On the female sex of some elusive South-American Gomphidae with the descriptions of three new genera and four new species (Odonata)

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Females of some South-American Gomphidae are recorded. *Anomalophlebia nitida* gen. nov. et spec. nov. (♀ holotype: Venezuela, State of Bolivar, Los Pijiguasos), *Praeviogomphus proprius* gen. nov. et spec. nov. (♀ holotype: Brazil, State of Rio de Janeiro, Itatiaya), *Brasiliogomphus uniseries* gen. nov. et spec. nov. (♀ holotype: Brazil, State of São Paulo, Lins) and *Idiogomphoides emmeli* spec. nov. (♀ holotype: Brazil, State of Rondônia, Rio Pardo) are described and illustrated. A syntype female of *Agriogomphus sylvicola* Selys is designated as lectotype. The female of *Diaphlebia nexans* Calvert and *Gomphoides perdita* (Förster) are described for the first time while two females pertaining to unknown species of *Progomphus* and *Aphylla* are described under spec. indet. Intraspecific variations of three other females are also discussed.

Introduction

This contribution to the knowledge of the Neotropical Gomphidae deals among others with three new genera the diagnoses of which are based on a single female. The new taxa, which are easily recognizable by their special wing venation, are here introduced under the names *Anomalophlebia* gen. nov., *Praeviogomphus* gen. nov. and *Brasiliogomphus* gen. nov. with respectively *Anomalophlebia nitida* spec. nov., *Praeviogomphus proprius* spec. nov. and *Brasiliogomphus uniseries* spec. nov. as their type species. The new genera are not or not well to place in Carle's (1986) classification of the Gomphidae nor in the old classification of this family as proposed by Fraser (1957). The acquaintance with these unexpected and important discoveries should be particularly attractive for some future investigators of the South-American gomphid fauna. The description of the fourth new species introduced in this paper, viz. *Idiogomphoides emmeli* spec. nov., is also based on a single female. Further the unknown females of *Diaphlebia nexans* Calvert, 1903, and *Gomphoides perdita* (Förster, 1914) are described and illustrated, the former from two fully mature specimens, the latter from a teneral individual. Colour and morphological differences found in the females of *Progomphus pijpersi* Belle, 1966, *Aphylla scapula* Belle, 1992, *Idiogomphoides demoulini* (St. Quentin, 1967) and *Idiogomphoides ictinia* (Selys, 1878) are also discussed. A female of *Progomphus* Selys, 1854, and another one of *Aphylla* Selys, 1854, I could not refer to a known species; they are described as *Progomphus* spec. indet. and *Aphylla* spec. indet., respectively. Finally I have taken this opportunity to designate a lectotype for *Agriogomphus sylvicola* Selys, 1869.

The Comstock-Needham terminology for the wing venation is used. All illustrations are reproductions of drawings on the same scale made by myself with the aid

of a camera lucida (the details being completed by free-hand) or based on actual photographs (wings). The depictions of the pterothoracic colour pattern are diagrammatic. The measurements are in millimeters. "Incl. app." means including appendages.

Acknowledgements and disposition of material studied

Below is a list of the depositories and their acronyms of the material studied together with the names of those who were so kind to loan me the material. I wish to express my gratitude to all these colleagues.

MNRJ-Museu Nacional, Rio de Janeiro; Professora Dr Janira Martins Costa, Museu Nacional, Rio de Janeiro (MNRJ). IRSN-Institut Royal des Sciences Naturelles de Belgique, Brussels; Dr P. Grootaert. UCV-Instituto de Zoologia Agricola, Universidad Central de Venezuela, Maracay; Lic. Jorge de Marmels. CM-Private collection of Machado, Belo Horizonte; Professor Dr Angelo B.M. Machado. SMF-Senckenberg Museum, Frankfurt-am-Main; Dr Heinz Schröder. FSCA-Florida State Collection of Arthropods; Professor Dr Minter J. Westfall, Jr.

I. Descriptions of the females of the new genera

Anomalophlebia gen. nov.

Diagnosis.— Wing characters: Basal subcostal cross-vein wanting; second primary antenodal cross-vein in hind wing somewhat nearer to nodus than to first primary antenodal cross-vein; stigma with brace vein and relatively short; middle fork of fore wing very strongly askew forward and midway between distal angle of discoidal triangle and posterior end of subnodus; anterior sector of arculus of fore wing nearer to Cu than to R+M; in fore wing the distance between base of middle fork and subnodus two times as long as the distance between oblique vein and subnodus; supratriangles, subtriangles and discoidal triangle of fore wings entire but discoidal triangle of hind wings (normally) traversed by a vein; trigonal interspace with two rows of cells near triangle; hind wing with two intermedian cross-veins and A1 running in a curve from gaff to marginal row of cells.

Female: occipital plate and transverse ridge present. Abdominal segment 2 without auricles. Vulvar lamina in ventral aspect subtriangular, its posterior margin divided by a median cleft. Sternum of ninth abdominal segment about four times as wide as long.

Male and larva are unknown.

Type-species: *Anomalophlebia nitida* spec. nov.

The nearest relative of *Anomalophlebia* seems to be *Neogomphus* Selys, 1858, but the latter differs essentially from the former in having the second primary antenodal cross-vein in hind wing somewhat nearer to the first primary antenodal cross-vein than to the nodus, in having the middle fork of the fore wing slightly askew forward and closer to the distal angle of the discoidal triangle than to the posterior end of the subnodus, in having the anterior sector of the fore wing arculus nearer to R+M than to Cu, in having the discoidal triangle of the hind wing always open, and in having a single intermedian cross-vein in the hind wing (cf. Schmidt, 1941: fig. 3).

Anomalophlebia nitida spec. nov.
(figs 1-2, 8, 21, 26)

Material.— Venezuela: State of Bolivar, Los Pijiguasos (500 m), Via Las Niños, Vivero Trapichote II, 3-13.vi.1992, 1 ♀ (holotype), Jorge de Marmels leg., UCV (No. 16280).

Female (holotype; abdomen broken between segments 4-5).— Total length 38; abdomen 29 (incl. app. 0.9); hind wing 24; costal edge of stigma in fore wing 2.2.

Head.— Base of mandibles externally white-green to bluish-green. Face bluish-green but base of labrum brown in middle, and lower half of postclypeus brown in middle and on facial lobes. Frons low, its upper surface brown with green on antero-lateral fourth. Vertex and top of head brown. Occipital plate narrow, its posterior ridge undulate and provided with a few long dark brown hairs (fig. 21). Rear of head brown, each side with a yellow spot at mid-height.

Thorax.— Prothorax brown with yellow middorsal twin-spot and yellow lateral sides. Pterothorax brown with yellow stripes, its colour pattern shaped as shown in fig. 8.

