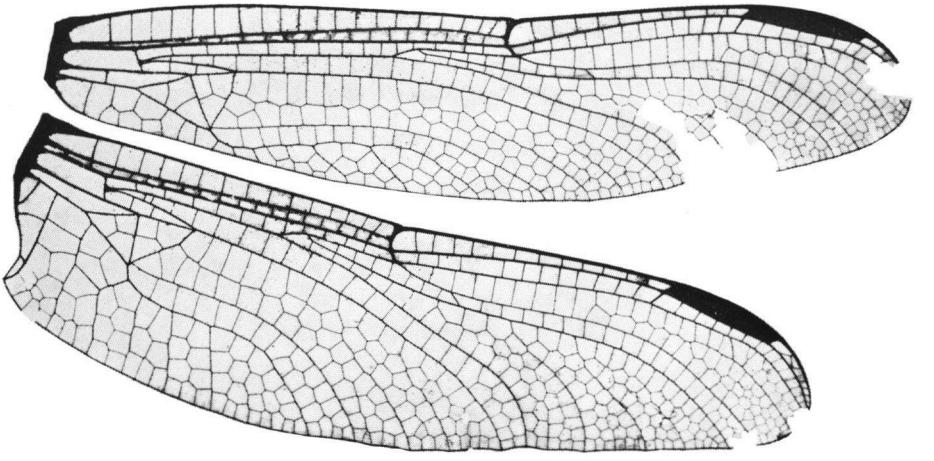


Plate XVIIa. *Negomphoides infumatus* (Rambur). Right pair of wings of holotype male.

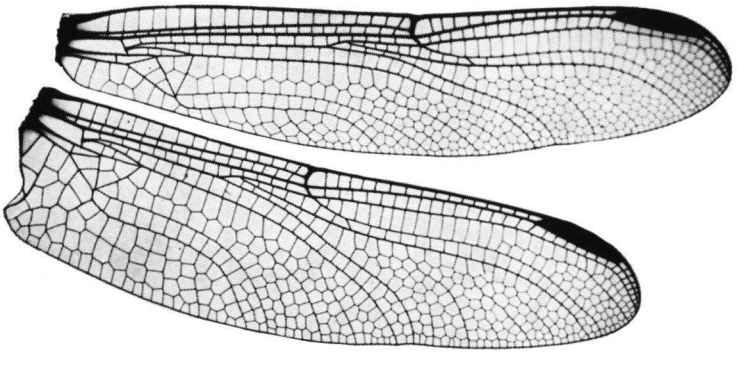


Plate XVIIb. *Negomphoides cristatus* (Needham) from Surinam. Right pair of wings of male.

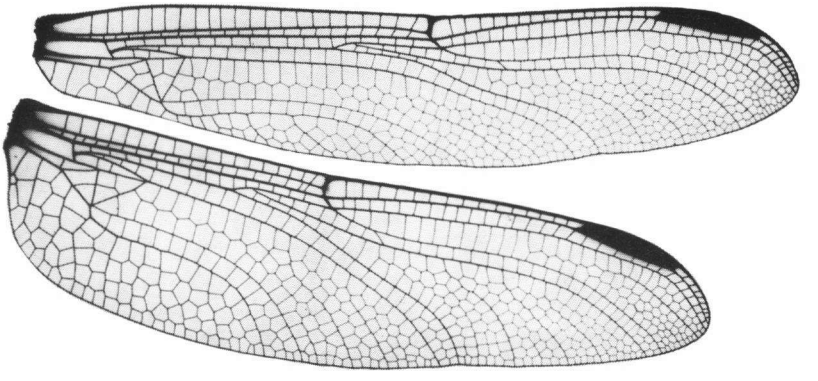


Plate XVIIIa. *Negomphoides cristatus* (Needham) from Surinam. Right pair of wings of female.

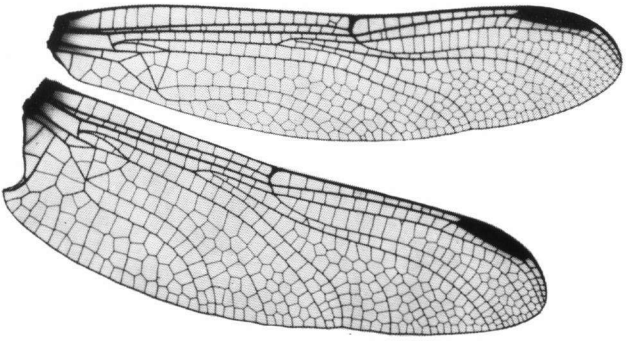


Plate XVIIIb. *Negomphoides undulatus* (Needham) from Surinam. Right pair of wings of male.

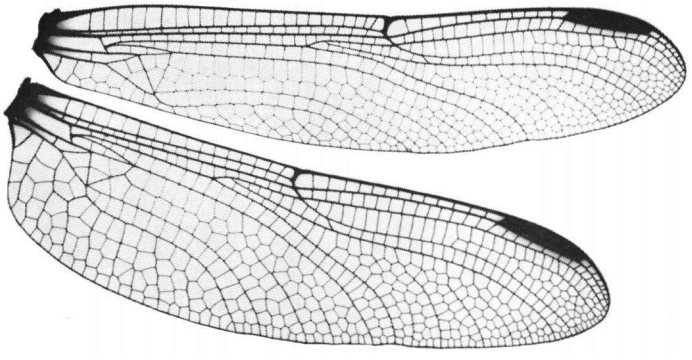


Plate XIXa. *Negomphoides undulatus* (Needham) from Surinam. Right pair of wings of female.

