

A REVISION OF THE NEW WORLD GENUS *PROGOMPHUS* SELYS, 1854 (ANISOPTERA: GOMPHIDAE)

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The genus *Progomphus* Selys is revised and the nomenclatural difficulties around the *Progomphus* versus *Gomphoides* problem are ironed out. Muttkowski's name *Negomphoides* is discarded in favour of *Gomphoides* Selys, 1854. A key to the 52 species known in the adult stage is constructed, including 20 that are introduced as new, viz. *Progomphus virginiae* (Brazil), *adaptatus* (Brazil), *elegans* (Brazil), *australis* (Argentina), *aberrans* (Argentina, Brazil, Paraguay), *delicatus* (Peru), *amazonicus* (Brazil), *tibialis* (Surinam), *mexicanus* (Mexico, Costa Rica), *nervis* (Peru), *formalis* (Ecuador, Peru), *boliviensis* (Bolivia), *anomalus* (Ecuador, Panama, Peru), *abbreviatus* (Colombia), *incurvatus* (Peru), *tantillus* (Bolivia), *superbus* (Ecuador, Venezuela), *fassli* (Brazil), *montanus* (Bolivia), and *kimminsi* (Argentina). Descriptive notes on most of the previously described species are offered and important details are elucidated with camera lucida drawings. Illustrations of *P. polygonus* are published for the first time. The male accessory genitalia of Ris' species are described and figured. The type species of the genus, *Progomphus gracilis*, is redescribed and more fully characterized. A conspectus of the type status and locations is compiled. For 31 of the previously known 33 nominal species type specimens could be located. The type of *Progomphus herrerae* is apparently lost, while the location of that of *Progomphus intricatus* is doubtful. Nine lectotypes have been selected. A table summarizing the geographic ranges of single species, and distributional maps of some species groups are added.

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INTRODUCTION

In the present study the nomenclatural problem around the names *Progomphus* and *Gomphoides* is reviewed; as a result the author arrives at the conclusion that the name *Progomphus* must be retained and MUTTKOWSKI's (1910) *Negomphoides* abandoned.

The first species of what is now understood as the genus *Progomphus* has been described in 1842 as *Diastatomma obscurum* RAMBUR. When SELYS erected the genus *Progomphus* in 1854 it was redescribed under this generic name. Since Rambur's description of the first species 32 others were published, all under the name *Progomphus*, viz. nine by SELYS (1854, 1873, 1878, 1879), one by SELYS & HAGEN (1858), two by CALVERT (1905, 1909), eight by RIS (1908, 1911, 1916), one by WILLIAMSON (1920a), two by BYERS (1934, 1939), four by NEEDHAM (1941, 1943, 1944), one by NEEDHAM & ETCHEVERRY (1956), and four by BELLE (1966). In the present paper 20 more are added, bringing the total number up to 53. This figure, however, can be by no

means regarded as final, as several other species were brought on record by various workers (e.g. WILLIAMSON, 1920a), although for different reasons they could not be formally described and named.

The increasing number of closely related forms makes it necessary, in order to ensure species recognition, to pay more attention to structures hitherto considered as being but of little taxonomic importance. This is all the more true since many nominal species have been insufficiently defined, the descriptions were often incomplete and figures inadequate or altogether lacking, notably in the case of male accessory genitalia of those described by RIS (1908, 1911, 1916).

In view of the pronounced intraspecific variation, as noticed already by BYERS (1939), our material of several species is too limited to serve as a basis for a comprehensive formal monograph. Nevertheless, for the present revision all representatives of the genus have been examined and the imagines keyed, except for WILLIAMSON's (1920a) unnamed species, the original specimen of which could not be located. Morphological details of newly described taxa and of some other little known species are elucidated by original camera lucida drawings or reproductions of previously published illustrations.

The type species of the genus is rediagnosed and a conspectus of the type status and locations is compiled. For 31 of the 33 previously known nominal species type specimens could be located with certainty. Of these, 24 were studied and they allowed me to state emphatically the specific identity of many specimens. One type is apparently lost, while the location of another is doubtful. In the course of this work, nine lectotypes have been selected.

Some of the new species are known from a single specimen or from a few specimens only, often in a poor condition. Of some other elusive species, however, long series could be examined. A considerable number of adults, larvae and exuviae were brought together during my explorations in Surinam. Although already placed on record earlier (BELLE, 1966), this material was also re-examined in the course of the preparation of this paper.

In order to facilitate future studies on the genus, a table summarizing the geographic ranges of single species and distributional maps for some groups of allied species are also presented.

Although the present paper is not concerned with the study of immature stages, some bibliographic notes on the subject are added for the sake of completeness.

Museum name abbreviations used

The below institutions loaned the material; their names are preceded by the abbreviations as used further in this paper.

| | |
|------|--|
| ANSP | – The Academy of Natural Sciences of Philadelphia, Philadelphia; |
| BM | – British Museum (Natural History), London; |
| CMP | – Carnegie Museum, Pittsburgh; |
| CUI | – Cornell University, Ithaca; |
| FSC | – Florida State Collection of Arthropods, Gainesville; |
| IML | – Instituto Miguel Lillo, San Miguel de Tucumán; |
| IPUC | – Instituto Pedagógico de la Universidad de Chile, Santiago; |
| IRSN | – Institut Royal des Sciences Naturelles de Belgique, Brussels; |
| MC | – Universitetets Zoologiske Museum, Copenhagen; |
| MCZ | – Museum of Comparative Zoology, Cambridge, Mass.; |
| MKB | – Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn; |
| ML | – Rijksmuseum van Natuurlijke Historie, Leiden; |
| MNB | – Museum für Naturkunde der Humboldt-Universität, Berlin; |
| MNHW | – National Museum of Natural History, Washington, D.C.; |
| MZM | – Museum of Zoology, Ann Arbor; |
| SMF | – Natur-Museum Senckenberg, Frankfurt am Main; |
| ZMH | – Zoologisches Staatsinstitut und Zoologisches Museum, Hamburg. |

THE GENUS *PROGOMPHUS*

Progomphus SELYS, 1854:69 (50 sep.); – SELYS & HAGEN, 1858:454 (194 sep.); – HAGEN, 1875:48, 52; – KIRBY, 1890:72; – NEEDHAM, 1901:435; – NEEDHAM, 1940:388, 389; – NEEDHAM, 1941:221; – NEEDHAM, 1944:172, 174; – CALVERT, 1905:148; – RIS, 1911:101, 107; – RIS, 1916:139; – WILLIAMSON, 1920a:2; – WILLIAMSON, 1920b:8, 12; – GLOYD, 1936:9; – BYERS, 1939:21; – FRASER, 1940:548; – FRASER, 1957:93; – BELLE, 1972a:64.
Gomphoides SELYS, 1850:360 (footnote) [*nec* SELYS, 1854:73 (54 sep.)]; – MUTTKOWSKI, 1910:78.

Type species and nomenclature

In one way or another, the following four generic names are involved in the nomenclature of the species treated in this paper.

- (1) *Gomphoides* SELYS, 1850:360 (footnote) with “type” the species *Diastatomma obscurum* Rambur, 1842.
- (2) *Progomphus* SELYS, 1854:69 (50 sep.) with type species *Progomphus gracilis* Hagen in Selys, 1854 as designated by KIRBY (1890).
- (3) *Gomphoides* SELYS, 1854:73 (54 sep.) with type species *Diastatomma infumatum* Rambur, 1842 as designated by KIRBY (1890).
- (4) *Negomphoides* Muttkowski, 1910:81 (a new generic name for *Gomphoides* Selys, 1854) with type species *Diastatomma infumatum* Rambur, 1842.

I accept the generic name *Progomphus* Selys with *Progomphus gracilis* Hagen in Selys as its type species.

MUTTKOWSKI (1910) stated that SELYS (1850: 360, footnote) had fixed Rambur’s species *Diastatomma obscurum* as the type species of the genus *Gom-*

phoides. Since that time several authors expressed doubt as to the validity of the generic name *Progomphus*. BYERS (1939) commented at length on this nomenclatural difficulty. He agreed with Muttkowski's view that the strict application of the "Code" made it necessary to discard the name *Progomphus* in favor of *Gomphoides*, but wished to retain *Progomphus* "until formal monographs for both *Progomphus* and *Gomphoides* may be written and the consequent difficulties ironed-out", and also on account of "the great amount of quoted material" in his paper.

Worth mentioning is also the fact that some specimens of the four species originally (re-)described under *Progomphus* in 1854 bear labels with the generic name *Gomphoides* or its possible abbreviation "G", viz., in the Selys collection at Brussels the holotype of *Diastatomma obscurum* ("Gomphoides obscurus R ♀", in Selys' handwriting!), and in the Hagen collection at Cambridge this is the case with the male of *Progomphus costalis* ("G. costalis Sello") and the lectotype of *Progomphus gracilis* ("G. gracilis Hagen Brasilia Beschre Neu Friburg"). I have not seen the labels of the holotype of *Progomphus zonatus* in the Hagen collection. The repeated use of the generic name *Gomphoides* and its possible abbreviation on the labels suggest that Selys originally intended to place *Diastatomma obscurum* in a genus named *Gomphoides*. Curiously enough, also one of the males of *Progomphus obscurus* in the Selys collection bears a pin label "Gomphoides obscurus R ♂" in Selys' handwriting, but the male of this species was not described until 1878!

The footnote in question reads: "Je pense que c'est de mon nouveau genre *Gomphoides* de l'Amérique, que cette aile se rapproche le plus par la disposition des triangles de l'aile. Le type actuel est la *Diastatamma obscura* de Rambur. (De Selys-Longchamps)."

However, the word "type" of the footnote was in all probability not used in the modern sense of "type species of the genus". Mrs. Gloyd wrote in a letter to me (October 28, 1971): "I would discard *Negomphoides* altogether because I believe the French word 'type' of the unfortunate footnote referred to the 'type of venation' found in *D. obscurus* and the intended new genus with no intention whatsoever of designating a type species", and "If De Selys had meant 'type species' wouldn't he have been more likely to have written 'the typical species of which is *Diastatomma obscura* Rambur?'".

Dr. Donnelly wrote in a letter to me (November 29, 1971): "I always felt that Selys' use of the word 'actual' was the key here. In paleontology (and Selys was referring to a fossil form) this means recent (in age). I feel that the word 'type' here does not mean type in the systematic sense, but that a certain living species was the closest equivalent to his fossil".

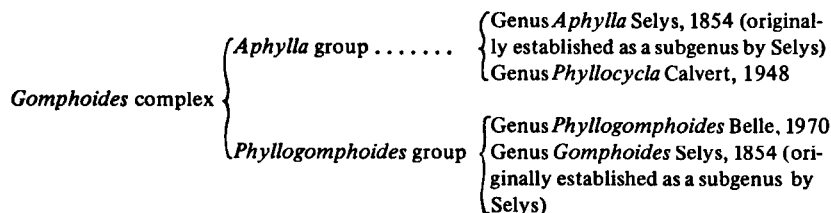
The French word "actuel" indeed means "present". Further I would note, that Selys commonly used the word "type" in the sense of "example". The following may illustrate this: When SELYS (1878) discussed the probable spe-

cific identity of the two species *Progomphus obscurus* and *Progomphus borealis* he used three times the word "type" and once the word "types", viz. "... le type décrit aux Troisièmes Additions ...", "... Chez ces nouveaux types ...", "... types du Texas ...", and "... ce type dans ma collection ...". As we see the first and fourth time only, Selys' "type" can be meant in a systematic sense, whereas "nouveaux types" is evidently not a new kind of type. But in all four cases it can mean "example(s)". In this connection one can read for the footnote: "The present example is *Diastatomma obscurum* Rambur" (Selys was referring to a fossil form!).

Moreover, Selys did not have the custom to indicate a type species for his new genera (nor a type specimen for his new species). And finally, no objection was ever made by Selys when KIRBY (1890) designated *Progomphus gracilis* as the type species of the genus *Progomphus*.

Clearly, the questionable value of the word "type" in the unfortunate footnote invalidates the arguments in favour of switching over the *Progomphus* species to *Gomphoides* (and does not justify this switch). And consequently the generic name *Gomphoides* as employed by SELYS in 1854 and 1858 can be used in future, while MUTTKOWSKI's (1910) name *Negomphoides* must be discarded altogether.

Remark: In this connection I would invite special attention to one of my earlier papers on the South American *Gomphidae* (BELLE, 1970) in which I had used the name *Negomphoides*. My system for the classification of the gomphids pertaining to the genus (not subgenus) *Gomphoides* Selys, 1854 (*Gomphoides* complex) may now read as follows:



The type species of the genus *Gomphoides* Selys, 1854 is *Diastatomma infumatum* Rambur, 1842, as fixed by KIRBY (1890).

C H A R A C T E R S o f t h e g e n u s

The species pertaining to the genus *Progomphus* are characterized by the following combination of features:

In b o t h s e x e s: (1) Supratrangles usually free of cross-veins. (2) No anal loop in hind wings; (3) Sectors of arcus distinctly separated at their origin; (4) An occipital ridge present between compound eyes; (5) Anal tubercles usually

with apical fold or process; this process often very conspicuous and elongated in male. — In the male: (6) Anal triangle in hind wings not reaching backward to anal angle of wing and usually made up of three cells, sometimes of two or four cells; (7) Posterior genital hamules broadly expanded at base; this part with an anterior row of denticles or an anterior chitinous ridge; (8) Hood of penial peduncle deeply hollowed out, having "something of the appearance of a gaping clamshell" (Needham & Westfall, 1955), each deeply concave half providing a shelter in which the slender apical filaments of the penis are coiled when at rest; (9) Superior caudal appendages usually more or less blade-shaped and with denticulated basal inferior carina; (10) Inferior caudal appendage bifid, the branches with a supero-external anteapical tooth; (11) First tibiae with lamina tibialis. — In the female: (12) Vulvar lamina short, its posterior margin medially excised.

FRASER (1940) wrote about the penis in *Progomphus*: "Species belonging to this genus possess highly characteristic and specialised penes; the median segment is very short and has a robust spine, often of great length, projecting from its base ventrally and forwards, which may represent the prepuce; the glans is narrowly elongate and resembles *Gomphidia* by having two enormously lengthened, tapering watch-spring flagellae; specific differences are noticed in the shape and length of the ventral spine and flagellae." But the length of the flagellae varies greatly and it is very small in some species (cf. page 305).

THE SPECIES OF *PROGOMPHUS*

The 53 known species of the genus, together with their type localities, type status and type locations, are listed in Table I.

The males of *australis*, *conjectus*, *fassli*, *nervis*, *polygonus* and *williamsi* are unknown, while the females are unknown of the following 11 species: *abbreviatus*, *amazonicus*, *delicatus*, *elegans*, *incurvatus*, *kimminsi*, *perpusillus*, *recticarinatus*, *tantillus*, *tibialis* and *virginiae*. *Progomphus zephyrus* is known from the larval stage only.

The recognition of species is comparatively easy. Considerable differences often exist in the reticulation and colouring of the wings, the relative length of the pterostigma, the colour design of the body, the conformation of the frons, the vertex (particularly that of the female), the occipital plate, the sternal process on the first abdominal segment, the accessory genitalia, the male caudal appendages, the vulvar lamina, the length of the occipital hairs, the proportions of the tibia and tarsus of the third pair of legs, and the length of the lamina tibialis of the first tibia of the male.

Table I

Alphabetic list of the species of *Progomphus*, with type localities, type status and type locations

| Species | Type locality | Typestatus | | | Sex | Type location |
|--|-------------------------------------|------------|-------|------|-------|---------------|
| | | Holo | Lecto | Lost | | |
| <i>abbreviatus</i> spec. nov. | Colombia (Canca) | + | | | ♂ | MZM |
| <i>aberrans</i> spec. nov. | Argentina | + | | | ♂ | MKB |
| <i>adaptatus</i> spec. nov. | Brazil (Espírito Santo) | + | | | ♂ | ZMH |
| <i>alachuensis</i> Byers, 1939 | USA (Florida) | + | | | ♂ | MZM |
| <i>amazonicus</i> spec. nov. | Brazil (Manacapuru) | + | | | ♂ | FSC |
| <i>anomalus</i> spec. nov. | Ecuador (Abitagua) | + | | | ♂ | MNHW |
| <i>approximatus</i> Belle, 1966 | Surinam (Mooi Wana) | + | | | ♂ | ML |
| <i>auropictus</i> Ris, 1911 | Argentina (Misiones) | + | | | ♂ | SMF |
| <i>australis</i> spec. nov. | Argentina (Concordia) | + | | | ♀ | BM |
| <i>basistictus</i> Ris, 1911 | Argentina (Misiones) | | + | | ♂ | MC |
| <i>boliviensis</i> spec. nov. | Bolivia (Ichilo) | + | | | ♂ | FSC |
| <i>borealis</i> Mac Lachlan in Selys, 1873 | USA (Oregon) | + | | | ♂ | BM |
| <i>brachycnemis</i> Needham, 1944 | Surinam (Kabelstation) | + | | | ♀ | CUI |
| <i>clendoni</i> Calvert, 1905 | Mexico (Tuxpan) | + | | | ♂ | ANSP |
| <i>complicatus</i> Selys, 1854 | Brazil (Bahia) | | + | | ♂ | IRSN |
| <i>conjectus</i> Belle, 1966 | Surinam (Coppename) | + | | | ♀ | ML |
| <i>costalis</i> Hagen in Selys, 1854 | Brazil | | + | | ♂ | MNB |
| <i>delicatus</i> spec. nov. | Peru (Mishuyacu) | + | | | ♂ | SMF |
| <i>dorsopallidus</i> Byers, 1934 | Venezuela (San Esteban) | + | | | ♂ | MZM |
| <i>elegans</i> spec. nov. | Brazil (Teresópolis) | + | | | ♂ | IRSN |
| <i>fassli</i> spec. nov. | Brazil (Cachoeira) | + | | | ♀ | SMF |
| <i>formalis</i> spec. nov. | Ecuador (Jatun Yacu) | + | | | ♂ | MZM |
| <i>geijskesi</i> Needham, 1944 | Surinam (Paleumeu) | + | | | ♀ | CUI |
| <i>gracilis</i> Hagen in Selys, 1854 | Brazil (Nova Friburgo) | | + | | ♂ | MCZ |
| <i>guyanensis</i> Belle, 1966 | Surinam (Coropina) | + | | | ♂ | ML |
| <i>herreræ</i> Needham & Etcheverry, 1956 | Chile (Arica) | (+) | + | + | ♂ | IPUC |
| <i>incurvatus</i> spec. nov. | Peru (San Pedro) | + | | | ♂ | MZM |
| <i>integer</i> Hagen in Selys, 1878 | Cuba | + | | | ♂ | MCZ |
| <i>intricatus</i> Hagen in Selys & Hagen, 1858 | Brazil (Amazon) | (+) | + | + | ♂ | BM |
| <i>joergenseni</i> Ris, 1908 | Argentina (Chacras de Coria) | + | | | ♂ | MC |
| <i>kimminsi</i> spec. nov. | Argentina (Fronterita) | + | | | ♂ | BM |
| <i>lepidus</i> Ris, 1911 | Argentina (Misiones) | + | | | ♂ | SMF |
| <i>longistigma</i> Ris, 1916 | Costa Rica (Infernillo) | + | | | ♂ | SMF |
| <i>mexicanus</i> spec. nov. | Mexico (Tehuantepec) | + | | | ♂ | MNHW |
| <i>montanus</i> spec. nov. | Bolivia (Río Dolores) | + | | | ♂ | FSC |
| <i>nervis</i> spec. nov. | Peru (Iquitos) | + | | | ♀ | SMF |
| <i>obscurus</i> (Rambur, 1842) | USA | + | | | ♀ | IRSN |
| <i>perpusillus</i> Ris, 1916 | Peru (Hamburgo) | + | | | ♂ | SMF |
| <i>phyllochromus</i> Ris, 1916 | Peru (Pozuzo) | + | | | ♂ | SMF |
| <i>pijpersi</i> Belle, 1966 | Surinam (Wilhelmina Mountain Range) | + | | | ♂ | ML |
| <i>polygonus</i> Selys, 1879 | Venezuela (Merida) | | + | | ♀ | IRSN |
| <i>pygmaeus</i> Selys, 1873 | Colombia (Bogota) | + | | | ♂ | BM |
| <i>recticarinatus</i> Calvert, 1909 | Brazil (Chapada) | | + | | ♂ | CMP |
| <i>recurvatus</i> Ris, 1911 | Brazil (Espírito Santo) | | + | | ♂ | ZMH |
| <i>risi</i> Williamson, 1920 | Guatemala (Gualan) | + | | | ♂ | MZM |
| <i>serenus</i> Hagen in Selys, 1878 | Haiti (St. Jérémie) | + | | | ♂ | MCZ |
| <i>superbus</i> spec. nov. | Ecuador (Los Ríos) | + | | | ♂ | MZM |
| <i>tantrillus</i> spec. nov. | Bolivia (Buena Vista) | + | | | ♂ | FSC |
| <i>tibialis</i> spec. nov. | Surinam (Stoelmanseiland) | + | | | ♂ | ML |
| <i>virginiae</i> spec. nov. | Brazil (Nova Teutonia) | + | | | ♂ | MKB |
| <i>williamsi</i> Needham, 1943 | Guatemala (Esquitla) | + | | | ♀ | CUI |
| <i>zephyrus</i> Needham, 1941 | Dominica (Bajo Millo) | + | | | larva | CUI |
| <i>zonatus</i> Hagen in Selys, 1854 | Mexico | + | | | ♀ | MCZ |

Key to the species

- 1 Basal subcostal cross-vein absent 2
- Basal subcostal cross-vein present in at least one wing 8
- 2 A complete second pale antehumeral stripe present; sides of pterothorax pale with three brown lateral stripes, the brown interpleural and metapleural stripes often less developed; inferior caudal appendage of male brownish yellow or brown-yellow 3
- Second pale antehumeral stripe absent or reduced to an antealar spot; sides of pterothorax brown or dark brown with two pale stripes, the pale metepimeral stripe often less developed; inferior caudal appendage of male dark brown or blackish brown 4
- 3 Wings with diffuse yellow spot posterior to pterostigma; superior caudal appendages of male gradually tapering to an acute point *auropictus*
- Wings without yellow spot posterior to pterostigma; superior caudal appendages bluntly pointed. (Female unknown) *virginiae*
- 4 Third tarsus three-quarters the length of third tibia; first pale antehumeral stripe of male broad, confluent below with pale area of collar, the upper portion wedge-shaped and tapering; basal externo-lateral dilatation of superior caudal appendages of male much expanded and conspicuous; vertex of female with a pair of postocellar spines 5
- Third tarsus two-thirds the length of third tibia; first pale antehumeral stripe of male narrow, parallel-sided, joined with pale area of collar at lateral edge; basal externo-lateral dilatation of superior caudal appendage of male small, inconspicuous, and with a pointed apical inferior angle; vertex of female without postocellar spines 6
- 5 Basal externo-lateral dilatation of superior caudal appendage of male reaching caudad to half way along branches of inferior caudal appendage; postocellar spines of female short *gracilis*
- Basal externo-lateral dilatation of superior caudal appendage of male excessively enlarged, its hind lobe reaching to supero-external anteapical tooth of branch of inferior caudal appendage; postocellar spines of female long and reclined to far beyond anterior margin of occipital plate *adaptatus*
- 6 Frons not distinctly angled and without an anterior ridge. (Female unknown) .. *elegans*
- Frons distinctly angled and with an anterior ridge 7
- 7 Wings hyaline; inferior caudal appendage of male, in profile view, stout, the branches long and strongly incurved beyond supero-external anteapical tooth;

- posterior genital hamules of male with an extra internal anteapical tooth; female with a conspicuous twin-protuberance on each postocellar ridge **lepidus**
- Wings brownish yellow at base to subtriangle (except anal field) and in costal and subcostal interspaces; female with a small tubercle between each postocellar ridge and compound eye. (Male unknown) **australis**
- 8 Wings with coloured band along costa 9
- No coloured band along costa of wing 10
- 9 Larger species; abdomen 35-37 mm, hind wing 28-30 mm; superior caudal appendages of male acutely pointed **costalis**
- Smaller species; abdomen 29-32 mm, hind wing 23-24 mm; superior caudal appendages of male bluntly tipped **aberrans**
- 10 Wings with brown-yellow nodal spot which is sometimes nearly absent; pterostigma light yellow 11
- No trace of nodal spot on wings; pterostigma not light yellow 12
- 11 Larger species; male: abdomen 34-37 mm, hind wing 25-29 mm, pterostigma 3.0-3.1 mm; female: abdomen 31-38 mm, hind wing 28-32 mm, pterostigma 3.6 mm **joergenseni**
- Smaller species; male: abdomen 29-33 mm, hind wing 23-24 mm, pterostigma 2.5-2.9 mm, female: abdomen 29-31 mm, hind wing 24-25 mm, pterostigma 2.7-2.9 mm **herreræ**
- 12 Third tarsus distinctly longer than third tibia; size very small; male: abdomen 18 mm, hind wing 14-15 mm. (Female unknown) **perpusillus**
- Size larger, third tarsus as long as or shorter than third tibia 13
- 13 Third tarsus about two-thirds the length of third tibia or shorter 14
- Third tarsus three-quarters the length of third tibia, or longer 20
- 14 Wings hyaline, distal side of triangle in front wings an angular line consisting of a re-entrant angle and a salient angle; (first) pale antehumeral stripes reaching to collar, the upper portion wedge-shaped; hind wing of female 31 mm long, 10 mm broad, with five rows of cells behind Cu2, and practically as long as abdomen. (Male unknown) **polygonus**
- Not as above 15
- 15 Abdominal segment 1 with a midventral process; superior caudal appendages of male more or less round in cross-section and lacking the usual basal externo-lateral dilatation and the inferior carina with the row of denticles 16

- Abdominal segment 1 without midventral process; superior caudal appendages of male blade-shaped and with a denticulated inferior carina 17
- 16 Abdominal segment 1 with a more or less bean-shaped midventral process clothed with stiff hairs; male with tip of superior caudal appendage regularly curving downward, and with an inferior caudal appendage reaching to half way along superior caudal appendages **pijpersi**
- Midventral process on abdominal segment 1 a distinct flap clothed with stiff hairs; male with tip of superior caudal appendage rather abruptly curving downwards in an oblique direction, and with an inferior caudal appendage reaching to a point about two-thirds the way along superior caudal appendages **geijskesi**
- 17 Anal field in front wings one cell wide; frons low; smaller species: abdomen 22-28 mm, hind wing 18-24 mm 18
- Anal field in front wings two cells wide; frons high; larger species: abdomen 31-39 mm, hind wing 24-26 mm 19
- 18 Dark midlateral and third lateral stripes of pterothorax narrow and not connected; branches of inferior caudal appendage of male with apical part beyond supero-external anteapical tooth straight **pygmaeus**
- Dark midlateral and third lateral stripes of pterothorax enlarged and partly confluent; branches of inferior caudal appendage of male with apical part beyond supero-external anteapical tooth curved to rear. (Female unknown) **delicatus**
- 19 Sides of pterothorax with three pale stripes; posterior genital hamules of male terminating in a single tooth; lamina tibialis of first tibia of male one-third the tibial length; inferior carina of superior caudal appendage of male with 3 to 5 denticles. (Female unknown) **amazonicus**
- Sides of pterothorax with two pale stripes; posterior genital hamules of male terminating in two teeth; lamina tibialis of first tibia of male three-sevenths the tibial length; inferior carina of superior caudal appendage of male with 8 to 10 denticles. (Female unknown) **tibialis**
- 20 Abdominal segment 1 usually with a slender midventral process. United States, Central American, or Antillean species 21
- No such process on abdominal segment 1. South American species 29
- 21 Costal edge of wing lined with yellow 23
- Costa wholly dark brown or blackish brown 22
- 22 Labrum without definite colour pattern; sides of pterothorax brown with two broad pale stripes. (Male unknown) **williamsi**
- Labrum broadly green along free border, otherwise brown, sides of pterothorax with three (inconstant) pale stripes **serenus**

- 23 Wings with brown basal spot extending outward to first primary antenodal cross-vein or nearly so; usually a trace of brown between sectors of arculus at their origin 24
- Brown basal spot of wings absent, or extending at most to basal subcostal cross-vein; no brown trace at origin of sectors of arculus 25
- 24 Inferior carina of superior caudal appendage of male with a single line of denticles; caudal appendages of female brown *alachuensis*
- Denticles on inferior carina of superior caudal appendage of male scattered, caudal appendages of female yellow *obscurus*
- 25 Third femora brown with pale (grey, yellow) markings, the lateral outer side broadly pale along ventral margin, the dorsal side with a pale spot near knee; the pale markings less developed on second femora *borealis*
- Second and third femora brown 26
- 26 Labrum blackish brown, with a crescent-shaped milk-white or grey spot on each side *integer*
- Labrum not as above 27
- 27 Branches of inferior caudal appendage of male stout and inequilaterally bifid at tip; postocellar ridges of vertex of female well-developed and often more or less tubercle-shaped near eye border *clendoni*
- Branches of inferior caudal appendage of male slender; vertex of female not as above 28
- 28 Smaller species: abdomen 32-39 mm, hind wing 27-30 mm. Branches of inferior caudal appendage of male with apical part beyond supero-external anteapical tooth long and strongly incurved *mexicanus*
- Larger species: abdomen 40-43 mm, hind wing 32-33 mm. Branches of inferior caudal appendage of male very slender and widely separated, the apical part beyond supero-external anteapical tooth obsolete and no more than a low hump *zonatus*
- 29 Labrum with distinct brown marking 30
- Labrum without or with a not well defined brown marking 46
- 30 First pale antehumeral stripe not reaching to collar and not joined with pale area of collar 31
- First pale antehumeral stripe reaching to collar or confluent with pale area of collar 37
- 31 Second pale antehumeral stripe well-developed *conjectus*

- Second pale antehumeral stripe absent or very weakly developed and reduced to an antealar spot and (or) a very narrow stripe near mid-height of humeral suture. 32
- 32 Second postnodal cell divided by a cross-vein parallel to costa; female with deep pit posterior to each lateral ocellus. (Male unknown) *nervis*
- Not as above 33
- 33 Basal externo-lateral dilatation of superior caudal appendage of male not terminating distally in an acute point; caudal appendages of female dark brown or blackish brown with yellow tip 34
- Basal externo-lateral dilatation of superior caudal appendage of male terminating distally in a very acute point; caudal appendages of female entirely dark brown or blackish brown 35
- 34 Pterostigma about half the distance from nodus to pterostigma *complicatus*
- Pterostigma about one-third the distance from nodus to pterostigma *formalis*
- 35 Tip of each branch of inferior caudal appendage of male strongly incurved; post-ocellar ridges of female terminating laterally in a distinct tubercle *guyanensis*
- Tip of each branch of inferior caudal appendage of male curving in an oblique direction to the rear; postocellar ridges of female becoming laterally very low . . . 36
- 36 Abdominal segment 1 with a small but distinct midventro-anterior tubercle; apical process of anal tubercle of male nearly as long as anal tubercle itself . . . *approximatus*
- No sternal process on abdominal segment 1; apical process of anal tubercle of male shorter than half the length of anal tubercle itself. (Female unknown) . . *boliviensis*
- 37 First pale antehumeral stripe more or less wedge-shaped, broad below, the upper portion tapering 38
- First pale antehumeral stripe not wedge-shaped 42
- 38 First pale antehumeral stripe confined to anterior half of dorsum *brachycnemis*
- First pale antehumeral stripe reaching from collar to, or to near antealar sinus . . . 39
- 39 Posterior margin of occipital plate deeply concave, V-shaped; pale antealar spot present; pterostigma longer than half the distance from nodus to pterostigma *longistigma*
- Posterior margin of occipital plate not markedly concave; no pale antealar spot; pterostigma shorter than half the distance from nodus to pterostigma 40
- 40 Pale metepisternal stripe absent or weakly developed and often represented by a dorsal spot only; anal triangle in hind wing of male normally two-celled *anomalus*

| | |
|--|---------------|
| – Pale metepisternal stripe well-developed; anal triangle in hind wing of male three-celled | 41 |
| 41 Branches of inferior caudal appendage of male with apical part beyond supero-external anteapical tooth obsolete and not evidently present. (Female unknown) . | |
| abbreviatus | |
| – Branches of inferior caudal appendage of male with distinct (incurved) apical part beyond supero-external anteapical tooth. Female with a symmetric pair of pale side spots on superior surface of frons | phyllochromus |
| 42 Second pale antehumeral stripe present | recurvatus |
| – Second pale antehumeral stripe absent or represented by an antealar spot only .. | 43 |
| 43 First pale antehumeral stripe reaching to antealar sinus being expanded along it. (Female unknown) | incurvatus |
| – First pale antehumeral stripe not reaching to antealar sinus and separated from it by about its own width | 44 |
| 44 Labrum with a symmetric pair of grey spots | risi |
| – Labrum entirely brown | 45 |
| 45 Wings hyaline. (Female unknown) | tantillus |
| – Hind wings brownish yellow nearly to pterostigma; fore wings with brownish yellow subcostal band | superbus |
| 46 Wings with blackish brown basal spot reaching to first primary antenodal cross-vein | basistictus |
| – Not such basal spot in wings | 47 |
| 47 Posterior margin of occiput convex and with a distinct median excision; second anal interspace in hind wings of female narrower in middle and starting with a single row of cells from anal vein outwards. (Male unknown) | fassli |
| – Posterior margin of occiput almost straight and without, or without distinct median excision | 48 |
| 48 Dorsum of pterothorax pale green with indistinct brown markings | dorsopallidus |
| – Dorsum of pterothorax brown or pale brown with distinct pale antehumeral stripes | 49 |
| 49 Pterostigma 3.8-4.3 mm; lateral keel of abdominal segment 7 of male suddenly widened on apical half; postocellar ridges of female with a lateral spine near eye border | 50 |

- Pterostigma 2.8-3 mm; lateral keel of abdominal segment 7 of male not suddenly widened on apical half; postocellar ridges of female without lateral spine 51
- 50 Sides of pterothorax largely green with indistinct brown markings along meta-pleural and interpleural sutures; wings without distinct basal spot **montanus**
- Sides of pterothorax brown with two distinct green stripes, the brown midlateral stripe sometimes here and there green; wings with distinct yellowish brown basal spot reaching to near first primary antenodal cross-vein **kimminsi**
- 51 First pale antehumeral stripe confluent with pale area of collar; branches of inferior caudal appendage of male yellow **intricatus**
- First pale antehumeral stripe not joined with pale area of collar; branches of inferior caudal appendage of male black. (Female unknown) **recticarinatus**

D e s c r i p t i o n s o f s p e c i e s

The species are consecutively treated as mentioned in the key. For each species are given a list of synonyms, a list of the material studied, and a description, redescription or descriptive notes.

PROGOMPHUS AUROPICTUS RIS, 1911

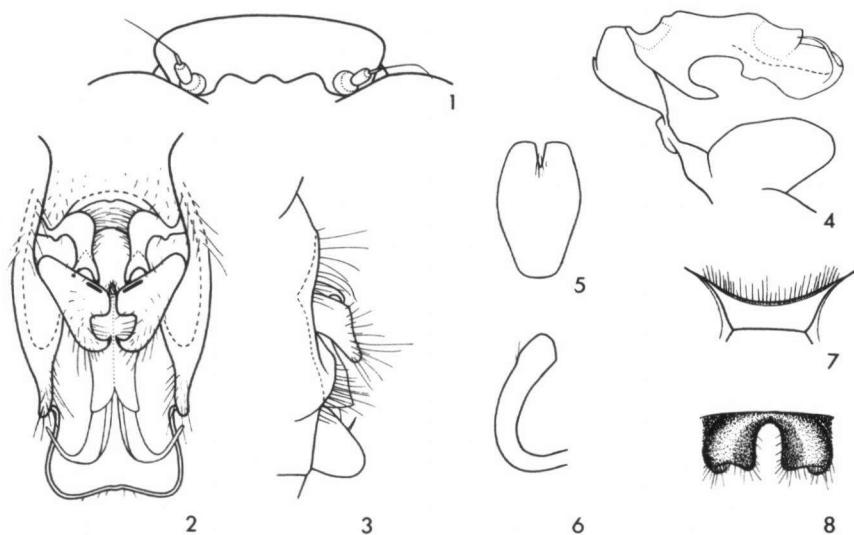
Figures 1-8

Progomphus auropictus RIS, 1911:109-110; figs. 4-6 (♂, ♀); RIS, 1913:73.

Material. — *A r g e n t i n a*: Misiones, 18.III.1909, 1 ♂ (holotype), (SMF, no. 15182); 22.III.1909, 1 ♀ (allotype), both leg. Jörgensen; II.1911, 1 ♂ (MC).

Readily recognizable from any other member of the genus by the presence of a diffuse yellow spot posterior to the pterostigma.

The dorsal posterior margin of the tenth abdominal segment of the male is armed with denticles at the level of the bases of the superior caudal appendages, and the latter are gradually tapering into an acute point; in the male of all other species without a basal subcostal cross-vein in the wings, the dorsal posterior margin of the tenth abdominal segment is devoid of denticles, and the superior caudal appendages are blunt at apex. The lamina tibialis of the anterior tibia is one-third the tibial length. The third tarsus is two-thirds the length of the third tibia. The posterior genital hamules are peculiar in having the antero-internal



Figs. 1-8. *Progomphus auropictus* Ris: (1) frons of holotype male, dorsal view; – (2) accessory genitalia of holotype male, ventral view; – (3) the same, right lateral view; – (4) penis, right lateral view; – (5) penis guard, frontal view; – (6) the same, right lateral view; – (7) occipital plate of holotype male; – (8) vulvar lamina of allotype female, ventral view.

border of the swollen base armed with a chitin ridge instead of the usual row of denticles. The anterior hamules are small and brown, the apex is widely excised and the margin of the excision is dark brown. The posterior hamules are green, the acute apex and the chitin ridge on the swollen base are dark brown. The hood of the penial peduncle is pale brown. The filaments of the penis are pale, short, broad and membranous at the base.

The male in the Copenhagen Museum is very teneral and shrivelled. In figures 4-6 illustrations are given of its penis (also partly shrivelled) and its penis guard. There is a single cubito-anal cross-vein in addition to the inner side of the subtriangle in each wing of this male.

The dorsal posterior margin of the tenth abdominal segment of the female allotype also has denticles at the level of the bases of the caudal appendages only. The lamina supra-analis is about four-fifths the length of the caudal appendages. The relative lengths of the abdominal segments 7, 8, 9 and 10 are about 26:16:10:8, with the anal appendages 7 on the same scale.

PROGOMPHUS VIRGINIAE SPEC. NOV.

Figures 9-20

Material. — Brazil: Santa Catarina, Nova Teutonia, 16.XII.1950, 1 ♂ (holotype), (MKB); Nova Teutonia, 27°S., 52° - 53°W., 28.XII.193?, 3 ♂, leg. Fritz Plaumann (paratypes), (MZM).

The second pale antehumeral stripe is well-developed in this species and in *auropictus*. It is absent, or represented by a dorsal spot only, in all other congeners without a basal subcostal cross-vein in the wings.

The male of this species is remarkable by the conformation of the inferior caudal appendage, of which the branches are more or less spoon-shaped.

Male (holotype; immature and less pigmented; right anterior tibia lost; abdomen broken between segments 5 and 6). — Total length 41.5 mm; abdomen 32 mm; hind wing 24.5 mm; costal edge of pterostigma in fore wing 3.5 mm.