Legs.— Posterior side of femur brown, the anterior side green. Spines of outer anterior row on apical half of hind femur half as long as diameter of femur, the end spine longer. Tibiae, tarsi and claws brown, claws may be dark brown.

Wings.— Clear. Venation (figs 1-2) dark brown including frontal margin of costa. Stigma brownish-yellow. In fore wing the stigma including its ridges three times as long as wide, and distance between nodus and proximal end of stigma four and a half times as long as costal edge of stigma. Postnodal cells becoming noticeably longer than nearby proximal end of stigma. Nodal index 9:13-15:11/9:10-10:9. Second primary antenodal cross-vein the fifth in left fore wing, the sixth in other wings. Intermedian index 4-4/2-2. Discoidal triangle of left hind wing two-celled, that of right hind wing with a very short, partly developed cross-vein. Anal field of fore wing with a single row of cells. Hind wing with five paranal cells and three rows of cells behind Cu2.

Abdomen.— Predominantly brown but sides of segment 1 greenish-yellow and sides of segments 2 to 9 with a yellow longitudinal stripe that is interrupted by the brown supplementary transverse carina. Anal appendages bluntly pointed, yellow at base, greenish-yellow in middle and brown at tips. Middorsal length of segments 7, 8, 9, and 10 approximately in ratio 35:19:10:7, with the anal appendages 9 on the same scale. Vulvar lamina nearly half as long as ninth sternum, its tip divided by a V-shaped median cleft for about one-third the length of lamima, the lobes being beset with about 20-25 microscopic tubercles (fig. 26).

Praeviogomphus gen. nov.

Diagnosis.— Wing characters: basal subcostal cross-vein wanting; second primary antenodal cross-vein in hind wing much nearer to first primary antenodal cross-vein than to nodus; stigma with brace-vein and relatively short; anterior sector of arculus nearer to R+M than to Cu; fore wing with middle fork askew forward and closer to distal angle of discoidal triangle than to posterior end of subnodus; in fore wing the distance between base of middle fork and subnodus two and a half times as

long as the distance between oblique vein and subnodus; supratriangles, subtriangle of fore wings and discoidal triangles entire but subtriangle of hind wing entire or traversed by a vein; trigonal interspace with two rows of cells near discoidal triangle; hind wing with one intermedian cross-vein and A1 running in a curve to posterior margin.

Female: occipital plate wanting but transverse ridge present. Vulvar lamina in ventral aspect subtriangular of form, its posterior margin divided by a median cleft.

Male and larva are unknown.

Type-species: *Praeviogomphus proprius* spec. nov.

This genus agrees with the western South-American *Neogomphus* Selys, 1858, in having a single intermedian cross-vein in the hind wing. It differs, however, from this genus in having five to six paranal cells in the hind wing; there are only four paranal cells in the hind wing of *Neogomphus*.

Praeviogomphus proprius spec. nov.
(figs 3-4, 9, 16, 28)

Material.— Brazil: State of Rio de Janeiro, Itatiaya (elev. 700 m), 5.i.1925, 1 ♀ (holotype), I.F. Zikán leg., SMF.

Female (holotype; abdomen broken between segments 4-5 and 5-6; right hind leg broken off).— Total length 48; abdomen 36 (incl. app. 1.5), hind wing 33; costal edge of stigma in fore wing 3.4, in hind wing 4; hind femur 6.

Head.— Genae and base of mandibles greenish-yellow. Labrum pale brown with a narrow green band near and parallel along its free border. Anteclypeus green. Postclypeus, frons, vertex and top of head brown. Postocellar ridge of paired ocelli laterally ending in a tubercle near compound eye. Occipital ridge with a posterior median swelling and at either lateral end merging into a knob behind compound eye (fig. 16). Rear of head brown-yellow but brown on top. Labium and adjacent mouth parts pale greenish-yellow.

Thorax.— Prothorax brown with yellow twin-spot on middorsum of middle lobe. Pterothorax brown with pale (= yellow) markings, colour pattern shaped as shown in figure 9. No pale mesothoracic "half collar" discernible. Second pale antehumeral stripes very narrow.

Legs.— Brown-yellow, the inner side of first and second pair of femora green. Spines of outer anterior row on distal part of hind femur about one-third as long as diameter of femur, the end spine nearly half as long as the diameter of femur. Tibiae and tarsi dark brown. Claws pale brown with black hooks.

Wings.— Clear. Venation (figs 3-4) brown including frontal margin of costa. Stigma brownish-yellow. In fore wing the distance between nodus and proximal end of stigma three and a half times as long as costal edge of stigma. Second primary antenodal cross-vein the seventh in left hind wing, the sixth in other wings. Nodal index 15:16-17:12/12:13-11:12. Intermedian index 2-2/1-1. Subtriangle of left hind wing open, that of right hind wing two-celled. In fore wing the distance from middle fork to distal end of discoidal triangle and to distal end of subnodus in ratio 2:3. Hind wings without anal loop, with 5 (left) and 6 (right) paranal cells, and with area behind Cu2 five to six cells wide.

Abdomen.— Predominantly brown, the sides of basal segments largely yellow. The yellow side markings becoming successively narrower on rear segments. Segments 8 to 10 largely brown but yellow along ventral tergal margins. Segment 2 without auricles. Middorsal length of abdominal segments 7, 8, 9 and 10 approximately in ratio 32:12:6:3, with the anal appendages 7 on the same scale. Vulvar lamina about three-quarters as long as ninth sternum, its posterior margin deeply cleft for nearly half the length of lamina (fig. 28). Anal appendages brown-yellow with brown base and tip, the latter bluntly pointed.

Brasiliogomphus gen. nov.

Diagnosis.— Wing characters: basal subcostal cross-vein present; second primary antenodal cross-vein nearer to first primary antenodal cross-vein than to nodus; stigma with brace-vein and relatively long; anterior sector of arculus nearer to R+M than to Cu; fore wing with middle fork slightly askew forward and closer to distal end of discoidal triangle than to posterior end of subnodus; in fore wing the distance between base of middle fork and subnodus slightly more than two times the distance between subnodus and oblique vein; supratriangles, subtriangles and discoidal triangles open; trigonal interspace one cell wide near triangle; hind wing with two intermedian cross-veins and A1 running straight to posterior margin of wing.

Female: occipital plate present, its posterior transverse ridge undeveloped in middle. Vulvar lamina in ventral aspect subtriangular, its tip divided by a median cleft.

Male and larva are unknown.

Type-species: *Brasiliogomphus uniseries* spec. nov.

This genus seems to be related to *Tibiagomphus* Belle, 1992, but it differs substantially in the following particulars: fore wing with distance of oblique vein to subnodus about half the distance of subnodus to base of middle fork; in *Tibiagomphus*, two-fifths. Trigonal interspace one cell wide near discoidal triangle; in *Tibiagomphus*, two cells wide. Dorsal margin of foramen magnum V-shaped (fig. 14); in *Tibiagomphus*, U-shaped (fig. 15). Occipital ridge undeveloped in middle (fig. 24); in *Tibiagomphus*, continuous (fig 23).