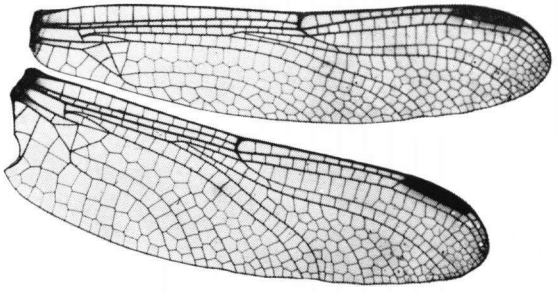


Plate XIXb. *Negomphoides andromeda* (Selys) from Surinam. Right pair of wings of allotype male.

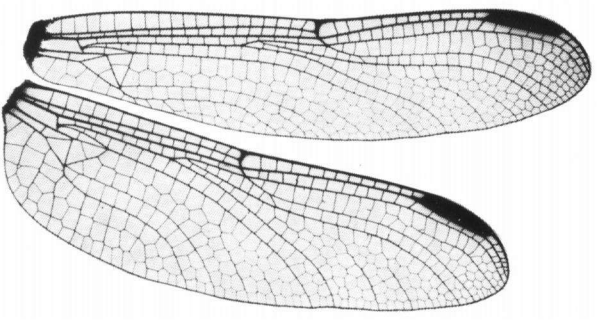


Plate XXa. *Negomphoides andromeda* (Selys) from Surinam. Right pair of wings of female.

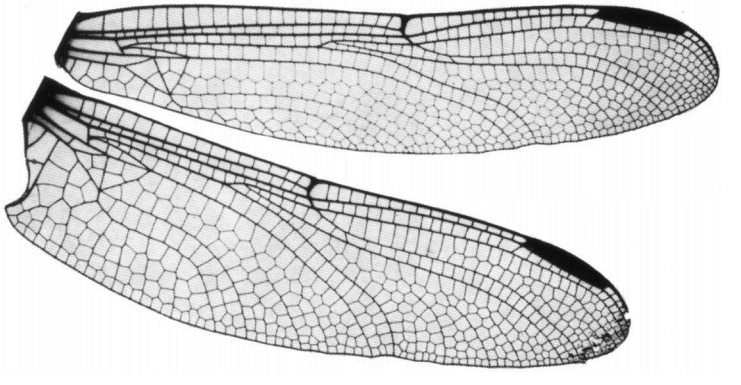
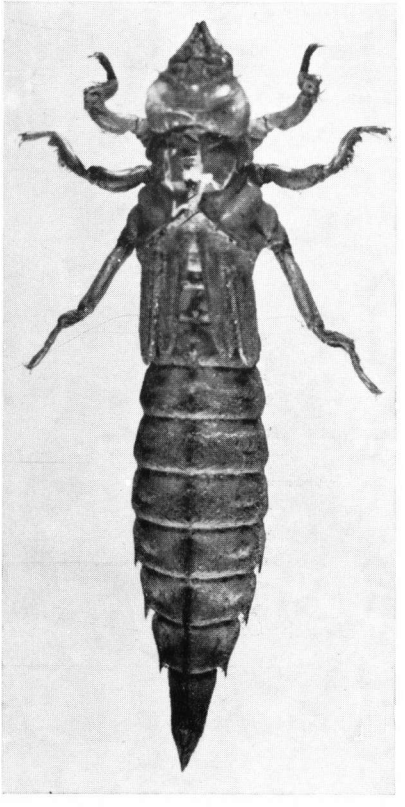
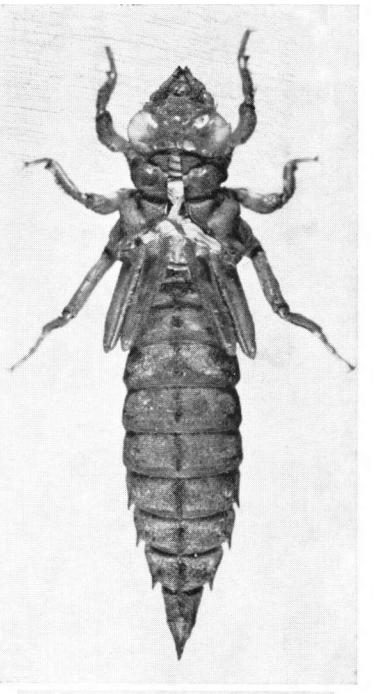


Plate XXb. *Negomphoides atlanticus* spec. nov. from Surinam. Right pair of wings of holotype male.





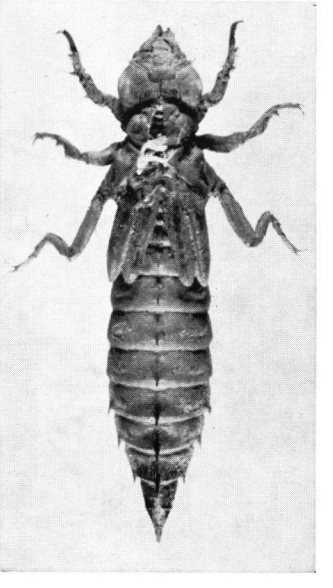


Plate XXIa. *Negomphoides cristatus* (Needham) from Surinam. Dorsal view of larval exuvia.

Plate XXIb. *Negomphoides undulatus* (Needham)? from Surinam. Dorsal view of larval exuvia.

Plate XXIc. *Negomphoides andromeda* (Selys) from Surinam. Dorsal view of larval exuvia.