

ON *DIAPHLEBIA* SELYS, 1854 FROM CENTRAL AMERICA  
(ODONATA: GOMPHIDAE)

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Two species of *Diaphlebia* Selys from Central America are placed on record, one of which is new and herein described under the specific name *pallidistylus*, the other conspecific with Selys' *paucinervis*. On account of the characters found in these species a proposal to subdivide the genus *Diaphlebia* into three subgeneric groups *Diaphlebia* s. str., *Desmogomphus* Williamson, and *Perigomphus* subgen. nov. is made.

INTRODUCTION

The genus *Diaphlebia* Selys shows superficially a striking resemblance to *Epigomphus* Hagen in Selys, but is readily distinguished from it by the following characteristics:

In both sexes:

- (1) Basal subcostal cross-vein usually absent; usually present in *Epigomphus*.
- (2) Brace vein of pterostigma present; absent in *Epigomphus*.

In the male:

- (3) Anal triangle in hind wing present; absent in *Epigomphus*.
- (4) No differentiation in certain spines on tibiae and tarsi; third tibiae and first two joints of third tarsi with the spines of the antero-inferior row much shorter than those of postero-inferior row and blunt at tip in *Epigomphus*.

In the female:

- (5) Auricles of second abdominal segment absent; present in *Epigomphus*.
- (6) Lamina supra-analis small; markedly enlarged in *Epigomphus*.

In 1920 WILLIAMSON established the genus *Desmogomphus*. Although most nearly related to *Diaphlebia* it is at once separated from it by the relatively

shorter pterostigma (in hind wing about one-eighth the wing length; about one-sixth in *Diaphlebia*), and in having the posterior border of the hind wing in the male of the usual form and not excavated basally as in *Diaphlebia* (and correlated with this feature the hind wing in the male has three postanal cells; only two in *Diaphlebia*).

Williamson's second character for distinguishing these two genera does not hold, for in the new material of *Desmogomphus paucinervis* from Central America the front wings possess a single row of cells behind vein Cu2 in the male but one or two rows of cells behind vein Cu2 in the female.

It is to be remembered that only a single male of *Desmogomphus tigrivensis* served WILLIAMSON (1920) for the definition of the genus *Desmogomphus*. Some features in the female of this species fail to conform to some other venational characters of the genus as listed by Williamson (cf. BELLE, 1972). In this female the second primary antenodal cross-vein in the left front wing is the sixth, the trigonal interspace in the right hind wing starts with four cells against the triangle, and the proximal angle of the subtriangle in the front wings is slightly before the arculus as is usually the case in *Progomphus* Selys. In the three females of *Desmogomphus paucinervis* the anterior side of the triangle in the front wings is not "slightly the shortest".

KLOTS (1944) suggested that the hooking of the vein tips in the wings of *Diaphlebia* is possibly a good distinguishing character. But in the wings of the females the author found five to six paranal cells in *Desmogomphus*, only four in *Diaphlebia*, and in the males studied the superior caudal appendages are forcipate in *Desmogomphus*, almost straight in *Diaphlebia*.

Nevertheless the generic definition of *Desmogomphus* remains based on minor characters only, and the question arises whether *Desmogomphus* must be considered as a distinct genus or as a subgeneric group of *Diaphlebia*. In this connection the discovery of a new species somewhat intermediate between *Diaphlebia* and *Desmogomphus* is of first importance as it justifies a subdivision of the genus *Diaphlebia* into three subgenera, one of which is *Desmogomphus*.

I. Subgenus *Diaphlebia*: Type species of the genus and subgenus *angustipennis* Selys, 1854, from Brazil (Amazon). Associated with it are *semilibera* Selys, 1869, from Brazil (Amazon), and *nexans* Calvert, 1903, from Brazil (Chapada).

II. Subgenus *Desmogomphus*: Type species of the subgenus *tigrivensis* Williamson, 1920, from Guyana. Associated with it is *paucinervis* (Selys), 1873, from Colombia (Bogota), Panama, Costa Rica, and Nicaragua.