In the old classification of the Gomphidae as proposed by Fraser (1957) this genus can at best be placed in the Gomphinae although the middle fork in the fore wing is slightly askew forward. On the other hand this genus is unmistakably a member of the *Agriogomphus* -complex as characterized by Needham (1944).

Brasiliogomphus uniseries spec. nov.
(figs 5, 11, 14, 24, 27)

Material.— Brazil: State of São Paulo, Lins (ca. 15 km west), 6.x.1985, 1 ♀ (holotype), N. Santos, L. Fernando & Tosi Roberto, MNRJ.

Female (holotype; abdomen broken between segments 5-6).— Total length 37; abdomen 29 (incl. app. 1); hind wing 26; costal edge of stigma in fore wing 3.6, in hind wing 3.8.

Head.— Yellow including vertex and occipital plate but tip of mandibles and

pedicel of antennae brown. Rear of head superiorly with a well-developed swelling behind compound eyes and below this swelling there is a small hump near posterior border of eye. Upper surface of swelling and partly developed occipital ridge sparsely covered with upright standing black-brown bristles. Anterior margin of frons in dorsal aspect slightly convex along its whole breadth.

Thorax.— Prothorax yellow with a pale yellow middorsal band. Pterothorax largely yellow, its dorsum with a pair of broad brown antehumeral bands (fig. 11), its lateral sides entirely yellow.

Legs.— Femora yellow, the outer side with a brown stripe. On basal half of hind femora this brown stripe interrupted by yellow forming five short brown stripes. Spines on anterior side of hind femur very short. Tibiae yellow anteriorly, brown posteriorly. Tarsi brown. Claws pale brown.

Wings.— Venation (fig. 5) brown including frontal margin of costa. Stigma yellow, six times as long as wide. Distance between nodus and proximal end of stigma two and one-third times as long as costal edge of stigma. Nodal index 9:11-12:7/8:9-10:7. Second primary antenodal cross-vein the fourth in left fore wing, the fifth in other wings. Intermedian index 3-3/2-2. Trigonal interspace in fore wings starting with two cells against triangle followed by a single row of four (right) and five (left) cells, that in hind wings starting with three cells against triangle followed by a single cell. Hind wings with five paranal cells, two postanal cells and three rows of cells behind Cu2.

Abdomen.— Predominantly yellow but segments 1 to 6 with a longitudinal brown band on each side. Black denticles along entire hind margin of tergites 3 to 9 but hind margin of tergite 10 with black denticles on lateral sides only. Hind margin of tergite 2 with black denticles on lower lateral sides and a few minute denticles near middorsum. Tergite 1 with a few denticles near hind margin of lateral sides. Black denticles also on ventral tergal margins of segments 7 and 8. Vulvar lamina (fig. 27) yellow, reaching a point halfway the venter of ninth sternum, broad at base, its posterior half medially cleft, the lobes subtriangular and provided with microscopic transverse striations. Middorsal length of segments 6, 7, 8, 9 and 10 approximately in ratio 21:18:11:9:4, with the anal appendages 5 on the same scale.

Below is a verification table of the generic characters in the wings of the new genera *Anomalophlebia*, *Praeviogomphus* and *Brasiliogomphus*, together with those of *Neogomphus* Selys and *Tibiagomphus* Belle.

Table 1. Wing characters of *Neogomphus*, three new genera and *Tibiagomphus*.

Characters	1	2	3	4	5	6	7	8	9	10
Species										
Neogomphus Selys, 1858	–	+	+	–	+	–	+	+	+	–
Anomalophlebia gen. nov.	–	–	–	–	–	+	–	–	+	+
Praeviogomphus gen. nov.	–	+	+	+	+	–	+	–	+	–
Brasiliogomphus gen. nov.	+	+	+	+	+	–	–	+	–	+
Tibiagomphus Belle, 1992	+	+	+	+	+	–	+	+	+	+

The numbers in the upper row refer to: 1. Basal subcostal cross-vein present (+) or wanting (-); 2. Second primary antenodal cross-vein in hind wing nearer to first primary antenodal cross-vein than to nodus (+) or nearer to nodus than to first primary antenodal cross-vein (-); 3. Brace vein of stigma present (+) or wanting (-); 4. Stigma (including its ridges) in fore wing long, more than three times as long as wide (+) or short, two to three times as long as wide (-); 5. Anterior sector of arculus in fore wing nearer to R+M than to Cu (+) or nearer to Cu than to R+M (-); 6. Middle fork in fore wing very strongly askew forward (+) or not strongly or slightly askew forward (-); 7. Fore wing with distance between base of middle fork and subnodus two and a half times as long as the distance between subnodus and oblique vein (+) or twice as long as the distance between subnodus and oblique vein (-); 8. Supratriangles, subtriangles and discoidal triangles entire (+) or these triangles entire but subtriangle or discoidal triangle in hind wing generally or occasionally traversed by a vein (-); 9. Trigonal interspace near triangle two cells wide (+) or one cell wide (-); 10. Hind wing with two intermedian cross-veins (+) or with one intermedian cross-vein (-).

II. Descriptions of the females of known genera

Diaphlebia nexans Calvert, 1903
(figs 17-18, 25)

Material.— Brazil: State of Mato Grosso, Municipio Diamantino (trail along Paraguai River), 27.x.1960, 1 ♀, J. Evangelista & Levi, MNRJ; Diamantino (stream [Alto Rio Arinos] in cerrado [savanna]), xii.1985, 1 ♂, 1 ♀, E. Furtado Jr leg., CM.

The female of *Diaphlebia nexans* has not yet been described. The present females agree in the characters 1 to 5 listed by me for the lectotype male (cf. Belle, 1977) but not in all respects with character 7. The fore wing discoidal triangle of the female from the Museu Nacional at Rio de Janeiro has the anterior side as long as the proximal (inner) side while the hind wing discoidal triangle has the anterior side one and a half times as long as the proximal side. In *Diaphlebia angustipennis* Selys, 1854, the discoidal triangle is longer in the axis of the wing than in *Diaphlebia nexans*. As a result the trigonal interspace in the hind wing of the former species starts with an extra initial cell at the hind angle of the triangle but there is generally not such an extra initial cell in *Diaphlebia nexans*. The vulvar lamina in *Diaphlebia nexans* resembles that in *Diaphlebia angustipennis*.

The female from the collection Machado is described below.

Female (hitherto unknown; hairs of occipital ridge and right anal appendage broken away; abdomen broken into four pieces.— Total length 43; abdomen 32.5 (incl. app. 1.2); hind wing 27.5; costal edge of stigma in fore wing 4.5, in hind wing 4.8.