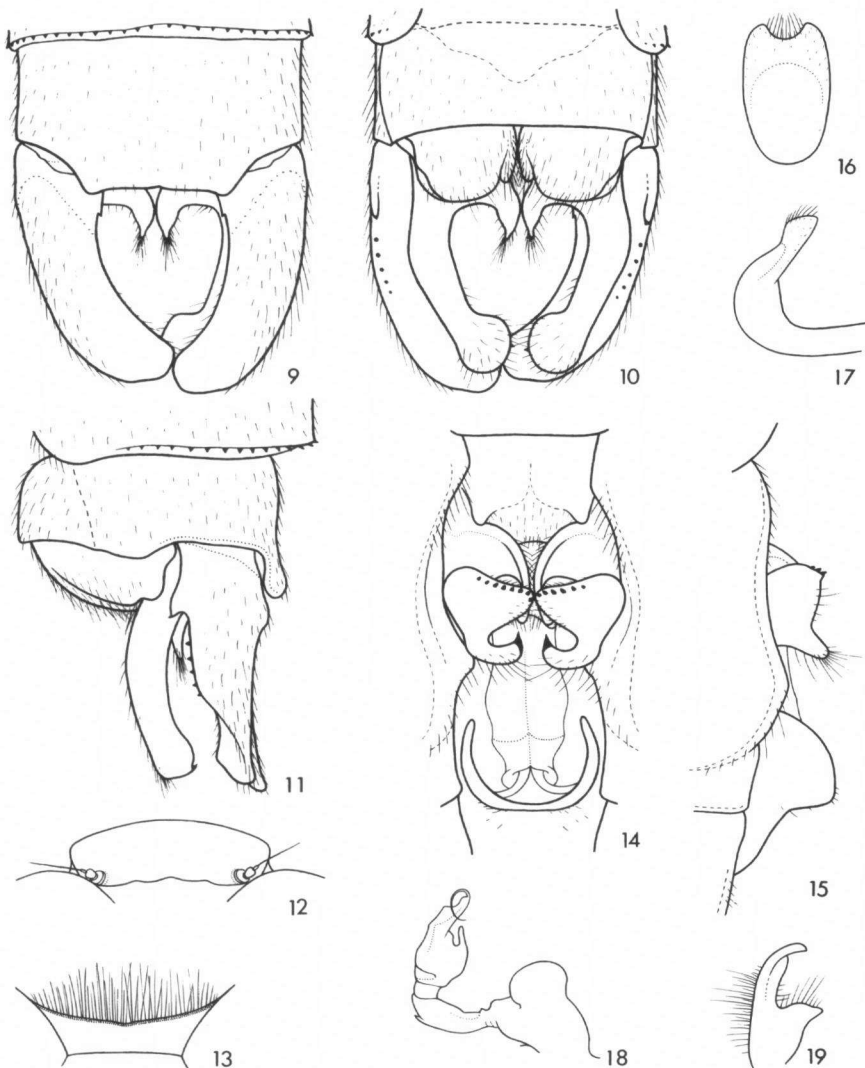
Face pale yellow but middle of postclypeus and vertical part of frons brown. Superior surface of frons largely yellow, with a brown basal band which is nearly half the width of frons in middle. Vertex brown. Occipital plate yellow, its rear margin with a shallow median excision and fringed with long brown hairs. Posterior part of head largely brownish yellow, paler below, dark brown along superior border of compound eyes. Labium and adjacent mouth parts pale yellow.

Prothorax brown, yellow on lateral sides and on middorsum.

Dorsum of pterothorax brown with yellow markings. Middorsal carina yellow. First pale antehumeral stripes rather broad, widest at mid-height, narrowest at junction with pale area of collar. Second pale antehumeral stripe narrow, about one-third the width of first pale antehumeral stripe but becoming wider near antealar sinus. Sides of pterothorax yellow with three brown stripes. Brown posthumeral stripe well-developed, brown interpleural stripe less developed, and brown metapleural stripe weakly developed.

Femora yellow, the outer sides with a longitudinal brown stripe. Tibiae and tarsi brown. Claws pale brown on basal two-thirds, the tip black. Third tarsus about two-thirds the length of third tibia. Lamina tibialis of first tibia about one-third the tibial length.

Abdomen yellow on lower parts of sides. Sterna brown. Dorsum brown. Segments 1 to 9 with a middorsal yellow stripe which is widest at base of segments 3 to 7. Dorsal posterior margin of segment 10 yellow in middle. No denticles along dorsal posterior margin of segment 10. No sternal process on segment 1. Accessory genitalia scarcely provided with hairs. Peduncle of penis brown laterally, yellow midventrally, its hood brownish yellow. Genital hamules yellow but ventral tip of anterior hamule brown, and acute tip of posterior



Figs. 9-19. *Progomphus virginiae* spec. nov.: (9) tenth abdominal segment and caudal appendages of holotype male, dorsal view; – (10) the same, ventral view; – (11) the same, left lateral view; – (12) frons of holotype male, dorsal view; – (13) occipital plate of paratype male; – (14) accessory genitalia of holotype male, ventral view; – (15) the same, right lateral view; – (16) penis guard of paratype male, frontal view; – (17) the same, right lateral view; – (18) penis of paratype male, right lateral view; – (19) right anterior genital hamule of paratype male, right lateral view.

hamule and denticles on swollen base of posterior hamule black. Anterior hamules with a large apical notch. Apex of penis guard with a semicircular median excision and provided with hairs. Filaments of penis rather short. Superior caudal appendages largely yellow, brown near base, with a minute internal basal tooth, an external lateral tooth, and a row of denticles on inferior carina. Inferior caudal appendage brownish yellow, the apical part of each branch beyond supero-external anteapical tooth roundly expanded, flattened and more or less concave dorsally, its inner border armed with a single minute black tooth.

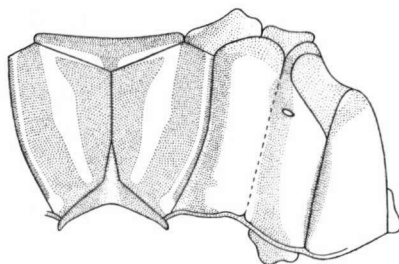


Fig. 20. *Progomphus virginiae* spec. nov., holotype male. Diagram of pterothorax.

Wings hyaline. Venation brown but frontal margin of costa yellow. Pterostigma brownish yellow, surmounting 5-6 cells. No basal subcostal cross-vein. Antenodal and postnodal cross-veins of first series 8:13-13:8/8:10-11:8 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 6-5/3-3 in fore and hind wings, respectively. Supratrangles open. All triangles and subtriangles two-celled. Trigonal interspaces starting with two rows of cells from triangle outwards, in hind wings starting with an extra initial cell at hind angle of triangle. Area posterior to Cu2 three cells wide in fore wings, four cells wide in hind wings. Four paranal cells in each hind wing. Second anal interspace in hind wings starting with a single cell against anal vein followed by two rows of cells. Three (left) and four (right) postanal cells in hind wings. Anal triangle in hind wings three-celled.

F e m a l e unknown.

The three paratype males were received after the holotype was described and returned to the Museum Alexander Koenig at Bonn; contrary to the holotype they are fully mature specimens.

Concerning the coloration of the paratypes the following may be noted: Dark colours with a larger extent than in holotype, more obscure, becoming black on dorsum of pterothorax and abdomen. Vertex black. Occipital plate brown or with a pair of elongated pale areas. Dorsum of prothorax entirely blackish

brown, sometimes with a pair of minute yellow twin-spots. Tibiae, tarsi and claws black.

The venation in the wings of the paratypes is very similar to that of the holotype; all supratrangles are open, all triangles and subtriangles are two-celled.

PROGOMPHUS GRACILIS HAGEN IN SELYS, 1854

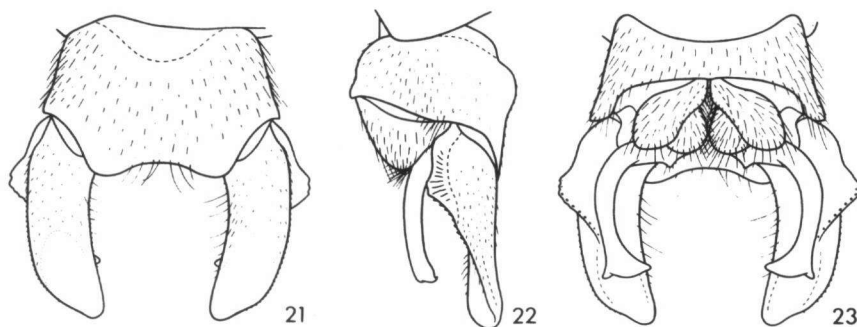
Figures 21-33

Progomphus gracilis Hagen in SELYS, 1854:70 (51 sep.) (♂, ♀); – SELYS & HAGEN, 1858:457-459 (196-198 sep.); pl. 10, figs. 6a-q; – HAGEN, 1861:312; – KIRBY, 1890:72; – KARSCH, 1890:371.

Material. – B r a z i l : 1 ♂, 1 ♀ (teneral), leg. J. Michaelis, (MNB); 6 ♂; Minas Gerais ? , 1 ♀ (IRSN); Theresiopolis, 1 ♀, leg. J. Michaelis, (MNB); Prov. Rio de Janeiro, Nova Friburgo, 1 ♂ (lectotype), (MCZ, no. 12372).

This species was described on the basis of several specimens taken at Nova Friburgo, Prov. Rio de Janeiro, Brazil. As Selys refers to Hagen concerning the description of the species I select as lectotype a male pertaining to the original series in Hagen's collection, now in the Museum of Comparative Zoology at Cambridge. The specimen bears at the pin the labels "Type 3 12372" (a red museum label), "Hagen", "Neu Friburg Rio Beschre", and "G. gracilis Hagen Brasilia Beschre Neu Friburg".

The pterothorax of the lectotype is in poor condition; the colour design on the sides cannot be studied exactly. The abdomen is broken off from the thorax and glued on to it. Also the accessory genitalia are in bad condition, dirty, the hairs broken off, the left posterior hamule partly damaged, etc.



Figs. 21-23. *Progomphus gracilis* Hagen in Selys, lectotype male: (21) tenth abdominal segment and caudal appendages, dorsal view; – (22) the same, left lateral view; – (23) the same, ventral view.

The female of this species differs greatly from the male regarding the colour design on the dorsum of the pterothorax. The (first) pale antehumeral stripes are narrow in the female; very broad below, wedge-shaped and tapering above in the male. The vertex of the female is of a peculiar form. The ridge behind each lateral ocellus terminates posteriorly in a small but distinct spine, a feature not mentioned by Hagen and Selys.

Male. — Total length 39-42 mm; abdomen 27-31 mm; hind wing 22-26 mm; costal edge of pterostigma in fore wing 3.0-3.2 mm.

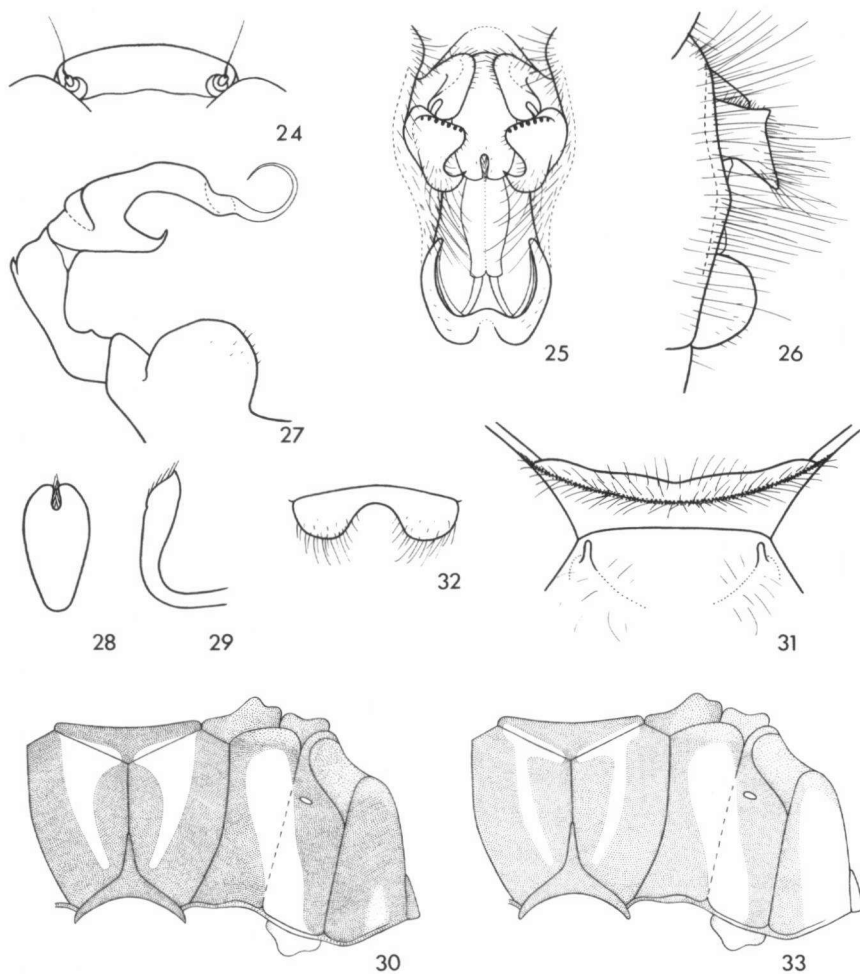
Face brown. Superior surface of frons with a broad whitish frontal band. Vertex and occipital plate dark brown. Posterior margin of occipital plate slightly concave in middle and fringed with long brown hairs. Posterior part of head brown, paler below. On temporae there is first an indistinct yellow spot followed by an indistinct yellow band. Labium and adjacent mouth parts pale brown.

Prothorax dark brown, with an indistinct tawny median twin-spot. Pterothorax dark brown, blackish brown on dorsum, with yellowish white stripes as follows: On dorsum a pair of (first) pale antehumeral stripes, each stripe very broad below and confluent with area of collar, the upper portion wedge-shaped and tapering. No trace of a pale marking of any kind immediately in front of humeral suture. Sides of pterothorax with a long and rather broad pale stripe on mesepimeron, and with a badly developed pale stripe on metepimeron.

Femora brown, the inner sides paler. Tibiae, tarsi and claws black. Third tarsus three-quarters the length of third tibia. Lamina tibialis of anterior tibia about one-fifth the tibial length.

Abdomen brown, becoming black towards apex. Basal segments paler along ventral tergal margins. A narrow middorsal stripe on segments 1 to 7, the stripe becoming narrower towards rear, being very fine on segments 5 to 7. Segment 7 with a yellow baso-lateral spot on each side, the spots sometimes confluent on middorsum. No denticles along dorsal posterior margin of segment 10. Superior caudal appendages black at base, becoming yellow on apical half, the tip blunt, the basal externo-lateral dilatation large and lacking the usual acute point at inferior apical angle. Inferior caudal appendage black, the branches widely separated, very slender and gradually incurving. Anterior genital hamules with a small apical excision. Posterior hamules with a short incurving tip. No sternal process on segment 1.

Wings hyaline. Venation dark brown but frontal margin of costa with a narrow, inconspicuous yellow line. Pterostigma yellowish brown. The features in the wings of the lectotype are: Basal subcostal cross-vein wanting. Pterostigma surmounting 4 to 5 cell. Antenodal and postnodal cross-veins of first series 9:17-17:11/10:10-12:10 in fore and hind wings, respectively. Second primary antenodal cross-vein the fourth in left hind wing, the fifth in other wings. Intermedian cross-veins 7-7/4-4 in fore and hind wings, respectively. Supratrangles open. Triangles and subtriangles two-celled except for subtriangle in left hind



Figs. 24-33. *Progomphus gracilis* Hagen in Selys: (24) frons of lectotype male, dorsal view; – (25) accessory genitalia of male, ventral view; – (26) the same, right lateral view; – (27) penis, right lateral view; – (28) penis guard, frontal view; – (29) the same, right lateral view; – (30) diagram of pterothorax of male; – (31) posterior part of vertex and occipital plate of female, dorsal view; – (32) vulvar lamina, ventral view; – (33) diagram of pterothorax of female.

wing which is open. Distal side of triangles convex, forming a broken line. Trigonal interspaces starting with a row of two (left fore wing) or three (other wings) cells against triangle followed by two rows of cells. Anal field in fore wings one cell wide. Five paranal cells in each hind wing. Three postanal cells in

left hind wing, four in right hind wing. Second anal interspace in hind wings starting with two cells against anal vein. Anal triangle in hind wings three-celled.

F e m a l e. — Total length 39-40 mm ; abdomen 29-30 mm; hind wing 27-28 mm; costal edge of pterostigma in fore wing 3.5-3.6 mm.

Dark colours brown, not blackish brown as in male, becoming somewhat darker towards apex of abdomen. Anal appendages becoming yellow on apical half. Differing from male in colour design of pterothorax as follows: Dorsum with a pair of long narrow pale antehumeral stripes, each stripe confluent below with pale area of collar, becoming slightly narrower above. Pale stripe on metepimeron much better developed than in male, long and rather broad. Vulvar lamina short, its posterior margin with a deep and wide median excision. Dorsal posterior margin of segment 10 with denticles only at level of bases of caudal appendages. Relative lengths of abdominal segments 7, 8, 9, and 10 about as 42:25:16:10, with the anal appendages 14 on the same scale.

Venation of wings brown, including frontal margin of costa. The features in the wings of the female borrowed from the Brussels Museum are: Antenodal and postnodal cross-veins of first series 9:15-16:10/11:10-11:11 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 6-6/4-4 in fore and hind wings, respectively. Anal field in fore wings one cell wide. Two rows of cells behind Cu2 in fore wings, three to four rows of cells behind Cu2 in hind wings. Triangle in fore wings open, in hind wings two-celled. Subtriangle in left fore wing open, in other wings two-celled. Supratrangles open. Hind wings with five paranal cells and three postanal cells.

The single female in the Brussels Museum is slightly immature and crushed. It bears a pin label "Prog. gracilis H" changed into "elegans sp.n." in Selys' handwriting. Selys, apparently being misled by the deviating colour design of the pterothorax in the two sexes, has referred the female to *Progomphus elegans* sp.n. described below, which possesses a more resembling colour design of the pterothorax.

One of the two females in the Berlin Museum is teneral. The other is a mature specimen in bad condition, not crushed but lacking the vulvar lamina and the abdominal segments 9 and 10, and being completely eaten out by scavengers (this is also the case with the female in the Brussels Museum). It differs somewhat from the female in the Brussels Museum by its larger size, the narrower antero-superior pale band of the frons, and the less developed pale antehumeral stripes.

The subtriangle and triangle in the fore wings of this species are often free from cross-veins. Also the subtriangle in the hind wings is sometimes open.

PROGOMPHUS ADAPTATUS SPEC. NOV.

Figures 34-43

Progomphus gracilis RIS, 1911:111; figs. 7-8.

Material. — Brazil: Espirito Santo, 20.V.1898. 1 ♂, 4 ♀ (holotype, allotype, and paratypes), (ZMH), 1 ♂, 1 ♀ (paratypes), (coll. Belle), all leg. J. Michaelis.

A somewhat smaller, more delicate and darker species than *gracilis*. Very closely related to it but readily recognizable by the following peculiarities in the two sexes: (1) The basal externo-lateral dilatation of the superior caudal appendage of the male is excessively enlarged, the posterior lobe of the expansion reaches to the supero-external anteapical tooth of the branch of the inferior caudal appendages, and (2) The vertex of the female possesses a pair of long postocellar spines, each spine inclined backward to far beyond anterior margin of occipital plate.

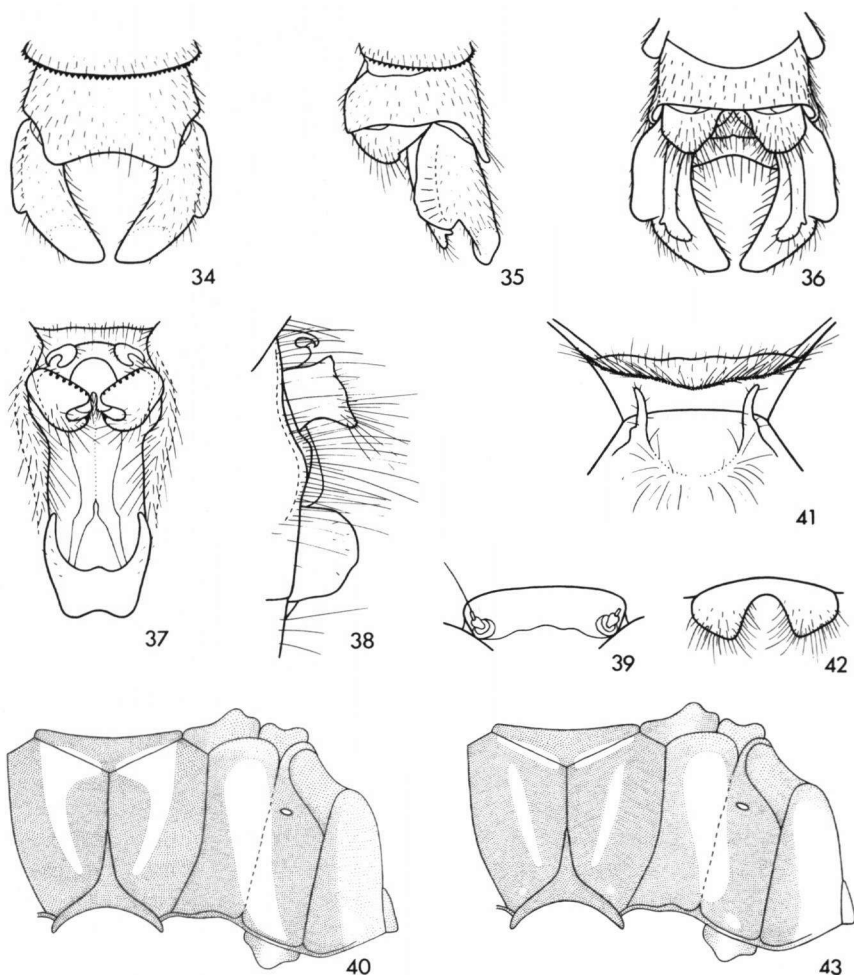
The differences in the colour design of the pterothorax in the two sexes of this species are greater than in *gracilis*. The pale antehumeral stripes in the female are shorter and narrower than in *gracilis* and not or barely connected below with the pale area of the collar.

Male (holotype). — Total length 37.5 mm; abdomen 28.5 mm; hind wing 23 mm; costal edge of pterostigma in fore wing 3.0 mm.

Resembling the male of *gracilis* but more delicate and with a smaller extent of the pale markings, in particular on abdomen. Prothorax entirely black on dorsum. Dorsum of pterothorax with a rudiment of a pale antealar spot on either side. Face with indistinct green markings as follows: Labrum with a green anterior band parallel to free margin; upper part of anteclypeus green except in middle, and lateral sides of postclypeus green. Base of mandible externally green.

Frons less projecting, occipital plate more concave in middle, tip of posterior genital hamule more slender, and tip of superior caudal appendage more acute and much more incurving to each other than in *gracilis*. Penis and penis guard much resembling those of *gracilis*.

Wings slightly brown. Venation dark brown but frontal margin of costa with a narrow inconspicuous pale line. Basal subcostal cross-vein absent. Pterostigma brown, surmounting $3\frac{1}{2}$ - $5\frac{1}{2}$ cells. Antenodal and postnodal cross-veins of first series 10:14-13:9/9:11-10:10 in fore and hind wings, respectively. Second primary antenodal cross-vein the fourth in right fore wing, the fifth in other wings. Supratrangles open. Subtriangles two-celled. Triangle in fore wings open, in hind wings two-celled. Anal field in fore wings one cell wide. Trigonal interspaces starting with a row of two (fore wings) and three (hind wings) cells against



Figs. 34-43. *Progomphus adaptatus* spec. nov.: (34) tenth abdominal segment and caudal appendages of holotype male, dorsal view; – (35) the same, left lateral view; – (36) the same, ventral view; – (37) accessory genitalia of holotype male, ventral view; – (38) the same, right lateral view; – (39) frons of holotype male, dorsal view; – (40) diagram of pterothorax of holotype male; – (41) posterior part of vertex and occipital plate of allotype female, dorsal view; – (42) vulvar lamina of allotype female, ventral view; – (43) diagram of pterothorax of allotype female.

triangle followed by two rows of cells. Intermedian cross-veins 5-5/4-3 in fore and hind wings, respectively. Hind wings with five (left) and six (right) paranal cells, and with three (left) and four (right) postanal cells. Anal triangle in hind wings three-celled.

F e m a l e (allotype). — Total length 38 mm; abdomen 28 mm; hind wing 24.5 mm; costal edge of pterostigma in fore wing 3.4 mm.

Dark colours dark brown, becoming black on apex of abdomen. No green markings discernible on face but base of mandible green. Pale antero-superior band of frons green. Dorsum of pterothorax with a very small pale antealar spot on each side. Pale antehumeral stripes not connected with pale area of collar. Pale stripe on metepimeron much better developed than in male. Vulvar lamina two-fifths the length of ninth sternum, its posterior margin deeply excised U-shaped in middle.

Wings slightly brown. Venation dark brown including frontal margin of costa. Antenodal and postnodal cross-veins of first series 10:15-15:10/10:11-11:10 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 5-5/4-4 in fore and hind wings, respectively. Centre of right fore wing with a deviating nervature. Triangle in fore wings open, in hind wings two-celled. Subtriangles two-celled. Hind wings with five (left) and six (right) paranal cells. Each hind wing with three postanal cells. Second anal interspace in hind wings two cells wide.

The paratype male differs slightly from the holotype. There are no green markings discernible on the labrum and anteclypeus. The dorsum of the prothorax has a pair of very small tawny spots. The dorsum of the pterothorax has a small but distinct pale antealar spot on each side. The triangle in the left fore wing is open, in the other wings two-celled. All subtriangles are two-celled.

Concerning the paratype females the following can be noted. The pale antehumeral stripes are not connected with the pale area of the collar in three females; in one female these stripes are barely connected with the pale area of the collar. One female only has pale antealar spots. One female has the triangle open in both fore wings, one female in one fore wing (left) only; the triangles are two-celled in all the other wings. The subtriangle is two-celled in all wings.

PROGOMPHUS ELEGANS SPEC. NOV.

Figures 44-51

Material. — **B r a z i l**: Teresópolis, 1 ♂, leg. Fruhstorfer (holotype), (IRSN).

Closely related to *lepidus* but differing from it in several respects. The inferior caudal appendage of the male is much more slender, the supero-external anteapical tooth of the branch is unusually large and as long as the apical part of the branch beyond it. The posterior genital hamules have no extra internal anteapical tooth.

The holotype bears the pin labels "Theresop. Fruhst." and "Prog. elegans S. ♂

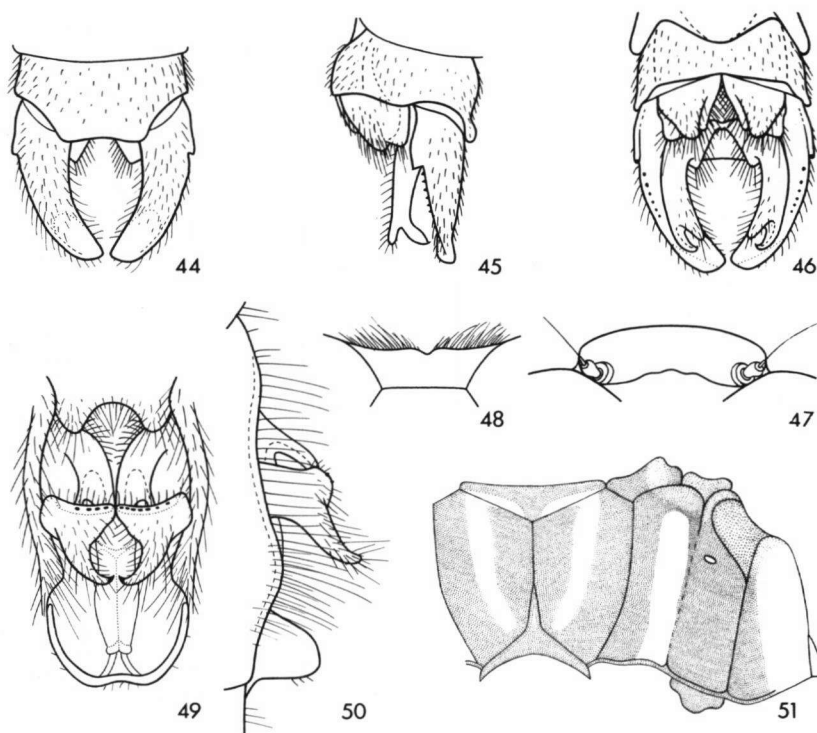
Téresopolis" in Selys' handwriting.

Male (holotype). — Total length 40.5 mm; abdomen 30.5 mm; hind wing 24.5 mm; costal edge of pterostigma in fore wing 3.0 mm.

Face brown. Superior surface of frons with a broad green frontal band. Base of superior surface of frons, vertex and occipital plate dark brown. Vertex with a protuberance between each lateral ocellus and eye border. Rear margin of occipital plate with a small but distinct median excision. Posterior part of head brown, paler on temporae. Labium and adjacent mouth parts pale green.

Prothorax dark brown, its hind lobe black.

Pterothorax dark brown, becoming black on dorsum, marked with green stripes as follows: Dorsum with a pair of long and narrow, nearly parallel-sided (first) pale antehumeral stripes, which are confluent with the narrow pale area of the collar. No pale marking of any kind immediately in front of humeral suture. Mesepimeron with a rather narrow pale stripe over its entire length. Metepime-



Figs. 44-51. *Progomphus elegans* spec. nov., holotype male: (44) tenth abdominal segment and caudal appendages, dorsal view; — (45) the same, left lateral view; — (46) the same, ventral view; — (47) frons, dorsal view; — (48) occipital plate; — (49) accessory genitalia, ventral view; — (50) the same, right lateral view; — (51) diagram of pterothorax.

ron with a broad pale stripe along hind border.

Femora brown, the inner sides green. Third tarsus two-thirds the length of third tibia. Tibiae, tarsi and claws black. Lamina tibialis of anterior tibia one-fifth the tibial length.

Abdomen predominantly black, brown along ventral tergal margin and on venter of segments 8 and 10. Anal tubercles brown. Segments 1 and 2 with green middorsal stripe. Segments 3 to 6 with a fine green middorsal line which becomes wider on base of each segment. Segment 7 green on its basal third. No denticles along dorsal posterior margin of segment 10. Caudal appendages black, the apical two-fifths of the superior ones yellow. Inferior carina of superior caudal appendage with a single row of six denticles. Basal externo-lateral dilatation of superior caudal appendage small and acutely pointed caudad. Anterior genital hamules with a large apical excision. Tip of posterior hamule long. A low but distinct tubercle on venter of segment 1.

Wings hyaline. Venation dark brown but frontal margin of costa with a narrow inconspicuous yellow line. Pterostigma brown, surmounting $4\frac{1}{2}$ - $5\frac{1}{2}$ cells. No basal subcostal cross-vein. Antenodal and postnodal cross-veins of first series 10:16-15:10/10:12-12:10 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 6-7/4-4 in fore and hind wings, respectively. Supratrangles and triangles two-celled. Anal field in fore wings one cell wide. Trigonal interspaces starting with a row of three cells against triangle followed by two rows of cells. Hind wings with four paranal and four postanal cells. Anal triangle in hind wings three-celled.

F e m a l e unknown.

PROGOMPHUS LEPIDUS RIS, 1911

Figures 52-60

Progomphus lepidus RIS, 1911:111-112; figs. 9-10 (♂) — RIS, 1913:73; — NEEDHAM, 1941:232-233, 234; pl. 20, fig. 7 (larva ?); — FRASER, 1947:439, 441 (♀).

Material. — A r g e n t i n a : Misiones, 3.XII.1909, 1 ♂, leg. Jörgensen (holotype), (SMF, no. 15196); Bemberg, 12-29.I.1945, 1 ♂, 1 ♀ (both with apical half of abdomen lost), leg. Hayward, Willink & Golbach, (IML). — B r a z i l : 1 ♂ (coll. Belle); 1 ♂; Santa Catarina, Nova Teutonia, 27.VIII.1950, 1 ♂; 20.XI.1950, 1 ♂, (MKB); 1 ♂, leg. W. Wittmer, (ML); 7.XII.1939, 1 ♂; 2.XI.1940, 1 ♀; 2.I.1941, 2 ♂; 4.I.1941, 3 ♂; 7.I.1942, 3 ♂; 27°S., 52°-53°W., 26.X.1938, 1 ♂ (fragments), all leg. Fritz Plaumann; Rio Grande do Sul, Cachoeira, 18.XII.1924, 1 ♂ (badly broken), leg. W.F. Henninger, (MZM).

The male of this species is peculiar in having the posterior genital hamule armed with an extra internal anteapical tooth, a feature not found in any other member of the genus.

The vertex of the female exhibits a peculiar adaptation to the claspers of the male caudal appendages. There is a conspicuous twin-protuberance between each lateral ocellus and compound eye.

The abdomen of the holotype male is broken between the segments 3-4, 4-5, and 7-8. The third tarsus is two-thirds of the length of the third tibia. The lamina tibialis of the first tibia is one-third of the tibial length. There is no sternal process on the abdominal segment 1, and there are no denticles along the dorsal posterior margin of the tenth abdominal segment.

The males of the series show some variation. The pale areas of the collar are less developed than in the holotype and often practically or entirely absent. The triangles and subtriangles are two-celled but in the male taken by W. Wittmer in Nova Teutonia the subtriangle in the hind wings only is two-celled. The subtriangles in the fore wings and the triangles in all wings are open.

The male collected by Wittmer belongs to the smaller specimens of the series. It differs somewhat from the holotype in the colour of some details. The face is paler, the occipital plate brown (in holotype black), the prothorax is brown (in holotype black) except for the hind collar which is also black, the pale markings of the pterothorax and abdomen are yellowish green, the pale posterior band on the metepimeron is narrower and about as wide as the pale mesepimeral stripe, and the base of the abdominal segment 8 has a fine pale middorsal line. Some features in the wings of this male are: Antenodal and postnodal cross-veins of first series 7:12-13:7/7:9-10:7 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth in left fore wing and right hind wing, the fourth in other wings. Intermedian cross-veins 5-4/3-3 in fore and hind wings, respectively. Each hind wing with five paranal cells and three postanal cells.

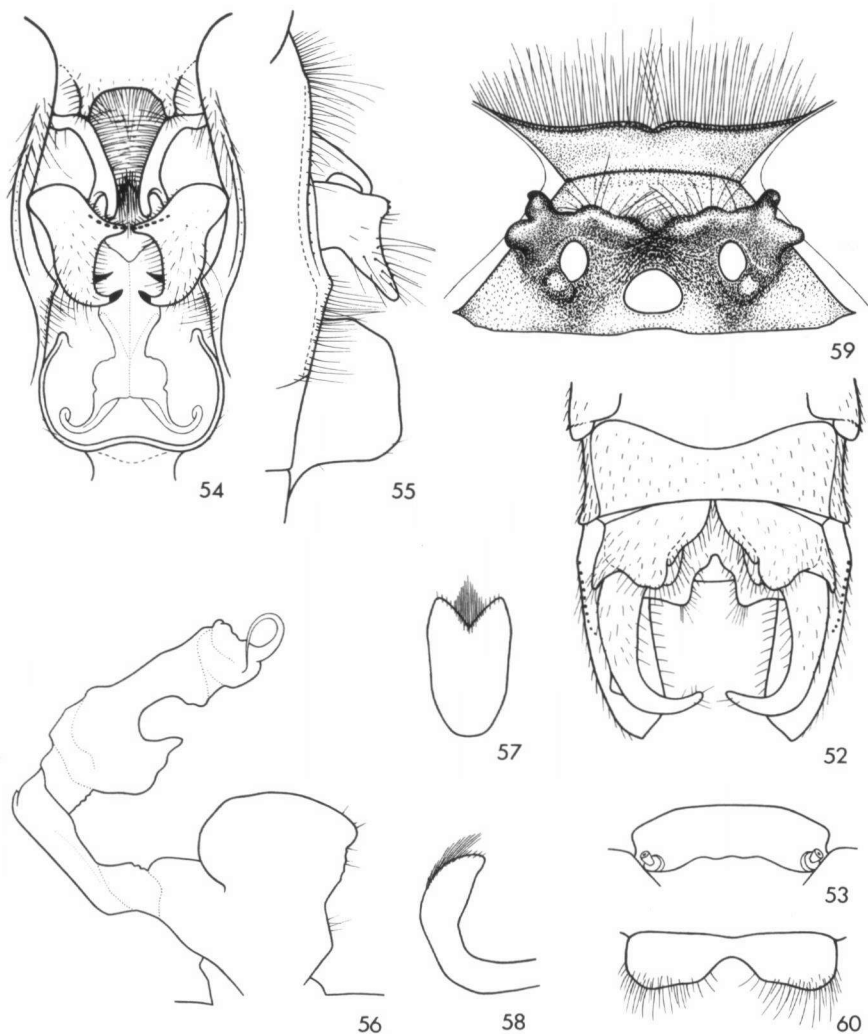
Differences are also found in the conformation of the male inferior caudal appendage; the incurved apical part of the branch in some males is much more slender than in the holotype (Fig. 52).

Two males from the Museum Alexander Koenig at Bonn were found to be stored in triangular envelopes without any locality data but a note made on a sheath of paper by Buchholz refers to Brazil.

In 1947 FRASER recorded some specimens of *lepidus* from Argentina. The two females taken at Concordia, however, belongs to the new species *australis* described hereinafter. The (incomplete) female taken at Bemberg belongs to *lepidus*. As only few notes were given from this specimen I describe the female from Nova Teutonia, Brazil.

F e m a l e (abdomen broken between segments 4 and 5). — Total length 41 mm; abdomen 26 mm; hind wing 24.5 mm; costal edge of pterostigma in fore wing 3.2 mm.

Similar to male regarding stature and general coloration but face paler. Superior surface of frons largely brown and with a narrow pale anterior band. Vertex with a tubercle in front of each lateral ocellus and with a twin-pro-



Figs. 52-60. *Progompheus lepidus* Ris: (52) tenth abdominal segment and caudal appendages of male from Nova Teutonia collected on 4.I.1941, ventral view; – (53) frons of holotype male, dorsal view; – (54) accessory genitalia, ventral view; – (55) the same, right lateral view; – (56) penis, right lateral view; – (57) penis guard, frontal view; – (58) the same, right lateral view; – (59) vertex and occipital plate of female, frontal view; – (60) vulvar lamina, ventral view.

tubercle on each postocellar ridge between lateral ocellus and compound eye. Vertex and occipital plate brown, pale below each lateral ocellus. Pale markings on dorsum of pterothorax more weakly developed than in holotype male; in particular pale areas of collar, but pale posterior stripe on metepimeron much wider than in holotype male. Abdominal segment 7 without pale basal marking but with only a fine pale middorsal line. Anal tubercles pale yellow. Dorsal posterior margin of segment 10 with denticles only at level of bases of caudal appendages. Relative lengths of abdominal segments 7, 8, 9 and 10 about as 42:22:15:10. Caudal appendages about as long as segment 10 and dark brown. Vulvar lamina short, its posterior margin with a semicircular median excision. No sternal process on abdominal segment 1.

Coloration of wings including pterostigma as in male but frontal margin of costa without yellow line. Antenodal and postnodal cross-veins of first series 9:15-14:9/10:12-12:10 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Triangles and subtriangles two-celled. Supratrangles open. Intermedian cross-veins 6-6/4-4 in fore and hind wings, respectively. Anal field in fore wings with one double cell. Hind wings with six paranal cells, four postanal cells, and five rows of cells behind Cu2. Second anal interspace in hind wings two cells wide but with a marginal row of three cells.

The incomplete female from Bemberg is smaller than the female from Nova Teutonia. Its hind wings measure only 20.5 mm. Further the antehumeral pale stripes are less developed and narrower, and the twin-protuberances on the vertex are provided with a small superior tooth.

PROGOMPHUS AUSTRALIS SPEC. NOV.

Figures 61-64

Progomphus lepidus FRASER, 1947:439-441 (♀).

Material. — Argentina: Concordia, XII.1935, 1 ♀ (holotype), (BM); II.1936, 1 ♀ (paratype), (coll. Belle), both leg. K. Hayward.

Closely related to *lepidus* but smaller and readily distinguished from it by the brownish yellow basal colouring on the wings. The female moreover has no pair of twin-protuberances on the vertex but only a small tubercle between each postocellar ridge and compound eye.

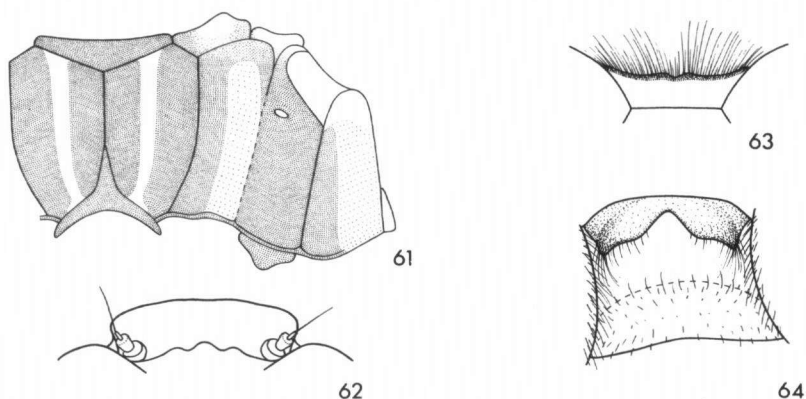
Male unknown.

Female (holotype; apical segments of abdomen somewhat distorted). — Total length 37 mm; abdomen 27 mm; hind wing 23 mm; costal edge of pterostigma in fore wing 3.0 mm.

Face yellow. Frons angled, its upper part brown except for a narrow anterior

yellow band. Vertex brown. Postocellar ridges well-developed. Occipital plate brown, its posterior margin with a small median excision and fringed with long brown hairs. Posterior part of head brown, becoming yellow below temporae. Labium and adjacent mouth parts yellow.