III. Subgenus nov. *Perigomphus*: Type species of the subgenus *pallidistylus* spec. nov., from Costa Rica, described in this paper.

*Perigomphus* agrees with *Diaphlebia* s. str. and differs from *Desmogomphus* in having the male superior caudal appendages almost straight but differs from *Diaphlebia* s.str. and agrees with *Desmogomphus* in having the tip of the wings not blunt and in having the base of the hind wings in the male of the usual form.

Other subgeneric characters of *Perigomphus* (derived from two males only) which are different from those of *Diaphlebia* s. str. and *Desmogomphus* are: stigma in hind wing one-seventh the wing length; male anal triangle in hind wing two-celled; triangles always open; second anal interspace in hind wing of male starting anteriorly with a single row of (enlarged) cells; top of head round, without a ridge or a line of hairs to mark the place of the usual crest; inferior caudal appendage of male stout, the branches widely divaricate: no trace of a lamina tibialis on anterior tibiae.

Our future knowledge of the larva of the diverse species may corroborate the validity of this subdivision. At present only the larva of *Desmogomphus tigrivenis* is known. It has been described in 1970 by the author.

### *DIAPHLEBIA (DESMOGOMPHUS) PAUCINERVIS* (SELYS)

Figures 1-11

*Progomphus paucinervis* SELYS, 1873:762-763 (34-35 sep.); 503 (59 sep.).

*Desmogomphus paucinervis* BELLE, 1970:31-32, pl. 5b.

Material. — C o l o m b i a : Bogota, 1 ♀ (holotype, Institut Royal des Sciences Naturelles, Brussels). — N i c a r a g u a : Chontales, La Flor, rt. 7, km. 159,4 miles west Acoyapa jct., 29.VII.1967, 1 ♂, O.S. FLINT, Jr. & M.A. ORTIZ B. — P a n a m a : Canal Zone; Pipeline Road, Rio Agua Salud, 8-13.VII.1967, 1 ♀, O.S. FLINT, Jr. & M.A. ORTIZ B. (National Museum of Natural History, Washington, D.C.). — C o s t a R i c a : Prov. Limón, Guápiles (in forest, 1000'), 6.VII.1969, 1 ♀, M.J. and D.N. WESTFALL (Florida State Collection of Arthropods, Gainesville).

This rare species was hitherto represented only by a single female taken at Bogota, Colombia. The holotype is in poor condition, very teneral, broken, and entirely crushed. The measurement of the abdomen 31 mm as given by Selys is incorrect. The segments of the restored abdomen are partly incomplete. In fact the abdomen is longer, probably 35 mm.

The female from Costa Rica is an old specimen in good condition. The female from Panama is teneral, partly shriveled, and broken, the head crushed. The corresponding male from Nicaragua is a more fully mature specimen but incomplete, missing the head.

Male (hitherto undescribed; somewhat teneral; head lost). — Abdomen 34 mm; hind wing 25 mm; width of hind wing at nodus 6.6 mm; costal edge of pterostigma in front wing 2.8 mm, in hind wing 3.0 mm.

Prothorax brown, with a greenish-yellow middorsal twin-spot.

Pterothorax brown with greenish-yellow stripes; its colour design shaped as shown in Figure 4.

Legs brown, pale on outer tibial side (third tibiae on basal half only). Lamina

tibialis of first tibiae a mere rudiment being about one-fifteenth the tibial length. Tarsi blackish. Third tarsus without claws about two-thirds the length of third tibia. Subapical tooth of claws more distal than in *Desmogomphus tigrivensis*.