The female fits fairly well the colour description for the male as given by Calvert (1903). Its pterothoracic colour pattern is shaped as depicted for the male lectotype (Belle, 1977) [In the present (topotypic) male the first and second pale antehumeral stripes are complete and connected at the antealar sinus]. Also the anterior ridge of the frons is shaped as in the lectotype. Antero-superior band of frons green. Occipital plate with a low central hump, the posterior ridge undulate and convex in middle (fig. 25). Longest spines of outer anterior row of hind femur half as long as diameter of femur, the end spine not longer. Vulvar lamina as long as ninth sternum and cleft for its apical two-thirds (fig. 17). Middorsal length of abdominal segments 7, 8, 9 and 10 approximately in ratio 5:3:2:1, with the anal appendages 1.5 on the same scale.

Wings with brown tinge. Stigma brown-yellow. No basal subcostal cross-vein. Supra- and subtriangles open. Discoidal triangle in fore wings open, in hind wings two-celled. Nodal index 12:14-16:12/11:13-11:12. Second primary antenodal cross-vein the fifth in right hind wing, the sixth in other wings. Intermedian index 7-8/4-4. Hind wings with three cells for a third row of cells behind Cu2.

The female from the Museu Nacional at Rio de Janeiro is slightly larger. Its dimensions are: total length 45; abdomen 34 (incl. app. 1.4); hind wing 32; costal edge of stigma in fore wing 5, in hind wing 5.3. The nodal index is 11:14-15:12/11:11-11:10, the second primary antenodal cross-vein the sixth, the intermedian index 7-6/4-5, the discoidal triangle in the right fore wing two-celled. The hind wings have one cell (right) and two cells (left) for a third row of cells behind Cu2. In this specimen the lobes of the vulvar lamina are slightly divergent manifesting on this way the deep cleft (fig. 18).

Agriogomphus sylvicola Selys, 1869

Lectotype designation of *Agriogomphus sylvicola* Selys.— The original material of this small gomphid consists of two (pinned) females in the Selys collection at Brussels.They are very uniform and undoubtedly conspecific. They have been collected at São Paulo de Olivença and Ega (now Tefé) in the State of Amazonas, Brazil. The female with the pin labels "St. Paulo" and "*Agriogomphus sylvicola* Bates S" in Selys' handwriting is here designated as the lectotype of *Agriogomphus sylvicola* Selys, 1869. At its pin I have attached the label "Lectotype. Det. Jean Belle 1992". The lectotype has de nodal index 9:13-13:10/11:10-11:9. Williamson (1919) has published a photograph of its left pair of wings. The other female syntype has the pin labels "172" and "*Gomphus sylvicola* B" in Selys' hand. The specimen has the nodal index 9:12-13:9/8:11-11:8 and is of course paralectotype of *Agriogomphus sylvicola* Selys.

Progomphus pijpersi Belle, 1966
(fig. 12)

Material.— Brazil: State of Amazonas, Manaus (Br. 17, km 38), xi.1959, 1 ♀, Elias leg., MNRJ.

If compared with the Surinam examples described by me (Belle, 1966) the present female is smaller, the pale markings on the dorsum of the pterothorax are strongly reduced to a pair of slender 7-marks (fig. 12), while the bean-shaped tubercle on the venter of abdominal segment 1 is less produced. Its dimensions are: total length 33; abdomen 25 (incl. app. 0.9); hind wing 19.5; costal edge of stigma in fore wing 2.8.

Progomphus spec. indet.
(figs 13, 22, 30)

Material.— Brazil: State of Mato Grosso, Diamantino (stream in cerrado [savanna]), xii.1985, 1 ♀ , E. Furtado Jr, CM.

This female is closely related to *Progomphus geijskesi* Needham, 1944 and *Progomphus flinti* Belle, 1975, in having the venter of abdominal segment 1 with a

transverse fold which is densely covered with spine-like hairs but the occipital plate is narrower than in these two species (fig. 22). The pterothorax colour pattern resembles more that of *Progomphus flinti* but the first pale antehumeral stripe is not connected with the pale dorsal juxta-humeral spot (fig. 13).

Before I studied (Belle, 1973: 239) an incomplete female from Chapada which I had referred to *Progomphus geijskesi*. The Chapada female is probably conspecific with that from Diamantino since both specimens have been taken in the same area.

Female (abdomen broken between segments 4-5 and 6-7).— Total length 34.4; abdomen 27 (incl. app. 0.8); hind wing 20; costal edge of stigma in fore wing 2.9.

Head.— Face predominantly brown but base of mandibles, anteclypeus and facial lobes of postclypeus green. Superior surface of frons green for its anterior two-thirds. Vertex brown but posterior area yellowish-brown in middle.

Thorax.— Colour pattern of pterothoracic dorsum shaped as shown in figure 13.

Wings.— Venation brown including frontal margin of costa. Stigma brown-yellow. Second primary antenodal cross-vein the fifth. Nodal index 10:13-13:9/10:10-10:10. Intermedian index 5-5/3-3. Two cubito-anal cross-veins in addition to inner side of subtriangle in right fore wing, one in other wings. Supratriangles open. Subtriangle in fore wings two-celled, in hind wings open. All discoidal triangles two-celled. Hind wings with five paranal cells, three postanal cells and three rows of cells behind Cu2.

Abdomen.— Colouration resembling that of *Progomphus flinti* but sides of segments 8 and 9 largely brown-yellow. Anal appendages brown on their basal three-fifths, brown-yellow on their apical two-fifths. Middorsal length of segments 7, 8, 9 and 10 approximately in ratio 17:9:5:4, with the anal appendages 4 on the same scale. Vulvar lamina shaped as shown in fig. 30.

Aphylla scapula Belle, 1992

Material.— Brazil: State of Rondônia, Fazenda Rancho Grande, 62 km S of Ariquemes (10°32'S 62°48'W, elev. 540 ft), Linea C-20, 7 km E of B-65, 15.xi.1991, 1 ♀, M.J. Westfall, Jr leg., FSCA.

The present female exhibits some noteworthy differences if compared with the females of the original series. Here the tip of the lobes of the vulvar lamina is ventrally heightened to a low tubercle, the vertex has no pale band on its posterior area, the free border of the labium is not evenly convex in the middle but slightly concave, and the first and second pale antehumeral stripes are not confluent.

Aphylla spec. indet.
(fig. 31)

Material.— Brazil: State of Rio de Janeiro, Friburgo (Parque S. Clemente), 12.ii.1966, 1 ♀, N. Santos leg., MNRJ.

This female belongs to the larger species of *Aphylla* but cannot be referred to one of the described species. It probably represents an undescribed species. It differs from the female of *A. robusta* Belle, 1976, by the smaller size and the different shape of the vulvar lamina, from that of *A. producta* Selys, 1854, and *A. boliviana* Belle, 1972, by the presence of lateral exfoliations on the abdominal segments 8 and 9, from that

of *A. scapula* Belle, 1992, by the paler labrum and the different shape of the vulvar lamina, while it cannot be the female of *A. silvatica* Belle, 1992 since the latter is a much paler species (cf. Dunkle, 1994). The female is described below.