Prothorax brown. Pterothorax brown with paler stripes, the brown colour darker on dorsum. Dorsum with a pair of narrow, nearly parallel-sided (first) yellow antehumeral stripes reaching from antealar sinus to collar. No second pale antehumeral stripes. Sides of pterothorax with two brown-red stripes, a well-developed brown-red stripe on mesepimeron and a second brown-red stripe covering the posterior half of the metepimeron. Metapostepimeron yellow. Lower parts of sides of pterothorax yellow or brownish yellow.



Figs. 61-64. *Progompheus australis* spec. nov., holotype female: (61) diagram of pterothorax; – (62) frons, dorsal view; – (63) occipital plate; – (64) vulvar lamina and ninth sternum, ventral view.

First two pairs of femora dark brown, the inner sides yellow. Third femora largely brown-yellow becoming dark brown towards knees (joints between femora and tibiae). Third tarsus about two-thirds the length of third tibia.

Abdomen predominantly dark brown. Segments 1 to 7 with a yellow mid-dorsal stripe, the stripes on 3 to 7 widened at base, the basal spot on 7 large. Sides of segment 1 and 2 largely yellow. Sides of segment 3 with a yellow stripe which becomes narrower towards apex of segment. Sides of segments 4 and 5 with yellow basal spot only. Vulvar lamina about one-third the length of ninth sternum, its posterior margin with a deep, V-shaped median excision. Relative lengths of segments 7, 8, 9 and 10 about as 39:21:13:10. Caudal appendages a trifle longer than segment 10, and with an acute point. Lamina supra-analis about three-quarters the length of caudal appendages. Posterior dorsal margin of segment 10 denticulated except in middle.

Brownish yellow basal colouring on wings extending to anal vein and inner side of subtriangle, and continued, but weakly developed, in antenodal interspace and to just beyond nodus in postnodal interspace. Pterostigma brown-yellow, surmounting 5 - 5½ cells. Basal subcostal cross-vein wanting. Antenodal and postnodal cross-veins of first series 10:13-13:8/9:9-9:8 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth in fore wings, the fourth in hind wings. Intermedian cross-veins 5-6/4-4 in fore and hind wings, respectively. Trigonal interspaces starting with two (fore wings) and three (hind wings) cells against triangle, followed by two rows of cells. Supratrangles open. Subtriangles in fore wings two-celled, in hind wings open. Triangles two-celled. Hind wings with five (right) and six (left) paranal cells, four postanal cells, and with four rows of cells behind Cu2.

The paratype female is a somewhat teneral specimen. All triangles and subtriangles in the wings of this female are two-celled. The brownish yellow colouring is anteriorly developed from base to second primary antenodal cross-vein only and at nodus.

PROGOMPHUS COSTALIS HAGEN IN SELYS, 1854

Figures 65-75

Progomphus costalis Hagen in SELYS, 1854:71 (52 sep.) (♂); – SELYS & HAGEN, 1858:461-462 (200-201 sep.); pl. 11, figs. 2a-k; – HAGEN, 1861:312; – SELYS, 1873:763 (36 sep.); – KIRBY, 1890:72; – KARSCH, 1890:371; – RIS, 1911:116-117; figs. 16, 17 (♀).

Material. – Brazil: 1 ♂ (lectotype), (MNB), 1 ♂ (MCZ, no. 12373), both leg. Sellow; Prov. Paraná, Guarapuava, XII.1961, 1 ♂, 1 ♀, leg. Hipólito Schneider, (FSC); Prov. Minas Gerais, Carrancas, XI, 1 ♂, leg. Walthère de Selys, (IRSN); Rio Grande do Sul, Santa Cruz, 10.VII.1895, 1 ♀, leg. Stieglmayer, (ZMH); Prov. Santa Catarina, Lages, 1 ♂, leg. Fruhstorfer, (MNB).

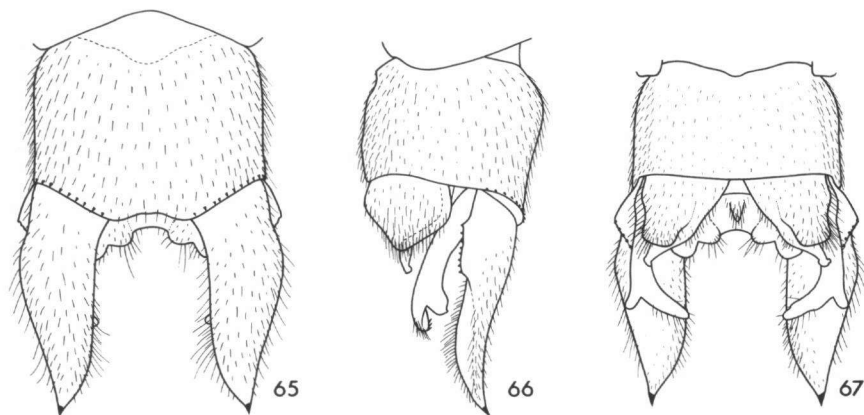
Described on the basis of two males taken in Brazil by Sellow, and very well redescribed and illustrated in SELYS & HAGEN (1858). The male used by Hagen for his figures in this monograph is in the Berlin Museum and has been selected as the lectotype of this species. The pin labels of this specimen are "2324" (white label), "Brasil Sello" (green label), "costalis Hag." (green label), "Typus" (red museum label), and "Progomphus costalis Hgn det. K.K. Günther 1958" (white label). The male is in fairly good condition but the accessory genitalia are lacking. These were apparently removed by Hagen and not reattached to the specimen.

The second male of the original series is in the Museum of Comparative Zoology at Cambridge, Mass. The pin labels of this specimen are "Type

12373", "Mus. Berol.", "Hagen", "G. costalis Sello", and "P. costalis Hag.". The label "Mus. Berol" is evidently an abbreviation for "Museum Beroliense" (= Berlin Museum). The male lacks the right fore wing but for the rest it can very well be studied. The abdomen was broken off from the thorax and glued again to it. The second male is very similar to the lectotype.

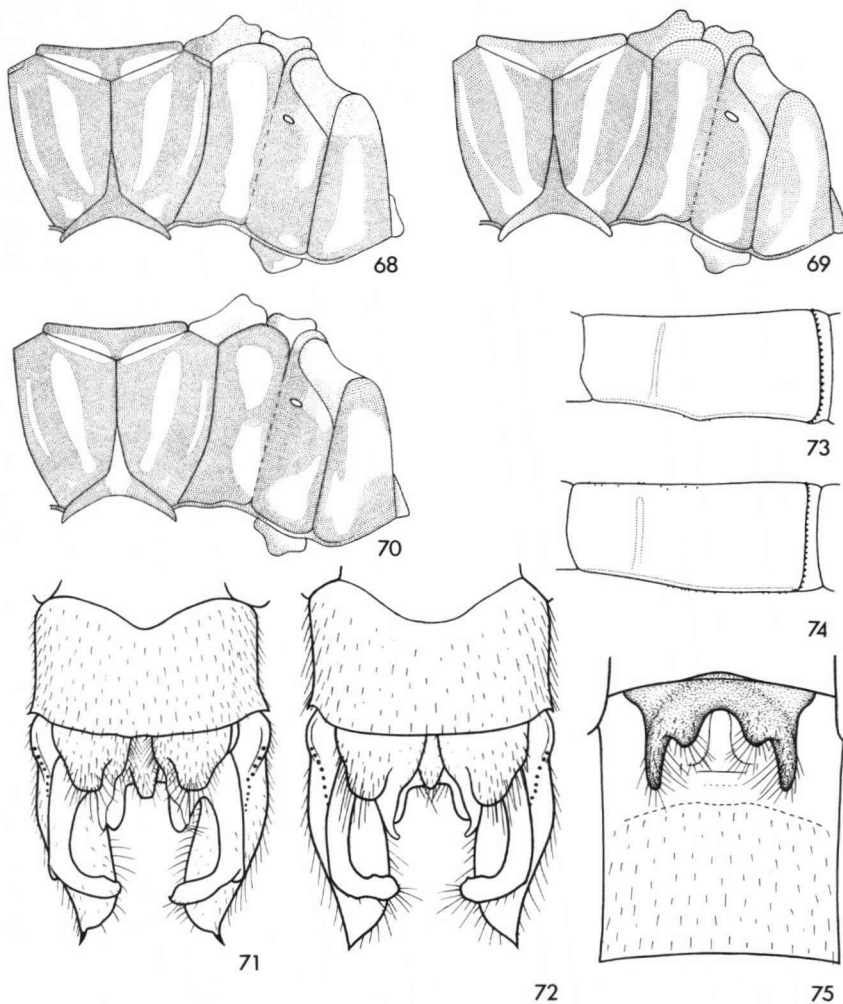
The variations in the material recorded here are surprising.

Variation (1): Specimens from Guarapuava and Carrancas. Differing from the lectotype by the following features: Wings with distinct brown basal spot (no distinct basal spot in lectotype); first pale antehumeral stripes confluent with pale area of collar (not confluent in lectotype); second pale antehumeral stripes complete (interrupted near upper end in lectotype); lateral keel of abdominal segment 9 in male brown (in lectotype black); pterostigma (4-4.5 mm) larger than in lectotype (3.7 mm); lateral keel of abdominal segment 7 in male less widened on apical half than in lectotype; inferior caudal appendage of male with the submedian marginal processes much longer, the two branches less widely separated, the supero-external anteapical tooth of the branch less outstanding, the tip of the branch less slender than in lectotype, and with the apex of the tip of the branch with two or three superior teeth (with four in lectotype); apical part of superior appendage of male not gradually tapering into an acute point (as it is in lectotype).



Figs. 65-67. *Progomphus costalis* Hagen in Selys, lectotype male: (65) tenth abdominal segment and caudal appendages, dorsal view; – (66) the same, left lateral view; – (67) the same, ventral view.

Variation (2): Represented by the single female from Santa Cruz. Similar to the female of variation (1) in stature and coloration but differing from it in some structural details: Caudal appendages, if viewed from dorsum, parallel on the



Figs. 68-75. *Progomphus costalis* Hagen in Selys: (68) diagram of pterothorax, lectotype male; - (69) the same, male variation (1); - (70) the same, male variation (3); - (71) ventral view of tenth abdominal segment and caudal appendages, male variation (1); - (72) the same, male variation (3); - (73) left lateral view of seventh abdominal segment, lectotype male; - (74) the same, male variation (1); - (75) vulvar lamina and ninth sternum of female variation (1), ventral view.

basal two-thirds and tapering into an acute point on the apical third (in female of variation (1) parallel on the basal third and tapering into an acute point on the apical two-thirds); posterior margin of vulvar scale less widely excised in middle; furrow between vertex and occipital plate larger and deeper; postocellar ridges

well-developed and terminating laterally into a large tubercle (in female of variation (1) much lower and laterally without a distinct tubercle). The structural differences in the vertex may be correlated with some differences in the configuration of the inferior caudal appendage of the corresponding male.

Variation (3): Represented by the single male from Lages. Apparently melanistic. Dark colours of body blackish brown (in other specimens of the series brown) and wings with blackish brown basal and nodal spots; coloured costal band weakly developed, and between R1 and M1 not developed at all; first pale antehumeral stripes not confluent with pale area of collar; second pale antehumeral stripes interrupted near the upper end; pterostigma short (3.5 mm); lateral keel of abdominal segment 7 as in variation (1); caudal appendages closely approaching those of variation (1); apex of tip of branch of inferior caudal appendage with three superior teeth; tip of posterior genital hamule stouter than in variation (1).

PROGOMPHUS ABERRANS SPEC. NOV.

Figures 76-87

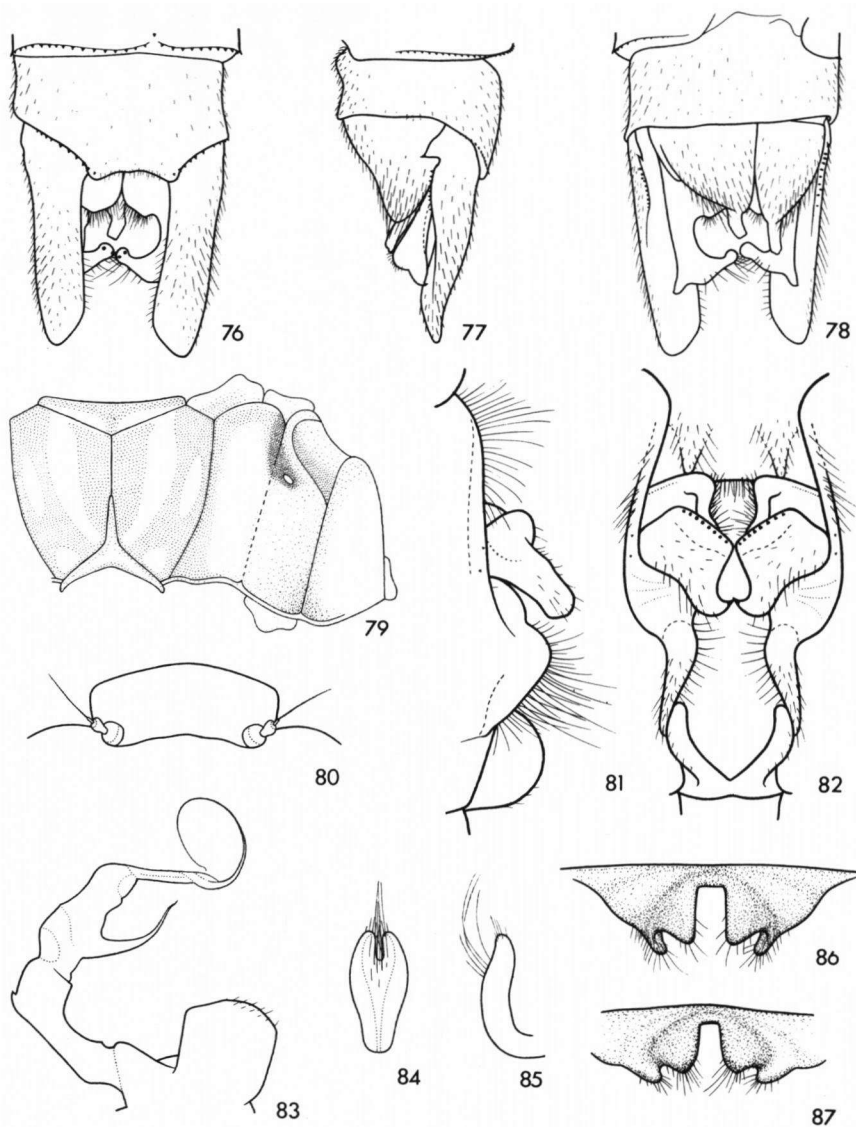
Material. — **Argentina**: 15.XII.1950, 1 ♂ (holotype), (MKB); 20.XII.1950, 1 ♂ (paratype), (coll. Belle); 1904, 2 ♂ (end segments of abdomen lost), leg. O.W. Thomas (paratypes), (BM); Iguazu Falls, 22.I.1920, 1 ♂ (teneral), leg. J.C. Bradley (paratype); Prov. Cordoba, Dumesnil, 11.XI.1945, 1 ♂ (paratype), from Ward's Nat. Sci. Estab., (MZM). — **Brazil**: Rio Grande do Sul, Cachoeira, 5.XI.1924, 1 ♀ (badly broken); 29.XI.1924, 1 ♀ (badly broken), both leg. W.F. Henninger (paratypes), (MZM). — **Paraguay**: Dept. Guaira, Villarrica, Colonia-Carlos Pfannl, 12.I.1945, 1 ♀ (paratype); II.1945, 1 ♀ (allotype), both leg. F.H. Schade, (MZM).

The two males from Argentina taken in 1950 are from coll. Buchholz. No indication on the accompanying paper triangles refers to their locality and collector. However, Buchholz provided the envelopes with the character "C" and on a sheath of paper found in this estate a note was found "C 2 ♂ Argentina", in his handwriting. Obviously Argentina is the correct country of capture of these two males.

This species resembles somewhat *costalis* by the coloured costal band on the wings, but it is smaller, and the male has quite different caudal appendages and accessory genitalia.

Male (holotype; abdomen broken between segments 3-4 and 5-6; apical segments partly crushed). — Total length 44 mm; abdomen 32 mm; hind wing 23 mm; costal edge of pterostigma in fore wing 3.3 mm.

Face pale white, vertical part of frons slightly brown. Labium and adjacent mouth parts pale. Superior surface of frons largely pale, and with a large, brown midbasal spot. Face with brown hairs, the hairs on superior surface of frons long.



Figs. 76-87. *Progomphus aberrans* spec. nov.: (76) tenth abdominal segment and caudal appendages of holotype male, dorsal view; – (77) the same, left lateral view; – (78) the same, ventral view; – (79) diagram of pterothorax of holotype male; – (80) frons of holotype male, dorsal view; – (81) accessory genitalia of holotype male, right lateral view; – (82) the same (except penis and penis guard), ventral view; – (83) penis of paratype male, right lateral view; – (84) penis guard of paratype male, frontal view; – (85) the same, right lateral view; – (86) ventral view of vulvar lamina, allotype female; – (87) the same, female from Cachoeira.

Vertex brown, the projecting parts paler. Occipital plate brown, its posterior margin convex in middle and fringed with long soft pale hairs. Posterior part of head brown with pale (brownish yellow) spots, pale behind occipital plate. On temporae first a pale spot and then a pale marginal area to below.

Prothorax brown, greenish brown on dorsum of middle lobe, the hind collar with brownish yellow warts and long soft hairs.

Pterothorax hairy, in particular on dorsum. It is brown with pale green markings on dorsum. The colour design of the sides cannot exactly be studied because of postmortem changes but it may be shaped as shown in the diagram (Fig. 79). Middorsal carina pale. First pale antehumeral stripes more or less wedge-shaped, widened laterally at mid-height, confluent with pale area of collar. Second pale antehumeral stripes represented only by a large antealar spot and a rather broad oblong spot at mid-height of humeral suture. Sides of pterothorax with a dark brown streak from spiracle to lower side of mesepimeron. Pale mesepimeral stripe broad. Metepisternum entirely brown. Metepimeron pale for the most part. Metapostepimeron pale.

Femora brown, paler along ventral sides. Dorsum of third femora with two longitudinal pale stripes. Ventral side of first femora yellow. Knees yellow. Tibiae brown with yellow carinae. Lamina tibialis of anterior tibia about one-third the tibial length. Tarsi brown with pale dorsal sides. Third tarsus as long as third tibia. Claws pale brown with black tips.

Abdomen brown but lower sides of segments 1 and 2, including auricles, and dorsum of segments 3 to 7 pale. Sides of segments 8 to 10 washed with yellow. Dorsal posterior margin of segment 10 with denticles only at level of bases of superior caudal appendages. Caudal appendages brown, the upper surface of superior appendages pale at apex. Superior appendages nearly parallel-sided if viewed from dorsum, the tip more or less round. Inferior carina of superior appendage with a single row of about ten denticles. Apical part of branch of inferior appendage incurved and more or less recurved, its apex with two superior teeth. No sternal process on segment 1. Genital hamules pale at base, becoming brown to apex. Anterior hamules small, apex cleft. Hood of penial peduncle relatively small and dark brown.

Wings with distinct brown basal spot in antenodal interspace, proximal to nodus yellowish brown between costa and R, distal to nodus yellowish brown between costa and R1. Venation brown but frontal margin of costa yellow. Pterostigma yellowish brown, surmounting $4\frac{1}{2}$ - 6 cells. Basal subcostal cross-vein present. Antenodal and postnodal cross-veins of first series 6:13-13:7/7:10-9:7 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 5-5/3-3 in fore and hind wings, respectively. Subtriangles open. Triangles and subtriangles two-celled. Trigonal interspaces starting with a row of four (right hind wing) or three (other wings) cells against triangle followed by two rows of cells. Anal field in fore wings two cells

wide. Area posterior to Cu2 three cells wide in fore wings, four cells wide in hind wings. Second anal interspace in hind wings starting with a single cell against anal vein followed by two rows of cells. Anal triangle in hind wings three-celled.

F e m a l e (allotype). — Total length 40 mm; abdomen 29.5 mm; hind wing 23.5 mm; costal edge of pterostigma in fore wing 3.5 mm.

Head and thorax not noticeably hairy (most of the hairs broken off). Coloration of body and wings similar to holotype but prothorax entirely brown. Abdomen brown but sides brownish yellow. Segments 2 to 7 pale green along ventral tergal margins, and with a yellow middorsal line. Vertex with high ridge anterior to each lateral ocellus; postcellar ridges somewhat lower. Vulvar lamina yellow, small, about a quarter the length of ninth sternum, its posterior margin with a deep, narrow, U-shaped median excision. Caudal appendages acutely pointed. Dorsal posterior margin of abdominal segment 10 with denticles only at level of bases of caudal appendages. Relative lengths of abdominal segments 7, 8, 9, and 10 about as 50:33:18:10, with the caudal appendages 18 on the same scale.

Antenodal and postnodal cross-veins of first series 6:14-13:6/6:9-9:7 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-vein 4-5/3-3 in fore and hind wings, respectively. All triangles and subtriangles two-celled. Anal field in fore wings two cells wide. Second anal interspace in hind wings two cells wide. Hind wings with six (right) and five (left) paranal cells, four postanal cells, and with four rows of cells behind Cu2.

The development of the coloured costal band is variable. This band is faintly developed in the teneral male from Iguazu but possibly not owing to immaturity, because one of the two teneral (incomplete) males in the British Museum has a very well developed coloured costal band, which is expanded at base of wing to the anal vein. In most specimens the colouring posterior to R + M is weakly developed and sometimes nearly wanting.

The wings of the two females from Brazil have a less dense reticulation. The fore wings have a single row of cells in the anal field; the hind wings have three postanal cells and three rows of cells behind vein Cu2. One of these females has moreover an open subtriangle in each fore wing.

Other differences in these two females are: First pale antehumeral stripes confluent with pale oblong spot at mid-height and immediately in front of humeral suture. Caudal appendages and triangular lobes of vulvar lamina somewhat shorter than in females from Paraguay. Posterior margin of vulvar lamina less widely excised U-shaped than in the females from Paraguay.

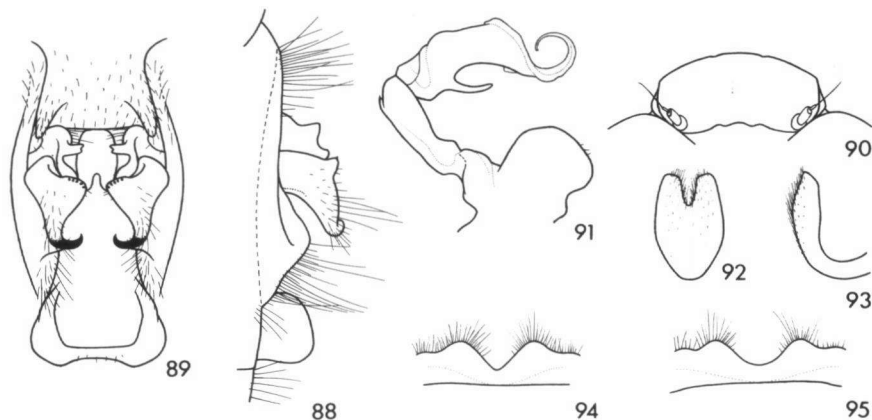
PROGOMPHUS JOERGENSENI RIS, 1908

Figures 88-96

Progomphus joergenseni RIS, 1908:521-522; figs. 3a-b (♂, ♀); – RIS, 1911: 119; – NAVAS, 1922:54; – FRASER, 1947:441.

Material. – **Argentina:** Prov. Mendoza, Chacras de Coria, 6.IV.1907, 1 ♂, leg. Jörgensen (holotype); 29.III.1907, 1 ♀, leg. Hensen-Haarüp (allotype), (MC); Mendoza, 2.V.1908, 1 ♂ (coll. Belle); Chacras de Coria, 25.IV.1907, 1 ♂; 6.IV.1907, 1 ♂; 25.IV.1907, 1 ♂; 22.V.1907, 1 ♂, all leg. Jörgensen, (ML); Prov. Tucumán (1200 m), 7 ♂, 7 ♀; Salta-Cachi (2500 m), 8 ♂ (MNB); 1 ♂, 1 ♀ (coll. Belle), all leg. J. Steinbach; Prov. Salta, Estancia Yacochuya, 7 km n.w. of Cafayate (at stream above the Río Conchas, about 1750 m elev.), 15.II.1968, 1 ♂ (teneral), leg. T.E. Moore & A. Willink, (MZM). – **Bolivia:** Cochabamba (2600 m), 1.III.1950, 1 ♂, leg. R. Zischka, (MKB). – **Peru:** Chosica, 3-4.V.1920, 1 ♂, leg. Dr. T.M. Forbes, (MZM).

The holotype is in fairly good condition. The abdomen is broken between the segments 3-4 and 5-6. The posterior genital hamule is yellow, the long and strongly incurved tip dark brown, its swollen base with a row of five black denticles. The anterior hamule is dark brown, its inner margin with a rather large subapical notch. The hood of the penial peduncle is dark brown but yellow in middle. The tip of the penis guard is deeply excised U-shaped in middle. There is no sternal process on abdominal segment 1. The lamina tibialis of the anterior tibia is about two-sevenths of the tibial length. The length of the third tarsus is two-thirds the length of the third tibia.



Figs. 88-95. *Progomphus joergenseni* Ris: (88) accessory genitalia of holotype male, right lateral view; – (89) the same (except penis), ventral view; – (90) frons of holotype male, dorsal view; – (91) penis, right lateral view; – (92) penis guard, frontal view; – (93) the same, right lateral view; – (94) ventral view of vulvar lamina, female from Tucumán (1200 m); – (95) the same, another female from same locality.

There is some variation in the length and the form of the superior caudal appendages of the male and also in those of the caudal appendages and the vulvar lamina of the female. The vulvar lamina of the allotype female is yellow and about one-fifth of the length of the ninth sternum, its posterior margin is widely excised V-shaped. RIS (1908) figured the right pair of wings (transposed) of the allotype female.

The male from Bolivia is the most yellow specimen of the series.

The male from Peru has a shorter pterostigma (costal edge of pterostigma in front wing 3 mm) and shorter appendages than the other males of the series.

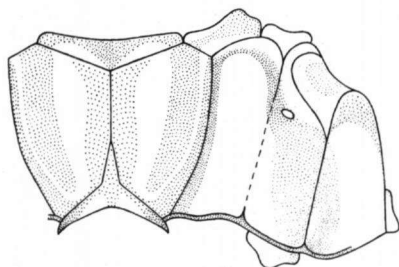


Fig. 96. *Progomphus joergenseni* Ris, holotype male. Diagram of pterothorax.

Moreover its wing has a weakly developed basal spot whereas the nodal spot is nearly absent.

I have not seen the Peruvian specimen called "Libélula gris" by Dr. Escomel and referred to *Progomphus joergenseni* by NAVAS (1922). *Progomphus joergenseni*, however, is not at all a grey species.

PROGOMPHUS HERRERAE NEEDHAM & ETCHEVERRY, 1956

Figures 97-108

Progomphus herrerae NEEDHAM & ETCHEVERRY, 1956:214-215; figs. 1-9 (♂).

Material. — Chile: Prov. Tarapacá, Miñi-Miñi, 13.II.1948, 1 ♂ (lectotype); Lluta, 7.II.1948, 1 ♂ (paratype); Prov. Antofagasta, Aguas Blancas, 9.XII.1966, 1 ♀; Guatín, 2.XII.1959, 1 ♂ (IPUC), 1 ♂; Tilopozo (2300 m), 8.XII.1966, 1 ♀; Peine (2350 m), 8.XII.1966, 1 ♂, 1 ♀ (coll. Belle), all leg. M. Etcheverry.

Contrary to the statement in the original description (NEEDHAM & ETCHEVERRY, 1956), the species is not listed in the type file of the Cornell University. The holotype was apparently dissected and slide-mounted and may be lost.

The paratype male, with the same locality data as the holotype, has been selected as lectotype.

The species is very closely related to *joergenseni*. The differences between the two species are slight. Most striking is the difference in size. The dark areas are somewhat better defined and the second pale antehumeral stripes generally better developed than in *joergenseni*, and there is a pale area along each side of the middorsal carina. The morphological differences are not distinct. The superior caudal appendages of the male and the caudal appendages of the female are generally shorter and more slender than in *joergenseni*. Also the apical notch of the penis guard seems to be excavated more deeply, the inner apical projection of the anterior genital hamules relatively shorter, and the posterior margin of the vulvar lamina less widely excised V-shaped than in *joergenseni*. When the species *Progomphus joergenseni* will be better known from the Andean highlands, *Progomphus herrerae* may prove to be no more than a western form of it.

Male (lectotype; left hind wing damaged between nodus and pterostigma; abdomen broken between segments 3-4). — Total length 42 mm; abdomen 30.5 mm; hind wing 23 mm; costal edge of pterostigma in fore wing 2.5 mm.

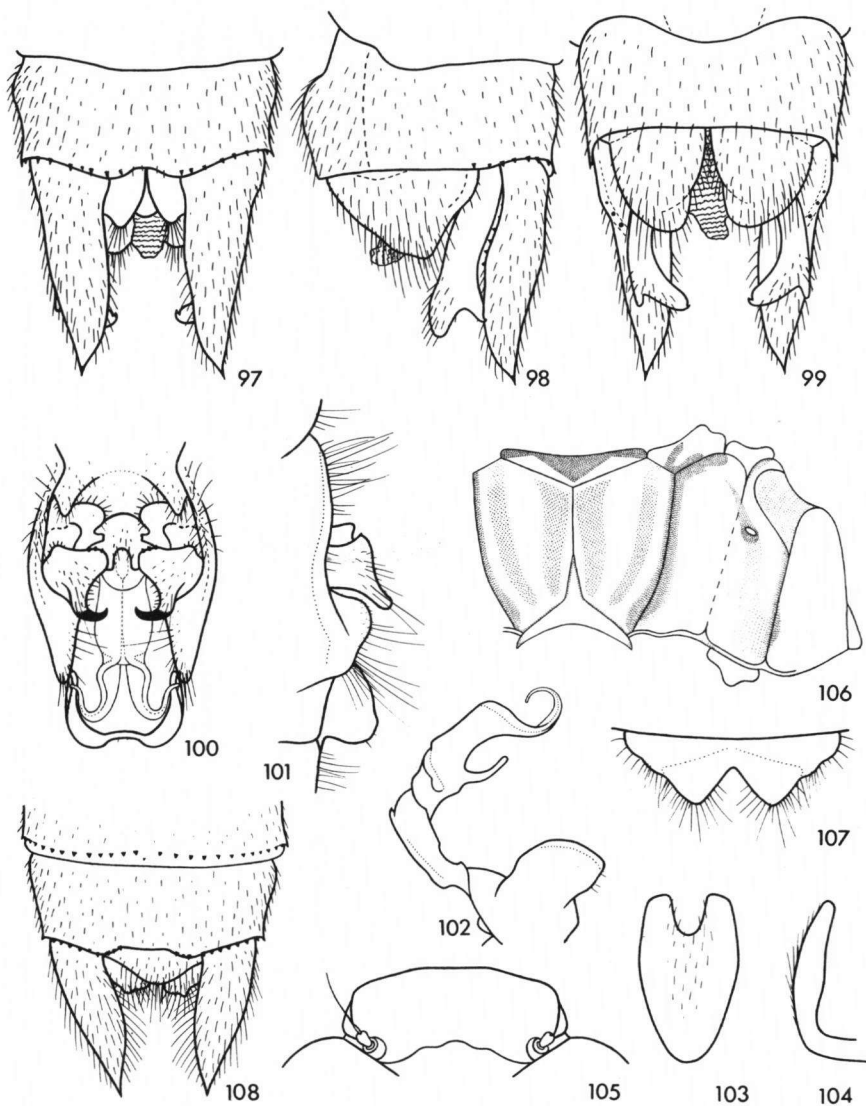
Coloured and marked similarly to *joergenseni* but slightly differing from it by the features given above.

Pterostigma surmounting 3 - 3½ cells. Antenodal and postnodal cross-veins of first series 7:13-13:7/? :10-9:6 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 4-5/3-4 in fore and hind wings, respectively. Two rows of cells in anal field of fore wings. Trigonal interspace starting with two (left front wing) or three (other wings) cells against triangle followed by two rows of cells nine cells long in fore wings and five cells long in hind wings counting the anterior row. Supratrangles open. Subtriangles and triangles two-celled. Hind wings with five paranal cells and with four (left) and five (right) postanal cells. Second anal interspace in hind wings starting with a single cell against anal vein. Anal triangle in hind wings three-celled.

Female (hitherto unknown). — Total length 41-42 mm; abdomen 29.5-30.5 mm; hind wing 24-25 mm; costal edge of pterostigma in fore wing 2.7-2.9 mm.

Very similar to male regarding stature and general coloration.

The features in the wings of the female from Tilopozo are: Pterostigma surmounting 4 - 4½ cells. Antenodal and postnodal cross-veins of first series 7:13-13:9/8:10-10:8 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 5-5/3-3 in fore and hind wings, respectively. Trigonal interspace starting with two cells against triangle in right fore wing, with three cells in left fore wing and right hind wing, and with four cells in left hind wing. Subtriangles two-celled. Triangle in fore wings two-celled, in right hind wing three-celled, and in left hind wing four-celled. Five paranal



Figs. 97-108. *Progomphus herrerae* Needham & Etcheverry: (97) tenth abdominal segment and caudal appendages of lectotype male, dorsal view; – (98) the same, left lateral view; – (99) the same, ventral view; – (100) accessory genitalia, ventral view; – (101) the same, right lateral view; – (102) penis, right lateral view; – (103) penis guard, frontal view; – (104) the same, right lateral view; – (105) frons of paratype male, dorsal view; – (106) diagram of pterothorax of female; – (107) vulvar lamina, ventral view; – (108) tenth abdominal segment and caudal appendages of female, dorsal view.

cells in hind wings. Four (left) and six (right) postanal cells in hind wings. Second anal interspace in hind wings starting with a single cell against anal vein.

In the paratype from Lluta the triangle in the right fore wing is two-celled, in the other wings three-celled. In males from Guatin and Peine the subtriangle is open in four fore wings, two-celled in the other wings and in all hind wings; the triangle is three-celled in one hind wing, two-celled in all other wings.

In the females from Aguas Blancas and Peine the subtriangle is two-celled in all wings, the triangle is three-celled in three hind wings and two-celled in all other wings.

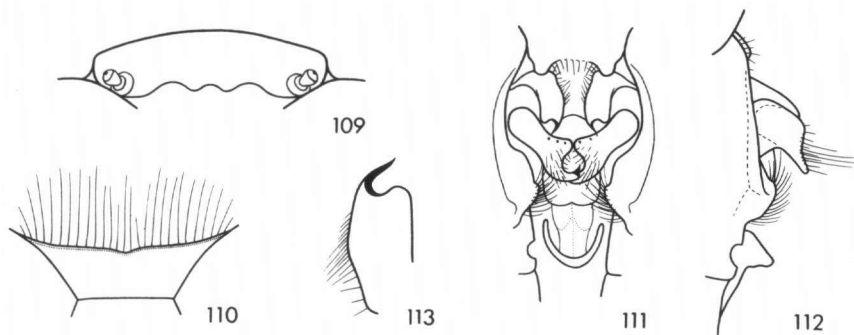
PROGOMPHUS PERPUSILLUS RIS, 1916

Figures 109-113, 336

Progomphus perpusillus RIS, 1916: 144-145; figs. 87-89 (♂); — SCHMIDT, 1952:235, 251.

Material. — Peru: Río Samiria (Upper Amazone), Hamburgo, 5.VII.1912, 1 ♂, leg. Dres. Bluntschli and Peyer (holotype), (SMF, no. 15199). — Brazil: Amazonas, Rio Solimoes, 3.IX.1920, 1 ♂ (right pair of wings only), C.U. exp., (CUI).

This species is the smallest gomphid ever recorded. The holotype is very teneral. No definite colour pattern is discernible but it may approach that of its closest relatives *risi*, *tantillus* sp.n., and *superbus* sp.n., the last two species described hereinafter. Although more or less shrivelled the structural details of the type furnish adequate information for specific recognition. The right pair of wings of the type is lost but a figure of it (transposed) was given by RIS (1916).



Figs. 109-113. *Progomphus perpusillus* Ris, holotype male: (109) frons, dorsal view; — (110) occipital plate; — (111) accessory genitalia, ventral view; — (112) the same, right lateral view; — (113) right anterior genital hamule, ventral view.

The right pair of wings of the male from Rio Solimoes is very similar to that of the type, but the trigonal interspace in the hind wing starts with a row of three cells against the triangle followed by two rows of cells. It seems that in this species the triangles and the subtriangle in the hind wings are open, and the subtriangle in the fore wings is two-celled.

The accessory genitalia are shaped as shown in the figures. The apex of the anterior hamule is excised U-shaped, the internal apical tooth is very acute and more or less sinuous. The tip of the penis guard is slightly emarginate in middle. There is no sternal process of any kind on abdominal segment 1. The lamina tibialis of the anterior tibia is one-sixth of the tibial length. The third tarsus is five-quarters of the length of the third tibia.

F e m a l e unknown.

PROGOMPHUS POLYGONUS SELYS, 1879

Figures 114-118

Progomphus polygonus SELYS, 1879:11-12 (6-7 sep.); LXVIII (♀); KIRBY, 1890:73; — NEEDHAM, 1943:205 (footnote); — BELLE, 1966:14, 16.

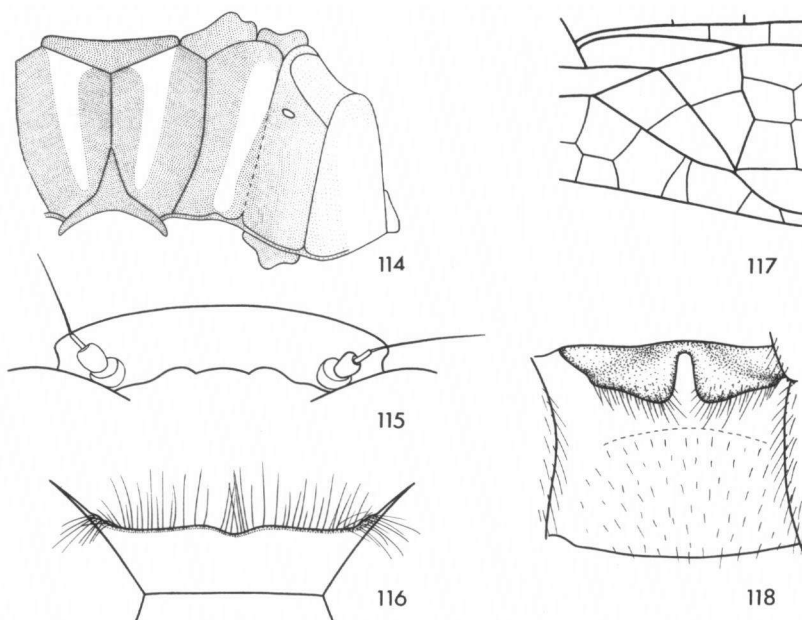
Material. — V e n e z u e l a : Merida, 1 ♀ (lectotype), 1 ♀ (IRSN).

M a l e unknown.

A female of this species was briefly redescribed by BELLE (1966). However, as stated in the original description of the species, the triangle in the hind wings is sometimes three-celled with the cross-veins tri-radiate from the centre, and the fore wings have sometimes 14 postnodal cross-veins, all features not found in the female redescribed. Recently I have traced, in Selys collection, a second female of this species from Merida with the venational features here mentioned. The discovery of a second specimen apparently pertaining to the original series makes it necessary to designate a lectotype. The female mentioned by BELLE (1966) is here designated as lectotype.

The two females are very teneral and crushed over the entire length of the body. The wings are broad. The hind wing of the lectotype is 31 mm long and the greatest width is 10 mm. The distance on the fore wing from the nodus to the stigma is 11.5 mm. The lectotype has three cubito-anal cross-veins in addition to the inner side of the subtriangle in the left fore wing, only one in the other wings. The relative lengths of the abdominal segments 7, 8, 9 and 10 are about as 42:25:15:10, with the caudal appendages 13 on the same scale. There is no sternal process of any kind on abdominal segment 1. The third tarsus is two-thirds of the length of the third tibia.

The other female of the primary type material bears the single label



Figs. 114-118. *Progomphus polygonus* Selys, lectotype female: (114) diagram of pterothorax; – (115) frons, dorsal view; – (116) occipital plate; – (117) triangle, subtriangle and supratriangle in right fore wing; – (118) vulvar lamina and ninth sternum, ventral view.