Abdomen predominantly dark brown, becoming blackish on apical segments, marked with tawny yellow as follows: Sides of segments 1 and 2 largely marked, sides of segment 3 with an elongated basal spot extending to middle of segment; segment 4 to 7 with an annular basal spot, the one on 7 largest, covering the basal one-fourth of the dorsum. Ventral tergal margins of segment 8 and 9 unexpanded. Accessory genitalia and caudal appendages shaped as shown in accompanying figures. Hamules brown. Anterior hamule resembling that of *tigrivensis* but apical projection larger and straight. Penis slender, the third segment terminating in two very long flagellae. Tip of penis guard medially deeply V-shaped excised. Hood of penial peduncle blackish brown. Ventral tergal margins of segment 2 denticulated at level of posterior hamules. Superior caudal appendages forcipate, round externally, concave on inner side, pale yellowish but blackish at tip and at extreme base. Inferior caudal appendage also pale but blackish at tip of branches and at extreme base. Anal tubercles blackish, terminating in a point.

Wings hyaline, venation dark brown including frontal margin of costa. Pterostigma dark brown, covering 4 - 4½ cells. Antenodal and postnodal cross-veins of first series 9:17-16:10/10:13-12:10 in front and hind wings, respectively. Triangle in front wings open, in hind wings two-celled. First anal interspace about half, and third anal interspace about two-thirds the width of second anal interspace. Five paranal cells and three postanal cells in each hind wing, the fifth paranal cell is the first postanal cell. Two rows of cells behind Cu2 in hind wings.

Female. — Description of female from Costa Rica: Abdomen 35.5 mm; hind wing 29.5 mm; width of hind wing at nodus 8.0 mm; costal edge of pterostigma in front wing 3.2 mm, in hind wing 3.7 mm.

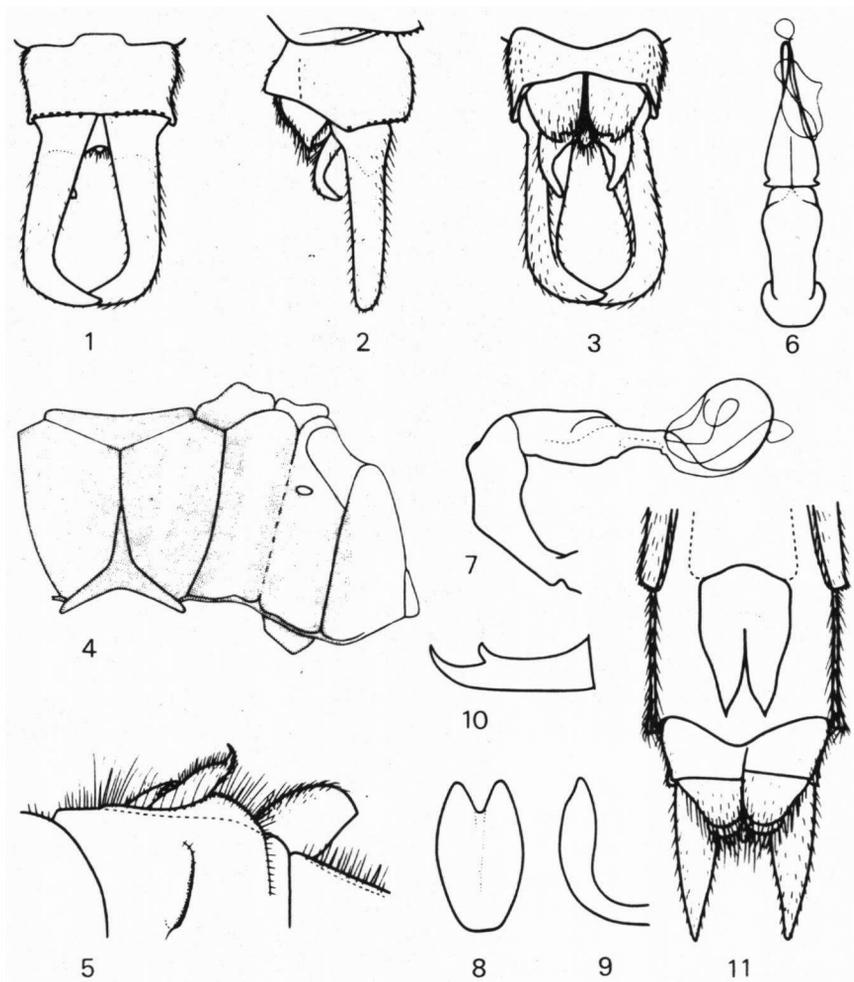
Labrum dark brown with a symmetric pair of more or less crescent-shaped pale (green) spots. Mandibles dark brown on apical half, pale on basal half. Anteclypeus largely pale. Postclypeus dark brown, laterally pale. Frons dark brown, its superior surface with a symmetric pair of large pale spots. Vertex dark brown, high behind ocelli. Top of head dark brown, its posterior margin slightly concave and fringed with brown hairs. Occipital ridge low. Rear of head dark brown. Labium and adjacent mouth parts pale.