Female (abdomen broken between segments 3 and 4).— Total length 64; abdomen 50 (incl. app. 1.6); hind wing 41; greatest width of hind wing 11.3; costal edge of stigma in fore wing 4.8.

Head.— Mandibles (except tips), genae and anteclypeus pale brownish-yellow. Labrum and postclypeus brown-yellow. Vertical part of frons brown. Superior surface of frons brown-yellow for its anterior half, brown for its basal half. Vertex reddish-brown. Occipital plate dark green. Labium and adjacent mouth parts pale yellow. Frontal margin of middle lobe of labium slightly concave.

Thorax.— Pterothorax brown with grass-green stripes, its colour pattern of the usual type with the first pale antehumeral stripe not connected with the pale mesothoracic "half collar" nor with the second pale antehumeral stripe.

Legs.— Femora brown but inner side of first pair of femora green. Spines on anterior side of hind femur very short. Tibiae, tarsi and claws dark brown.

Wings.— Clear. Venation dark brown including frontal margin of costa. Stigma brown-yellow. Basal subcostal cross-vein present. Supratriangle in left hind wing two-celled, in other wings three-celled. Subtriangle in hind wings open, in fore wings three-celled. Discoidal triangle in hind wings two-celled, in fore wings three-celled with the dividing cross-veins tri-radiate from the centre. Nodal index 17:21-22:17/18:16-17:18. Second primary antenodal cross-vein the sixth in left hind wing, the seventh in other wings. Trigonal interspaces starting with three cells against triangle followed by two rows of cells. Area behind Cu2 of hind wings five to seven cells wide.

Abdomen.— Notably widened on segments 7 to 9. Predominantly brown, the basal segment with yellow markings. Segments 8 and 9 dark brown on dorsum. Lateral exfoliations of segments 8 and 9 orange and equal in width (0.2 wide). Vulvar lamina very resembling that of *A. producta* from Rio Grande do Sul (Belle, 1992b: fig. 19). Segment 10 brown on dorsum, the dorsal apical rim about one-sixth the segment's length. Venter of segments 8 to 10 orange. Anal appendages brown. Middorsal length of segments 7, 8, 9 and 10 approximately in ratio 15:10:5:4, with the stylets 4 on the same scale. Vulvar lamina shaped as shown in figure 31.

Gomphoides perdita (Förster, 1914)
(figs 10, 20, 29)

Material.— Brazil: State of Paraná, Ponta Grossa, ii.1952, 1 ♀, F. Justus Jr leg., CM.

The female of this species has not been described. The present specimen fits fairly well the description of the male holotype.

Female (hitherto unknown; teneral and much broken; right hind wing and one anal appendage broken away).— Total length about 65; abdomen 46 (excl. app. 3); hind wing about 43; costal edge of stigma in fore wing 6.

Head.— Face pale yellow. Superior surface of frons largely yellow, brown along base. Vertex brown. Occipital plate yellow, its surface bulging and undulating, its posterior ridge slightly convex and very densely fringed with long pale yellow hairs (fig. 20).

Thorax.— Prothorax brown. Pterothorax yellow with brown stripes, its colour pattern shaped as shown in figure 10.

Legs.— Each leg with yellow coxa and trochanter. Femora yellow, becoming brown to knee. Spines of outer anterior row of hind femur two-fifths as long as diameter of femur. Tibiae, tarsi and claws brown.

Wings.— With brown-yellow tinge in cubito-anal, midbasal, antenodal and postnodal interspaces, and at base of sectors of arculus. Venation brown but cross-veins on anterior parts of wings more or less brown-yellow, the frontal margin of costa bright yellow to proximal end of stigma, the latter yellow. Basal subcostal cross-vein present. Second primary antenodal cross-vein the seventh. Nodal index 12:20-19:11/12:15-?:?. Intermedian index 9-10/6-?. Supratriangles two-celled. Subtriangles three-celled with the dividing cross-veins tri-radiate from the centre. Discoidal triangle in right fore wing five-celled, in other wings three-celled. Anal loop of hind wing four-celled.

Abdomen.— Predominantly yellow and annulated with brown. Segment 1 brown between yellow middorsal area and yellow sides. Segments 2 to 7 with brown supplementary transverse carina and a brown posterior marking. This marking extending on dorsum to midway of segment 2, becoming successively shorter on rear segments, occupying apical one-fourth of segment 7. Posterior brown marking on segment 8 triangular and reaching to near base of segment. Segment 9 with a large brown dorsal marking reaching from base to apex of segment. Segment 10 entirely yellow. Stylets yellow, the extreme tips black. Middorsal length of segments 7, 8, 9 and 10 approximately in ratio 27:17:11:11, with the stylets 15 on the same scale. Vulvar lamina deeply excised U-shaped for nearly whole length of lamina (fig. 29), the tip of the lobes pointed downward.

Idiogomphoides demoulini (St. Quentin, 1967)

Material.— Brazil: State of Paraná, Caviuna, xii.1945, 1 ♀, ex coll. A. Maller [Frank Johnson donor], FSCA.

This second recorded female of this apparently rare species is a fully mature individual in perfect condition. It has a somewhat denser reticulation than the female allotype. The nodal index is 11:22-22:11/12:19-16:14. The supratriangle in the fore wings is three-celled, in the hind wings two-celled. The subtriangle in the fore and hind wings is four-celled. The discoidal triangle in the fore wings is five-celled, in the hind wings four-celled.

Idiogomphoides ictinia (Selys, 1878)
(figs 6, 19)

Material.— Brazil: State of Espirito Santo, Conceição da Barra (61), 15-21.iv.1968, 1 ♀, Paulo Elias leg., MNRJ.

The female of this rare species differs from that of the preceding one in the following particulars: 1, size smaller: abdomen 48 (incl. app. 3.3), hind wing 43; in *I.*

demoulini, abdomen 56 (incl. app. 3.8), hind wing 46; 2, pterostigma dark brown and long (costal edge of stigma in fore wing 5.9), in *I. demoulini*, yellowish and shorter (-costal edge of stigma in fore wing 4); 3, occipital transverse ridge almost straight (fig. 19), in *I. demoulini*, undulate; 4, second pale antehumeral stripe strongly reduced, in *I. demoulini*, well developed; 5, branches of vulvar lamina notably more slender than in *I. demoulini*.