“Merida”. The specimen is very similar to the lectotype but there are some differences in the venation of the wings, as already stated. Other features in the wings of this second female are: Two cubito-anal cross-veins in addition to the inner side of the subtriangle in the fore wings, only one in the hind wings. The trigonal interspace in the fore wings starts with two rows of cells from the triangle outwards. The cell between the first and second postnodal cross-veins in the fore wings is not double.

PROGOMPHUS PIJPERSI BELLE, 1966

Progomphus pijpersi BELLE, 1966:11-14; figs. 23-28 (♂, ♀); – LIEFTINCK, 1971:107 (holotype).

Material (in addition to that recorded by BELLE, 1966). – Surinam: Wilhelmina Mountain Range (Kamp 2), 16.VII.1963, 1 ♀, leg. S. Ligori, (ML). – Brazil: State of Amazonas, Porto Velho, 2.V.1922, 2 ♀, leg. J.H. Williamson & J.W. Strohm. – Ecuador: Napo Pastaza, Jatun Yacu (700 m), Rio Napo watershed, III.1937, 1 ♀, leg. William Clarke-Macintyre, (MZM).

The females from Brazil and Ecuador are distinctly smaller than those from Surinam. The measurements of one of the females from Brazil are: Total length 32 mm; abdomen 24 mm; hind wing 18.5 mm; costal edge of pterostigma in fore wing 2.9 mm.

PROGOMPHUS GEIJSKESI NEEDHAM, 1944

Figures 328-332

Progomphus pygmaeus CALVERT, 1905:151-152 (♀); — *Progomphus* sp.n. WILLIAMSON, 1920a:11-12; — *Progomphus geijskesi* NEEDHAM, 1944:211-212; pl. 15, fig. 14; — BELLE, 1966:7-11; figs. 13-20; pl. 2 (♂); — LIEFTINCK, 1971:90; — BELLE, 1972b:113-116, figs. 1-5 (larva ?).

Material (in addition to that recorded by BELLE, 1966). — Surinam: Paloemeu, Papidron, Cashewsoela, 1.IV.1952, 1 ♂, leg. D.C. Geijskes, (ML). — Brazil: State of Pará (northern), Upper Rocana River, VI or VII.1918, 1 ♂, leg. S.M. Klages, (FSC); Chapada, 1 ♀ (abd. segm. 4-10 lost), leg. H.H. Schmidt, (CMP).

PROGOMPHUS PYGMAEUS SELYS, 1873

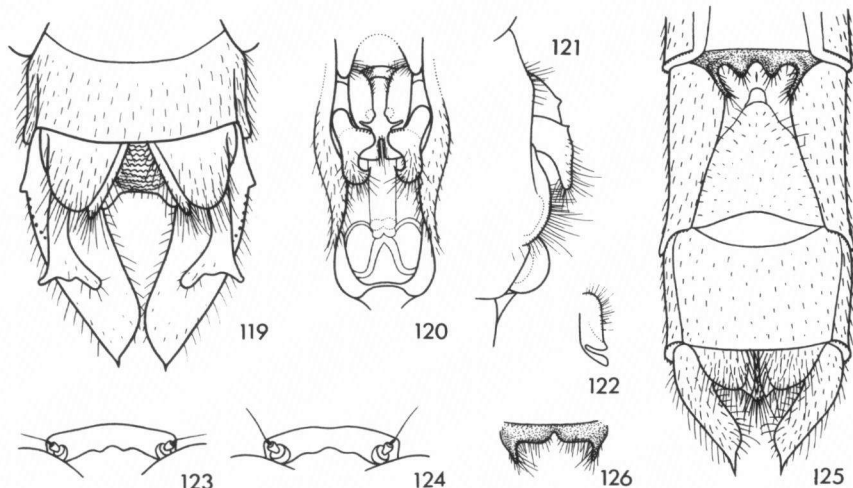
Figures 119-126, 333

Progomphus pygmaeus SELYS, 1873:502-503 (58-59 sep.) (♂); — SELYS, 1879:12 (7 sep.); LXVIII; — KIRBY, 1890:72; — CALVERT, 1905:151-152; tab. 7, figs. 4-4a; — CALVERT, 1917:395; — RIS, 1916: 142-143; figs. 83-84 (♀); — WILLIAMSON, 1920:9-14, figs. 2, 4-5, 12-14; — FRASER, 1940: pl. 5, fig. 2; — KIMMINS, 1969:297.

Material. — Colombia: Bogota, 1 ♂ (holotype), (BM); Bolivar near Santa Marta 24-25.XII. 1916, 1 ♂ (IRSN), 1 ♂ (MNHW), 1 ♂ (MC), 2 ♂ (MZM), 1 ♂ (SMF), 1 ♂ (CMP), 2 ♂ (BM), 2 ♂, 1 ♀ (FSC), all leg. J.H. and E.B. Williamson; Dept. Magdalena, Bonda (250 ft), X, 1 ♂ leg. H.H. Schmidt, (CMP); Río Negro, 1 ♀ (SMF). — Ecuador: Prov. Los Ríos, Playas de Montalvo (15 m), near Balzapamba, 6.IV.1938, 1 ♀; 7.IV.1938, 1 ♂, leg. William Clarke-Macintyre; Prov. El Oro, Pórtio Bello (600-650 m), 4.VIII.1941, 1 ♂, leg. David B. Laddey. — Guyana: Demerara River, 1 ♀ (teneral), (BM). — Peru: Dept. Junin, Satipo, IV.?1940, 1 ♂; 14.XI.1940, 1 ♂, leg. Pedro Paprzycki, (MZM). — Bolivia: Steinbach No. 01, 15.V.1960, 2 ♂, 3 ♀; Steinbach No. 02, 12.V.1960, 1 ♂; 14.V.1960, 2 ♂; Dept. Cochabamba, Prov. Chapare, Alto Palmar, 1 ♂, leg. R. Steinbach, (FSC). — Guatemala: 1 ♂ (BM); Dept. El Progreso, Finca la Cajeta, 29.VIII.1965, 1 ♂, 1 ♀ (both teneral), leg. T.W. Donnelly, (coll. Belle); Estancia de la Virgen, 11-12.VIII.1965, 3 ♂, 2 ♀; Suchitepequez, streams between Mazatenango and Samayac, 11.VI.1966, 1 ♂; Cuyotenango, Finca San Rafael Olimpo (1700'), 10-20.VI.1966, 1 ♂, 1 ♀, all leg. O.S. Flint, Jr. & M.A. Ortiz B. — Costa Rica: Puntarenas, 6.2 mi. N. of Buenos Aires, 2.VII.1967, 1 ♀, leg. O.S. Flint, Jr. M.A. Ortiz B., (MNHW).

Concerning the localities of the Bolivian specimens with the Steinbach numbers 01 and 02, Professor Westfall wrote in a letter to me: "These were collected by Roy Steinbach and he did not give us any further data. We are assuming that they were taken in the vicinity of his home in Buena Vista, as Cumming said he rarely got far from home. This is in Prov. Ichilo, Dept. Santa Cruz."

Associated with the incomplete (head lost) holotype male are the labels "Type" (museum label), "Type", "Bogota", "Mc Lachlan Coll. B.M. 1938-674", and "Prog. pygmaeus Selys ♂". Some data noted down for the holotype during my visit to the British Museum (Nat. Hist.) are: Dark colour of dorsum of pterothorax very dark brown. Pale (first) antehumeral stripes wedge-shaped, the upper portion tapering and reaching to antealar sinus but without any expansion or enlargement at dorsal end. Fore wings with area posterior to Cu2 one cell wide but with one of the cells double.



Figs. 119-126. *Progompheus pygmaeus* Selys: (119) tenth abdominal segment and caudal appendages of male from Suchitepequez; – (120) accessory genitalia of male from Bolivar, ventral view; – (121) the same, right lateral view; – (122) right anterior genital hamule of male from Bolivar, ventral view; – (123) dorsal view of frons, male from Bolivar; – (124) the same, male from Suchitepequez; – (125) apical segments of abdomen of female from Río Negro, ventral view, showing vulvar lamina; – (126) vulvar lamina of female from Bolivia, ventral view.

Progompheus pygmaeus is in some respects a plastic species. Most striking are the following colour and morphological variations:

(1) Size. The specimens from Bolivia and Colombia are the smallest of the series. The largest specimen is a male from Guatemala (abdomen 27.5 mm; hind wing 21.5 mm).

(2) Colour design of pterothorax. Concerning the variability in the extent of the (first) pale antehumeral stripe WILLIAMSON (1920a) wrote as follows: "...; in *pygmaeus* the pale dorsal stripes are as shown for the male or they may narrow continuously dorsally without any expansion or enlargement at the dorsal end, but in either case they are barely separated from the antealar sinus; ...". In the holotype the pale antehumeral stripes have no expansion or enlargement at the dorsal end. Also the colour design of the sides of the pterothorax exhibits great differences. In some specimens the brown midlateral and third lateral are nearly absent.

(3) Frontal part of frons. In dorsal view generally convex. In the males from Suchitepequez medially concave. In the female from Los Ríos straight but in the male from the same locality convex (slightly concave in middle).

(4) Superior caudal appendages of male. Differences are found in the length and the width. In the holotype, they are somewhat more tapering at the apex than in the Bolivar specimens, but in these they are somewhat more tapering than in males from Guatemala.

(5) Inferior caudal appendage of male. The branches are distinctly stouter in the males from Suchitepequez than in the males from other localities. The branches exhibit sometimes a swelling between the supero-external anteapical tooth and the apical part.

(6) Apical excision of anterior genital hamule. In some males from Guatemala larger than in the males from other localities.

(7) Ridge between lateral ocellus and eye border. In some females with a distinct tubercle. In the female from Bolivar no distinct tubercle.

(8) Triangular lobes of vulvar lamina. In the female from Bolivar practically wanting. The female from Río Negro, questionably referred to this species by RIS (1916), does not show differences justifying a racial distinction. The colour design on the sides of the pterothorax is largely obliterated owing to post-mortem changes. The pale antehumeral stripes show an enlargement at the dorsal end (the enlargement apparently not drawn in Ris' diagram of this female). The tip of the caudal appendage is more acute and the subtriangular lobes of the vulvar lamina are more prominent than in the female from Bolivar.

The incomplete female from Chapada in the Carnegie Museum, Pittsburgh (CALVERT, 1905; WILLIAMSON, 1920a), belongs to *Progomphus geijskesi*.

PROGOMPHUS DELICATUS SPEC. NOV.

Figures 127-134, 333

Material. — Peru : Mishuyacu, Iquitos, 19.II.1930, 1 ♂, leg. P.P. Nagel Hanov (paratype), (SMF); 7.III.1930, 1 ♂ (holotype), (SMF, nr. 15175); 26.III.1930, 1 ♂ (paratype), (coll. Belle), both leg. Klug.

Closely related to *pygmaeus* but distinguished from it by the following features in the male: (1) Wings relatively shorter and with a shorter pterostigma; – (2) Pale antehumeral stripes more reduced and wedge-shaped; – (3) Dark midlateral and third lateral stripes enlarged and partly confluent; – (4) Frontal part of frons less prominent and straight; – (5) Superior caudal appendages, in dorsal view, narrower; – (6) Basal externo-lateral dilatation of superior caudal appendage more produced and normally with two teeth at apex; – (7) Pale marking on upper surface of superior caudal appendage confined to apical half of appendage only; – (8) Posterior margin of inferior caudal appendage with a pair of rather acute submedian projections; – (9) Branches of inferior caudal appendage with a distinct swelling between supero-external anteapical tooth and apical part; – (10) Branches of inferior caudal appendage with apical part beyond supero-external anteapical tooth curved towards rear.

The accessory genitalia exhibit a considerable resemblance to those of *pygmaeus*. The internal subapical tubercle of the anterior hamule is somewhat better developed than in *pygmaeus*.

Male (holotype; abdomen broken between the segments 3-4, 4-5, and 5-6) – Total length 32 mm; abdomen 25 mm; hind wing 18.5 mm; costal edge of pterostigma in fore wing 2.4 mm.

Labium pale green. Labrum brown, with a symmetric pair of oblong green spots along free border. Anteclypeus green. Postclypeus brown, with a small green spot on lateral sides. Frons low, without frontal ridge. Vertical part of frons brown. Superior surface of frons largely green, brown along base. Vertex brown, becoming dark brown between ocelli. Occipital plate dark brown, its posterior margin with a shallow median excision and a distinct erect hair fringe. Posterior part of head brown. Temporae with a yellow spot just below re-entrant angle in eye border followed by a lower marginal band of yellow.

Prothorax brown, its hind lobe blackish brown.

Pterothorax brown with green stripes, the darker colour becoming nearly black on dorsum. Colour design of pterothorax shaped as shown in Figure 130.

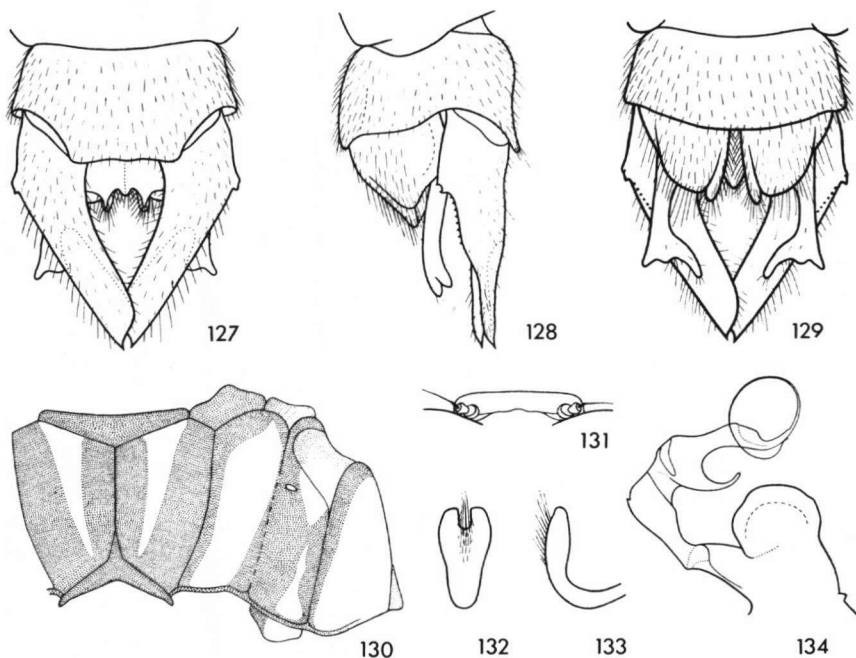
Legs dark brown, the inner sides of femora green. Lamina tibialis of first tibia one-sixth the tibial length. Third tarsus two-thirds the length of third tibia.

Abdomen predominantly dark brown. Sides of segments 1,2 and 8 washed with yellow. A yellow middorsal line on segments 1 to 7. Sides of segments 3 to 9 with yellow baso-lateral spot. Dorsum of segments 8 and 9 dark brown. Segment 10 dark brown. Caudal appendages dark brown except for pale marking on upper surface of superior appendage. Basal externo-lateral dilatation of superior appendage armed with two teeth. Inferior carina of superior appendage with 6 (right) and 8 (left) denticles. Tip of branch of inferior appendage with three superior teeth. No sternal process on segment 1.

Wings hyaline. Venation dark brown, including frontal margin of costa. Pterostigma brown, surmounting 5 cells. Basal subcostal cross-vein present. Antenodal

and postnodal cross-veins of first series 10:13-14:10/10:10-9:11 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 6-5/4-4 in fore and hind wings, respectively. Each wing with a single cubito-anal cross-vein in addition to inner side of subtriangle. Fore wings with a single row of cells in anal field and in area posterior to Cu2. Supratrangles open. Subtriangles and triangles two-celled except for subtriangle in left hind wing which is open. Distal side of triangle in fore wings strongly broken. Trigonal interspaces starting with two (fore wings) and three (hind wings) cells against triangle followed by two rows of cells. Hind wings with five paranal cells, two postanal cells, two rows of cells behind Cu2, and a three-celled anal triangle. Second anal interspace in hind wings starting with two cells against anal vein.

F e m a l e unknown.



Figs. 127-134. *Progomphus delicatus* spec. nov.: (127) tenth abdominal segment and caudal appendages of holotype male, dorsal view; – (128) the same, left lateral view; – (129) the same, ventral view; – (130) diagram of pterothorax of holotype male; – (131) frons of holotype male, dorsal view; – (132) penis guard of paratype male, frontal view; – (133) the same, right lateral view; – (134) penis of paratype male, right lateral view.

PROGOMPHUS AMAZONICUS SPEC. NOV.

Figures 135-143

Material. — Brazil: Manacapuru, 1 ♂, leg. S.M. Klages (holotype), (FSC).

The terminalia of the single male of this species are partly crushed. In both figures of the caudal appendages the intact right side is in a normal position.

Male (holotype: teneral; broken into pieces; apical segments of abdomen including caudal appendages somewhat crushed). — Total length 52 mm; abdomen 39 mm; hind wing 26 mm; costal edge of pterostigma in fore wing 4.0 mm.

Face yellowish brown. Frons without frontal ridge, not low. Superior surface of frons and postcellar ridges with long brown hairs. Frontal half of superior surface of frons probably pale. Vertex and occipital plate yellowish brown. Rear margin of occipital plate with a shallow median excision and fringed with long brown hairs. Posterior part of head predominantly yellowish brown, darker above along compound eyes. Labium and adjacent mouth parts pale yellow.

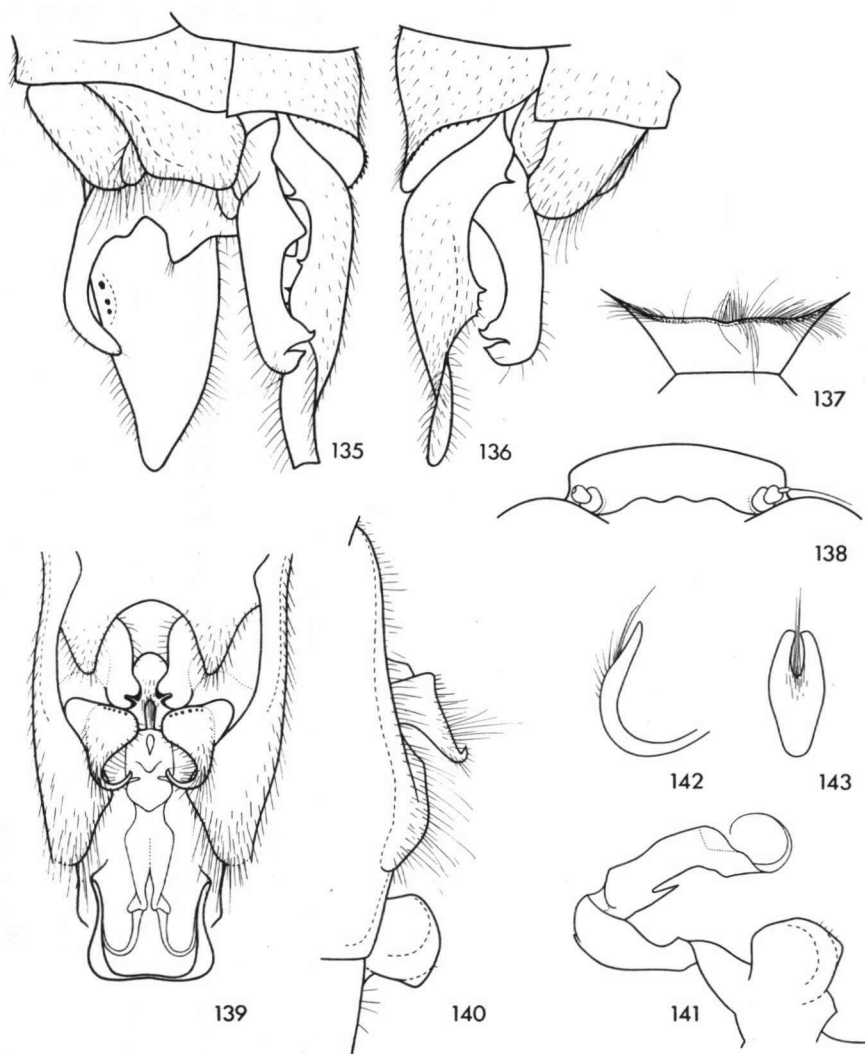
Prothorax yellowish brown, with a yellow spot on each side.

Pterothorax yellowish brown with pale areas as follows. Dorsum with a pair of wedge-shaped (first) pale antehumeral stripes reaching to near antealar sinus and broadly confluent below with pale collar. No second pale antehumeral stripe. Pale antealar spot present. Pale mesepimeral, metepisternal, and metepimeral stripes well-developed, the last reaching to hind border.

Legs yellowish brown. Third tarsi about four-sevenths the length of third tibia. Lamina tibialis of first tibia one-third the tibial length.

Wings hyaline but extreme base yellowish brown. Venation brown but frontal margin of costa yellow. Pterostigma yellowish brown, surmounting $5\frac{1}{2}$ - 6 cells (stigma in left hind wing deformed). Basal subcostal cross-vein present. Antenodal and postnodal cross-veins of first series 9:14-15:9/8:11-11:10 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermediate cross-veins 7-6/4-4 in fore and hind wings, respectively. Supratrangles two-celled. Triangle in left hind wing two-celled, in other wings three-celled, the cross-veins tri-radiate from centre. Trigonal interspace starting with a row of three cells against triangle followed by two rows of cells. Fore wings with two rows of cells in anal field and three rows of cells behind Cu2. Hind wings with four (left) and five (right) paranal cells. Each hind wing with four postanal cells and with area posterior to Cu2 three (proximal) to four (distal) cells wide. Second anal interspaces starting with a single row of cells from anal vein outwards, two cells long. Anal triangle in hind wings three-celled.

Abdomen slender, predominantly yellowish brown, yellow markings on sides of segments 1, 2, 8, and 9, and yellow along ventral tergal margins of segments 3



Figs. 135-143. *Progomphus amazonicus* spec. nov., holotype male: (135) tenth abdominal segment and caudal appendages, ventral view; – (136) the same, right lateral view; – (137) occipital plate; – (138) frons, dorsal view; – (139) accessory genitalia, ventral view; – (140) the same, right lateral view; – (141) penis, right lateral view; – (142) penis guard, right lateral view; – (143) the same, frontal view.

to 7. A middorsal basal spot on segments 2 to 7, elongated on 2, small on 3 to 6, larger again on 7. Caudal appendages yellowish brown, tip of superior ones paler. Basal externo-lateral dilatation of superior caudal appendage small but with a distinct tooth. Inferior carina of superior caudal appendage short and with three (right) and four (left) denticles at level of middle of appendage. Left superior appendage with an extra denticle between carina and basal externo-lateral tooth, along lateral margin. Dorsal posterior margin of tenth abdominal segment similarly denticulated as other apical segments, the middorsal portion not denticulated. Accessory genitalia small, yellowish brown. Tip of anterior hamule black, with a small excision. Tip of posterior hamule slender, strongly incurved. Penis with a small, straight ventral spine on median segment. Penis guard with a deep median excision.

F e m a l e unknown.

PROGOMPHUS TIBIALIS SPEC. NOV.

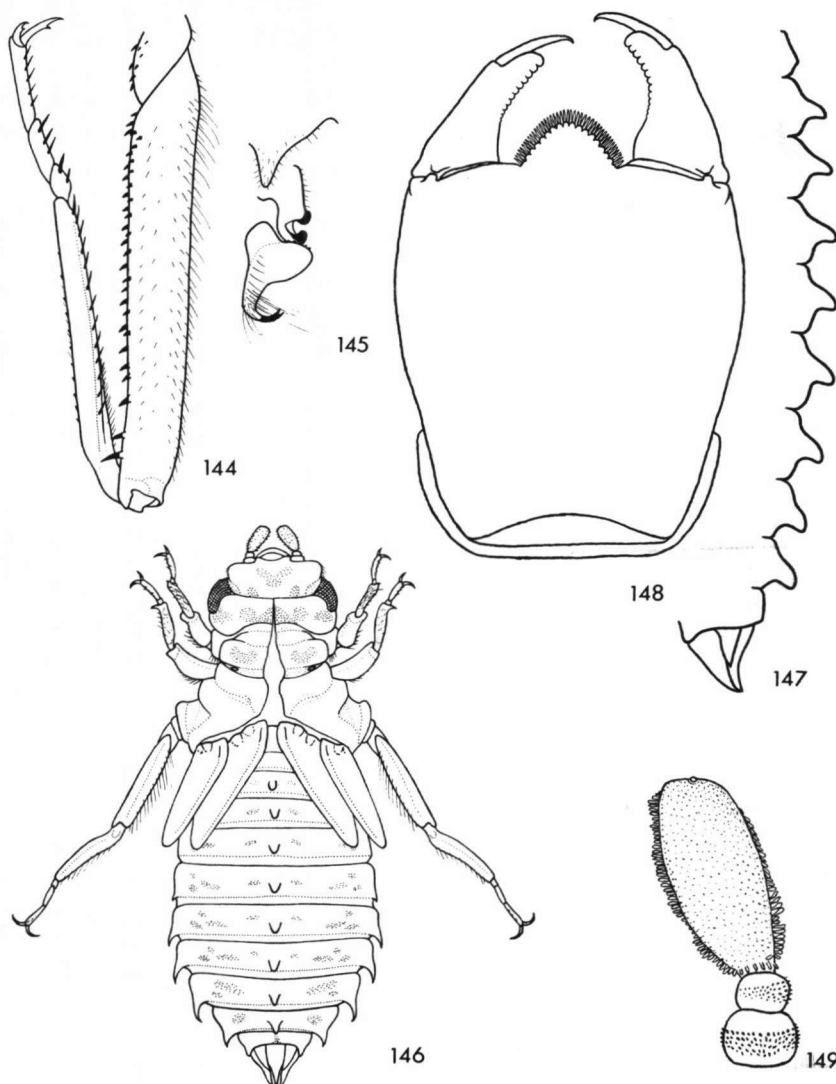
Figures 144-149

? *Cyanogomphus* sp. ? NEEDHAM, 1944:185; pl. 14, fig. 3 (larva); BELLE, 1966:60.

Material. — S u r i n a m: Lawa, Stoelmanseiland ("hatching on a trunk in rapid stream at 10 a.m."), 14.VIII.1953, 1 ♂ (holotype) and its exuvia; Marowijne, Apoema Falls, 14.X.1953, 1 exuvia, all leg. D.C. Geijskes, (ML).

This species is closely related to *amazonicus* but it is somewhat smaller and readily recognizable by the two pale stripes on the sides of the pterothorax. Other important differences with the male of *amazonicus* are: (1) Anterior genital hamule with a relatively large apical excision; with a small and very narrow apical excision in *amazonicus*; — (2) Apical part of posterior genital hamule black and terminating in two teeth; pale and terminating in a single tooth in *amazonicus*; — (3) Dorsal posterior margin of abdominal segment 10 denticulated in middle; not denticulated in middle in *amazonicus*; — (4) Superior caudal appendages more slender than in *amazonicus*; — (5) Inferior carina of superior caudal appendage long and armed with 8 to 10 denticles; short, developed in middle of appendage only and armed with 3 to 5 denticles in *amazonicus*; — (6) Tip of branch of inferior caudal appendage terminating in two teeth; in a single tooth in *amazonicus*; — (7) Lamina tibialis of first tibia three-sevenths the tibial length; only one-third the tibial length in *amazonicus*.

The single male of *tibialis* is a newly emerged specimen preserved dry in a paper triangle. It is in a bad condition and hardly adequate for description but



Figs. 144-149. *Progomphus tibialis* spec. nov., holotype male: (144) left third leg, left lateral view; – (145) right pair of genital hamules, ventral view; – (146) exuvia, dorsal view; – (147) dorsal outline of abdomen of exuvia, left lateral view; – (148) labium of exuvia, external view; – (149) right antenna of exuvia, dorsal view.

together with the peculiar larval exuvia from which it came, its specific determination may be assured.

The larva of *tibialis* was described by NEEDHAM (1944) but it was supposed

to belong to the genus *Cyanogomphus*. The description was made from an incomplete exuvia (head lost).

Male (holotype; very teneral and much broken). — Total length 43 mm; abdomen 31 mm; hind wing 24 mm; costal edge of pterostigma in fore wing 3.5 mm.

Wings hyaline but extreme base brown. Venation pale brown but front margin of costa pale yellow. Pterostigma very pale brown, surmounting 4-5½ cells. Basal subcostal cross-vein present. Antenodal and postnodal cross-veins of first series 9:14-15:9/9:11-11:9 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 6-7/4-4 in fore and hind wings, respectively. Supratrangles open. Subtriangle and triangle in hind wings two-celled. Triangle in fore wings three-celled, the cross-veins tri-radiate from centre. Trigonal interspace starting with a row of four (left hind wing) or three (other wings) cells against triangle followed by two rows of cells. Fore wings with two rows of cells in anal field, and three rows of cells behind Cu2. Hind wings with four paranal cells, with three (left) or four (right) postanal cells, and four (proximal three) rows of cells behind Cu2. Second anal interspace in hind wings starting with a single cell against anal vein followed by two rows of cells. Anal triangle in hind wings three-celled.

Female unknown.

Larva (preserved dry). — Total length 18 mm; abdomen 11.5 mm; greatest width of abdomen 7 mm; width of head across eyes 4.4 mm; posterior femur 3.8 mm.

Head roughly triangular in outline, widest across eyes, for the greater part covered with microscopical warts except on eyes and ocellar areas, horizontal portion of frons, anteclypeus, and most of genae and labrum. Three bare scars in a transverse row on concave median part of occiput, and some smaller but conspicuous bare scars on bulging hind angles of head. Lateral ridge between antenna and eye margined with long hairs. Annular basal segments of antennae also with microscopical warts. Third segment of antenna flattened dorso-ventrally, blade-shaped, about twice as long as its greatest width, its surface granulated, and the edges with a marginal fringe of short scales except along frontal margin. Fourth segment of antenna a mere rudiment, knob-shaped. Labium short, widest in middle. Median lobe of labium convex, sub-triangular, its free front crenate by a row of about 16 low small teeth and bordered with a usual row of fringing scales. Lateral lobe broad at base, its apex gradually tapering and rounded, the inner margin armed with about 10 low small teeth diminishing in size to base. Movable hook about two-thirds the length of outer border of lateral lobe, its extreme tip suddenly recurved.

Wing cases divergent to rearward. Middle coxae as far apart as front ones. Other details of body as described by NEEDHAM (1944).

PROGOMPHUS WILLIAMSI NEEDHAM, 1943

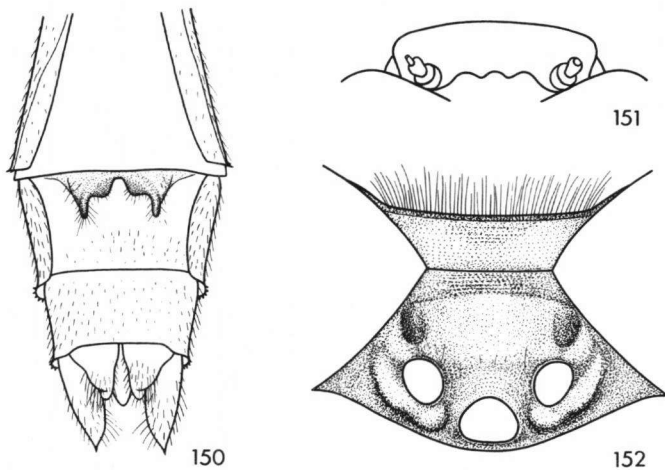
Figures 150-152

Progomphus sp. (No. 15) NEEDHAM, 1941:237-238; pl. 20, fig. 15 (larva). –
Progomphus williamsi NEEDHAM, 1943:202-204 (♀).

Material. – Guatemala: El Salto, Escuintla, 2.VII.1934, 1 ♀ (reared from ult. larva), leg. F.X. Williams (holotype), CUI, no. 3074).

Male unknown.

The holotype, a reared female preserved in a vial with alcohol together with the (intact) exuvia from which it came, is in a poor condition, very much broken and nearly entirely faded. The postocellar ridges of the vertex are low; there is a concave depression between the postocellar ridge and the eye border. The third tarsi are somewhat shorter than the third tibiae. The hind wings are 28 mm long and 8.5 mm wide. Some venational features mentioned in the original description are incorrect. The hind wings have a three-celled (not five-celled) triangle, and four (not five) postanal cells.



Figs. 150-152. *Progomphus williamsi* Needham, holotype female: (150) apical segments of abdomen, ventral view, showing vulvar lamina; – (151) frons, dorsal view; – (152) vertex and occipital plate, dorsal view.

PROGOMPHUS SERENUS HAGEN IN SELYS, 1878

Gomphoides sp. UHLER, 1867:295. — *Progomphus serenushageni* SELYS, 1875:48 (nomen nudum). Hagen in SELYS, 1878:661-663 (69-71 sep.) (♂); — KIRBY, 1890:72; — NEEDHAM, 1941:225-230, 234; textfigs. 1-4; pl. 20, fig. 5 (♀, larva); — NEEDHAM & WESTFALL, 1955:101-102; figs. 44C-1.

Material. — Haiti: Aux Cayes, 15-20.III.1922, 1 ♂ (CUI). — Dominican Republic: Santiago (river bottom), 8.XII.1918, 1 ♀ (teneral), leg. H.B. Sherman, (MZM); Jima River, 23.VI.1940, 1 ♀; Bojo Millo, 23.VI.1940, 1 ♂; Las Matas, Maymon River, 27.VI.1940, 1 ♂ (CUI); Jarabacoa, 4.VI.1969, 2 ♂, 1 ♀; La Toma, north of San Cristobal, 9-10.VI.1969, 1 ♂, 1 ♀, all leg. O.S. Flint, Jr. & J. Gomez, (MNHV).

The holotype, male, of this species is in the Museum of Comparative Zoology at Cambridge, Mass., and it bears the type number 12376 (Lawrence 1973, personal communication).

PROGOMPHUS ALACHUENSIS BYERS, 1939

Progomphus alachuensis BYERS, 1939:50-56, 64-66; pl. 1, figs. 3, 6-7; pl. 2, figs. 3, 6; pl. 3, fig. 2; pl. 4, fig. 1 (♂, ♀, larva); — NEEDHAM, 1941:234; pl. 20, fig. 3 (larva); — NEEDHAM & WESTFALL, 1955:98; fig. 44E.

Material. — United States: Florida, Winter Park, 12.V.1939, 2 ♂ leg. M.J. Westfall, Jr., (MNHV); Maitland, 1935, 1 ♂ (coll. Belle), 1 ♂, both leg. W. Atlee; 4.V.1941, 1 ♀, leg. D.W. Thornton; Highlands Co., Josephine Creek, 24.VI.1951, 1 ♂, leg. J.G. Needham; 4.VII.1951, 1 ♂, leg. R.H. Gibbs; De Soto Co., Horse Creek at Fla. 761, 9.V.1964, 1 ♂, leg. D.R. Paulson, (MNHV).

The holotype, male, and allotype, female, of this species, both specimens known to be in the collection formerly owned by Byers, are in the Museum of Zoology, Michigan (Gloyd 1972, personal communication).

PROGOMPHUS OBSCURUS (RAMBUR, 1842)

Diastomma obscurum RAMBUR, 1842:170 (♀). — *Progomphus obscurus* SELYS, 1854:72 (53 sep.) — SELYS, 1878:658-659 (66-67 sep.) (♂, ♀); — SELYS & HAGEN, 1858:461-463 (201-203 sep.); — HAGEN, 1861: 110-111; — HAGEN, 1875:48; — HAGEN, 1885:274-275 (larva); — KIRBY, 1890:72; — KARSCH, 1890:371; — NEEDHAM, 1901:55-56; pl. 1, fig. 3 (larva); — CALVERT, 1905:150-151; — KENNEDY, 1921:595-596; pl. 115, figs. 1-7 (larva); — BYERS, 1939:40-46, 60-63; pl. 1, figs. 1, 4; pl. 2, figs. 1, 4; pl. 3, figs. 3, 4; pl. 4, fig. 2 (♂, ♀, larva); — NEEDHAM, 1941:233-234; pl. 20, fig. 1 (larva); — NEEDHAM & WESTFALL, 1955:96, 101; figs. 42, 43, 44A-C; — CRUDEN, 1968:710 (chromosomes).

Material. — United States: 1 ♀ (holotype), (IRSN); Alabama, Cherokee-Calhoun Co.; trib. of Terrapin Cr. on Ala. 74, 14.VI.1952, 1 ♂; Talladega Co. Talladega Cr. at US 241, 15.VI.1952, 1 ♂, both leg. R.H. Gibbs, (MNH). Georgia, 3 ♂, 1 ♀, leg. Morrison, (IRSN); Banks Co.; Grove Cr., 6.6 mi. S. of Homer, 6.VI.1952, 1 ♂; Jackson Co.; Curry Cr. at Jefferson, 9.VI.1952, 2 ♂; Hall Co.; trib. of Chattahoochee R., 1 mi. N. of jct. Ga 52 on US 129, 10.VI.1952, 1 ♀, all leg. R.H. Gibbs. Louisiana, Rapides Parish, Beechwood Fish Hatchery, 16.VII.1953, 1 ♂, leg. G.H. Bick; Allen Parish, Kinder, Calcasieu River, 16.VIII.1953, 1 ♂, leg. P. Unkel. Massachusetts: Barnstable Co., Flax Pond, N. Falmouth, 16.VI.1954, 1 ♂, leg. S.P. & R.H. Gibbs; Jabinette's Pond, W. Yarmouth, 29.VII.1956, 2 ♂, leg. R.H. Gibbs. Mississippi, Clark Co., Chickasawhay R., 5 mi. S. of co. line, 16.VI.1952, 3 ♂, leg. R.H. Gibbs, (MNH). New Jersey, Burlington Co., near Fishers Dam, 15.IV.1954, emerged 10.V, 1 ♂, 1 ♀ (coll. Belle); 25-29.IV.1954, emerged 21.V, 1 ♀, emerged 25.V, 1 ♂, all leg. Beatty. Oklahoma, Pittsburg Co., Caney Cr. S. of Mc Alester, 27.VI.1954, 8 ♂, leg. S.P. & R.H. Gibbs; Marshall Co., Willis Branch about ½ mi. W. of Willis, 27.VI.1954, 1 ♂, leg. L. Hernuff, S.P. & R.H. Gibbs, (MNH). North Carolina, 6 ♂, leg. Morrison, (IRSN). South Carolina, Anderson Co., trib. of Seneca R., 8.VI.1952, 1 ♂; Eighteenmile Cr., 0.2 mi. W. of Pickens Co. line, 8.VI.1952, 1 ♂, both leg. R.H. Gibbs; Edisto R., 5 mi. S. Canadys, Colleton Co., 21.V.1968, 1 ♂, leg. O.L. Cartwright, (MNH). Texas, San Jacinto Co., Sam Houston Nat. For., Big Creek (Big Thicket Scenic Area), 26.VIII.1962, 1 ♂, 1 ♀ (in cop.), leg. T.W. Donnelly, (coll. Belle); near Cold Spring, 15-17.VI.1965, 4 ♂, leg. Oliver S. Flint, Jr., (MNH).

The holotype of *Diastomma obscurum* Rambur, a female from the collection of Latreille, is in the Brussels Museum. The type is in very poor condition, largely destroyed, and lacking the head and abdomen. Attached to the pin are the labels "Collect. Latreille", "(?Amér. Sept^{1e}).", "9 obscurus.", and "Gomphoides obscurus R ♀", the last in Selys' handwriting.

In the *obscurus* material of the Brussels Museum one male is labelled "Gomphoides obscurus R ♂" and two others as "Prog. obscurus R ♂", all in Selys' handwriting.

PROGOMPHUS BOREALIS MAC LACHLAN IN SELYS, 1873

Progomphus borealis Mac Lachlan in SELYS, 1873:764-765 (36-37 sep.) (♂); — SELYS, 1878:658-659 (66-67 sep.); — HAGEN, 1875:48; — KIRBY, 1890:72; — CALVERT, 1905:151; — KENNEDY, 1917: 524-529; figs. 148-163 (♂, ♀, larva); — BYERS, 1939:46-50, 63-64; pl. 1, figs. 2, 5; pl. 2, figs. 2, 5; pl. 3, fig. 5 (♂, ♀, larva); — FRASER, 1940:pl. 5, fig. 1; — NEEDHAM, 1941:234; pl. 20, fig. 2 (larva); — NEEDHAM & WESTFALL, 1955:98-99; fig. 44F; — KIMMINS, 1969:291 (holotype); — CRUDEN, 1968:210 (chromosomes).