Coloration of thorax, abdomen and legs similar to male but extent of pale markings on basal segments of abdomen larger.

Caudal appendages pale, blackish at extreme base, straight and conical.

Wings brownish. A basal subcostal cross-vein present in left hind wing.

The teneral female from Panama is much smaller; its measurements are: Abdomen 31 mm; hind wing 25 mm; width of hind wing at nodus 7.0 mm; costal edge of pterostigma in front wing 3.0 mm, in hind wing 3.2 mm.



Figs. 1-11. *Diaphlebia (Desmogomphus) paucinervis* (Selys): (1) tenth abdominal segment and caudal appendages of male, dorsal view; - (2) the same, left lateral view; - (3) the same, ventral view; - (4) diagram of pterothorax of male; - (5) accessory genitalia of male, right lateral view; - (6) tip of penis, ventral view; - (7) the same, right lateral view; - (8) penis guard, frontal view; - (9) the same, right lateral view; - (10) third tarsal claw of male; - (11) apical segments of abdomen of female from Costa Rica, ventral view, showing vulvar lamina.

The following intraspecific differences in the wings between the specimens from the diverse localities are noteworthy:

(1) The Central American females have two extra cubito-anal cross-veins in the front wings and one extra cubito-anal cross-vein in the hind wings. The male from Nicaragua has one extra cubito-anal cross-vein in the front wings and no extra in the hind wings but in the left hind wing there is an undeveloped extra cubito-anal cross-vein. The holotype has no extra cubito-anal cross-veins. Apparently the tendency to have extra cubito-anal cross-veins is greater in the specimens from Central America.

(2) The second primary antenodal cross-vein is the seventh or the eighth in the female from Panama; the sixth in the female from Costa Rica; the sixth or the seventh in the male from Nicaragua; the fifth or the sixth in the holotype.

(3) The pterostigma in the front wings is slightly longer than one-third the distance from nodus to stigma in the female from Panama; slightly shorter in the female from Costa Rica and the holotype.

(4) The front wings of the holotype have a single row of cells in the anal field and in the area behind vein Cu2. This is also the case in the male from Nicaragua. The female from Panama has a doubled cell in the anal field of the left front wing. The female from Costa Rica has two rows of cells behind vein Cu2 of the front wings.

(5) The anal area in the hind wings of the female from Panama and the holotype is four cells wide distally (with the anterior postanal cell divided); of the female from Costa Rica and the male from Nicaragua three cells wide distally (with the anterior postanal cell not divided).

(6) The Central American specimens have the triangle in all hind wings two-celled. The holotype has the triangle in the left hind wing open, in the right hind wing two-celled.

*DIAPHLEBIA (PERIGOMPHUS) PALLIDISTYLUS* SPEC. NOV.

Figures 12-20

Material. — Costa Rica: Prov. Guanacaste, Quebrada Azul, 2.5 miles west of Tiliran, 24.VII.1967, 1 ♂ O.S. FLINT, Jr & M.A. ORTIZ B. (holotype, National Museum of Natural History, Washington, D.C.); 2.6 miles NW of Tiliran, 1400', 28.VII.1967, 1 ♂, D.R. PAULSON (paratype, University of Washington, Seattle).