Only two females of *I. ictinia* are known. They have been collected in the (eastern) coastal region of Brazil. Both have the same dimensions but there is a striking colour-heteromorphism discernible in the wings, reason to consider the present female as belonging to a colour variation, here named var. *radiata* nov. The holotype of *Idiogomphoides ictinia* (from Pernambuco) has clear wings. Var. *radiata* nov. has wings with a conspicuous brownish-yellow band extending from base to stigma. At the base the wing is coloured in the cubito-anal, midbasal and antenodal interspaces, and beyond the nodus only coloured between the costa and R1.

It is not improbable that, when the males of these two forms are known, var. *radiata* nov. will be found to belong to a subspecies of or even to a species distinct from nominate *Idiogomphus ictinia* since females of closely allied gomphids often possess no or hardly determinable internal structural differences.

Idiogomphoides emmeli spec. nov.
(fig. 7)

Material.— Brazil: State of Rondônia, 16 km W of Fazenda Rancho Grande on C-20, Rio Pardo x Linea C-20, near Cacaulandia (elev. 500 ft), 14.xi.1990, 1 ♀ (holotype), T.C. Emmel leg., FSCA.

This species is closely related to *Idiogomphoides ictinia* (Selys). It has the same dimensions but is a darker species. The only specimen available is a female which is distinguished from that of *I. ictinia* by the following particulars: 1, costa entirely black; in *I. ictinia*, with yellow frontal margin; 2, wings with a coloured costal band that is broader than in var. *radiata* nov. and that extends to the apex of the wings, the tip of the wings being coloured as well; in *I. ictinia*, the tip of the wings is clear; 3, face cross-striped with blackish-brown i.e. base of labrum, anterior border of postclypeus and vertical part of frons blackish-brown; in *I. ictinia*, these markings are weakly developed and partly undefined; 4, middle lobe of labium is about twice as wide as it is long midventrally (fig. 7); in *I. ictinia*, about one and a half times (fig. 6); 5, vertical part of frons higher than in *I. ictinia*. In the middle about three-fifths of the height of the postclypeus; in *I. ictinia*, about two-fifths; 6, anal appendages (cerci) longer than in *I. ictinia*. Lengths of abdominal segment 10 and anal appendages approximately in the ratio 5:9; in *I. ictinia*, approximately in the ratio 5:7.

The wings have a somewhat denser reticulation. For instance, the supratriangle has generally two cross-veins and sometimes three; in *I. ictinia*, generally one cross-vein and sometimes two cross-veins.

Female (holotype).— Total length 65; abdomen 48 (incl. app. 3.6); hind femur 6.5; hind wing 42; costal edge of stigma in fore wing 5.8.

Head.— Face yellow, the following dark brown: vertical part of frons, a broad anterior band on postclypeus, and a large basal spot on labrum. Anterior surface of frons yellow for its anterior three-fifths, the basal two-fifths dark brown. Vertex

brown, becoming brown-yellow at occipital plate, the latter dark brown.

Thorax.— Prothorax dark brown. Pterothorax dark brown with yellow markings, its colour scheme shaped as in *I. ictinia* (cf. St. Quentin, 1967: fig. 1a).

Legs.— Second and third femora with brown-yellow dorsal side and dark brown ventral side. First femora brown with yellow ventral side. Tibiae, tarsi and claws black.

Wings.— From base to nodus brown coloured between costa and M4, from nodus to stigma brown coloured between costa and M1, and tip also brown coloured. Venation and stigma dark brown. Subcosta prolonged beyond nodus, one cell long, but in left hind wing not prolonged. Nodal index 11:24-24:12/14:17-17:12. Second primary antenodal cross-vein the seventh in fore wings, the sixth in hind wings. Intermedian index 15-13/8-8. Supratriangle in right fore wing four-celled, in other wings three-celled. Subtriangle in four wings four-celled, in hind wings three-celled. All discoidal triangles three-celled. Anal loop in hind wings four-celled. Area behind Cu2 of hind wings five cells wide.

Abdomen.— Predominantly dark brown, the segments with (obscured) yellow side spots but segment 10 almost black. Anal appendages (stylets) black but apical three-fifths of upper part yellow; the stylets are unusually long, conical and very acute. Segments 8 and 9 with yellow ventral tergal margins. Middorsal length of abdominal segments 7, 8, 9 and 10 approximately in ratio 25:18:12:10, with the stylets 16 on the same scale.

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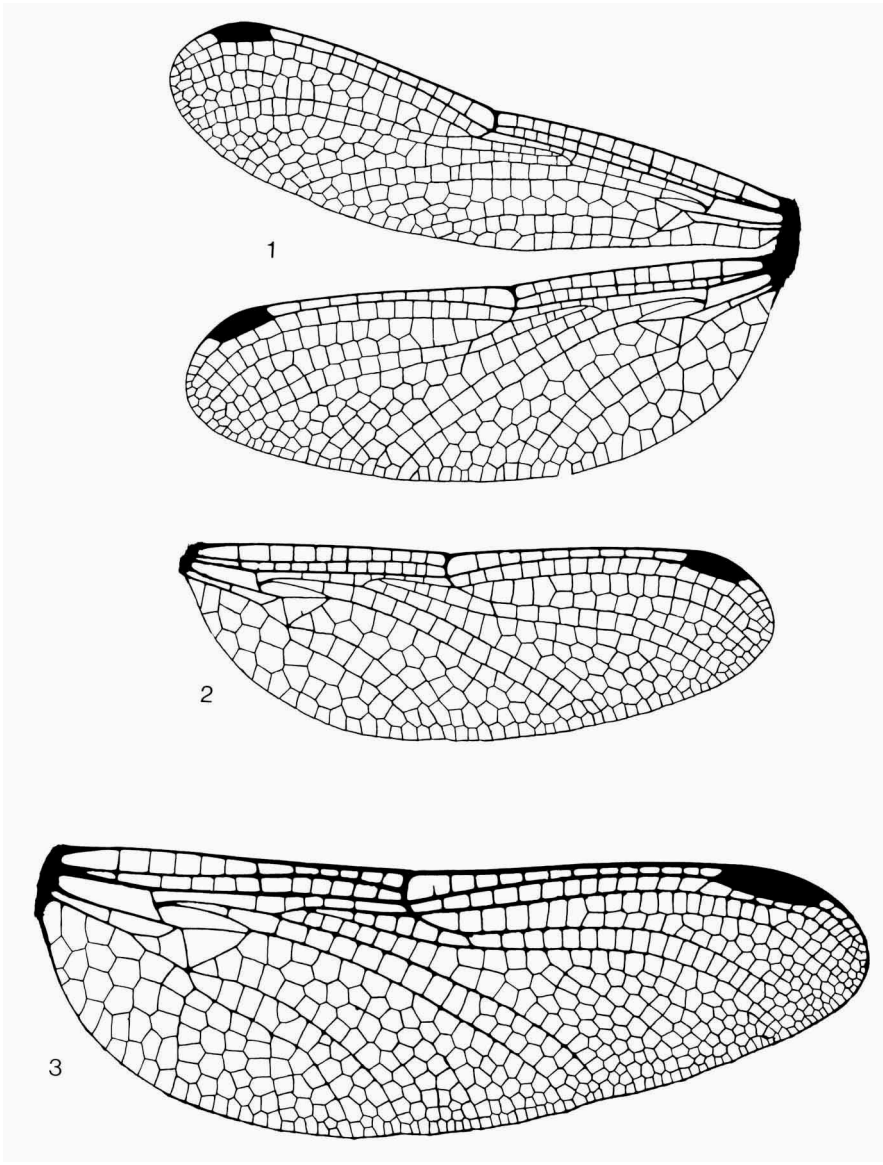

Figs 1-2. *Anomalophlebia nitida* spec. nov., ♀, holotype; 3. *Praeviogomphus proprius* spec. nov., ♀, holotype. 1, left pair of wings; 2, 3, right hind wing.