Material. — United States: Arizona, Gila Co., Sycamore Cr., 8 mi. N. Payson, 17.VI.1968, 1 ♂; Str. at Irvine Power Station, 11 mi. W. Strawberry, 17.VI.1968, 1 ♂, both leg. O.S. Flint, Jr. & A.S. Menke; Maricopa Co., Tortilla Flat, 14.VII.1954, 1 ♂, leg. S.P. & R.H. Gibbs. California, Palo Alto, San Francisquito Cr., no date, 1 ♂, leg. J.G. Needham. — Mexico: Chihuahua, Santa Rosalia Sprgs. (4000 ft), 20.VIII.1906, 1 ♂, leg. P.P. Calvert; Sonora, Hermosillo, 25.IX.1923, 1 ♂, leg. J.H. Williamson; Morelos, Xochitepec, 12-14.VI.1965, 1 ♀, leg. O.S. Flint, Jr. & M.A. Ortiz B., (MNH).

The female from Morelos, Mexico, is slightly melanistic, having on the vertex the yellow streak behind the ocelli much reduced, on the pterothorax the mid-lateral brown stripe rather well-developed, etc.

PROGOMPHUS INTEGER HAGEN IN SELYS, 1878

Progomphus integer Hagen in SELYS, 1869:208 (45 sep.) (nomen nudum); – HAGEN, 1875:48 (nomen nudum); – Hagen in SELYS, 1878:659-661 (67-69 sep.) (♂, ♀); – KIRBY, 1890:72; – CALVERT, 1895:500; – NEEDHAM, 1941:222-225, 234; pl. 20, fig. 4 (larva); – NEEDHAM & WESTFALL, 1955: 100, fig. 44D; – ALAYO, 1968:12; figs. 3A, 32B, 40D.

Material. – Cuba: Santiago de Cuba, 1938, 1 ♂, 1 ♀ (abd. segm. 5-10 lost), leg. Wards, (MZM); Pinar del Rio, no date, 1 ♂, leg. B.O. Roberta, (CUI); Las Villas Province, stream 7 miles S.E. of Soledad, 2.VI.1959, 1 ♂, leg. M.J. Westfall, Jr., (coll. Belle).

The holotype, male, and allotype, female, of this species are in the Museum of Comparative Zoology at Cambridge, Mass., and both bear the type number 12375 (Lawrence 1973, personal communication).

The incomplete female from Santiago de Cuba is noticeably stouter and larger than the male (hind wing 29 mm, costal edge of pterostigma in fore wing 5 mm; in male from same locality 24.5 mm and 4 mm, respectively). Also the pterostigma is relatively longer in the female than in the male; its costal edge is two-thirds the distance from nodus to pterostigma; in male from the same locality about half the distance from nodus to pterostigma.

PROGOMPHUS CLENDONI CALVERT, 1905

Figures 153-160

Progomphus clendoni CALVERT, 1905:150; tab. 7, figs. 8-9 (♂); – CALVERT, 1917:429; – WILLIAMSON, 1920a:14-16; – NEEDHAM, 1941:235; pl. 20, fig. 10 (larva ?); – NEEDHAM & WESTFALL, 1955:99-100.

Material. – Mexico: Vera Cruz, Puente Nacional, 23-24.VII.1965, 1 ♂; Rio Tacolapan, Route 180, km 551, 25-26.VII.1966, 5 ♂, 1 ♀; 30.VII.1966, 2 ♂, 1 ♀. Morelos, Xochitepec, 12-14.VII.1965, 2 ♂. Chiapas, Route 185, km 135, near Arriaga (1000'), 7-8.VII.1966, 1 ♂, 3 ♀; Route 190, km 1024, beyond Cintalpa (1800'), 8 & 10.VII.1966, 2 ♂, all leg. O.S. Flint, Jr. & M.A. Ortiz B., San Luis Potosi, El Salto, 4.VI.1967, 1 ♂, leg. O.S. Flint, Jr., (MNH). – Guatemala: Dept. El Progreso, Nr. Estancia de la Virgen, 6.5 km North, 29.VIII.1965, 1 ♂, 1 ♀, leg. Thomas W. Donnelly, (coll. Belle); Estancia de la Virgen, 11-12.VII.1965, 1 ♂, 1 ♀; Route 17, km 113, Quebrada Sitio del Nino, 22.VI.1966, 4 ♂; Route 17, 97 km, near Aldea Marajuma, 26.VI.1966, 1 ♂; Suchitepequez, Cuyotenango, Finca San Rafael Olimpo (1700'), 10-20.VI.1966, 3 ♂, all leg. O.S. Flint, Jr. & M.A. Ortiz B., (MNH). Puerto Barrios, 30.V.1909, 1 ♂ (IRSN), 1 ♂ (MNH), both leg.

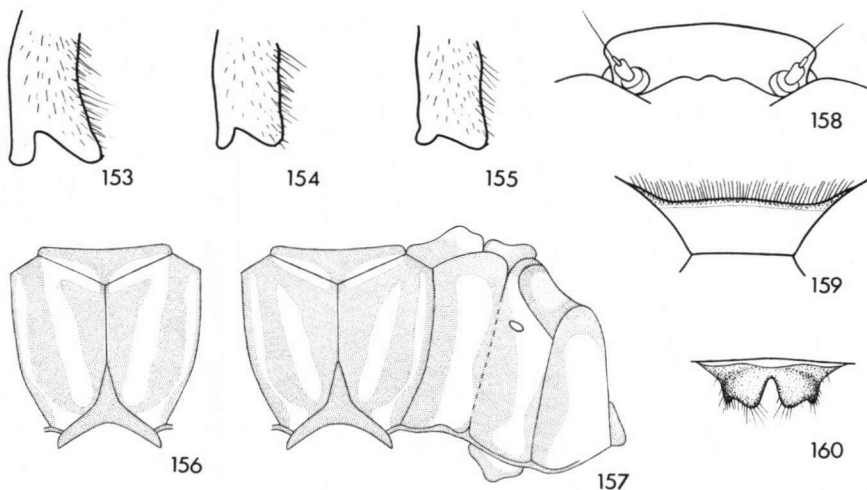
E.B. Williamson. — El Salvador: Santa Ana, Rt. 1, km 90, 2 miles north Candelaria de la Frontera, 7.VIII.1967, 2 ♂. — Nicaragua: Chontales, La Flor, Rt. 7, km 159, 4 miles west Acoyapa jct, 29.VII.1967, 8 ♂. — Costa Rica: Guanacaste, Rio Santa Rosa, 3.7 miles east Las Canas, 25.VII.1967, 1 ♂, all leg. O.S. Flint, Jr. & M.A. Ortiz B., (MNHW).

Described from Mexico on the basis of two males in the collection formerly owned by Calvert. The specimen of which the accompanying figures of the conventional lateral and dorsal views of the caudal appendages are given in the original description is the holotype as explicitly stated in the footnote on page XXVIII of the Introduction on the Odonata in the Biologia Centrali-Americana. This specimen is in the collection of The Academy of Natural Sciences of Philadelphia, and it bears the type number 9249 (Westfall 1972, personal communication).

One of the females from Chiapas, Mexico, is described below.

F e m a l e (hitherto unknown; abdomen broken between segments 4-5). — Total length 55 mm; abdomen 42 mm; hind wing 32 mm; width of hind wing 9 mm; costal edge of pterostigma in fore wing 4.8 mm.

Colour pattern more resembling that of holotype than that of male from same locality. First pale antehumeral stripes not connected with pale area of collar. Basal third of abdominal segment 7 yellow. Vertex largely yellowish



Figs. 153-160. *Progomphus clendoni* Calvert: (153) ventral view of right branch of inferior caudal appendage, male from Chiapas; — (154) the same, male from Santa Ana; — (155) the same, male from Suchitepequez; — (156) diagram of dorsum of pterothorax, male from Chiapas; — (157) diagram of pterothorax of female; — (158) frons of female, dorsal view; — (159) occipital plate of female; — (160) vulvar lamina, ventral view.

brown, with well-developed postocellar ridges. Posterior margin of occipital plate slightly convex, fringed with brown hairs, which are in length about half the middorsal length of the occipital plate. Caudal appendages largely pale yellow, the extreme base black. Sterna of abdominal segments, including vulvar lamina, black. Vulvar lamina about two-sevenths the length of ninth sternum, its posterior margin deeply excised V-shaped. Relative lengths of abdominal segments 7, 8, 9 and 10 about as 40:23:15:10, with the caudal appendages 10 on the same scale.

Wings with brown basal spot reaching to basal subcostal cross-vein. Antenodal and postnodal cross-veins of first 9:16-16:9/12:14-12:11 in fore and hind wings, respectively. Second primary antenodal cross-vein the sixth in fore wings, the fifth in hind wings. Intermedian cross-veins 7-8/5-5 in fore and hind wings, respectively. Supratrangles open. Subtriangles two-celled. Triangle in hind wings two-celled, in fore wings three-celled, the dividing cross-veins tri-radiate from centre. Trigonal interspace in fore wings starting with a row of three cells against triangle followed by two rows of cells, ten cells long, in anterior row, that in hind wings starting with a row of four (right) and five (left) cells against triangle followed by two rows of cells, six (right) and seven (left) cells long, in anterior row. Hind wings with six paranal cells, five (left) and six (right) postanal cells, and five rows of cells in area posterior to Cu2.

There are a number of variable characters within this species, as already stated by WILLIAMSON (1920a). For the specimens the following are noteworthy:

(1) Size: The largest males are from Mexico (abdomen 40 mm; hind wing 30 mm; costal edge of pterostigma in fore wing 4.5 mm). The males from Suchitepequez, Guatemala, are more delicate and smaller (abdomen 35 mm; hind wing 27 mm), and have the shortest pterostigma (3.8 mm). The largest female is the female described. The smallest female is also from Chiapas, Mexico (abdomen 36 mm; hind wing 29 mm; width of hind wing 8.3 mm; costal edge of pterostigma in fore wing 4.2 mm).

(2) Colour design: First pale antehumeral stripes confluent (sometimes slightly) with pale area of collar in one male from Morelos, Mexico, in all males and one female from Chiapas, Mexico, in three males from El Progreso, Guatemala, in one male from Chontale, Nicaragua, and in one male from El Salvador. The males from Suchitepequez, Guatemala, are more or less melanistic, and there is also no brown basal spot in the wings of these males. The anterior margin of the labrum is black in the females from Vera Cruz, Mexico. In these females the pale stripes on the mesepimeron and the metepisternum are also narrow, the pale metepisternal stripe almost interrupted near its upper end. The second pale antehumeral stripe in the female from El Progreso, Guatemala, is very reduced forming an antealar spot and a narrow inferior stripe.

(3) Inferior caudal appendage of male: Branches largest and with the longest

tip (apical part beyond supero-external tooth) in the specimens from Mexico, smallest and with the shortest tip in the specimens from Suchitepequez, Guatemala.

(4) Vertex of female: Posterior ridges high and tubercle-shaped near eye border in the specimens from Guatemala, lower and not tubercle-shaped near eye border in the specimens from Mexico.

(5) Wing venation: One male from Guatemala has the supratriangle in the hind wings crossed, and one male from Mexico has a supratriangle (in one of the fore wings) with two cross-veins.

PROGOMPHUS MEXICANUS SPEC. NOV.

Figures 161-169

Material — *Mexico*: Oaxaca, Tehuantepec, 5.VIII.1965, 1♂, leg. O.S. Flint, Jr. & M.A. Ortiz B. (holotype), (MNH, Type no. 72715); Vera Cruz, road from San Andres Tuxtla to Laguna Encantada, 23.VII.1961, 1♀, leg. John A. Harshaw (allotype), (MNH). — *Costa Rica*: Prov. Guanacaste, Hacienda Taboga, 29.VI.1967, 1♂ (teneral), leg. M.J. Westfall, Jr. (paratype), (FSC).

Much resembling *clendoni*, but at once recognizable from it by the quite different conformation of the inferior caudal appendage of the male and the vertex of the female.

Male (holotype; abdomen broken between segments 4-5 and 5-6; caudal appendages partly crushed). — Total length 42 mm, abdomen 32 mm; hind wing 27.5 mm; costal edge of pterostigma in fore wing 4.5 mm.

Face pale brown but lateral sides of postclypeus, anteclypeus, and free border of labrum pale green. Mandibles brown at tip, becoming pale green to base. Superior surface of frons largely pale green, brown at base. Vertex dark brown but concave area behind postocellar ridges pale. Occipital plate pale yellow, the posterior ridge brown and fringed with brown hairs. Posterior part of head brown but pale yellow behind occipital plate, and with a pale yellow spot on temporae. Labium and adjacent mouth parts pale brown.

Prothorax brown, its middle lobe pale green save for the middorsum which is brown.

Pterothorax brown with pale green stripes. First pale antehumeral stripes connected with pale area of collar. Second pale antehumeral stripes well-developed. Sides of pterothorax with three pale stripes.

Femora brown, the inner side of first femur pale green. Tibiae, tarsi and claws black. Lamina tibialis of first tibia about one-third the tibial length.

Abdomen blackish brown with pale markings. Lower parts of sides of first and second segments pale green. Auricles pale green. Between auricle and posterior

margin of segment 2 an extra pale green spot. Segments 2 to 7 with a yellow middorsal basal spot, the basal spot on 7 largest and occupying one-third of the segment. All basal spots confluent with yellow middorsal line. Sides of segments 7 to 10 with brown-yellow markings. Superior caudal appendages black, the apical half of upper surface pale greenish white. Inferior caudal appendage black, the slender branches strongly incurved, the supero-external tooth rather stout, the apical part ending in two teeth.

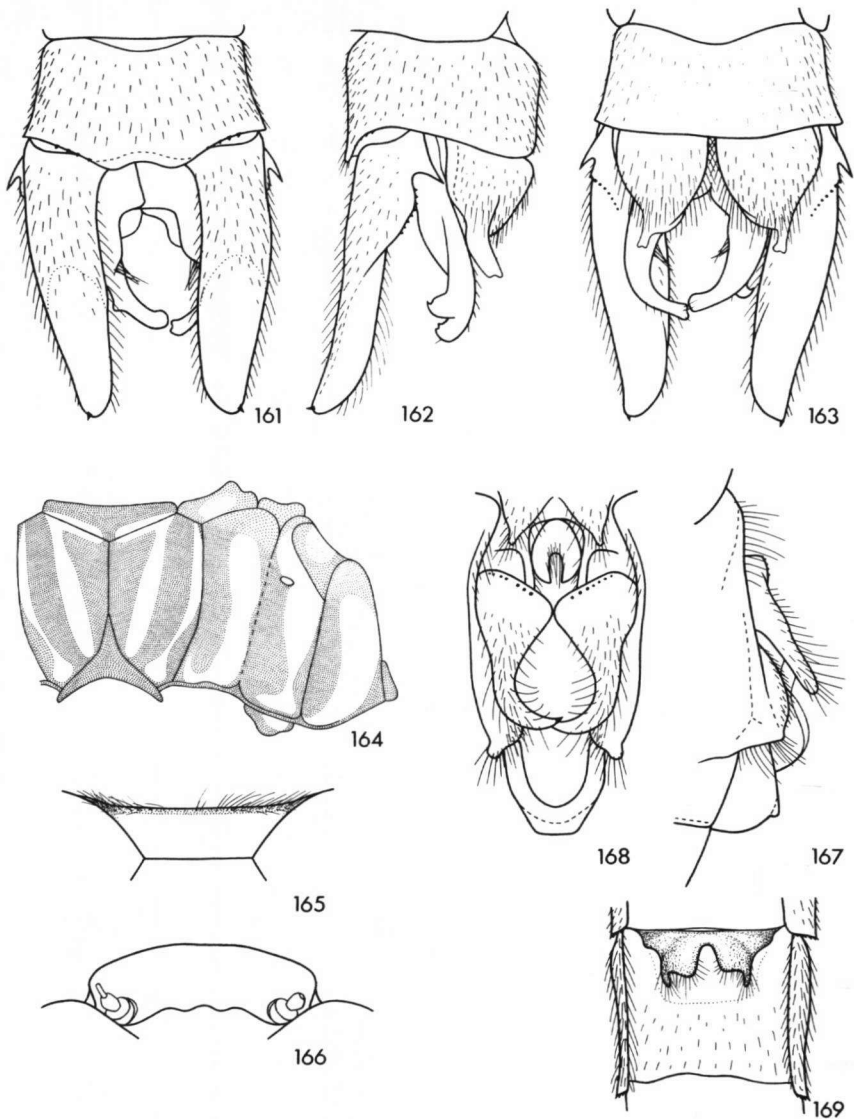
Genital hamules pale brown. Anterior hamules very small and largely concealed by the large posterior hamules. Incurved tip of posterior hamule long, slender, and ending in a black tooth. Hood of penial peduncle blackish brown.

Wings hyaline but extreme base brownish yellow. Venation dark brown but frontal margin of costa yellow. Pterostigma yellowish brown, surmounting 6-7½ cells. Basal subcostal cross-vein present. Antenodal and postnodal cross-veins of first series 7:14-15:7/8:10-10:9 in front and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 6-7/4-4 in fore and hind wings, respectively. Supratrangles open. Subtriangle in fore wings open, in hind wings two-celled. Triangle in fore wings three-celled, the dividing cross-veins tri-radiate from centre. Triangle in hind wings two-celled (right) and three-celled (left). Trigonal interspaces starting with two (right fore wing), three (left fore wing and right hind wing), and four (left hind wing) cells against triangle followed by two rows of cells. Hind wings with six paranal cells, three (left) and four (right) postanal cells, a three-celled anal triangle, and with three to four rows of cells in area posterior to Cu2.

F e m a l e (allotype; head broken off; abdomen broken between segments 5-6 and 6-7). — Total length 51 mm; abdomen 39 mm; hind wing 30 mm; width of hind wing 8.5 mm; costal edge of pterostigma in fore wing 4.6 mm.

Larger and stouter than holotype male. Differs in coloration from it as follows: Frontal lobe of prothorax with a yellow middorsal spot; middle lobe of prothorax brown except for a yellow spot on each side; first pale antehumeral stripe not confluent with pale area of collar but separated from it by more than its own width. Vertex much resembling that of *williamsi* but concave depressions deeper. Caudal appendages pale greenish white, the extreme base and acute tip black. Relative lengths of segments 7, 8, 9, and 10 about as 38:21:14:10. Caudal appendages as long as segment 10. Vulvar lamina one-third the length of ninth sternum, its posterior margin deeply excised U-shaped.

Two basal subcostal cross-veins in right hind wing, one in other wings. Antenodal and postnodal cross-veins of first series 11:16-16:10/11:12-12:12 in fore and hind wings, respectively. Intermedian cross-veins 6-6/4-5 in fore and hind wings, respectively. All triangles three-celled, the dividing cross-veins tri-radiate from centre. Subtriangle in right hind wing open, in other wings two-celled. Trigonal interspaces starting with three cells against triangle followed by



Figs. 161-169. *Progompheus mexicanus* spec. nov.: (161) tenth abdominal segment and caudal appendages of holotype male, dorsal view; – (162) the same, right lateral view; – (163) the same, ventral view; – (164) diagram of pterothorax of holotype male; – (165) occipital plate of holotype male; – (166) frons of holotype male, dorsal view; – (167) accessory genitalia of holotype male, right lateral view; – (168) the same (except penis), ventral view; – (169) vulvar lamina and tenth abdominal segment of allotype female, ventral view.

two rows of cells. Hind wings with six paranal cells, four (right) and five (left) postanal cells, and with four to five rows of cells in area posterior to Cu2.

Between the described female and the holotype male some striking differences exist. Despite the scarcity of the material I would consider them no more than individual variations, because most of these differences are also found in the nearest relative *clendoni*:

(1) The great difference in size. Also found in *clendoni*, especially between males and females from diverse localities.

(2) The isolated first pale antehumeral stripes. These stripes are generally also isolated in *clendoni* but in some specimens joined with the pale area of the collar.

(3) The yellow middorsal spot on the frontal lobe of the prothorax. The extent of this spot is variable in *clendoni* and in some specimens completely absent.

(4) The brown middle lobe of the prothorax. This difference in colour design has not been found in *clendoni* and perhaps it constitutes a secondary sexual character. All specimens of *clendoni* have the middle lobe of the prothorax more or less coloured as in the female.

PROGOMPHUS ZONATUS HAGEN IN SELYS, 1854

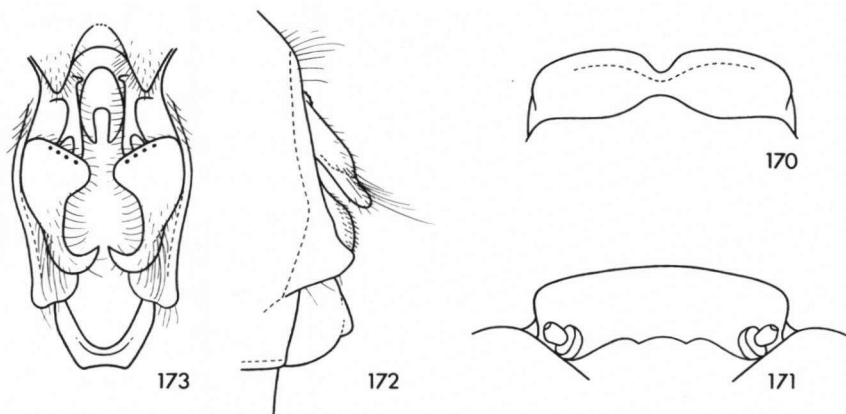
Figures 170-173

Progomphus zonatus Hagen in SELYS, 1854:72 (53 sep.) (♀); – SELYS & HAGEN, 1858: 463-465 (203-205 sep.); pl. 11, figs. 3a-d; – HAGEN, 1861:111; – KIRBY, 1890:72; – CALVERT, 1905:150; tab. 7, figs. 1-3 (♂); – NEEDHAM, 1941:234-235; pl. 20, fig. 9 (larva?).

Material.— G u a t e m a l a : Baja Vera Paz, Route 17, km 125 (4750'), near crest Sierra Las Minas, 25-25.VI.1966, 1 ♂, leg O.S. Flint, Jr. & M.A. Ortiz B., (MNHV).

Most resembling *clendoni* but readily distinguished from it by the larger size, the deep, superior median furrow of the frons, and the very slender, widely splayed branches of the inferior caudal appendage of the male. The hamules of the accessory genitalia are black but the outer side of the swollen base of the posterior hamule is pale grey. The posterior hamules are distinctly longer than in *clendoni*, and they are peculiar by the presence of an external groove.

The holotype, female, of *Progomphus zonatus* is in the Museum of Comparative Zoology at Cambridge, Mass., and it bears the type number 12374 (Lawrence 1973, personal communication).



Figs. 170-173. *Progompheus zonatus* Hagen in Selys, male: (170) frons, frontal view; — (171) the same, dorsal view; — (172) accessory genitalia, right lateral view; — (173) the same (except penis), ventral view.

PROGOMPHUS CONJECTUS BELLE, 1966

Progompheus sp. ? No. 15 NEEDHAM, 1944:213-214; pl. 15, figs. 15a-b (larva?); — BELLE, 1966:14-16, figs. 29-31 (larva?). *Progompheus conjectus* BELLE, 1966:17-20; figs. 32, 44; pl. 4 (♀); — LIEFTINCK, 1971:81 (holotype).

Male unknown.

PROGOMPHUS NERVIS SPEC. NOV.

Figures 174-176, 335

Material. — Peru : Mishuyacu, Iquitos, 7.III.1930, 1 ♀, leg. Klug (holotype), (SMF, no. 15177).

The near relative of this species seems to be *complicatus*, but there is only a single female available. The vertex of this female is peculiar by the possession of a deep pit behind each of the postocellar ridges. The cell between the first and second postnodal cross-veins in the fore wings is divided by a vein parallel to the costa, a feature also found in the female holotype of *polygonus*.

Male unknown.

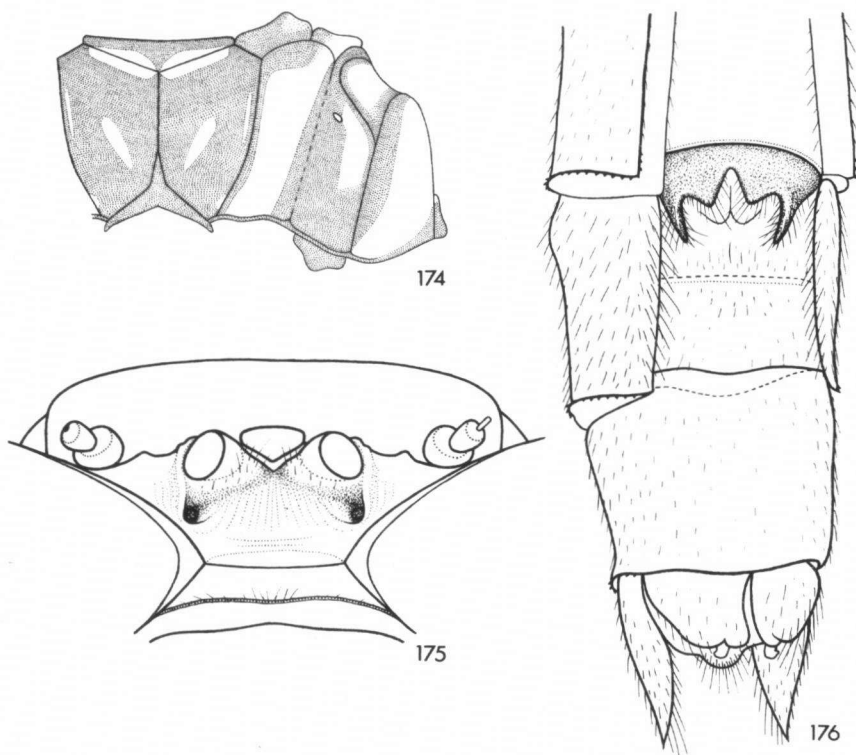
Female (holotype; head broken off; abdomen broken between segments 4-5). — Total length 37.5 mm; abdomen 30.5 mm; hind wing 23.5 mm; distance on fore wing from nodus to stigma 8 mm; costal edge of pterostigma in fore wing 3 mm.

Face predominantly dark brown. Lateral margins of labrum and margin of facial lobes of anteclypeus yellow (possibly due to postmortem changes). Labium yellow. Mandibles dark brown but greenish yellow on lower part of base. Superior surface of frons with a broad green frontal band and a narrow dark brown basal band. Occipital plate brown; its posterior margin with a very small median excision and fringed with brown hairs which are in length about as long as the middorsal width of occipital plate.

Prothorax brown, the hind collar darker, the middle lobe laterally washed with yellow.

Pterothorax brown, the pale markings greenish yellow; its colour design shaped as shown in Figure 174.

Third femora green, becoming brown on dorsum and towards knee. First and second femora dark brown, the inner side green. Tibiae, tarsi and claws dark brown. Knee-caps green.



Figs. 174-176. *Progomphus nervis* spec. nov., holotype female: (174) diagram of pterothorax; – (175) mid-region of head, dorsal view; – (176) apical segments and caudal appendages, ventral view, showing vulvar lamina.

Abdomen predominantly dark brown. Dorsum of segment 1 yellow on both ends. Segment 2 with middorsal yellow stripe, the stripe broad at base, becoming very narrow at apex. A very narrow middorsal yellow line on segments 3 to 7. Sides of segments 1 and 2 greenish yellow. Sides of segment 3 with a basal spot reaching to median transverse scar. A smaller basal spot on sides of segments 4 to 7, the two spots connected on middorsum on segments 5 to 7. Inferior lateral margins of segments 1 to 8 greenish yellow. Segments 9 and 10 without pale marking of any kind. Caudal appendages dark brown and acutely pointed. Sterna of all segments blackish brown. Vulvar lamina about two-fifths the length of ninth sternum; its posterior margin deeply excised U-shaped. Venter of segment 1 with a transverse fold which is thickly covered with short stiff hairs curved rearwards.

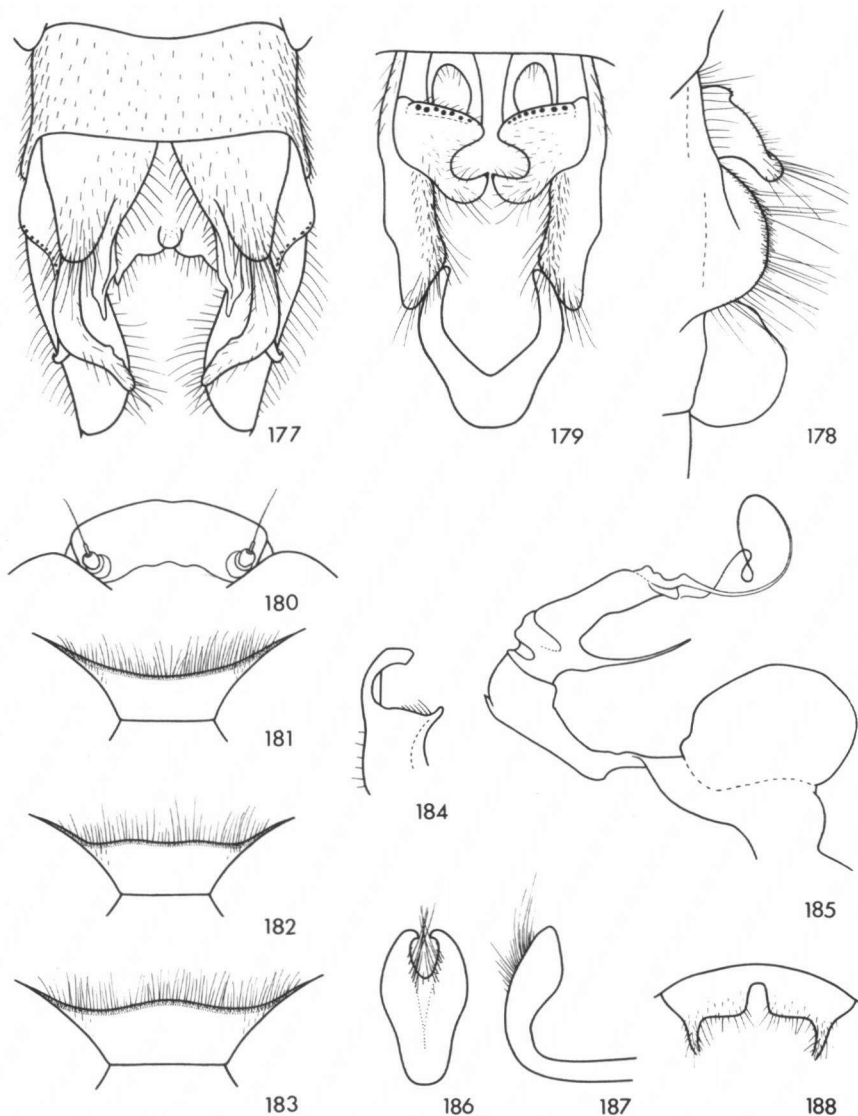
Wings hyaline. Venation dark brown including frontal margin of costa. Pterostigma brown. Basal subcostal cross-vein present. Antenodal and postnodal cross-veins of first series 11:16-16:11/10:12-14:11 in fore and hind wings, respectively. Second primary antenodal cross-vein the sixth in right hind wing, the fifth in other wings. Intermedian cross-veins 6-6/5-4 in fore and hind wings, respectively. Distal side of triangles strongly angulated. Triangle in left fore wing two-celled, in other wings three-celled, the cross-veins tri-radiate from centre. Subtriangle in fore wings two-celled, in hind wings three-celled, the cross-veins tri-radiate from centre. Trigonal interspace in fore wings with two rows of cells 14 cells long. Trigonal interspace in hind wings starting with an extra initial cell at hind angle of triangle followed by two rows of cells 7 (left) and 9 (right) cells long. Anal field in fore wing two cells wide. Number of paranal cells in left hind wing five, in right hind wing six (one cell very small). Three postanal cells in each hind wing. Fore wings with area posterior to Cu2 two (right) and three (left) cells wide. Same area in hind wings four cells wide.

PROGOMPHUS COMPLICATUS SELYS, 1854

Figures 177-188, 335

Progomphus complicatus SELYS, 1854:70-71 (51-52 sep.) (♂); SELYS & HAGEN, 1858:459-461 (198-200 sep.); pl. 11, fig. 1; – HAGEN, 1861:312; – SELYS, 1869:190 (27 sep.) (♀); – SELYS, 1873:763 (35 sep.); – KIRBY, 1890:72; – CALVERT, 1909:213; – RIS, 1911:113-114; figs. 11-12; – SANTOS, 1968:171-173; figs. 1-5 (larva?).

Material. – B r a z i l: 1 ♂, leg. Dr. Pierre Clausen (lectotype); Bahia, 1 ♂; Tijuca, 1 ♂, 1 ♀, leg. Paul de Borchgrave; Rio de Janeiro (Jardin botanique), 6 ♂, 1 ♀, leg. Walther de Selys, (IRSN); Rio de Janeiro, 31.VIII.1922, 1 ♂, 1 ♀ (teneral; "caught in Mt. Quebrada, resting on twig 8' above stream"); 6.IX.1922, 1 ♂ (on leaf on bank of creek); 12.IX.1922, 3 ♂ ("Two gomphines today were resting on rock in creek; one was on twig in creek. Saw



Figs. 177-188. *Progomphus complicatus* Selys: (177) tenth abdominal segment and caudal appendages of male from Espirito Santo, ventral view; – (178) accessory genitalia of lectotype male, right lateral view; – (179) the same (except penis and penis guard), ventral view; – (180) frons of lectotype male, dorsal view; – (181) occipital plate, lectotype male; – (182) the same, male from Espirito Santo; – (183) the same, female from Tijuca; – (184) right anterior genital hamule of male, right lateral view; – (185) penis, right lateral view; – (186) penis guard, frontal view; – (187) the same, right lateral view; – (188) vulvar lamina, ventral view.

several others, on rocks, and leaves. One rested at end of leaf"); 17.IX.1922, 10 ♂ ("Gomphines from creek below the big water falls, about 10 minutes walk up Mt. Tijuca from the Alto Boa Vista station on car line. Generally sit on rocks in creek bed"); 25.IX.1922, 4 ♂, all leg. J.H. Williamson, (MZM); Prov. Rio de Janeiro, 20.X.1906, 1 ♂, leg. von Bönninghausen; Espírito Santo, 20.V.1898, 3 ♂, leg. J. Michaelis, (ZMH). — **Paraguay:** Sapucay, XI.1899, 1 ♂; XII.1899, 2 ♂ (MNH), 1 ♂ (FSC), all leg. W.T. Foster; Colonia Independencia, 14.II.1939, 1 ♂ (FSC).

The lectotype male bears at the pin the labels "98", "98", Cl 2" (Cl = Clausen), and "Prog. complicatus S. ♂" (in Selys' handwriting). It is in fairly good condition. The abdomen is glued to the thorax. The first abdominal segment is dislocated and covers partly the base of the second segment.

There is some variation in the size and the colour design of this species as already stated by SELYS (1873) and RIS (1911), respectively. The males from Paraguay are the smallest of the series. The females are stouter than the males, and the largest specimen of the series is a female from Tijuca (total length 53 mm; abdomen 39.5 mm; hind wing 32.5 mm; costal edge of pterostigma in fore wing 5.0 mm). The pale metepisternal stripe is weakly developed in the lectotype. This is also the case in the specimens from Paraguay. In the other specimens this stripe is generally wanting or represented by a dorsal spot only.

The tip of the superior caudal appendage of the male is distinctly more blunt in the representatives from Espírito Santo than in the holotype. In some males from Rio de Janeiro and in the males from Paraguay the tip of the superior caudal appendage tapers more or less gradually to an acute point. Some males from Rio de Janeiro have a four-celled anal triangle in one of the hind wings.

The postocellar ridges are high and swollen. They are much better developed in the female from Tijuca than in the female from Rio de Janeiro. There is also some variation in the form of the occipital plate. The posterior border of the occipital plate is slightly concave in the lectotype; very convex in the female from Tijuca, slightly concave or slightly convex in the other specimens.

R e m a r k: A single female from Ecuador in the Museum of Zoology, Ann Arbor, Mich., is similar to *complicatus* except for the postocellar ridges which are very low. The vertex approaches greatly that of *approximatus*. The conformation of the postocellar ridges varies in *complicatus*, but it is not possible to say at present what allowance can be made for the development of these ridges. The female from Ecuador may belong to a new species, which should be confirmed by further collecting of the corresponding male.

Some other data of this female are: No antealar spot; no pale metepisternal stripe; caudal appendages pale for the apical two-thirds; total length 42 mm; abdomen 32 mm; hind wing 27 mm; costal edge of pterostigma in fore wing 4 mm. The locality data: Ecuador, Prov. Pinchinda, La Lorena, Sta. Domingo de los Colorados (500-550 m), 5.III.1941, leg. David B. Laddey.

PROGOMPHUS FORMALIS SPEC. NOV.

Figures 189-193, 335

Material. — **Ecuador:** Napo Pastaza, Jatun Yacu (700 m), 12.IV.1935, 1 ♂, leg. William Clarke-Macintyre (holotype). — **Peru:** Dept. Junín, Satipo, 20.VI.1940, 1 ♀, leg. Pedro Paprzycki (allotype), (MZM).

The nearest relative of *formalis* sp.n. is *complicatus* from eastern Brazil but it is readily distinguished from that species by its smaller size, and in having the costal edge of the pterostigma about one-third of the distance from the nodus to the pterostigma (about half the distance in *complicatus*).

The male caudal appendages and accessory genitalia resemble greatly those of *complicatus* but the apical part of the branch of the inferior caudal appendage extends more obliquely to the rear (more incurving in *complicatus*), and the tip of the posterior genital hamule is somewhat shorter and (relatively) stouter.

Male (holotype). — Total length 40 mm; abdomen 29 mm; hind wing 24.5 mm; distance on fore wing from nodus to pterostigma 8.5 mm; costal edge of pterostigma in fore wing 3.0 mm.

Face brown but lateral sides of postclypeus with a small green spot. Base of mandible green externally. Frons distinctly angled, its superior surface with a broad, green anterior band which becomes narrower in middle. Base of superior surface of frons, vertex and occipital plate brown. Posterior margin of occipital plate very slightly concave in middle. Posterior part of head brown, becoming yellow below. Labium and adjacent mouth parts pale green.

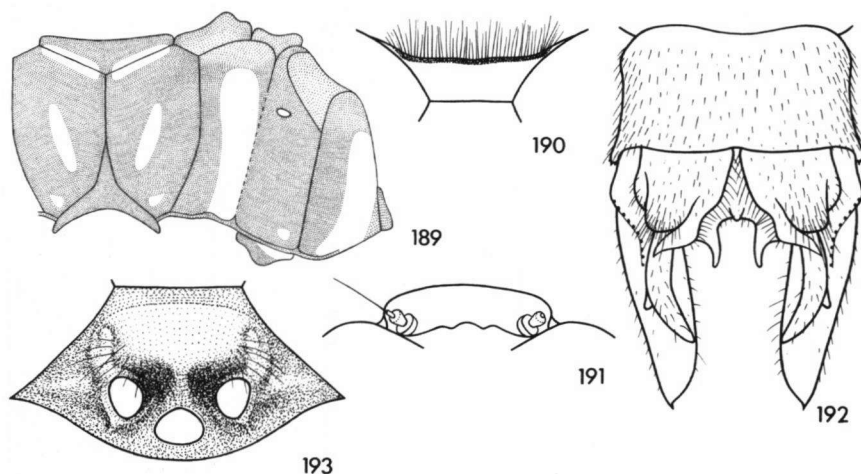
Prothorax brown. Colour design of pterothorax shaped as shown in diagram Fig. 189. First green antehumeral stripes much shorter than in *complicatus*.

Legs brown, the inner sides of first and second femora green. Third tarsus four-fifths the length of third tibia. Lamina tibialis of first tibia about a quarter of tibial length.

Abdomen predominantly brown. Middorsum of segment 2 with a yellow basal band from base to near apex of segment. Sides of segments 3 to 7 with small, yellow basal spots. Sides of segment 8 washed with yellow. Keel of segment 7 suddenly widened on apical two-fifths. Caudal appendages dark brown (apical half of upper surface of superior caudal appendage pale in *complicatus*). No ventral process on segment 1.

Wings hyaline. Venation brown but frontal margin of costa with a narrow, inconspicuous yellow line. Pterostigma yellowish brown, surmounting 5-6 cells. Basal subcostal cross-vein present. Antenodal and postnodal cross-veins of first series 11:15-13:11/11:12-12:10 in fore and hind wings, respectively. Second primary antenodal cross-vein the sixth in left fore wing, the fifth in other wings. Intermedian cross-veins 6-5/4-3 in front fore and hind wings, respectively. Anal

field in fore wings two cells wide. Trigonal interspaces starting with a row of three cells against triangle followed by two rows of cells. Supratrangles two-celled. Triangles three-celled, the dividing cross-veins tri-radiate from centre. Hind wings with four paranal cells, three (right) and four (left) postanal cells, three to four rows of cells behind Cu₂, and a three-celled anal triangle. Second anal interspace in hind wings starting with a single (paranal) cell against anal vein.