Male (holotype). — Abdomen 33 mm; hind wing 26 mm; width of hind wing at nodus 7.5 mm; costal edge of pterostigma in front wing 3.0 mm, in hind wing 3.7 mm.

Face black with bluish green markings as follows: Labrum entire except frontal margin and base; postclypeus in middle and laterally; antero-superior surface of frons laterally. Vertex, top and rear of head black. Top of head round

and hairy. Labium brown with black free border. Adjacent mouth parts brown, black antero-internally, pale greenish laterally.

Prothorax with frontal lobe yellow, otherwise dark brown.

Pterothorax blackish brown with green stripes, its colour design shaped as shown in Figure 15.

Legs rather slender, brown, the inner side of first two pairs of femora greenish. Spines on posterior femora very long, the longest spines nearly the diameter of the femur. Third tarsus without claws four-sevenths the length of third tibia. Subapical tooth of claws nearly in middle of claw as in *Desmogomphus tigrivensis*.

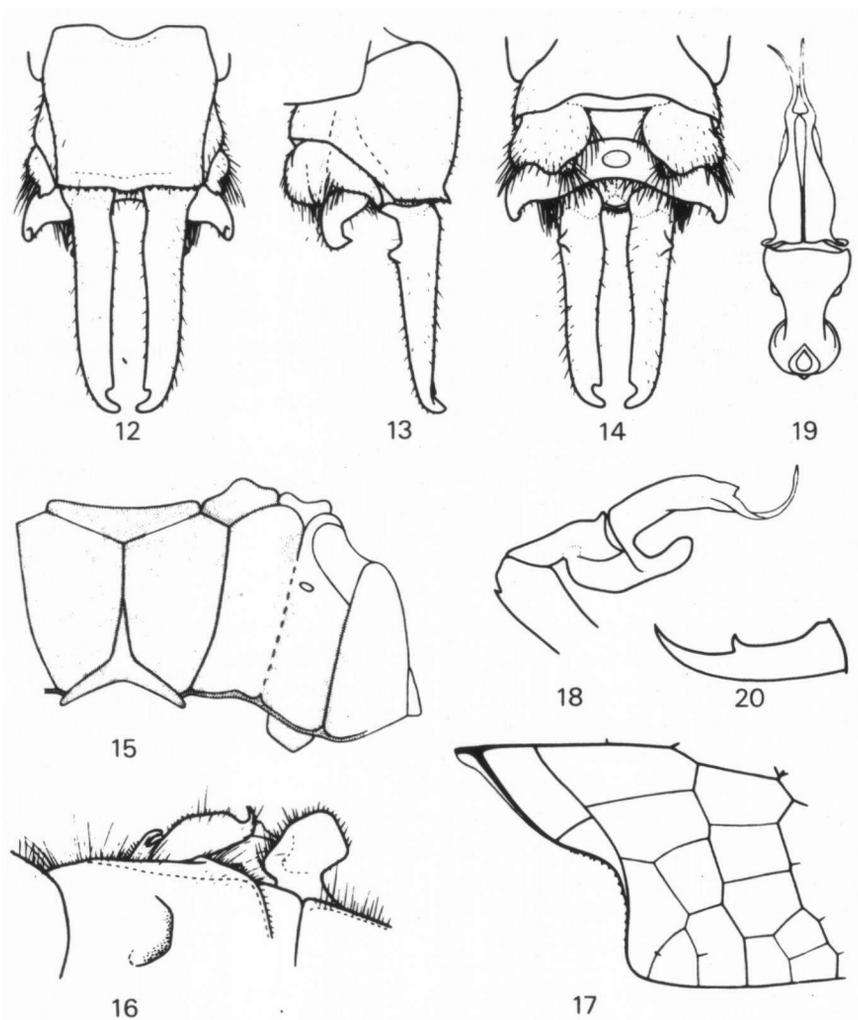
Abdomen dark brown on basal segments including accessory genitalia, becoming black on apical segments including inferior caudal appendage and anal tubercles. Segment 2 with a narrow yellowish middorsal stripe on apical half of segment. Superior caudal appendages pale yellowish. blackish at extreme base. Ventral tergal margins of segments 8 and 9 unexpanded. Accessory genitalia and caudal appendages shaped as shown in Figures 12-14 and 16. Anterior hamule small. Posterior hamule large. Penis with a blunt superior tooth on third segment, its tip terminating in two short flagellae. Tip of penis guard evenly convex, without median excision. Anal tubercles of very peculiar form, laterally developed and applied against inferior caudal appendage, and with a superior externo-lateral tooth.