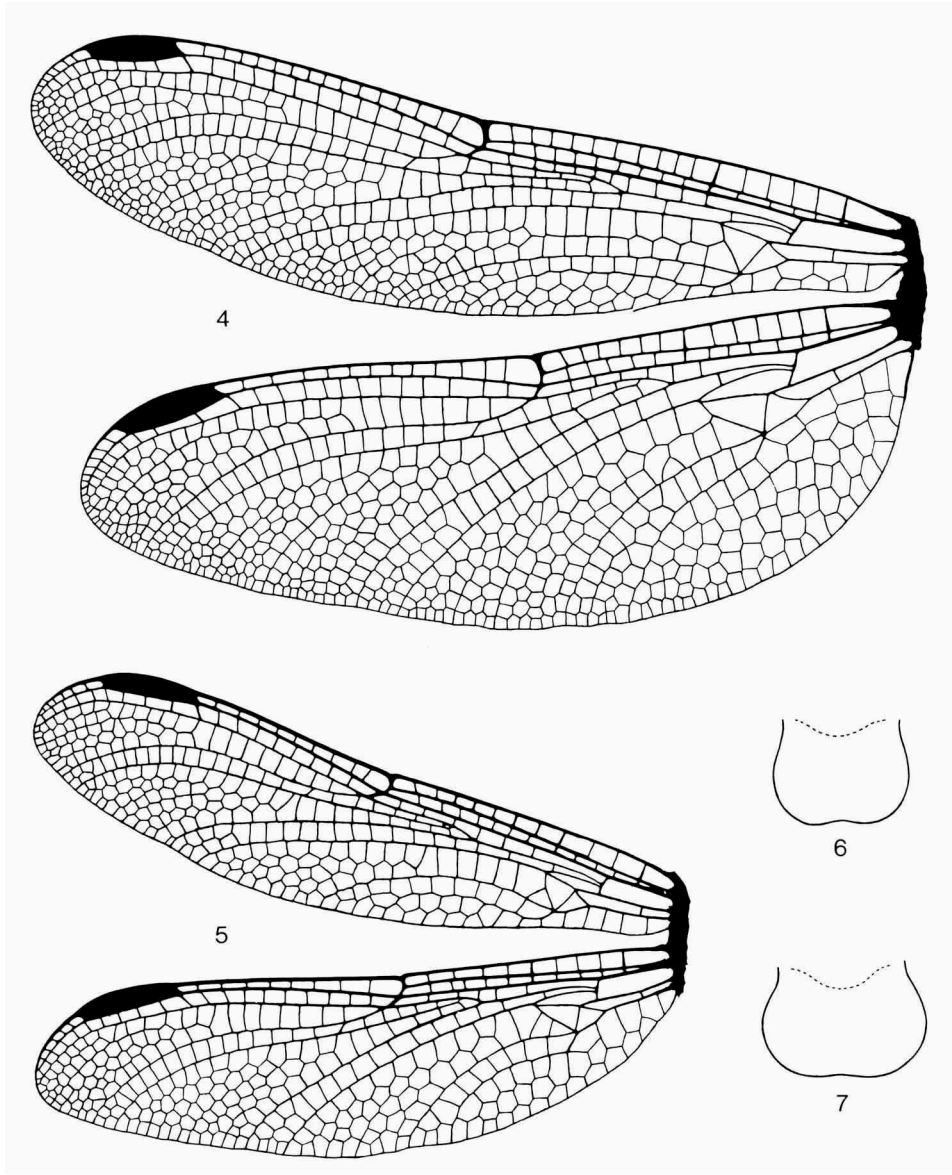

Fig. 4, *Praeviogomphus proprius* spec. nov., ♀, holotype; 5, *Brasiliogomphus uniseries* spec. nov. ♀, holotype; 6, *Idiogomphoides ictinia* (Selys), ♀, holotype; 7, *Idiogomphoides emmeli* spec. nov., ♀, holotype. 4-5, left pair of wings; 6-7, middle lobe of labium, ventral aspect.