Figs. 189-193. *Progomphus formalis* spec. nov.: (189) diagram of pterothorax of holotype male; – (190) occipital plate of holotype male; – (191) frons of holotype male, dorsal view; – (192) tenth abdominal segment and caudal appendages of holotype male, ventral view; – (193) vertex of allotype female.

F e m a l e (allotype; teneral and shrivelled; left pair of wings lost; abdomen broken between segments 2-3). – Total length 38 mm; abdomen 29 mm; hind wing 26.5 mm; distance on fore wing from nodus to pterostigma 9.2 mm; costal edge of pterostigma in fore wing 3.3 mm.

Larger than male and with stouter abdomen. Coloration similar to male but no trace of an antealar spot, extent of pale markings on abdomen larger, and segments 2 to 7 with distinct pale middorsal line which is widest on 2. Vertex of female with a pair of postocellar excavations, the postocellar ridges developed only near middle of vertex. Caudal appendages acutely pointed, largely brown, becoming pale towards apex. Dorsal posterior margin of segment 10 denticulated only at level of bases of caudal appendages. Vulvar lamina (shrivelled) of the usual form, about one-fourth the length of ninth sternum, its posterior margin deeply excised V-shaped. Relative lengths of abdominal segments 7, 8, 9, and 10 about as 50:26:20:10, with the caudal appendages 15 on the same scale. Ptero-

stigma surmounting 5 cells. Antenodal and postnodal cross-veins of first series 16:11/12:11 in right fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 5/3 in right fore and hind wings, respectively. Anal field in fore wing, supratrangles, subtriangles, triangles and trigonal interspaces as in male. Hind wing with five paranal cells, four postanal cells, and with four to five rows of cells posterior to Cu2. Second anal interspace starting with a single cell against anal vein followed by two rows of cells.

PROGOMPHUS GUYANENSIS BELLE, 1966

Figures 194, 335

Progomphus guyanensis BELLE, 1966:20-24, 27-28; figs. 33-43, 45; pl. 3 (♂, ♀, larva); — LIEFTINCK, 1971:91 (holotype).

Material (in addition to that recorded by BELLE, 1966). — Surinam: Joden-Savanna (Kamp 8), 14.III.1935, 1 ♂ (teneral), leg. Schulz. — Brazil: Maranhão, Aldeia Yavaruhu, 50 km east of Caninde, 11-25.II.1966, 1 ♂ (teneral), leg. B. Malkin, (ML).

The female of this species is readily recognizable from that of *approximatus* by the well-developed postocellar ridges. These are high and tubercle-shaped between lateral ocellus and compound eye. In the female of *approximatus* these postocellar ridges are low, and between each lateral ocellus and compound eye there is a shallow concavity instead of a tubercle.

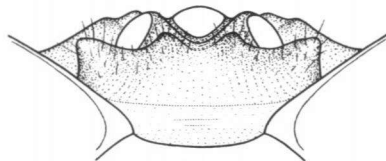


Fig. 194. *Progomphus guyanensis* Belle, allotype female. Vertex, dorsal view.

Remark: A single, somewhat smaller female from Para, Brazil, in the Institut Royal des Sciences Naturelles de Belgique, Brussels, is perhaps conspecific with *guyanensis* but the postocellar ridges are low and the tubercle between each lateral ocellus and compound eye is small.

PROGOMPHUS APPROXIMATUS BELLE, 1966

Figure 335

Progomphus approximatus BELLE, 1966:25-28; figs. 46-50 (♂, ♀, larva); –
LIEFTINCK, 1971:73 (holotype).

Material (in addition to that recorded by BELLE, 1966). – B r a z i l: State of Pará, Belem, 7.VIII.1922, 1 ♀; 14.VIII.1922, 1 ♂ (teneral), both leg. J.H. Williamson & J.W. Strohm, (MZM).

PROGOMPHUS BOLIVIENSIS SPEC. NOV.

Figures 195-206, 335

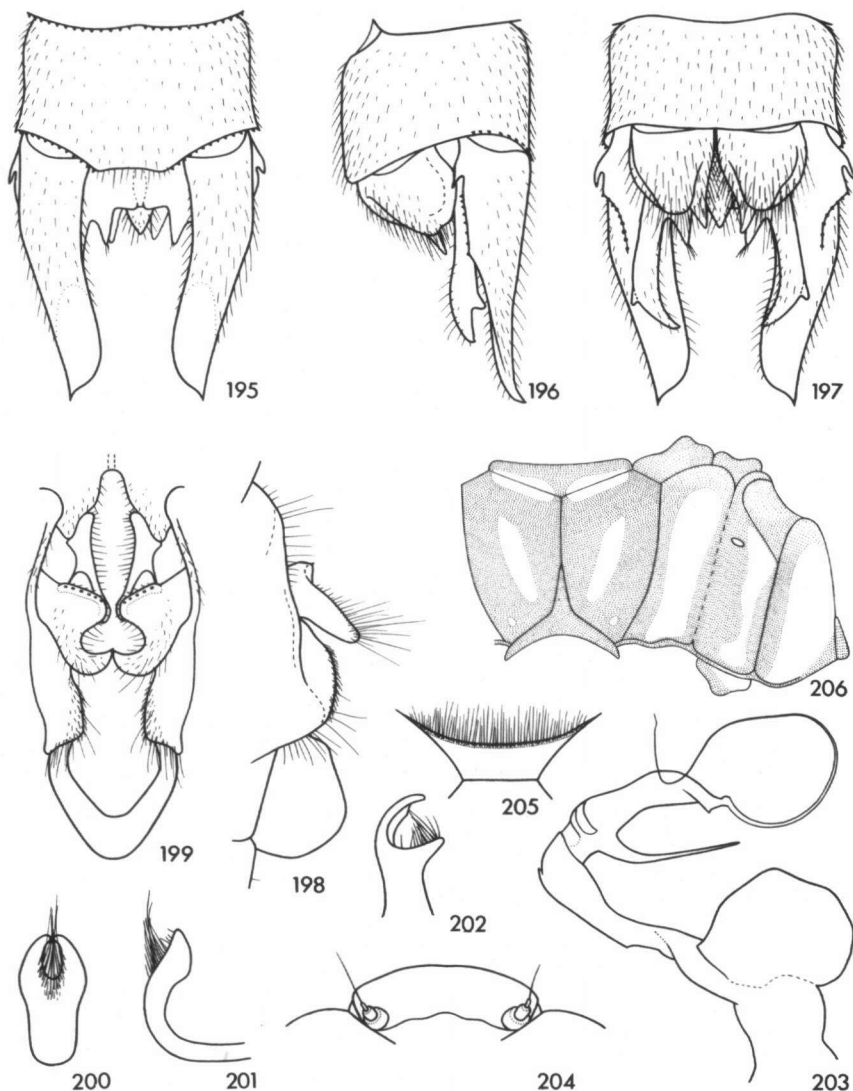
Material. – B o l i v i a: Dept. Santa Cruz, Prov. Ichilo (small stream 6.7 km east of Buena Vista, stream called Quebrado del Paquio), 10.III.1960, 4 ♂, leg. R.B. Cumming (holotype and paratypes), (FSC).

Closely related to *approximatus* but the male differs from it by the much stouter posterior genital hamules, the much shorter apical process of the anal tubercle, the absence of a sternal process on abdominal segment 1, and the stouter branches of the inferior caudal appendage. The tip of the branch of the inferior caudal appendage ends with four or five superior teeth, in *approximatus* with two or three superior teeth.

The antearal pale spot on each side of the dorsum of the pterothorax is sometimes absent.

Male (holotype; tip of right hind wing broken off and lost; abdomen broken between segments 3 and 4). – Total length 44 mm; abdomen 34 mm; hind wing 24 mm; costal edge of pterostigma of fore wing 3.0 mm.

Somewhat larger than *approximatus*. Coloration very similar to this species but extent of some pale markings larger. Green lateral spot on each side of postclypeus larger; antero-superior band of frons greenish white and broader in middle; posterior part of anteclypeus green in middle; etc. Posterior margin of occipital plate without median excision. Posterior part of middle lobe of prothorax green separated by brown on middorsal line. Green antearal spot on each side of dorsum of pterothorax small. Green metepisternal stripe better developed than in *approximatus*. Third tarsus somewhat shorter than third tibia. Lamina tibialis of anterior tibia a quarter of tibial length. Abdominal segment 2 with large pale markings on sides, and a pale middorsal spot. Abdominal segments 3 to 7 with small, pale baso-lateral spots, and a pale middorsal line which is very fine on segments 4 to 6, and very fine and interrupted on segment 7. Sides of abdominal



Figs. 195-206. *Progomphus boliviensis* spec. nov.: (195) tenth abdominal segment and caudal appendages of holotype male, dorsal view; – (196) the same, left lateral view; – (197) the same, ventral view; – (198) accessory genitalia of holotype male, right lateral view; – (199) the same (except penis and penis guard), ventral view; – (200) penis guard of paratype male, frontal view; – (201) the same, right lateral view; – (202) right anterior genital hamule of paratype male, right lateral view; – (203) penis of paratype male, right lateral view; – (204) frons of holotype male, dorsal view; – (205) occipital plate of holotype male; – (206) diagram of pterothorax of holotype male.

segments 7 and 8 yellow along ventral tergal margins. Abdominal segment 7 suddenly widened on apical half along ventral tergal margins. Superior caudal appendages black at base, becoming paler at apex.

Basal subcostal cross-vein present. Antenodal and postnodal cross-veins of first series 11:16-13:12/11:11-12:12 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. First series of antenodal cross-veins in left fore wing with an extra cross-vein proximal to basal subcostal cross-vein. Intermedian cross-veins 7-6/4-5 in fore and hind wings, respectively. Anal field in fore wings two cells wide for a distance of two cells. Triangle in fore wings three-celled, the dividing cross-veins tri-radiate from centre. Triangle in hind wings two-celled. Subtriangles two-celled. Supratriangles open. Trigonal interspace in fore wings with two rows of cells 12 cells long, in anterior row, in hind wings 6 cells long, in anterior row, and starting with an extra initial cell at hind angle of triangle. Hind wings with five paranal cells and four postanal cells, the fifth paranal cell is the first postanal cell. Three rows of cells behind Cu2 in hind wings. Second anal interspace in hind wings starting with a single (large) cell against anal vein. Anal triangle in hind wings three-celled.

F e m a l e unknown.

Some venational features in the wings of the three paratype males are: Triangle two-celled in ten wings, and three-celled in one fore wing (the other fore wing of the same specimen lost). Second anal interspace in hind wing starting with a single cell against anal vein in four hind wings, with two cells against anal vein in two hind wings.

PROGOMPHUS BRACHYCNEMIS NEEDHAM, 1944

Progomphus brachycnemis NEEDHAM, 1944:208-211; pl. 15, figs. 13a-b (♀, larva); – BELLE, 1966:2-7; figs. 1-12; pl. 1 (♂); – LIEFTINCK, 1971:78.
Gomphoides brachycnemis GEIJSKES, 1971:665.

Material (in addition to that recorded by BELLE, 1966). – Surinam: Coropina Creek (upper part), 4.VII.1948, 1 ♀ (teneral), leg. D.C. Geijskes, (ML).

PROGOMPHUS LONGISTIGMA RIS, 1916

Figures 207-211

Progomphus longistigma RIS, 1916:139-141; figs. 79-81, 98 (♂, ♀). – NEEDHAM, 1941:231-232, 234; pl. 20, fig.8 (larva).

Material. – Costa Rica: Infernillo, Reventazon (1000 m), 1913, 1 ♂, 1 ♀ (in cop.), leg. Garlepp (holotype and allotype, respectively), (SMF, no. 15197 and 15198, respectively); Guanacaste, Quebrada, 2.5 miles west Tilaran, 24.VII.1967, 1 ♂, leg. O.S.

Flint, Jr. & M.A. Ortiz B., (MNHW). — M e x i c o : Chiapas, stream 1.7 mi. N Ixhuatan (1700'), 10.VII.1965, 1 ♂, leg. D.R. Paulson, (FSC).

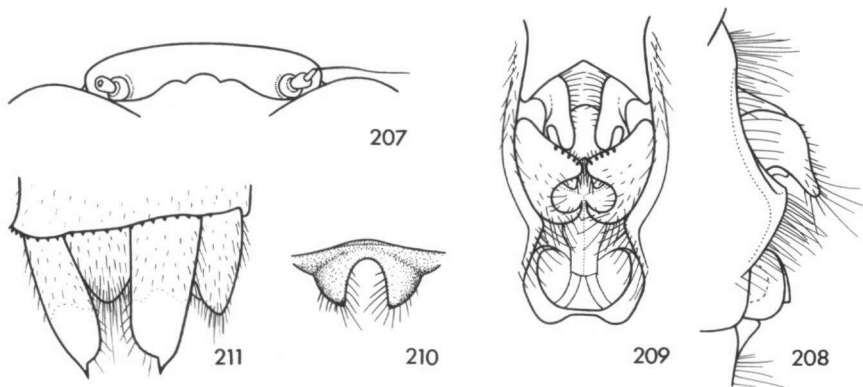
This species is peculiar by the relatively long pterostigma, which suggested the specific name (pterostigma longer than half the distance from nodus to pterostigma).

The holotype male lacks the right wings. These were apparently removed by Ris for his accompanying figure 98, and were not reattached to the specimen (in the original description the numbers 82 and 98 of Table 2 are shifted). The abdominal segments 4, 5 and 6 of the holotype are severely damaged.

The abdomen of the allotype female is partly crushed and broken between the segments 2-3 and 3-4.

There is no sternal process on abdominal segment 1. The third tarsus is three-quarters of the length of the third tibia. The lamina tibialis of the first tibia is about one-tenth of the tibial length in the holotype, about one-eighth in the male from Guanacaste, and about one-sixth in the male from Mexico.

The male from Mexico is somewhat larger than the specimens from Costa Rica; its measurements are: Total length 40 mm; abdomen 30.5 mm; hind wing 23.5 mm; costal edge of pterostigma in fore wing 4.3 mm.



Figs. 207-211. *Progomphus longistigma* Ris: (207) frons of holotype male, dorsal view; — (208) accessory genitalia of holotype male, right lateral view; — (209) the same, ventral view; — (210) vulvar lamina of allotype female, ventral view; — (211) caudal appendages of allotype female, dorsal view.

PROGOMPHUS ANOMALUS SPEC. NOV.

Figures 212-227

Material. — *Ecuador*: Abitagua, Oriente (1000 m), Río Pastaza watershed, 28.X.1936, 1 ♂ (holotype); Napo Pastaza, Río Napo watershed, 25.IX.1935, 1 ♂ (teneral); 24.XII.1935, 2 ♂ (teneral); Jatun Yacu (700 m), Río Napo, III.1937, 1 ♂ (teneral), all leg. William Clarke-Macintyre; Prov. Santiago Zamora, Macas, Río Upano (1050 m), no date, 2 ♂, leg. Leopoldo Gomez Alonzo (paratypes). — *Peru*: Dept. Junín, Satipo, 28.V.1940, 1 ♀; 25.VI.1940, 1 ♂ (teneral); 2.X.1940, 1 ♂ (teneral); 6.X.1940, 1 ♂ (teneral); 6.XI.1940, 1 ♂ (teneral), all leg. Pedro Paprzycki (allotype ♀ and paratypes), (MZM). — *Panama*: Panama, Cerro Campana nr. Chicá (elev. 640 m), 20.V.1970, 1 ♂ (teneral), leg. E.S. Morton (paratype), (coll. Donnelly).

This species differs from all other members of the genus by the two-celled male anal triangle in the hind wings. The nearest relative is *phyllochromus*.

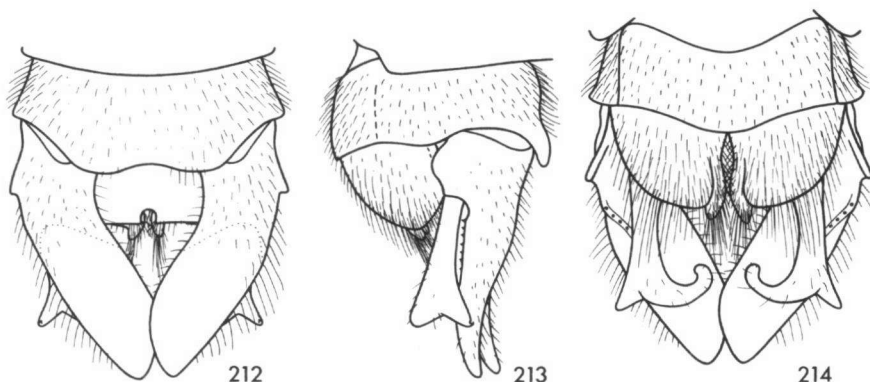
Male (holotype). — Total length 34.5 mm; abdomen 26 mm; hind wing 22.5 mm; costal edge of pterostigma in fore wing 3.3 mm.

Face brown but anteclypeus lead-grey. Frons angled; its superior surface lead-grey with a narrow brown basal band. Vertex and occipital plate brown. Posterior part of head brown, yellowish brown below temporae. Labium and adjacent mouth parts pale brownish green.

Prothorax brown. Pterothorax brown with green stripes; its colour design shaped as shown in diagram (Fig. 215). Dark colour on dorsum blackish brown. Second pale antehumeral stripes absent. No pale antealar spot. Only a pale dorsal spot on metepisternal.

First and second femora brown, the inner side green. Third pair of femora brown, darker on dorsal sides and towards knees. Tibiae, tarsi and claws brown. Third tarsus three-quarters the length of third tibia. Lamina tibialis of first tibia one-seventh the tibial length.

Wings slightly brown tinged. Venation dark brown, the costal edge with a very inconspicuous yellow line. Pterostigma yellowish brown, surmounting 5 - 5½ cells. Basal subcostal cross-vein present. Antenodal and postnodal cross-veins of first series 11:12-14:11/10:10-10:10 in fore and hind wings, respectively. Second primary antenodal cross-vein the fourth in left fore wing, the fifth in other wings. Intermedian cross-veins 6-7/5-3 in fore and hind wings, respectively. Anal field in fore wings two cells wide (double cell). Supratrangles open. All triangles and subtriangles two-celled. Distal side of triangles strongly angulated. Trigonal interspace starting with two (fore wings) and three (hind wings) rows of cells against triangle followed by two rows of cells. Hind wings with four paranal cells, three postanal cells, three rows of cells behind Cu₂, and a two-celled anal triangle. Second anal interspace in hind wings starting with two cells against anal vein.



Figs. 212-214. *Progomphus anomalus* spec. nov., holotype male: (212) tenth abdominal segment and caudal appendages, dorsal view; – (213) the same, left lateral view; – (214) the same, ventral view.

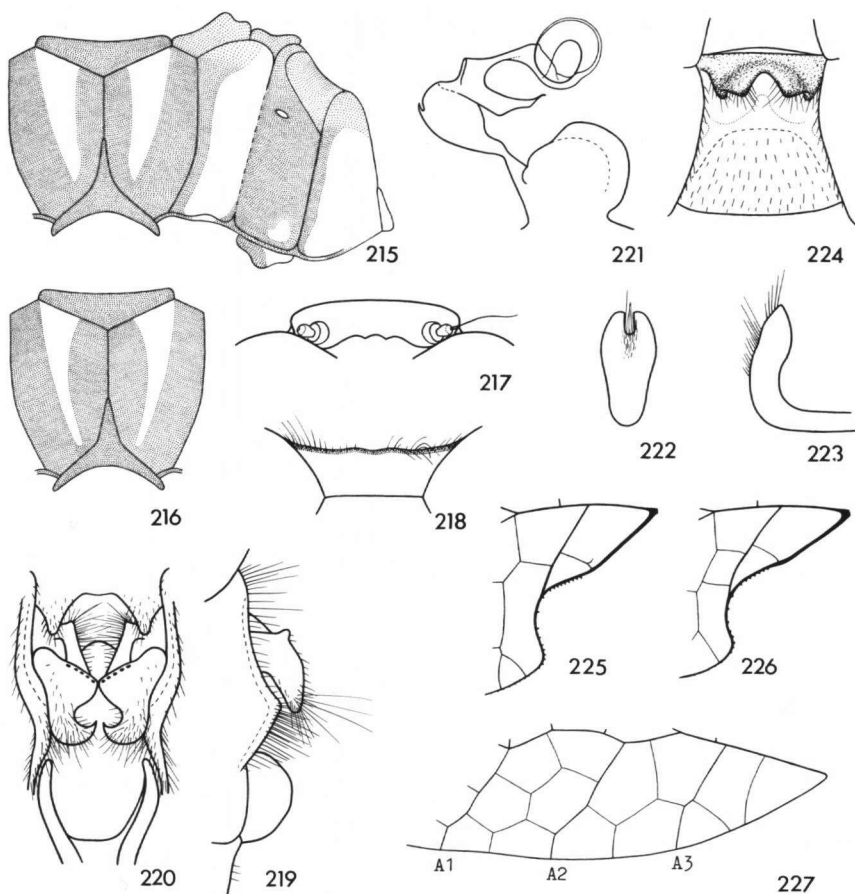
Abdomen predominantly brown, becoming blackish brown on dorsum of middle and apical segments. Sides of segments 1 and 2 green. Segment 2 with rather broad yellow middorsal line; this line very narrow on segments 3, 6 and 7, wanting on segment 4, and developed on apex only on segment 5. No denticles on posterior border of tenth segment. No sternal process on segment 1. Superior caudal appendages blackish brown at base, becoming pale yellow on apical two-thirds. Inferior caudal appendage blackish brown; apical part of branch strongly incurved and upcurved, and ending in a number of small denticles.

F e m a l e (allotype; somewhat teneral). – Total length 35 mm; abdomen 26 mm; hind wing 24 mm; costal edge of pterostigma in fore wing 3.5 mm.

Stouter than holotype male. Coloration similar but labrum with a weakly developed grey anterior band. Pterothorax with a partly developed pale metepisternal stripe, and abdomen with well-developed brownish yellow lateral markings on segments 3 to 7, reaching from base to apex of segment on 3, becoming successively shorter on 4 to 7, being confined to basal half of segment only on 7. Segments 1 to 7 with a yellow middorsal line from base to apex of segment. Pale lateral markings, including the ones on 7, not connected with pale middorsal line. Sides of segment 8 with a small yellow lateral spot at base.

Postocellar ridge of lateral ocelli low and continued between ocellus and compound eye, having below (anterior) a small tubercle.

Antenodal and postnodal cross-veins of first series 11:14-15:11/10:10-10:11 in fore and hind wings, respectively. First primary antenodal cross-vein the fourth in right fore wing, the fifth in other wings. Intermedian cross-veins 5-5/3-3 in fore and hind wings, respectively. Anal field in fore wings one cell wide. All subtriangles and triangles two-celled. Hind wings with five paranal cells and



Figs. 215-227. *Progomphus anomalus* spec. nov.: (215) diagram of pterothorax, holotype male; – (216) diagram of dorsum of pterothorax, paratype male from Panama; – (217) frons of holotype male, dorsal view; – (218) occipital plate of holotype male; – (219) accessory genitalia of paratype male, right lateral view; – (220) the same (except penis), ventral view; – (221) penis of paratype male, right lateral view; – (222) penis guard of paratype male, frontal view; – (223) the same, right lateral view; – (224) vulvar lamina and ninth sternum of allotype female, ventral view; – (225) anal triangle in right hind wing (transposed), holotype male; – (226) the same, paratype male from Panama; – (227) anal field in right wing (transposed), allotype female.

three postanal cells but with two cells on proximal side of A2.

The species varies considerably in several characters, especially in the extent of the pale markings:

(1) Basal third of abdominal segment 7: In holotype nearly entirely blackish brown, only a yellow middorsal line and a yellowish brown streak on each side; in some males (and in the single female) with a brownish yellow spot each side; and in some other males nearly entirely yellow, except along ventral tergal margin brown.

(2) Pale stripes on sides of abdominal segments: In holotype male absent or nearly so; in some specimens partly developed or well-developed.

(3) Pale colour on superior surface of male caudal appendages: In holotype male for apical two-thirds; in male from Panama for apical half; in males from Santiago-Zamora a large spot not reaching to inner border and apex of appendage.

(4) Pterostigma: In holotype longest; in male from Santiago-Zamora shortest (costal edge of pterostigma in fore wing 2.6 mm).

(5) Inferior caudal appendage of male: In holotype male stout and with rather large supero-external anteapical tooth; in other males more delicate and with distinctly smaller supero-external anteapical tooth.

Variable features are also found in the form of the posterior margin of the occipital plate, the width of the first pale antehumeral stripes (in holotype widest, in male from Panama narrowest), the development of the metepisternal stripe, and in the venation of the wings. One male has an extra (very small) third cell in the anal triangle in one of the hind wings. The anal field in the fore wings is normally one cell wide but it is two cells wide in the holotype male, in the male from Panama and in one of the males from Santiago-Zamora (in one fore wing only).

The female shows superficially a striking resemblance to that of *pygmaeus* but is readily distinguished from it by the larger size, the angled frons (although slightly), and the more simple nervature of the anal field in the hind wings.

PROGOMPHUS ABBREVIATUS SPEC. NOV.

Figures 228-235

Material. — C o l o m b i a : Canca, 1 ♂ (holotype), (MZM).

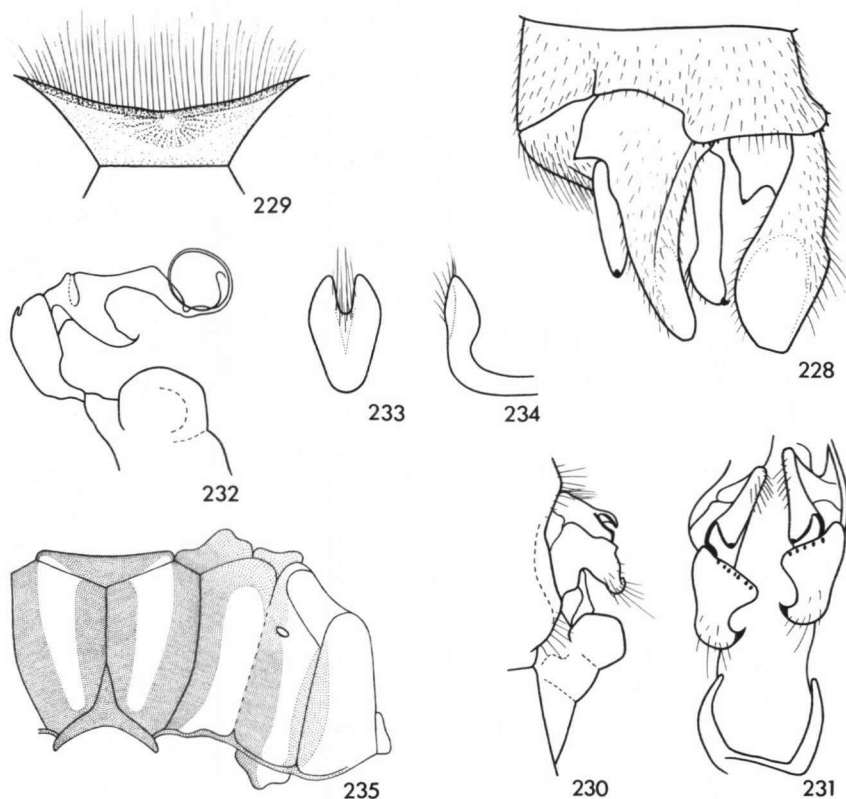
The single male of this species is in very poor condition, but it is at once recognizable by the unusual form of the inferior caudal appendage. The branches of this appendage lack the (incurved) apical part beyond the supero-external tooth. In this respect the inferior caudal appendage of the male agrees with that of *zonatus*. The nearest relative of the species, however, is *phyllochromus*.

M a l e (holotype; teneral and crushed over its entire length). — Total length 36 mm; abdomen 26 mm; hind wing 25 mm; costal edge of pterostigma in fore wing 2.4 mm.

Face pale brown. Superior surface of frons with a broad yellow anterior band. Vertex brown. Occipital plate brown, with a low median hump at posterior margin. This margin concave and fringed with long brown hairs. Posterior part of head brown, becoming tawny below. Labium and adjacent mouth parts pale yellow.

Prothorax brown. Pterothorax brown with yellow stripes; its colour design shaped as shown in diagram (Fig. 235). First pale antehumeral stripes wedge-shaped. No second pale antehumeral stripe or pale dorsal spot present.

Legs pale brown. Third tarsus about four-fifths the length of third tibia. Lamina tibialis of first tibia about one-sixth the tibial length.



Figs. 228-235. *Progompheus abbreviatus* spec. nov., holotype male: (228) tenth abdominal segment and caudal appendages, dorsal view; - (229) occipital plate; - (230) accessory genitalia, right lateral view; - (231) the same (except penis and penis guard), ventral view; - (232) penis, right lateral view; - (233) penis guard, frontal view; - (234) the same, right lateral view; - (235) diagram of pterothorax.

Dorsum of abdomen dark brown with yellow markings. Segments 2 to 7 with a yellow middorsal line. Sides of segment 1 and 2 largely yellow. Sides of segments 3 to 6 with yellow basal spot which is largest on segment 3. Dorsum of segment 7 yellow for its basal third. Dorsal posterior margin of segment 10 denticulated at level of bases of superior caudal appendages only. Superior caudal appendages brown at base, pale yellow on apical two-fifths, the tip blunt, the basal externo-lateral dilatation well-developed and ending in a black denticle, the inferior carina with five denticles. Tip of branch of inferior caudal appendage thickened, the supero-external tooth small and black. Apex of anterior genital hamule with a large excision. Posterior genital hamules short and thick, the incurved tip ending in a stout, black denticle. Hood of penial peduncle rather small. No tubercle of any kind on venter of segment 1.

Wings hyaline. Pterostigma pale brown, surmounting 4-5 cells. Basal subcostal cross-vein present. Antenodal and postnodal cross-veins of first series 9:14-14:9/10:11-11:9 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 5-6/4-4 in fore and hind wings, respectively. Supratrangles open. Subtriangles and triangles two-celled. Trigonal interspaces starting with two (fore wings) and three (hind wings) cells against triangle followed by two rows of cells. Hind wings with four (left hind wing) and five (right hind wing) paranal cells, four postanal cells, three rows of cells posterior to Cu₂, and a three-celled anal triangle. Second anal interspace in hind wings starting with a large (paranal) cell against anal vein followed by two rows of cells.

F e m a l e unknown.

PROGOMPHUS PHYLLOCHROMUS RIS, 1916

Figures 236-243

Progomphus phyllochromus RIS, 1916: 143-144; figs. 85-86 (♂); — SCHMIDT, 1952: 235, 250; — CUMMING, 1964: 65, 75 (chromosomes).

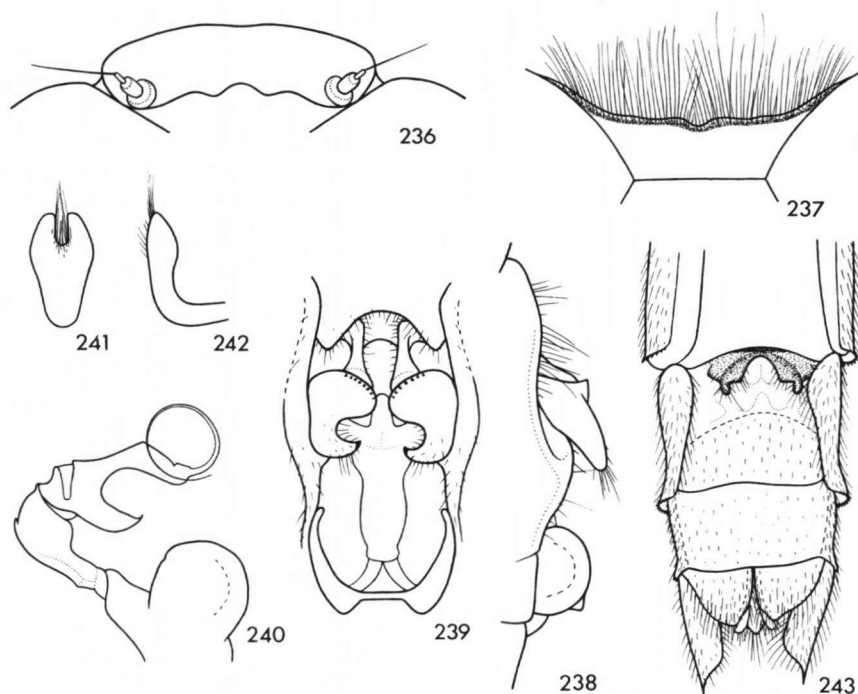
Material. — **P e r u :** Pozuzo, 1911, 1 ♂, leg. Rolle (holotype), (SMF, no. 15200); Dept. San Martin, vicinity of Rioja (900 m), in jungle, 16.IX.1936, 1 ♂; Río Seco, 18.IX.1936, 3 ♂ (2 ♂ taken flying over Río Seco, stream with strong current in jungle, 17 km west of Rioja), all leg. Felix Woytkowski; Campamiento, Colonia del Perrone, 8.VI.1920, 1 ♀, leg. J.H. Williamson. — **E c u a d o r :** Prov. Napo-Pastaza, Abitagua, Río Pastaza, Oriente Ee, 2.X.1936, 1 ♂ (teneral); Abitagua (1000 m), 7.XI.1936, 1 ♀ (teneral); Abitagua, on road near Río Fox (1100 m), 4.VI.1941, 2 ♂; Prov. Manabí, Cojimies (el. 0 m), 9.III.1949, 1 ♀, all leg. William Clarke-Macintyre; Prov. Santiago-Zamora, Zamora (1000-1200 m), 15.X.1941, 2 ♀ (teneral), leg. David B. Laddey; Macás, Río Upano (1050 m), no date, 1 ♀ (teneral), leg. Leopoldo Gomez Alonzo. — **V e n e z u e l a :** Yuracuy, Boqueron, 16.III.1920, 1 ♀ (teneral), leg. J.H. and E.B. Williamson & W.H. Ditzler. — **C o l o m b i a :** Hda Vista Nieve (5500 ft), Mt. San Lorenzo, Santa Marta Mts., Quebrada Viernes Santo, 15.VI.1920, 2 ♂,

1 ♀, leg. F.M. Gaige, (MZM). — B o l i v i a : Dept. La Paz, Prov. Nor. Yungas, 1 km north of Caranavi, rapid mountain stream crossing road, 1 km from town, 13.IV.1960, 1 ♂, leg. Robert B. Cumming, (FSC). — A r g e n t i n a : Dept. Tucumán, El Saladillo, 18.IV.1947, 1 ♂, leg. Ares, (BM).

Closely related to *longistigma* but readily recognizable from it by the absence of a pale antealar spot, the angled frons, the form of the occipital plate, and the relatively shorter pterostigma.

Some data of the holotype are: Tip of posterior genital hamule much shorter than in *longistigma*; tip of anterior genital hamule deeply excised; third tarsus three-quarters the length of third tibia; lamina tibialis of first tibia about one-fifth the tibial length; no tubercle of any kind on venter of abdominal segment 1.

The size of the specimens calls for special mention. The largest male is from Colombia (abdomen 33.5 mm; hind wing 26 mm), the smallest male is from



Figs. 236-243. *Progomphus phyllochromus* Ris: (236) frons of holotype male, dorsal view; — (237) occipital plate of holotype male; — (238) accessory genitalia of holotype male, right lateral view; — (239) the same, ventral view; — (240) penis, right lateral view; — (241) penis guard, frontal view; — (242) the same, right lateral view; — (243) apical segments of female abdomen, ventral view, showing vulvar lamina.

Peru, Río Seco (abdomen 27 mm; hind wing 22.5 mm).

The supero-external antepical tooth of the branch of the inferior caudal appendage of the male varies in length. It is (relatively) longer in some smaller specimens.

F e m a l e (hitherto unknown; bases of hind wings somewhat damaged). —

Total length 43 mm; abdomen 32 mm; hind wing 28.5 mm; costal edge of pterostigma in fore wing 3.9 mm.

Very similar to male regarding stature and colour design but abdomen stouter, pale antero-superior band of frons represented by a symmetric pair of side spots only, and pale antehumeral stripes narrower. Postocellar ridges not developed between lateral ocelli and compound eyes (in male developed). Caudal appendages dark brown, the acute tip black. Vulvar lamina shaped as shown in accompanying figure. Relative lengths of abdominal segments 7, 8, 9 and 10 about 40:26:16:10, with the caudal appendages 12 on the same scale.

Antenodal and postnodal cross-veins of first series 12:16-16:11/12:12-11:13 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 7-7/5-4 in fore and hind wings, respectively. Supratrangles open. All subtriangles and triangles two-celled. Trigonal interspace starting with two (fore wings) and three (hind wings) cells against triangle followed by two rows of cells. Hind wings with six paranal cells, and with four to five rows of cells in area posterior to Cu2. Second anal interspace in hind wings starting with a single (large) cell against anal vein followed by two rows of cells. Fore wings with two cubito-anal cross-veins in addition to inner side of subtriangle.

The female here described is from Colombia. The (first) pale antehumeral stripes of the females are narrower than those of the corresponding males, but in the males the extent of the pale antehumeral stripes varies as well; in the male from Argentina these stripes are distinctly narrower than in the holotype.

There are generally two cubito-anal cross-veins present (in addition to the inner side of the subtriangle) in the fore wings, generally one (anal crossing) in the hind wings. Two males have only a single row of cells in the anal field of one of the fore wings.

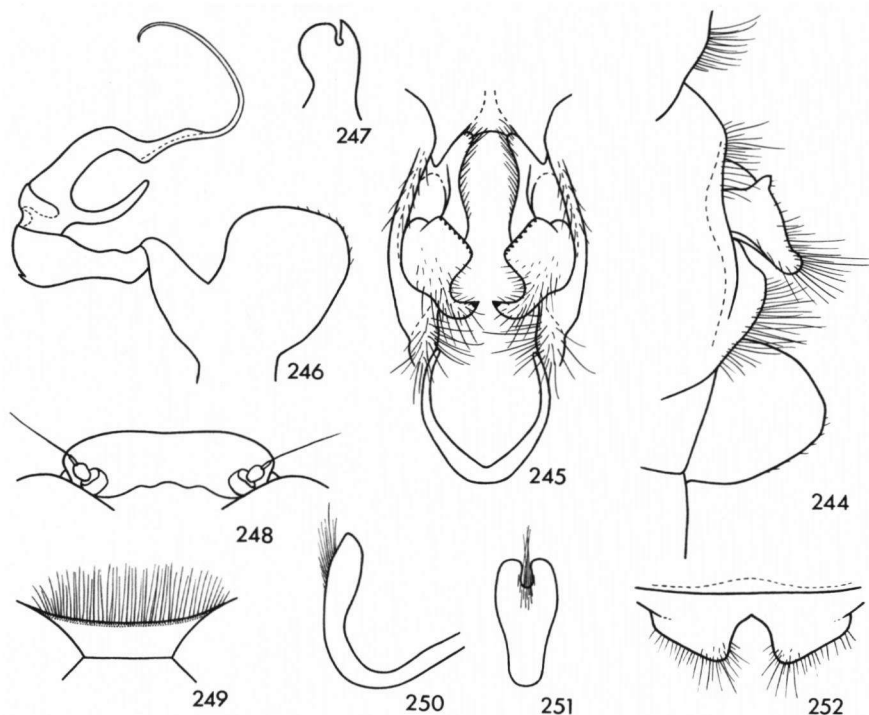
PROGOMPHUS RECURVATUS RIS, 1911

Figures 244-252

Progomphus recurvatus RIS, 1911: 114-116; figs. 13-15 (♂, ♀).

Material. — **B r a z i l**: Espirito Santo, 20.V.1898, 1 ♂ (lectotype), 1 ♂, 2 ♀ (ZMH), 1 ♂ (coll. Belle), all leg. J. Michaelis.

The male which served Ris for his figures in the original description is the lectotype by present designation. Figure 15 in his description illustrates its right



Figs. 244-252. *Progomphus recurvatus* Ris: (244) accessory genitalia of lectotype male, right lateral view; – (245) the same (except penis and penis guard), ventral view; – (246) penis, right lateral view; – (247) right anterior genital hamule of male, right lateral view; – (248) frons of lectotype male, dorsal view; – (249) occipital plate of lectotype male; – (250) penis guard, right lateral view; – (251) the same, frontal view; – (252) vulvar lamina, ventral view.

wings (transposed). Associated with this male are a hand-written label with "Type" on it (in Ris' handwriting) and a printed label "Holotype" but this type has not been cited in the original description. Consequently it does not have any official standing, and hence the designation of a lectotype.

One male and one female of the series mentioned here are incomplete, lacking the apical segments of the abdomen.

The third tarsus is slightly shorter than the third tibia. The lamina tibialis of the first tibia of the male is a quarter of the tibial length. There is no ventral process on abdominal segment 1.