Wing brownish, its venation dark brown including frontal margin of costa. Pterostigma brown, covering  $3\frac{1}{2}$  -  $4\frac{1}{2}$  cells. Antenodal and postnodal cross-veins of first series 12:16-16:11/10:10-11:10 in front and hind wings, respectively. Second primary antenodal cross-vein the sixth in hind wings, the seventh in front wings. Trigonal interspace in front wings with two rows of cells from triangle outwards, that in hind wings starting with a row of three cells against triangle followed by two rows of cells. Hind wing with first anal interspace three-fifths and third anal interspace only two-fifths the width of second anal interspace. Three paranal cells in each hind wing. Four postanal cells in right hind wing, five in left hind wing. Hind wings three to four cells wide behind Cu2. Membranule very narrow.

The paratype male lacks the penis. It is a younger specimen. The pale markings of the face are greenish white. The proximal angle of the subtriangle in the right front wing is slightly before the arculus.

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Figs. 12-20. *Diaplebia (Perigomphus) pallidistylus* spec. nov.: (12) tenth abdominal segment and caudal appendages of holotype male, dorsal view; - (13) the same, left lateral view; - (14) the same, ventral view; - (15) diagram of pterothorax of holotype male; - (16) accessory genitalia of holotype male, right lateral view; - (17) anal field of left hind wing of holotype male (transposed); - (18) tip of penis of holotype male, right lateral view; - (19) the same, ventral view; - (20) third tarsal claw of holotype male.

## REFERENCES

- BELLE, J., 1970. Studies on South American *Gomphidae* with special reference to the species from Surinam. Stud. Fauna Suriname 11: 1-158, figs. 1-264, pls. 1-21.
- BELLE, J., 1972. Further studies on South American *Gomphidae*. Tijdschr. Ent. 115. (In press).
- CALVERT, P.P., 1903. On some American *Gomphidae*. Ent. News 14: 183-192, pl. 8.
- CALVERT, P.P., 1920. The Costa Rican species of *Epigomphus* and their mutual mating adaptations. Trans. Amer. Ent. Soc. 46: 323-354, pls. 13-15.
- KLOTS, E.B., 1944. Notes on the *Gomphinae* (Odonata) with descriptions of new species. Am. Mus. Novit. 1259: 1-11, figs. 1-19.
- NEEDHAM, J.G., 1940. Studies on neotropical gomphine dragonflies. Trans. Amer. Ent. Soc. 65: 363-394, pls. 20-22.
- SELYS LONGCHAMPS, F. de, 1854. Synopsis des Gomphines. Bull. Acad.r. Belg. (2) 21: 23-112 (3-93 sep.).
- SELYS LONGCHAMPS, F. de. 1878. Quatrièmes Additions au Synopsis des Gomphines. Bull. Acad.r. Belg. (2) 46: 408-698 (1-106 sep.).
- SELYS LONGCHAMPS, F. de & H.A. HAGEN, 1858. Monographie des Gomphines. Mem. Soc. r. Sci. Liège 11: 257-720 (viii + 460 sep.), 23 pls., 5 tabs.
- WILLIAMSON, E.B., 1920. A new gomphine genus from British Guyana with a note on the classification of the subfamily (Order Odonata). Occ. Pap. Mus. Zool. Univ. Mich. 80: 1-12, pl. 1.