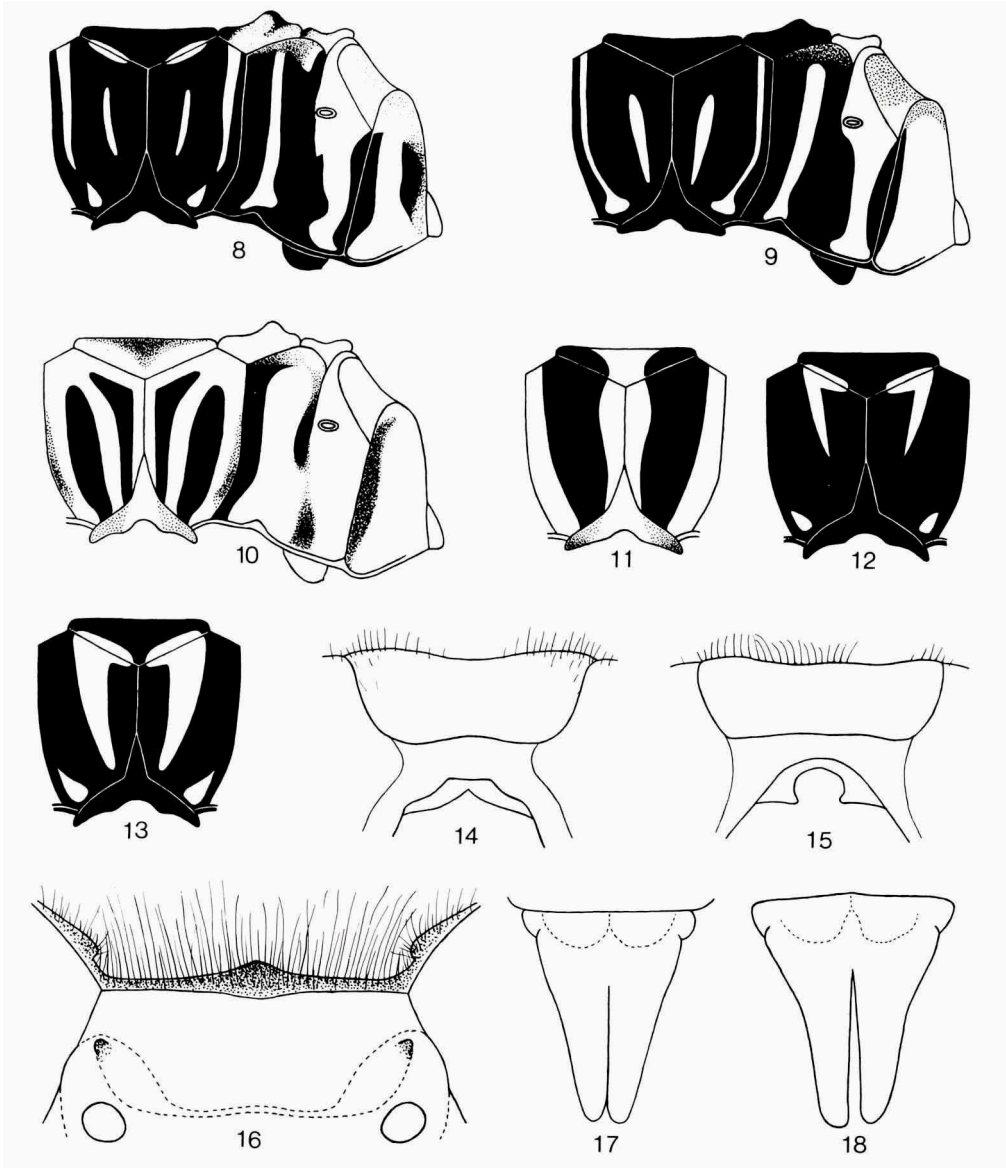

Fig. 8, *Anomalophlebia nitida* spec. nov., holotype; 9, 16, *Praeviogomphus proprius* spec. nov., holotype; 10, *Gomphoides perdita* (Förster), first described ♀; 11, 14, *Brasiliogomphus uniseries* spec. nov., holotype; 12, *Progomphus pijpersi* Belle; 13, *Progomphus* spec. indet.; 15, *Tibiagomphus uncatus* (Fraser); 17-18, *Diaphlebia nexans* Calvert, 17, first described ♀; 18, ♂ from MNRJ. 8-10, diagram of pterothoracic colour pattern of ♀; 11-13, diagram of colour pattern of pterothoracic dorsum of ♀; 14-15, central upper part of rear of head of ♀, caudal aspect; 16, top of head, dorsal aspect; 17-18, vulvar lamina.

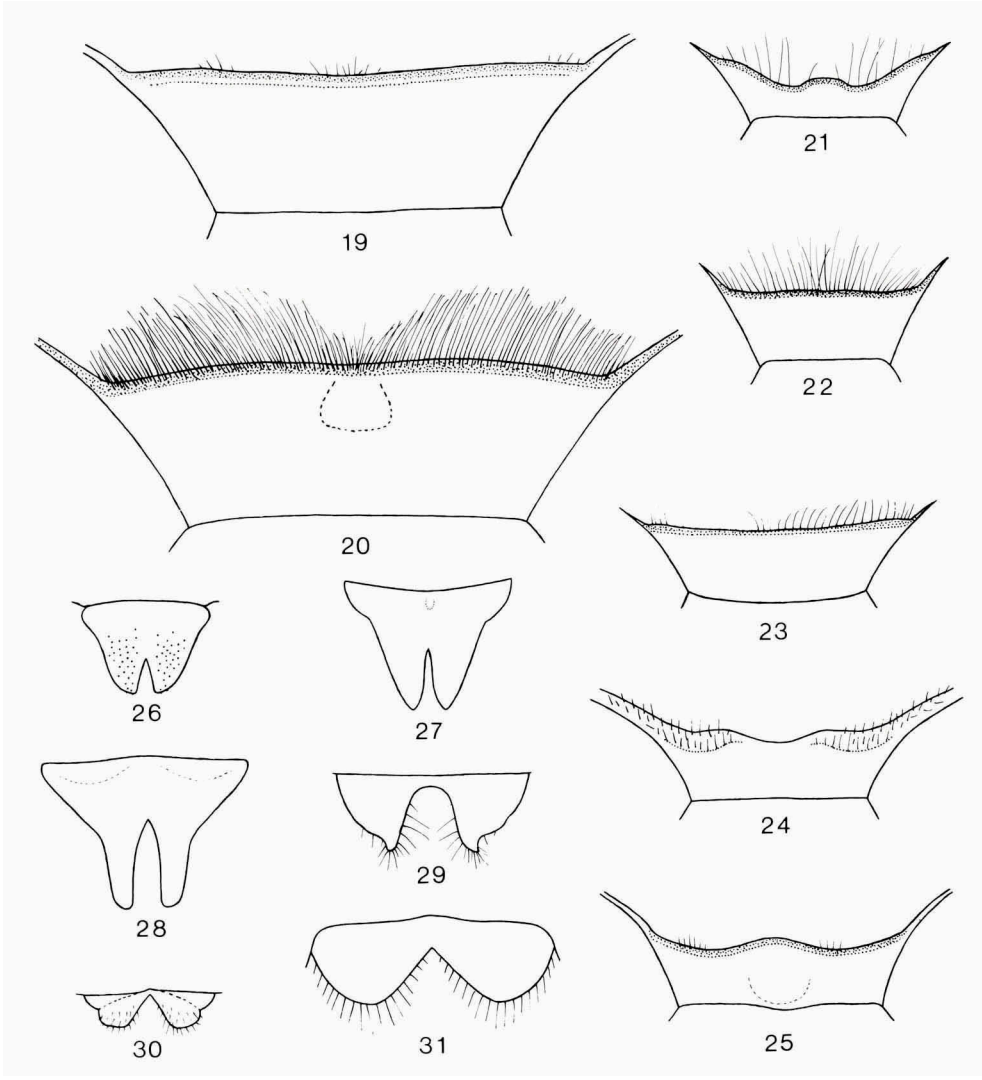

Fig. 19, *Idiogomphoides ictinia* (Selys), holotype; 20, 29, *Gomphoides perdita* (Förster), first described ♀; 21, 26, *Anomalophlebia nitida* spec. nov., holotype; 22, 30, *Progomphus* spec. indet.; 23, *Tibiagomphus uncatus* (Fraser); 24, 27, *Brasiliogomphus uniseries* spec. nov., holotype; 25, *Diaphlebia nexans* Calvert, first described ♀; 28, *Praeviogomphus proprius* spec. nov., holotype; 31, *Aphylla* spec. indet. 19-25, occipital plate of ♀, dorsal aspect; 26-31, vulvar lamina, ventral aspect.