Despite the peculiar configuration of the inferior caudal appendage of the male the vertex of the corresponding female does not show any conspicuous adaptation. The vertex of the female resembles more or less that of *complicatus*.

PROGOMPHUS INCURVATUS SPEC. NOV.

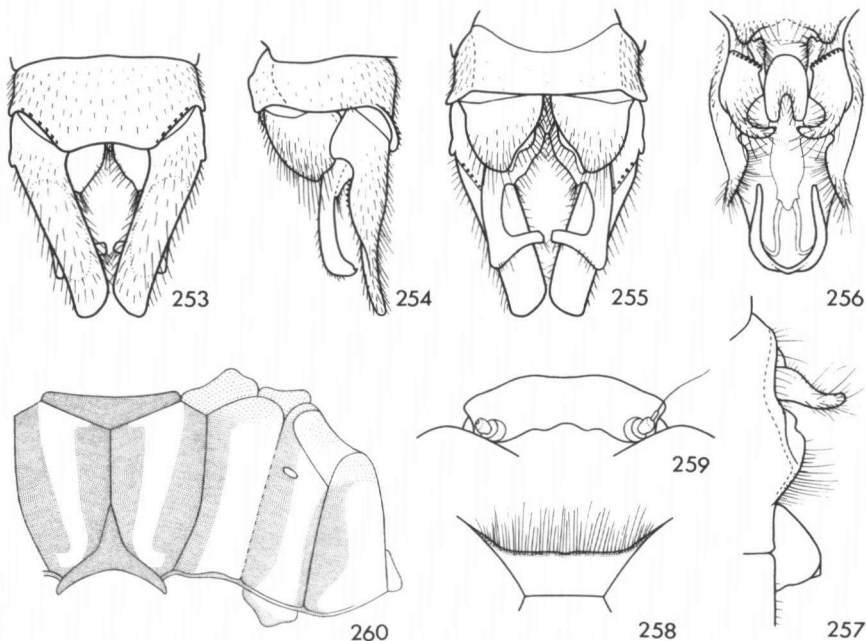
Figures 253-260

Material. — **P e r u :** Dept. Lima, vicinity of San Pedro (900 m), 15-18.V.1935, 1 ♂, leg. Felix Woytkowski (holotype), MZM).

Related to *recurvatus* but readily distinguished from it by the entire lack of a second pale antehumeral stripe. The tip of the branch of the inferior caudal appendage of the male is strongly incurved and not recurved as in that species.

M a l e (holotype). — Total length 43 mm; abdomen 32 mm; hind wing 23.5 mm; costal edge of pterostigma in fore wing 3.2 mm.

Labrum brown with a broad brown-orange band along free border. Genae green. Anteclypeus grey-green. Postclypeus brown, the sides green. Vertical part of frons brown, the upper margin green. Frons angled, its superior surface largely green, the base brown. Vertex and occipital plate brown. Postocellar ridges well-developed. Posterior margin of occipital plate slightly concave in middle,



Figs. 253-260. *Progomphus incurvatus* spec. nov., holotype male: (253) tenth abdominal segment and caudal appendages, dorsal view; — (254) the same, left lateral view; — (255) the same, ventral view; — (256) accessory genitalia, ventral view; — (257) the same, right lateral view; — (258) occipital plate; — (259) frons, dorsal view; — (260) diagram of pterothorax.

and fringed with long brown hairs. Posterior part of head brown above, green on and below temporae. Labium and adjacent mouth parts pale green.

Prothorax with brown frontal lobe, green middle lobe, and black hind lobe.

Pterothorax dark brown with green stripes; its colour pattern shaped as shown in Figure 260.

Femora brown, the inner sides of first two pairs of femora green. Tibiae, tarsi and claws blackish brown. Lamina tibialis of first tibia one fifth the tibial length. Third tarsus as long as third tibia.

Abdomen brown, becoming blackish brown on apical segments. Sides of segments 1 and 2 largely yellow. Accessory genitalia brown. Dorsum of segments 2 to 7 with yellow basal spot, the one on 3 reaching to middle of segment, the one on 7 to a point about one-third the way along segment, the ones on 4, 5, and 6 smaller. Basal spots on 5, 6, and 7 interrupted by a brown middorsal line. Caudal appendages blackish brown. Upper surface of superior caudal appendages grey-green on middle part. Tubercles also blackish brown.

Wings hyaline. Venation blackish brown but frontal margin of costa with a yellow line. Pterostigma dark brown, surmounting $3\frac{1}{2}$ - $5\frac{1}{2}$ cells. Basal subcostal cross-vein present. Antenodal and postnodal cross-veins of first series 8:15-16:7/7:10-10:8 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 5-6/4-4 in fore and hind wings, respectively. Supratriangle in right hind wing two-celled, in other wings open. All subtriangles and triangles two-celled. Trigonal interspaces starting with a row of three cells against triangle followed by two rows of cells. Hind wings with four paranal cells, three postanal cells, a three-celled anal triangle, and three rows of cells in area posterior to Cu2.

Female unknown.

PROGOMPHUS RISI WILLIAMSON, 1920

Figure 336

Progomphus risi WILLIAMSON, 1920a: 3-9; figs. 1, 6, 8-11 (♂, ♀).

Material. — Guatemala: 1 ♂ (CUI); Dept. Zacapa, Gualan, 16.VI.1909, 1 ♂, leg. E.B. Williamson (paratype), (MZM).

The holotype male and allotype female of this species are in the Museum of Zoology, Ann Arbor, Mich. (Gloyd 1972, personal communication).

Concerning the paratype recorded above Mrs. Gloyd (1972) noted down on the paper triangle in which the specimen was stored: "This is undoubtedly the PARATYPE ♂ mentioned in the original description. Some ignorant person discarded the original labels when the synoptic Odonata collection was relaxed and papered".

The measurements of the paratype are: Total length 35.5 mm; abdomen 26.5 mm; hind wing 17.5 mm; greatest width of hind wing 5.5 mm; costal edge of pterostigma in fore wing 2.6 mm.

The anal triangle in the right hind wing of the paratype is four-celled. The lamina tibialis of the paratype is about one-sixth the tibial length.

PROGOMPHUS TANTILLUS SPEC. NOV.

Figures 261-268, 336

Material. — Bolivia: Dept. Santa Cruz, Prov. Ichilo, Buena Vista, 1 ♂, leg. Roy Steinbach (holotype), (FSC).

Closely related to *risi* but readily distinguished from it by the presence of a distinct pale antealar spot on each side of the dorsum of the pterothorax, the shorter and stouter caudal appendages of the male, and the shorter pterostigma. The distance on the fore wings from the nodus to the stigma is two and a half times the length of the pterostigma, in *risi* twice the length of the pterostigma.

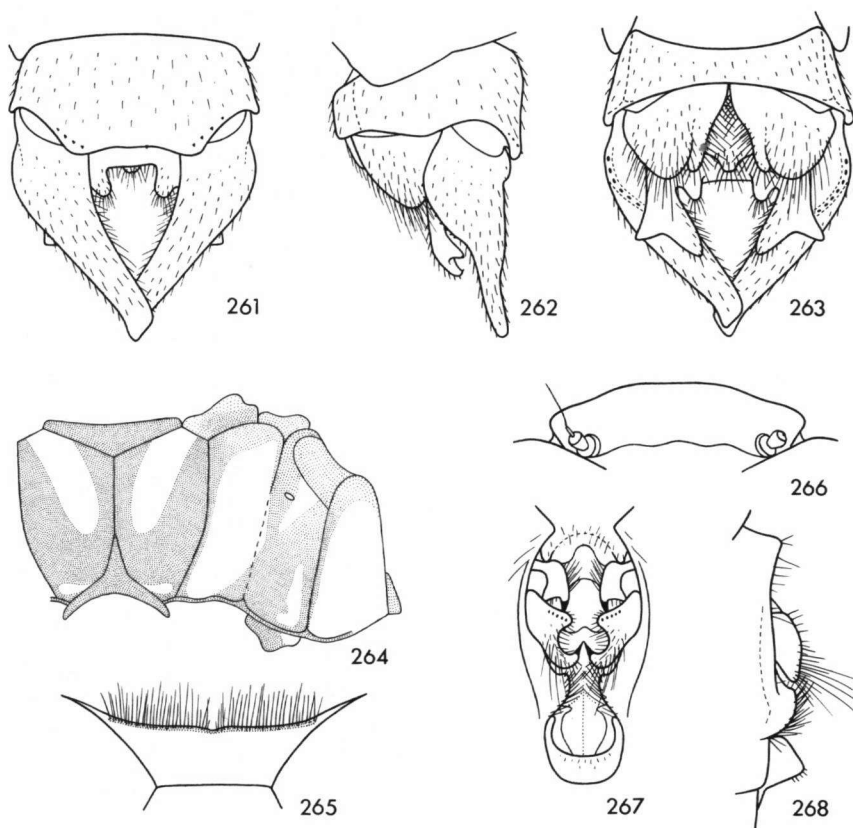
Male (holotype; an old specimen; abdomen broken between segments 5-6). — Total length 32 mm; abdomen 23.5 mm; hind wing 16.5 mm; greatest width of hind wing 5.5 mm; costal edge of pterostigma in fore wing 2.0 mm.

Face predominantly brown but free border of labrum laterally and border of facial lobes lighter, anteclypeus with a transverse green stripe in middle, and postclypeus with a green spot on each side. Base of mandible externally, and gena green. Frons rounded. Superior surface of frons largely green, its base brown but green in middle. Vertex brown but the postocellar ridges light-brown. Occipital plate brown, its posterior margin with a very small median excision and fringed with brown hairs. Posterior part of head brown, with two small yellow spots on tempore.

Prothorax brown. Pterothorax brown with green stripes as follows: Dorsum with a more or less crescent-shaped, pale antealar spot on each side and with two broad, abbreviated, pale antehumeral stripes, each distant from the brown mid-dorsal carina by about half its own width. Sides of pterothorax with a broad mesepimeral and a broad metepimeral pale stripe, the latter reaching to the hind border.

Femora brown, becoming more obscure towards knee, the inner sides of first two pairs of femora green. Tibiae, tarsi and claws dark brown. Lamina tibialis of first tibia one-fifth the tibial length. Posterior tarsus as long as posterior tibia.

Abdomen predominantly brown. Sides of segment 1 largely green, but yellow along posterior margin. Sides of segment 2 with a green basal spot reaching to auricle. Upper part of auricle green. Base of segments 3 to 6 with a middorsal yellow spot. Segment 7 yellow on basal two-fifths. Accessory genitalia re-



Figs. 261-268. *Progomphus tantillus* spec. nov., holotype male: (261) tenth abdominal segment and caudal appendages, dorsal view; – (262) the same, left lateral view; – (263) the same, ventral view; – (264) diagram of pterothorax; – (265) occipital plate; – (266) frons, dorsal view; – (267) accessory genitalia, ventral view; – (268) the same, right lateral view.

sembling those of *risi* but hood of penial peduncle distinctly smaller. Dorsal posterior margin of segment 10 denticulate at level of bases of superior appendages and with a minute denticle near middle. Superior caudal appendages pale on apical two-thirds. No sternal process of any kind on abdominal segment 1.

Wings slightly brown, venation brown but costa paler. Pterostigma light-brown, surmounting three cells. Basal subcostal cross-vein present. Antenodal and post-nodal cross-veins of first series 6:10-11:6/7:8-7:7 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth in left hind wing, the fourth in other wings. Intermedian cross-veins 5-5/3-3 in fore and hind wings, respectively. Trigonal interspace in fore wings with two rows of cells for its

entire length but ending with a row of four (right) and five (left) cells at wing margin. Trigonal interspace in hind wings starting with a row of two (right) and three (left) cells against triangle followed by two rows of cells six (right) and seven (left) cells long, in anterior row. Supratrangles open. Triangles two-celled. Subtriangle in fore wings two-celled, in hind wings open. Anal field in fore wings with two rows of cells two cells long. Hind wings with four paranal cells, three postanal cells, and three rows of cells in area posterior to Cu2. Anal triangle in hind wings three-celled.

F e m a l e unknown.

PROGOMPHUS SUPERBUS SPEC. NOV.

Figures 269-273, 336

Material. — E c u a d o r : Prov. Los Ríos (elev. 15 m), 4.III.1938, 1 ♂, leg. William Clarke-Macintyre (holotype). — V e n e z u e l a : El Guayabo, Zulia, 21.IV.1920, 1 ♀, leg. J.H. and E.B. Williamson & W.H. Ditzler (allotype), (MZM).

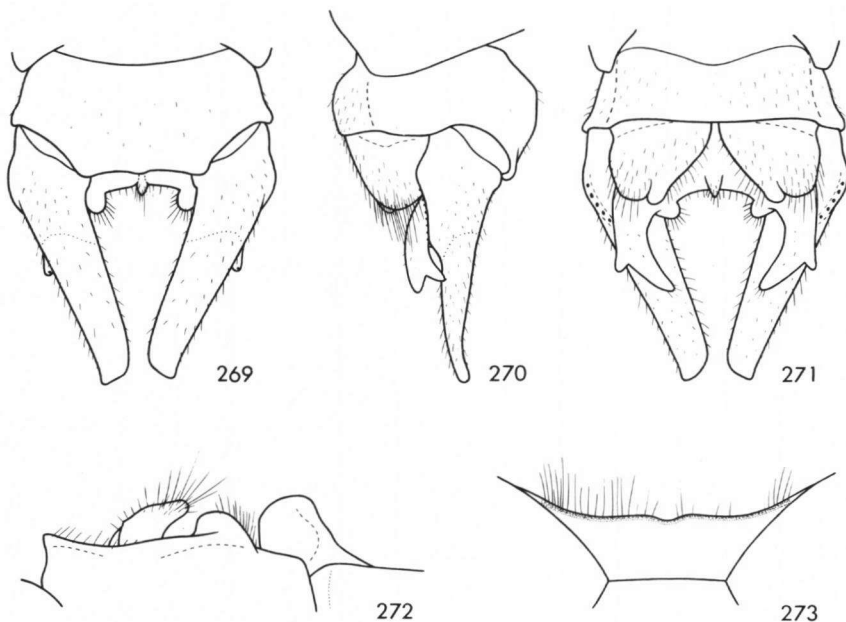
Perhaps more closely related to *tantillus* sp. n. than to *risi*, but at once recognizable from both (and from all other congeners) in having the hind wings brownish yellow to a point near the pterostigma and the front wings brownish yellow between Sc and R. The hind wings are also much broader than in these two species. The distance on the fore wings from the nodus to the pterostigma is two and a half times the length of the pterostigma. This is also the case in *tantillus*. Also the coloration is most like that of *tantillus* but the pale antealar spots are much smaller and nearly wanting. The dorsal posterior margin of the tenth abdominal segment of the male has no denticles, while in *risi* and *tantillus* it is denticulated at the level of the bases of the superior appendages. The caudal appendages are most like those of *risi* but the superior ones are distinctly stouter than in that species. The three species *risi*, *tantillus* and *superbus* have very similar accessory genitalia but the last-named resembles *risi* more by the larger hood of the penial peduncle.

M a l e (holotype; tips of wings broken off except of right hind wing). — Total length 35 mm; abdomen 27 mm; hind wing 16.5 mm; greatest width of hind wing 6.0 mm; costal edge of pterostigma in fore wing 2.2 mm.

Body somewhat larger and with distinctly broader head than in *risi* but with shorter wings and pterostigmata. Coloration most like that of *tantillus* sp. n. but darker colours of pterothorax and abdomen more obscure and nearly black, border of labrum and of facial lobes not lighter, anteclypeus entirely green, green side spots of postclypeus much larger, and pale antealar spots very small. Superior caudal appendages pale on apical two-thirds. No sternal process of any kind on abdominal segment 1. Posterior tarsus as long as posterior tibia. Lamina

tibialis of first tibia one-sixth the tibial length. Posterior margin of occipital plate with a shallow median excision (more deeply excised in *risi*).

Venation of wings brown but frontal margin of costa yellow. Pterostigma brown-yellow, surmounting 3-4½ cells. Basal subcostal cross-vein absent in left hind wing, present in other wings. Antenodal and postnodal cross-veins of first series 7:11-11:7/6:7-7:5) in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth in fore wings, the fourth in hind wings. Intermedian cross-veins 5-5/3-3 in fore and hind wings, respectively. Supratrangles open. Subtriangle in fore wings two-celled, in hind wings open. Triangles two-celled. Two rows of cells in anal field of fore wings. Trigonal interspace starting with two cells in fore wings and three cells in hind wings, followed by two rows of cells. Hind wings with four paranal cells, three postanal cells, three rows of cells behind Cu2, and a three-celled anal triangle.



Figs. 269-273. *Progomphus superbis* spec. nov., holotype male: (269) tenth abdominal segment and caudal appendages, dorsal view; – (270) the same, left lateral view; – (271) the same, ventral view; – (272) accessory genitalia, right lateral view; – (273) occipital plate.

F e m a l e (allotype; very teneral and shrivelled). – Resembling the holotype male in stature and coloration of wings. Posterior margin of vulvar lamina deeply and widely excised U-shaped. Costal edge of pterostigma in fore wing 2.3 mm. Basal subcostal cross-vein present in each wing. Antenodal and postnodal cross-

veins of first series 6:10-10:7/5:8-7:6 in fore and hind wings, respectively. Second primary antenodal cross-vein the fourth in each wing. Intermedian cross-veins 5-5/3-3 in fore and hind wings, respectively. Supratrangles open. Subtriangle in fore wings two-celled, in hind wings open. Triangles two-celled. Anal field in fore wings with a double cell. Trigonal interspace starting with two cells in fore wings and three cells in hind wings, followed by two rows of cells. Hind wings with five paranal cells, three postanal cells, three rows of cells behind Cu₂, and with two rows of cells in second anal interspace.

PROGOMPHUS BASISTICTUS RIS, 1911

Figures 274-281

Progomphus basistictus RIS, 1911:117-119; figs. 18-19 (♂); — RIS, 1913:74.

Material. — **Argentina:** Misiones, X.1910, 1 ♂ (lectotype), (MC); 31.III.1909, 1 ♂ (SMF). — **Brazil:** Santa Catarina, Nova Teutonia (27°S., 52°-53°W.), 12.I.1927, 2♂; 8.I.1936, 1 ♀ (FSC); 29.XI.1935, 1 ♂; 10.I.193?, 2 ♂; 12.I.193?, 2 ♂, all leg. Fritz Plaumann; Nova Teutonia, 4.I.1941, 2 ♂; 4.III.1942, 1 ♂ (MZM); 11.I.19? 6, 1 ♂ (coll. Belle); 18.XI.1949, 1 ♂; 13.XI.19? ?, 1 ♂; 11.I.19? ?, 1 ♂ (MKB).

The lectotype bears pin labels "X.10 Misiones", "Progomph. basistictus R", and "Coll. Esben-Petersen". The other male of the original series is in the Senckenberg Museum.

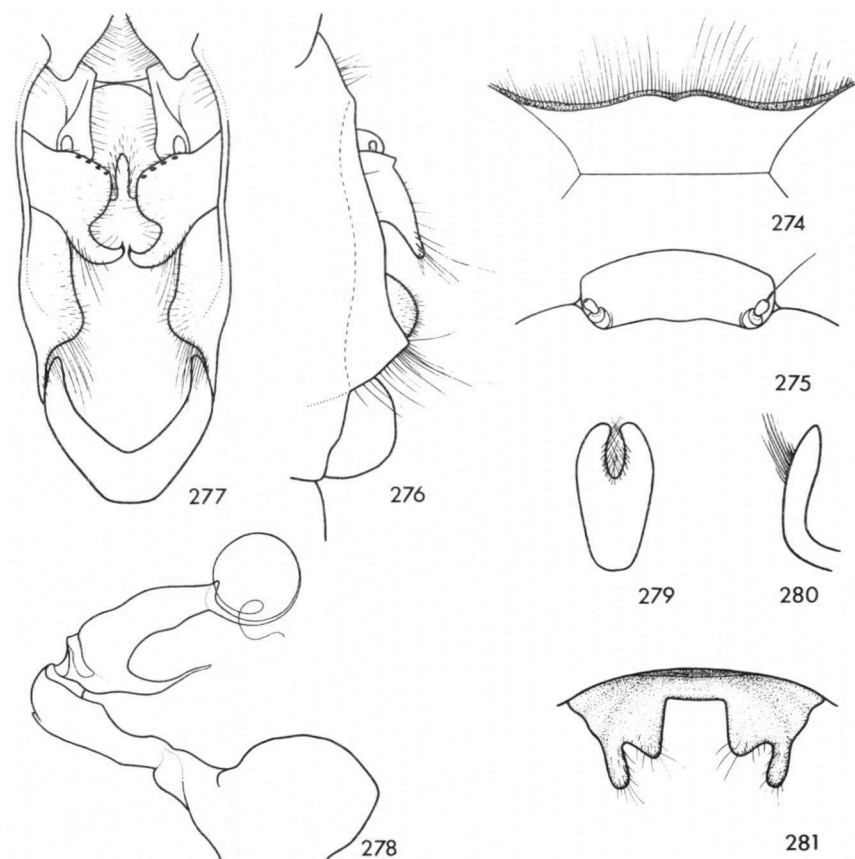
The accessory genitalia of the lectotype are shaped as shown in the accompanying figures. The swollen base of the posterior hamule is sometimes armed with a row of seven denticles, in the lectotype with a row of four denticles only. Also the swollen portion of the ventral keel of the second abdominal segment between the posterior hamule and the hood of the penial peduncle is more densely covered with short hairs in the other males than in the lectotype. The tip of the branch of the inferior caudal appendage of the lectotype has a row of four minute superior teeth. The third tarsus is slightly shorter than the third tibia. The lamina tibialis of the first tibia is about two-fifths the tibial length. There is no ventral process on abdominal segment 1.

Female (hitherto unknown; abdomen broken between segments 4-5, and 6-7). — Total length 46 mm; abdomen 34.5 mm; hind wing 28 mm; costal edge of pterostigma in fore wing 4.5 mm.

Stouter than male. Coloration very similar to male including basal spot on wings but face paler. Anterior ridge of lateral ocelli better developed than in male. Vulvar lamina about one-fifth the length of ninth sternum; its posterior margin deeply and widely excised U-shaped. Caudal appendages as long as tenth abdominal segment, acutely pointed, dark brown at base, becoming pale towards

apex. Dorsal posterior margin of tenth abdominal segment denticulate except in middle. Relative lengths of abdominal segments 7, 8, 9, and 10 about as 32:20:11:10.

Antenodal and postnodal cross-veins of first series 9:15-15:10/10:11-12:10 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 6-7/3-4 in fore and hind wings, respectively. All supra-triangles open. All subtriangles two-celled. Triangle in hind wings two-celled, in fore wings three-celled, the dividing cross-veins triradiate from centre. Trigonal



Figs. 274-281. *Progomphus basistictus* Ris: (274) occipital plate of lectotype male; – (275) frons of lectotype male, dorsal view; – (276) accessory genitalia of lectotype male, right lateral view; – (277) the same (except penis), ventral view; – (278) penis, right lateral view; – (279) penis guard, frontal view; – (280) the same, right lateral view; – (281) vulvar lamina, ventral view.

interspaces starting with three cells against triangle followed by two rows of cells. Hind wings with six paranal cells, five postanal cells, four to five rows of cells behind Cu₂, and second anal interspace starting with two rows of cells against anal vein.

PROGOMPHUS FASSLI SPEC. NOV.

Figures 282-285

Material. — **B r a z i l**: Tapajós (Cachoeira I), V.1920, 1 ♀, leg. A.H. Fassl (holotype), (SMF, no. 15180).

The single female of this species is in very poor condition and it is not without hesitation that I have named it, but it may be readily recognizable by the conformation of the occipital ridge, the vulvar lamina, and the second anal interspace in the hind wings.

M a l e unknown.

F e m a l e (holotype; teneral; crushed; abdomen broken). — Total length 48 mm; abdomen 37 mm; hind wing 26.5 mm; distance on fore wing from nodus to pterostigma 7.5 mm; greatest width of hind wing 8 mm; costal edge of pterostigma in fore wing 3.6 mm.

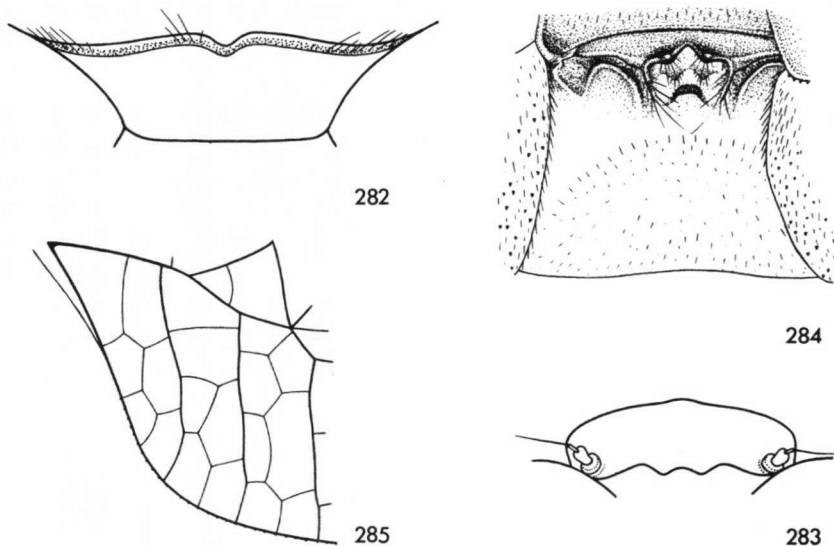
Face pale. Superior surface of frons pale brown. Vertex dark brown. Occipital plate brown, its posterior margin excised in middle. Labium and adjacent mouth parts pale. Posterior part of head brown.

Prothorax brown-yellow. Pterothorax brown with pale yellow stripes. First pale antehumeral stripes rather broad, reaching to antealar sinus, becoming slightly broader anteriorly, not confluent with pale collar, the latter interrupted in middle. Second pale antehumeral stripes not distinctly present. Colour design of lateral side of pterothorax indistinct but it would appear that it has three pale stripes.

Femora pale brown, becoming darker towards knee. Tibiae, tarsi and claws dark brown.

Abdomen brown, paler on dorsum of middle segments, becoming brownish yellow on apical segments. Ventral side of apical segments, including vulvar lamina, brownish yellow. Ventral tergal margin of segment 8 with black denticles on apical half. Lower part of side of segment 9 with many black denticles. Anal appendages brown and acutely pointed. Relative lengths of apical segments 7, 8, 9, and 10 about as 33:20:10:5, with the anal appendages 11 on the same scale. Vulvar lamina about a quarter of ninth sternum, its posterior margin with a small, V-shaped median excision, the triangular lobes more or less pointed ventrad.

Wings hyaline, slightly brown at extreme base. Venation dark brown. Ptero-



Figs. 282-285. *Progomphus fassli* spec. nov., holotype female: (282) occipital plate; – (283) frons, dorsal view; – (284) vulvar lamina and ninth sternum, ventral view; – (285) base of left hind wing (transposed).

stigma pale brown, surmounting $4\frac{1}{2}$ - 6 cells. Basal subcostal cross-vein present. Antenodal and postnodal cross-veins of first series 8:16-15:7/9:11-12:9 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 6-6/4-5 in fore and hind wings, respectively. Supratrangles open. Subtriangles two-celled. Triangle in hind wings two-celled, in fore wings three-celled, the dividing cross-veins triradiate from centre. Anal field, in fore wings two cells wide. Trigonal interspaces starting with a row of three cells against triangle followed by two rows of cells. Hind wings with three (left) and four (right) postanal cells, and with area posterior to Cu2 three to four cells wide. Each hind wing with four paranal cells. Second anal interspace in hind wings narrow, starting with a single cell against anal vein followed by another single cell. A2 and A3 slightly convergent from anal vein outwards, being divergent near hind margin of wing.

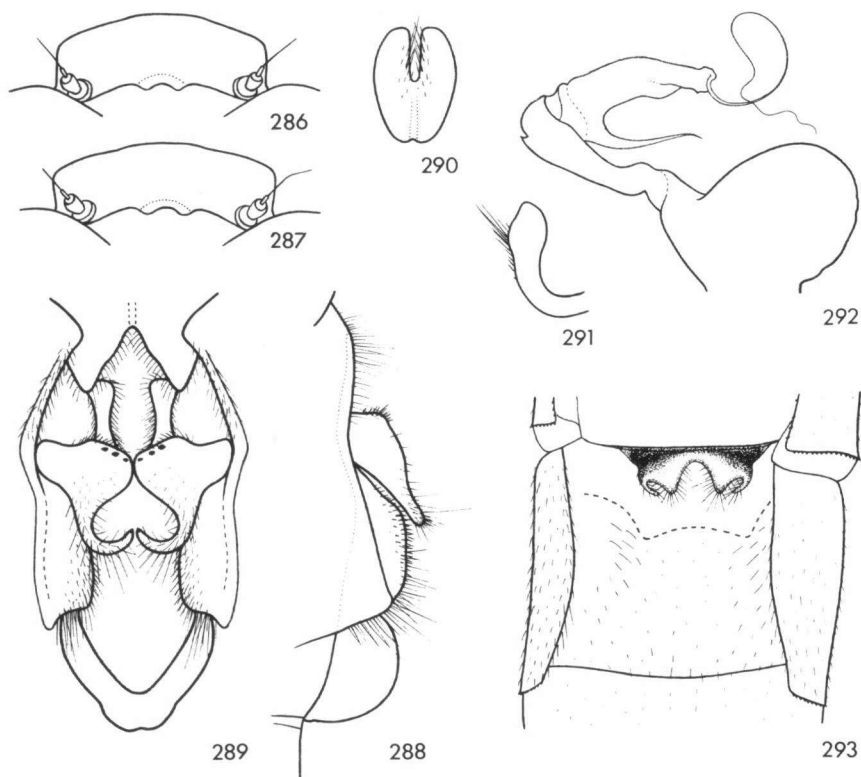
PROGOMPHUS DORSOPALLIDUS BYERS, 1934

Figures 286-293

Progomphus dorsopallidus BYERS, 1934:1-5; pls. 1-2 (♂); – BYERS, 1939: 27, 28, 67; – CALVERT, 1948:62 (♀).

Material. — **Venezuela:** San Estéban, Carabobo, 1 ♂; Valencia, 1911, 1 ♀, leg. Zobrys, (SMF).

The female of this species was known only from an incomplete specimen (lacking abdominal segments 4-10) from Kartabo, Guyana. The present female from Valencia, Venezuela, has a larger pterostigma (in fore wings 4.1 mm along costal edge and surmounting $5\frac{1}{2}$ - 7 cells), a smaller number of postcostal cross-veins (in fore wings 5 and 6, in hind wings 6 and 7), and three-celled triangles (the cross-veins triradiate from centre). The measurements are: Total length 43 mm; abdomen 32 mm; hind wing 25.5 mm. The frons is somewhat broader than in the male from Estéban. The abdomen is stouter than in the male. The



Figs. 286-293. *Progomphus dorsopallidus* Byers: (286) dorsal view of frons, male; — (287) the same, female; — (288) accessory genitalia, right lateral view; — (289) the same (except penis and penis guard), ventral view; — (290) penis guard, frontal view; — (291) the same, right lateral view; — (292) penis, right lateral view; — (293) vulvar lamina and ninth abdominal segment, ventral view.

sterna of the abdominal segments 2 to 8 are black. The sternum of abdominal segment 9 is brown. The vulvar lamina is brown-yellow and about one-sixth the length of the ninth sternum; its posterior margin is deeply excised V-shaped. The caudal appendages are pale brown, the tip very acutely pointed. The relative lengths of the abdominal segments 7, 8, 9, and 10 are about as 27:15:10:9, with the caudal appendages 9 on the same scale.

PROGOMPHUS MONTANUS SPEC. NOV.

Figures 294-308

Material. — B o l i v i a : Dept. Santa Cruz, Prov. Ichilo, Buena Vista (400 m), X.1934, 1 ♂, leg. R. Steinbach (paratype), (MZM); Río Dolores, 3 km east of Buena Vista, 12.III.1960, 15 ♂, leg. R.B. Cumming, Quiroga, and R. Rodriguez; 23.III.1960, 23 ♂, leg. R.B. Cumming (holotype and paratypes); Río San Miguelito, 14 km east of Buena Vista, 22.III.1960, 2 ♂, leg. R.B. Cumming (paratypes); Río Guaytu, about 5 km south of Buena Vista, collecting done on the Río Guaytu, downstream from the place it crosses the road to its confluence with the Río Surutu, 23.III.1960, 1 ♀ (paratype), (FSC); Prov. Sara (600 m), 6 ♂, 1 ♀ (paratypes and allotype), (MNB).

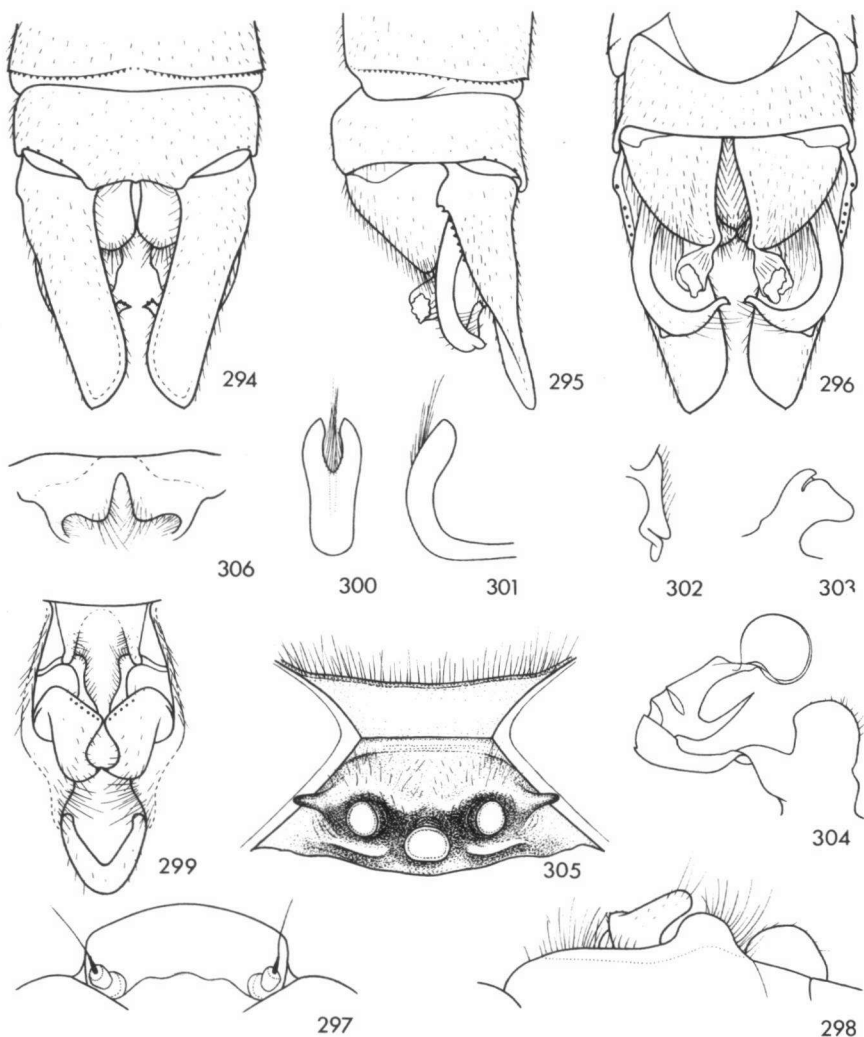
The near ally of this species is *intricatus*. The male is readily distinguished by the following features: Lateral keel of abdominal segment 7 not suddenly widened on apical part as in *intricatus*. Tip of posterior genital hamule short and thick; slender in *intricatus*. Apical part of branch of inferior caudal appendage very slender, strongly incurved and more or less upcurved; rather stout and directed in an oblique direction towards rear in *intricatus*. The female is peculiar by the pair of lateral spines on the vertex; there is no such pair of spines in the female of *intricatus*. Further the pterostigma in this species is distinctly smaller than in *intricatus*.

M a l e (holotype; abdomen broken between segments 3-4 and 5-6). — Total length 43 mm; abdomen 32 mm; hind wing 22.5 mm; costal edge of pterostigma in fore wing 3 mm.

Face pale green. Frons distinctly angled; its superior surface largely pale green, brown at base. Vertex brown, green behind well-developed postocellar ridges. Occipital plate green, brown at borders; its posterior margin nearly straight and fringed with brown hairs. Posterior part of head brown above, green behind occipital plate, brownish yellow below. Labium and adjacent mouth parts pale yellow.

Prothorax brown, the hind lobe yellow.

Pterothorax brown with green markings, the sides largely green with indistinct brown markings along interpleural and metapleural sutures. First pale antehumeral stripes broadly confluent with pale area of collar; the upper part diffusely conjoined with the weakly developed second pale antehumeral stripe.



Figs. 294-306. *Progomphus montanus* spec. nov.: (294) tenth abdominal segment and caudal appendages of holotype male, dorsal view; – (295) the same, left lateral view; – (296) the same, ventral view; – (297) frons of holotype male, dorsal view; – (298) accessory genitalia of paratype male, right lateral view; – (299) the same (except penis and penis guard), ventral view; – (300) penis guard of paratype male, frontal view; – (301) the same, right lateral view; – (302) right anterior genital hamule of paratype male, ventral view; – (303) the same, right lateral view; – (304) penis of paratype male, right lateral view; – (305) vertex and occipital plate of allotype female, frontal view; – (306) vulvar lamina of allotype female, ventral view.

Femora brown on dorsal side, green on ventral side. Tibiae and tarsi brown with yellow dorsal sides but distal joints of second and third tarsi entirely brown. Claws brown. Third tarsus slightly shorter than third tibia. Lamina tibialis of first tibia about one-third the tibial length.

Abdomen brown but middorsum of segments 3 to 7 with large yellow basal spot reaching to a point about three-fourths the way along segment. Lateral keel of segment 2 green. Anterior genital hamules relatively small, the tip with a small cleft. Incurved tip of posterior genital hamule black, in form of a broad nail. Hood of penial peduncle dark brown. Sides of segments 8, 9 and 10 with yellow. Venter of segment 10 brownish yellow. Middorsum of segment 10 yellow. No sternal process on segment 1. Upper surface of superior caudal appendages brown on basal one-third, pale on apical two-thirds. Anal tubercles brownish yellow, with well-developed apical processes. Middorsal portion of inferior caudal appendage yellow. Branch of inferior caudal appendage brown, becoming yellow on strongly incurved, and more or less recurved and upcurved slender tip, the apex of tip with three minute black teeth.

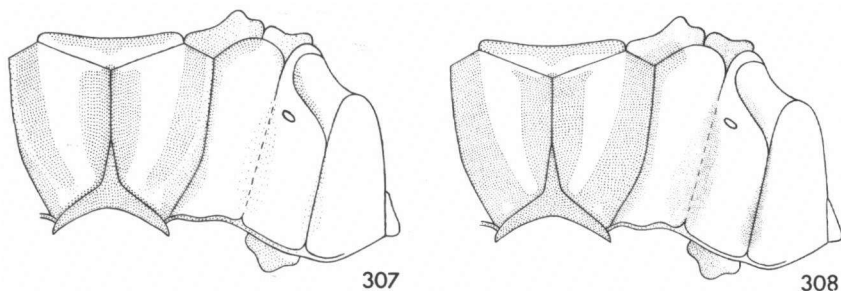
Wings slightly brown. Venation brown but frontal margin of costa yellow. Pterostigma brown, surmounting $4\frac{1}{2}$ - $5\frac{1}{2}$ cells. Basal subcostal cross-vein present. Antenodal and postnodal cross-veins of first series 7:13-12:7/9:10-9:8 in fore and hind wings, respectively. Second primary antenodal cross-vein the fifth. Intermedian cross-veins 5-5/3-3 in fore and hind wings, respectively. Trigonal interspaces starting with three cells against triangle followed by two rows of cells. Supratrangles open. All triangles and subtriangles two-celled. Hind wings with five paranal cells, with four postanal cells, with second anal interspace starting with a single (large) cell against anal vein, and with three-celled anal triangle.

F e m a l e (allotype; apical end of abdomen distorted and partly crushed). — Total length 40 mm; abdomen 28.5 mm; hind wing 23.5 mm; costal edge of pterostigma in fore wing 3 mm.

Similar to male in stature and general coloration but brown markings more diffuse, second pale antehumeral stripe to a weakly developed antealar spot, and pale markings on abdomen more extended. Postocellar ridges with a lateral spine near border of compound eye. In front of each lateral ocellus a well-developed yellow ridge. Vulvar lamina a quarter the length of ninth sternum; its posterior margin deeply excised V-shaped for three-quarters the length of vulvar lamina.

Venation of wings very similar to that of holotype male. Antenodal and postnodal cross-veins of first series 6:12-12:7/8:9-9:8 in fore and hind wings, respectively. Intermedian cross-veins 6-6/3-3 in fore and hind wings, respectively.

There is some variation in the extent of the pale markings. In some specimens the second pale antehumeral stripe is reduced to an antealar spot only, and the distal joints of the second and third tarsi are sometimes yellow on the dorsal side.



Figs. 307-308. *Progompheus montanus* spec. nov.: (307) diagram of pterothorax, holotype male; — (308) the same, paratype male, showing inconstancy of colour design.

Some venational features in the wings of the paratypes are: Second primary antenodal cross-vein the fourth of the fifth; anal interspace in hind wing starting with a single (large) cell or with two cells against anal vein; triangle three-celled or four-celled; subtriangle open or two-celled; in one fore wing there are two cubito-anal cross-veins in addition to the inner side of the subtriangle.

PROGOMPHEUS KIMMINSI SPEC. NOV.

Figures 309-312

Gompoides kimminsi Belle i.l., in KIMMINS, 1969:294 (nomen nudum).

Material. — **Argentina:** Dept. Tucumán (Famaille), Fronterita, 28.XI.1942, 1 ♂ (holotype), (BM), 1 ♂ (paratype), (coll. Belle), both leg. Ares.

Very closely related to *montanus* sp.n. but also allied to *aberrans* sp.n.. At once recognizable from the first named by the better development of the colour design and the configuration of the male inferior caudal appendage, and from the second named by the lack of a coloured costal band and the more sharply pointed male superior caudal appendages.

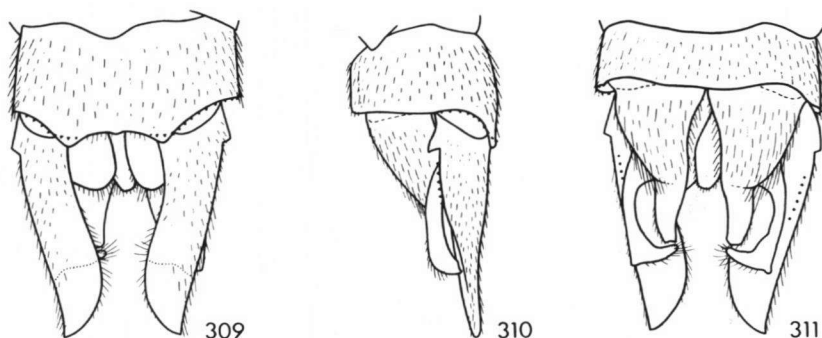
Male (holotype. — Total length 40.5 mm; abdomen 30 mm; hind wing 23 mm; costal edge of pterostigma in fore wing 2.8 mm.

Similar to male of *montanus* but face pale yellow, slightly brown on vertical part of frons. Superior surface of frons with broad yellow anterior band. Prothorax dark brown, the dorsal bilobed portion and hind collar green. Pterothorax dark brown with distinct green stripes; its colour design shaped as shown in Figure 312. Lamina tibialis about a quarter of the tibial length. Dark brown superior caudal appendages pale on apical one-third. Branches of inferior caudal appendage, in ventral view, angled at supero-external anteapical tooth, the in-

curving tip with a single tooth at apex.

Wing with yellowish brown basal spot at extreme base. Antenodal and post-nodal cross-veins of first series 6:12-13:6/6:9-9:7 in fore and hind wings, respectively. Intermedian cross-veins 5-5/3-3 in fore and hind wings, respectively. Supratriangle in left fore wing and right hind wing two-celled, in other wings open. Triangles and subtriangles two-celled. Anal field in fore wings one cell wide (right) and two cells wide (left). Trigonal interspace starting with four (right hind wing) or three (other wings) cells against triangle followed by two rows of cells. Hind wings with five paranal cells, with five (left) and four (right) postanal cells, and with second anal interspace starting anteriorly with a single cell against anal vein. Anal triangle in left hind wing three-celled, in right hind wing four-celled (one of the cells very small).

F e m a l e unknown.



Figs. 309-311. *Progomphus kimminsi* spec. nov., holotype male: (309) tenth abdominal segment and caudal appendages, dorsal view; – (310) the same, left lateral view; – (311) the same, ventral view.

The paratype male is slightly immature and less pigmented. The dark markings are brown or more or less dark brown, and the pale markings on the pterothorax are more or less pale green. The frontal band on the superior surface of the frons, however, is yellow. The supratriangle is open in each wing.

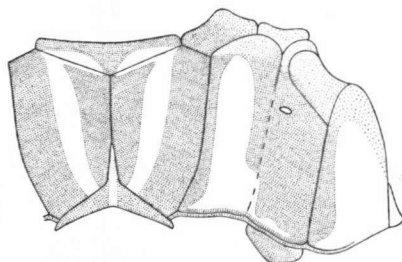


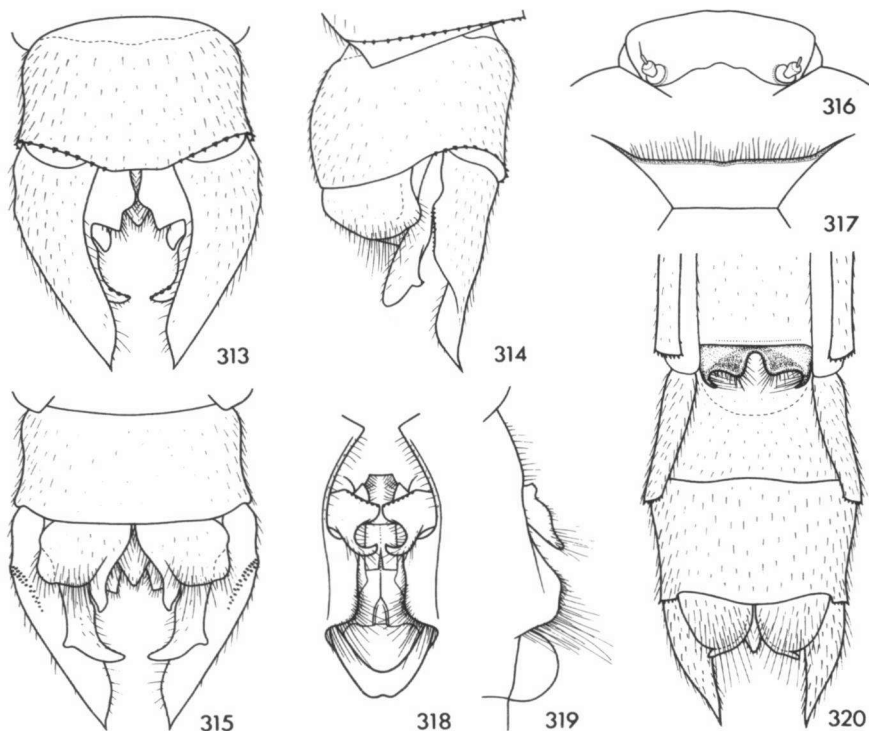
Fig. 312. *Progomphus kimminsi* spec. nov., holotype male. Diagram of pterothorax.

PROGOMPHUS INTRICATUS HAGEN IN SELYS & HAGEN, 1858

Figures 313-326

Progomphus intricatus Hagen in SELYS & HAGEN, 1858: 681-683 (421-423 sep.); pl. 22, figs. 3 a-b (♂); – SELYS, 1859: 545 (19 sep.) (♀); – HAGEN, 1861: 313; – KIRBY, 1890: 72; – CALVERT, 1909: 213 ("4 ♂" is a lapsus calami pro "4 ♀"); pl. 7, fig. 129; – CUMMING, 1964: 65, 75 (chromosomes).

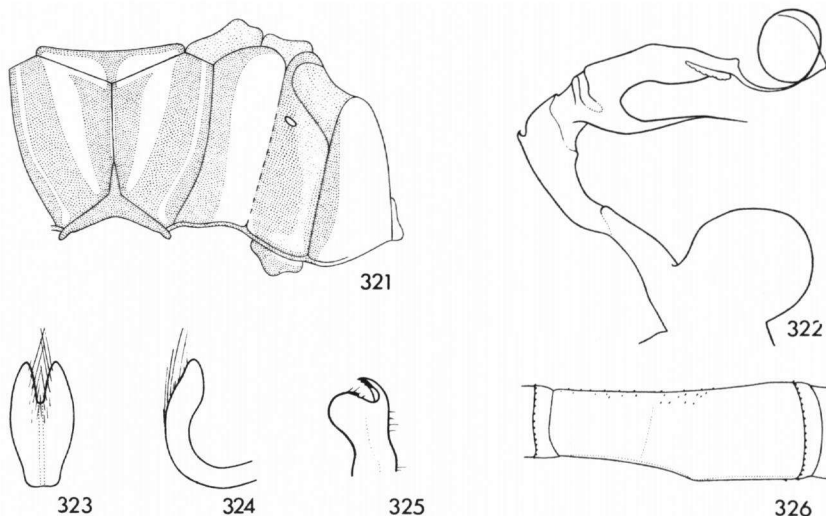
Material. – **Brazil**: 1 ♂, leg. Bates; 1 ♂, 3 ♀ (IRSN); Amazon, 1 ♂ (lectotype); Tapajós, 1 ♂, 2 ♀; Santarem, 2 ♂, 1 ♀; Chapada, 1913, 1 ♂, leg. Godman-Salvin; 1 ♀ (BM); Tapajós, Caxambu, V.1920, 1 ♂ (coll. Belle), 1 ♂, both leg. A.H. Fassl (SMF); Chapada, 1 ♂, 1 ♀ (MNHW). – **Bolivia**: Dept. Cochabamba, Prov. Chapare, III.1930, 1 ♀ (MZM); Dept.



Figs. 313-320. *Progomphus intricatus* Hagen in Selys & Hagen: (313) tenth abdominal segment and caudal appendages of male, dorsal view; – (314) the same, left lateral view; – (315) the same, ventral view; – (316) frons of male, dorsal view; – (317) occipital plate of male; – (318) accessory genitalia, ventral view; – (319) the same, right lateral view; – (320) apical segments of abdomen of female, ventral view, showing vulvar lamina.

Santa Cruz, Prov. Ichilo, Buena Vista, 2 ♂; Buena Vista (400 m), 2 ♂, all leg. J. Steinbach (FSC); 6.7 km east of Buena Vista, Quebrada del Paquió (small stream), 10.III.1960, 1 ♂, 1 ♀ (coll. Belle), 2 ♂, 1 ♀; 0.5 km east of Buena Vista ("taken at night with light"), 19.III.1960, 2 ♀, all leg. R.B. Cumming, (FSC).

The holotype of this species, a male known to be in the collection formerly owned by Saunders, is not in the Museum of Comparative Zoology at Cambridge, Mass. although the type catalogue recorded it (MCZ, no. 12349); nor is it in the University Museum of Oxford. To a male with the old pin labels "113", "Amaz", and "*Progomphus intricatus* Hagen" Mr. Kimmins (British Museum, Nat. Hist.), at my inquiry added the label: "I think, that this is probably the type of *Progomphus intricatus* Hagen (Selys). The register no. (1868-3) is missing. Measurements agree. D.E. Kimmins det. 1967. D.E.K.". The male also fits



Figs. 321-326. *Progomphus intricatus* Hagen in Selys & Hagen, male: (321) diagram of pterothorax; – (322) penis, right lateral view; – (323) penis guard, frontal view; – (324) the same, right lateral view; – (325) left anterior genital hamule, left lateral view; – (326) seventh abdominal segment, left lateral view.

the original description in all other respects. The caudal appendages are partly damaged ("en partie brisés"). The intact right side of the inferior caudal appendage could have served Hagen for his two figures of this species in the *Monographie*. However, one of the females from Tapajós in the British Museum collection bears also the old pin label "113", whereas, as explicitly stated in the original description, the corresponding female was unknown when Hagen described the species. These old labels suggest that the male from Amazon belongs

to a series later added to Saunders' collection. As it is obviously not possible to point out the holotype with security, and since all specimens in the collection of the British Museum placed under *intricatus* apparently are conspecific, it seems best to designate the male from Amazon or the male from Tapajós as the lectotype. In view of the great agreement with the original description in the *Monographie*, I have selected as lectotype the male from Amazon.

Concerning the intraspecific differences of the species the following may be noteworthy. In some males the pale metepisternal stripe is very weakly developed and practically wanting. The hind lobe of the prothorax is usually black, but sometimes yellow. The basal halves of the abdominal segments and the mid-dorsum of the abdominal segment 10 are usually yellowish brown, while in some specimens obscure brown or blackish brown. The inferior carina of the male superior caudal appendage is armed with one or two rows of denticles, in the lectotype with two rows. The female from Cochabamba has well-developed longitudinal brown stripes on the femora, in the two specimens from Santa Cruz, "taken at night with light", the stripes are practically lacking.

PROGOMPHUS RECTICARINATUS CALVERT, 1909

Figure 327

Progomphus recticarinatus CALVERT, 1909: 213-215; pl. 7, fig. 128; – SANTOS, 1966: 65; – SANTOS, 1968a: 159.

Material. – B r a z i l : Chapada, 1 ♂ (lectotype), 2 ♂ (CMP).

The lectotype is the best preserved male of the original series. It bears the pin labels "69", "Chapada", and "*Progomphus recticarinatus* Calv. P.P. Calvert det. 1909 Type AnCarMus. VIp. 215 Orig. Pl. VII, f. 128".

The species is closely related to *intricatus* but the male differs from it by the following peculiarities: (1) Darker colour of pterothorax black or blackish brown; brown or pale brown in *intricatus*; – (2) First pale antehumeral stripe not confluent with pale area of collar; confluent in *intricatus*; – (3) Middorsum of tenth abdominal segment practically black; mainly reddish brown in *intricatus*; – (4) Superior caudal appendages somewhat longer and more slender than in *intricatus* and nearly black at base; reddish brown at base in *intricatus*; – (5) Row of denticles on inferior carina of superior caudal appendages starting nearer to base of superior caudal appendage as in *intricatus*; – (6) Branches of inferior caudal appendage black; yellowish brown in *intricatus*; – (7) Apical processes of anal tubercles less acute in *intricatus* and green; black in *intricatus*.

The lectotype, male, of *Progomphus recticarinatus* has a single row of denticles on the inferior carina of the superior caudal appendage.

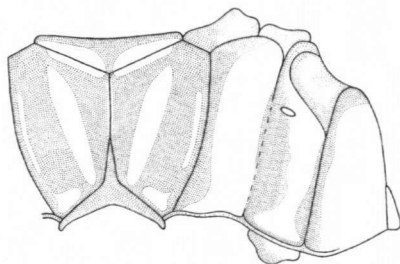


Fig. 327. *Progomphus recticarinatus* Calvert, lectotype male. Diagram of pterothorax.

The female of *recticarinatus* is unknown. From the Carnegie Museum I received (along with three males of the original series) the "♀ abdomen attached to a thorax and head of a *P. intricatus* ♀". But the abdomen is of a female belonging to a much smaller (and unknown) species of *Progomphus*. The first segment of this abdomen is missing and the segments 2 to 10 measure 23 mm only.

The fourth male of the original series of *Progomphus recticarinatus* is in the Academy of Natural Sciences of Philadelphia.

THE UNNAMED SPECIES OF WILLIAMSON

In 1920 WILLIAMSON published figures and a description of a female of *Progomphus* from La Tigrera, Colombia. Despite the fact that it belonged to a new species he did not name it because of the scanty material.

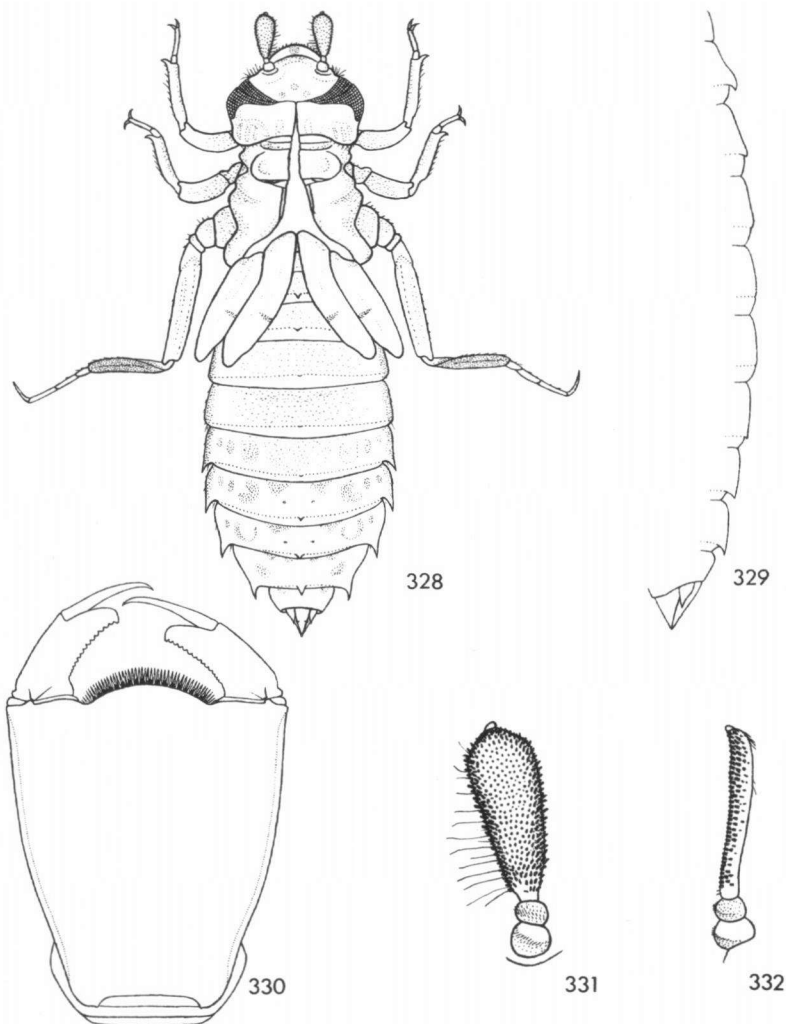
I have asked Mrs. Gloyd to look for this female, a specimen known to be in the collection formerly owned by Williamson. This she has kindly done, but she could not locate it. Mrs. Gloyd wrote in a letter to me (May 9, 1972): "I have searched in vain for the *Progomphus* sp. ♀ described by Mr. Williamson in 1920. He had put it in the Type Collection but apparently when this collection was 'gone over' by an untrained person several years ago, it was taken out and now no one knows what has become of it."

The female is not in the Florida State Collection of Arthropods, Gainesville, either (Westfall 1972, personal communication).

A NOTE ON THE IMMATURE STAGES

A systematic treatment of the larval forms does not fall within the scope of the present paper. It seems useful, however, to list here a few bibliographic notes.

The most useful paper on the immature stages of *Progomphus* in general is undoubtedly that of NEEDHAM (1941). In this and in his 1944 paper he point-



Figs. 328-332. *Progompheus geijskesi* Needham (supposition), larval exuvia: (328) exuvia, dorsal view; – (329) dorsal outline of abdomen, left lateral view; – (330) labium, external view; – (331) right antenna, dorsal view; – (332) the same, right lateral view. (After BELLE, 1972b).

ed out the structural characters of a typical larva of the genus (based on 14 species known at that time), which can be briefly summarized as follows: (1) Subcylindric form; – (2) Small and narrow labium, with blunt-tipped lateral lobe; – (3) Indrawn middle coxae, with the resulting outer concavity of the sides

of the mesothorax overarched by roof-like shoulder plates on the expanded prothoracic dorsum; — (4) Sand brushes on the outer face of the long joints of the fore and middle legs; — (5) Front tibiae especially flattened on the bare inner side and fitted to the contour of the side of the head against which they are closely appressed.

Since NEEDHAM's 1941 paper six other larvae were described, viz. *brachycnemis* (NEEDHAM, 1944), Needham's larva No. 15 from Surinam (NEEDHAM, 1944; possibly *conjectus*), *guyanensis* (BELLE, 1966), *approximatus* (BELLE, 1966), and (by supposition) those of *complicatus* (SANTOS, 1968b) and *geijskesi* (BELLE, 1972b).

In this paper the description of the larva of *Progomphus tibialis* is added to the list. In its morphology it transgresses the boundaries of the typical *Progomphus* larva as characterized by NEEDHAM (1944).

It is interesting that the supposed larva of *P. geijskesi* (Figs. 328-332) exhibits a distinct relationship to that of *tibialis*. This fact may corroborate my guess that it does indeed belong to this species.

The larval stages of only 21 representatives of the genus have thus become known, but four of them can not be referred to known species, while six can be named by supposition only. It is a matter of course that a tentative classification within the genus will be possible only when the immature stages of more species will have been discovered.

The *Progomphus* larvae are the champion burrowers in dragonflies. For notes on their ecology and behaviour reference is made to the papers by CALVERT (1917), BYERS, (1939), NEEDHAM (1941), NEEDHAM & WESTFALL (1955) and BELLE (1966).

GEOGRAPHIC DISTRIBUTION AND AFFINITIES WITHIN THE GENUS

The genus *Progomphus* is limited in its geographic distribution to the Western Hemisphere, and it is primarily a South American group.

The type localities of the 53 nominal species are grouped as follows: Brazil 11; Argentina and Surinam each 7; Peru 5; Bolivia, Ecuador, Mexico and United States each 3; Colombia, Guatemala and Venezuela each 2; Chile, Costa Rica, Cuba, Dominica Republic and Haiti each 1.

As appears clearly from Table II, the greatest number (19) of species occurs in Brazil. There are no records from Honduras and Uruguay. A prognosis concerning the habitat of some species can be made. For instance *clendoni* we can expect in Honduras; *pygmaeus* in Honduras, El Salvador, Nicaragua and Panama; *anomalus* in Colombia; the species known from Surinam also in Guyana and French Guyana.

In general the species of *Progomphus* exhibit but little migratory tendency. The greater part (27) of them are known from one country only. On the other

Table II
Geographic distribution of the species of *Progomphus*

| Species | USA | Central America | | | | | Antilles | | | South America | | | | | | | | | | | | | |
|-----------------------|-----|-----------------|-------------|-----------|--------|-----------|----------|------|----------------|---------------|---------|-----------|---------|--------|-------|----------|---------|---------------|--------|----------|------|---------|-----------|
| | | Costa Rica | El Salvador | Guatemala | Mexico | Nicaragua | Panama | Cuba | Dominican Rep. | Haiti | Jamaica | Argentina | Bolivia | Brazil | Chile | Colombia | Ecuador | French Guyana | Guyana | Paraguay | Peru | Surinam | Venezuela |
| <i>abbreviatus</i> | | | | | | | | | | | | | | | | x | | | | | | | |
| <i>aberrans</i> | | | | | | | | | | | | x | x | | | | | | | x | | | |
| <i>adaptatus</i> | | | | | | | | | | | | | x | | | | | | | | | | |
| <i>alachuensis</i> | x | | | | | | | | | | | | | | | | | | | | | | |
| <i>amazonicus</i> | | | | | | | | | | | | | | x | | | | | | | | | |
| <i>anomalus</i> | | | | | | | x | | | | | | | | | | x | | | | x | | |
| <i>approximatus</i> | | | | | | | | | | | | | x | | | | | | | | | x | |
| <i>auropictus</i> | | | | | | | | | | | | x | | | | | | | | | | | |
| <i>australis</i> | | | | | | | | | | | | x | | | | | | | | | | | |
| <i>basistictus</i> | | | | | | | | | | | | x | | x | | | | | | | | | |
| <i>boliviensis</i> | | | | | | | | | | | | | | | | | | | | | | | |
| <i>borealis</i> | x | | | | x | | | | | | | | x | | | | | | | | | | |
| <i>brachynemius</i> | | | | | | | | | | | | | | | | | | x | | | | x | |
| <i>clendoni</i> | | | x | x | x | x | x | | | | | | | | | | | | | | | | |
| <i>complicatus</i> | | | | | | | | | | | | | | x | | | | | | x | | | |
| <i>conjectus</i> | | | | | | | | | | | | | | | | | | | | | | x | |
| <i>costalis</i> | | | | | | | | | | | | | | x | | | | | | | | | |
| <i>delicatus</i> | | | | | | | | | | | | | | | | | | | | | x | | |
| <i>dorsopallidus</i> | | | | | | | | | | | | | | | | | | | x | | | | x |
| <i>elegans</i> | | | | | | | | | | | | | | x | | | | | | | | | |
| <i>fassli</i> | | | | | | | | | | | | | | x | | | | | | | | | |
| <i>formalis</i> | | | | | | | | | | | | | | x | | | | | | | | | |
| <i>geijskesi</i> | | | | | | | | | | | | | | x | | | | | | | | x | |
| <i>gracilis</i> | | | | | | | | | | | | | | x | | | | | | | | | |
| <i>guyanensis</i> | | | | | | | | | | | | | | x | | | | | | | | x | |
| <i>herreræ</i> | | | | | | | | | | | | | | | x | | | | | | | | |
| <i>incurvatus</i> | | | | | | | | | | | | | | | | | | | | | x | | |
| <i>integer</i> | | | | | | | | x | x | | x | | | | | | | | | | | | |
| <i>intricatus</i> | | | | | | | | | | | | | x | x | | | | | | | | | |
| <i>joergenseni</i> | | | | | | | | | | | | x | x | | | | | | | | x | | |
| <i>kimminsi</i> | | | | | | | | | | | | x | | | | | | | | | | | |
| <i>lepidus</i> | | | | | | | | | | | | x | | | | | | | | | | | |
| <i>longistigma</i> | | x | | | x | | | | | | | | | | | | | | | | | | |
| <i>mexicanus</i> | | x | | | x | | | | | | | | | | | | | | | | | | |
| <i>montanus</i> | | | | | | | | | | | | | x | | | | | | | | | | |
| <i>nervis</i> | | | | | | | | | | | | | | | | | | | | | x | | |
| <i>obscurus</i> | x | | | | x | | | | | | | | | | | | | | | | | | |
| <i>perpusillus</i> | | | | | | | | | | | | | | x | | | | | | | | x | |
| <i>phyllochromus</i> | | | | | | | | | | | | x | x | | | x | x | | | | | | x |
| <i>pipersi</i> | | | | | | | | | | | | | | x | | | x | | | | | x | |
| <i>polygonus</i> | | | | | | | | | | | | | | | | | | | | | | | |
| <i>pygmaeus</i> | | x | | x | | | | | | | | | x | | | x | x | | x | | x | | |
| <i>recticarinatus</i> | | | | | | | | | | | | | | x | | | | | | | | | |
| <i>recurvatus</i> | | | | | | | | | | | | | | x | | | | | | | | | |
| <i>risi</i> | | | | | x | | | | | | | | | | | | | | | | | | |
| <i>serenus</i> | | | | | | | | | x | x | | | | | | | | | | | | | |
| <i>superbus</i> | | | | | | | | | | | | | | | | | x | | | | | | x |
| <i>tantillus</i> | | | | | | | | | | | | | x | | | | | | | | | | |
| <i>tibialis</i> | | | | | | | | | | | | | | | | | | | | | | x | |
| <i>virginiae</i> | | | | | | | | | | | | | | | x | | | | | | | | |
| <i>williamsi</i> | | | | | x | | | | | | | | | | | | | | | | | | |
| <i>zephyrus</i> | | | | | | | | | x | | | | | | | | | | | | | | |
| <i>zonatus</i> | | | | | x | x | | | | | | | | | | | | | | | | | |

hand *pygmaeus*, *anomalus*, *phyllochromus*, *piipersi* and *geijskesi* apparently have a large range. Most striking is the wide range of *pygmaeus* which occurs in Central America and the western regions of South America, from Guatemala to Bolivia (Fig. 333).

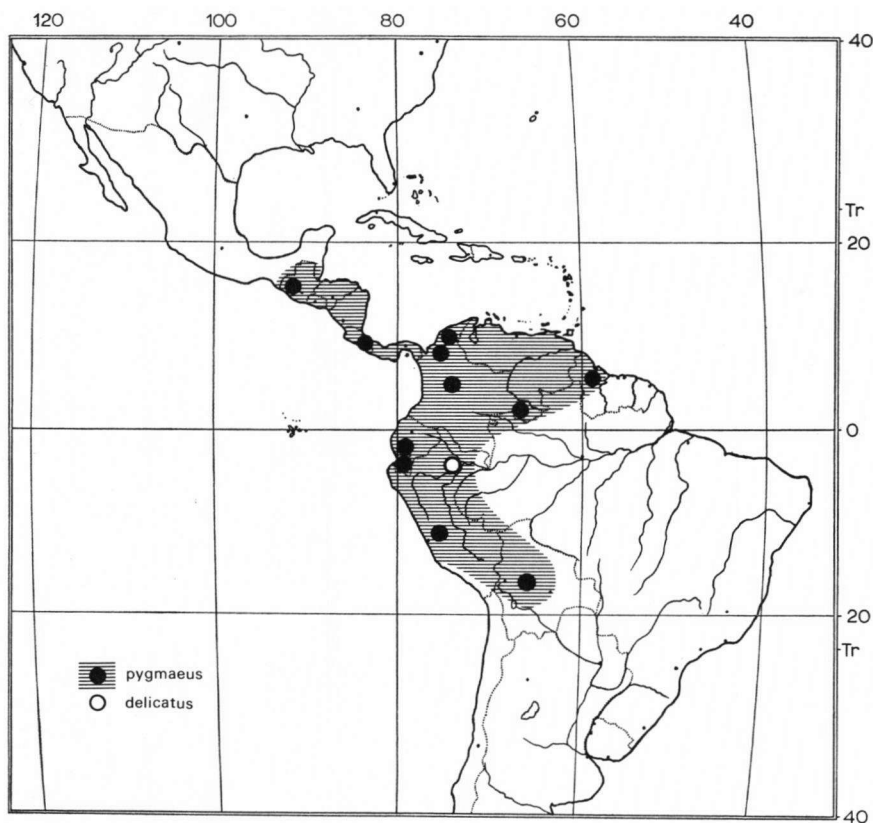


Fig. 333. Distribution of *Progomphus pygmaeus* and its near ally, *Progomphus delicatus* sp. n.

Also a number of interesting interspecific relationships were found, which eventually may serve as a basis for further studies. All species without a basal subcostal cross-vein are found only in southeast Brazil and the adjacent Misiones from Argentina (Fig. 334), viz. *auropictus*, *virginiae*, *gracilis*, *adaptatus*, *lepidus*, *elegans* and *australis*. But although agreeing by the lack of a basal subcostal cross-vein, they differ considerably in many respects. The male superior caudal appendages are acute in *auropictus*, blunt-tipped in *virginiae*, *gracilis*, *adaptatus*,

lepidus and *elegans*. *Progomphus virginiae* differs remarkably from *gracilis*, *adaptatus*, *lepidus* and *elegans* by the aberrant male inferior caudal appendage, while also its pterothorax has a totally different colour design. *Progomphus lepidus*, *elegans* and *australis* differ from *gracilis* and *adaptatus* in the proportions of the tibia and tarsus of the third pair of legs. Only *gracilis* and *adaptatus* are evidently closely related species because of their great correspondence in colour design, structure of male caudal appendages and accessory genitalia, etc. Further the colour designs of the pterothorax of both sexes in these two species are different, a secondary sexual character not found in any other member of the genus. Also *lepidus* and *australis* seems to be closely related species but *australis* is known only from the female sex.

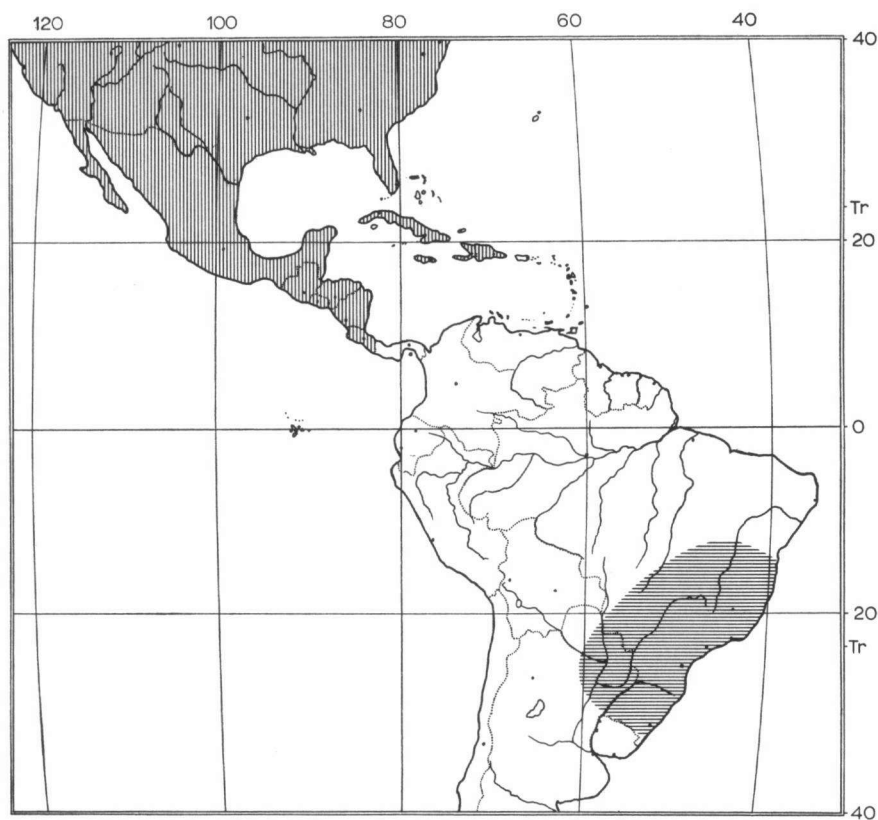


Fig. 334. Distribution of the nine species with a slender midventral process on abdominal segment 1 (vertically shaded), and of the seven species without a basal subcostal cross-vein (horizontally shaded).

All species with a slender midventral process on abdominal segment 1 are found in the United States, Central America and the Greater Antilles (Fig. 334), viz. *obscurus*, *alachuensis*, *borealis*, *clendoni*, *mexicanus*, *zonatus*, *integer*, *williamsi*, and *serenus*, though *obscurus*, *alachuensis* and *borealis* are distinctly forming a group apart (the *obscurus* group). They more or less agree in the venation, the colour design and the shape of the male caudal appendages. *Progomphus clendoni* and *mexicanus* are very similar in stature and coloration but they differ greatly in the configuration of the male inferior caudal appendage. The two show some relationship with the species of the *obscurus* group. *P. serenus* and *williamsi* are the only species of the series in which the costal edge of the wings is not lined with yellow.

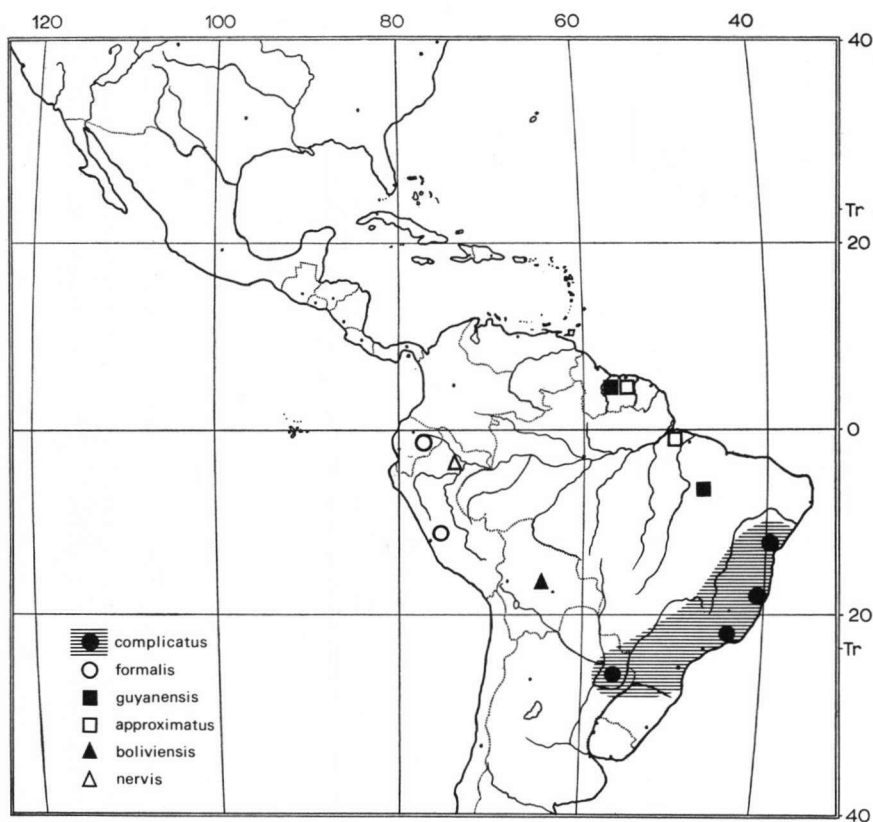


Fig. 335. Distribution of the *complicatus* group.

Many species exhibit a striking resemblance in the venation, the colour design, the shape of the caudal appendages, etc. The number of such species is great but only a few groups consisting of more than two species can be compiled, viz.:

(1) The *obscurus* group comprising the species *obscurus*, *alachuensis*, and *borealis*;

(2) The *complicatus* group comprising the species *complicatus*, *formalis*, *guyanensis*, *approximatus*, *boliviensis*, and perhaps also *nervis* (Fig. 335);

(3) The *risi* group comprising the species *risi*, *tantillus*, *superbus*, and probably also *perpusillus* (Fig. 336).

Distinct couples of closely related species are *gracilis* and *adaptatus*, *joergenseni* and *herreriae*, *geijskesi* and *pijpersi*, *pygmaeus* and *delicatus*, *clendoni* and *mexicanus*, *montanus* and *kimminsi*, *intricatus* and *recticarinatus*.

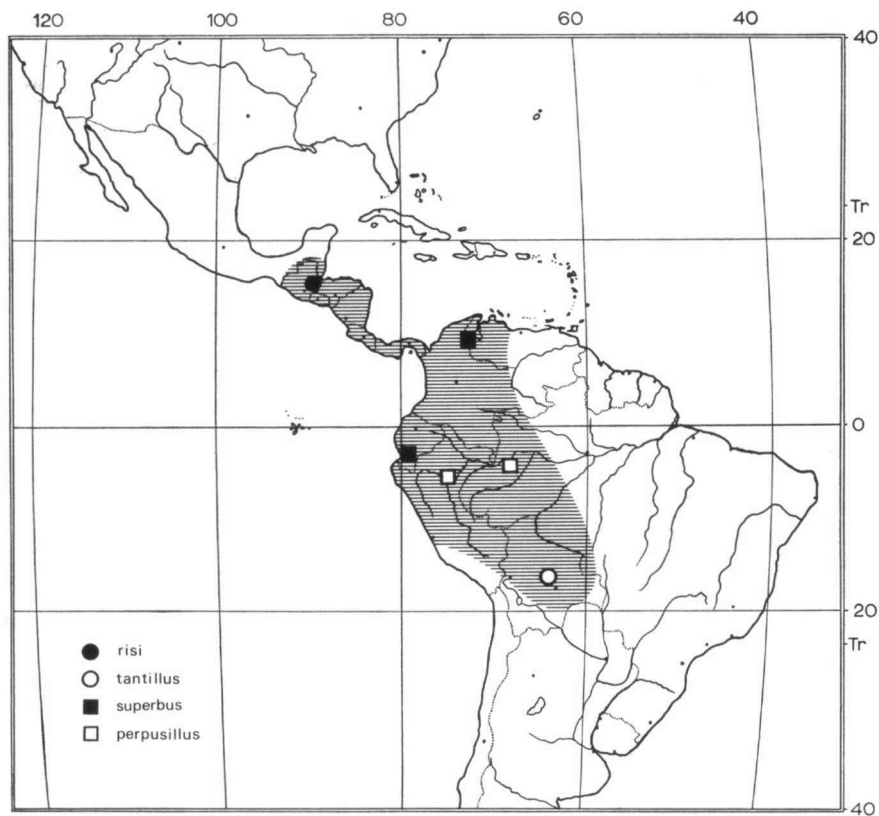


Fig. 336. Distribution of the *risi* group.

The flagellae of the penis are generally very long in *Progomphus* but they are distinctly shorter in *gracilis*, *amazonicus*, *joergenseni*, etc., and are very short in such species as *auropictus*, *virginiae* and *lepidus*. The penes of the species belonging to the *complicatus* group have very long flagellae and a very long ventral spine.

In venational characters *P. phyllochromus* differs from all other species of the genus (except *polygonus*) by the possession of extra cubito-anal cross-veins in the fore wings. It is interesting, in this context, that the presence of an m-chromosome in its karyotype is also unique among the hitherto studied members of the genus (cf. CUMMING, 1964; CRUDEN, 1968).

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