Notes on three species of Cyanogomphus Selys, 1873 (Odonata: Gomphidae)

by

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ABSTRACT. — New records of *C. waltheri* Selys, *C. uncatus* Fraser, and *C. minutus* Belle are given. Interspecific differences, and geographic variation of these forms are discussed and elucidated by figures. The female of *C. waltheri* is described.

INTRODUCTION

This paper deals with the three Neotropical species *Cyanogomphus waltheri* Selys, *C. uncatus* Fraser and *C. minutus* Belle which, at this time, were known from only a few individuals and from a small number of localities. The type material of the first two species was investigated. The new material treated here was submitted to me for identification. I have thought it useful to put on record the results of my study of this material, especially with regard to the sometimes most interesting and surprising interspecific differences, and geographic variation encountered.

The following are the sources of the material studied together with the names of those to whose kindness I owe the privilege of examining it: Profesora Dr. Yolanda Petrona de Abenante, Universidad de la República, Montevideo (URM); Mr. Carl Cook, collection Cook, Center (CC); Dr. Georges Demoulin, Institut Royal des Sciences Naturelles de Belgique, Brussels; Dr. Oliver S. Flint, Jr., National Museum of Natural History, Washington, D.C. (MNHW); Professor Dr. Gerhard Jurzitza, collection Jurzitza, Karlsruhe (CJ); Dr. Jean Legrand, Muséum National d'Histoire Naturelle, Paris (MP); Professor Dr. Angelo B.M. Machado, collection Machado, Belo Horizonte (CM); Dr. Janis Rácenis (†), Museo de Biología, Caracas (MBC); Professor Dr. Minter J. Westfall, Jr., Florida State Collection of Arthropods, Gainesville (FSC); and Dr. A. Willink, Instituto Miguel Lillo, San Miguel de Tucumán.

Cyanogomphus waltheri Selys, 1873

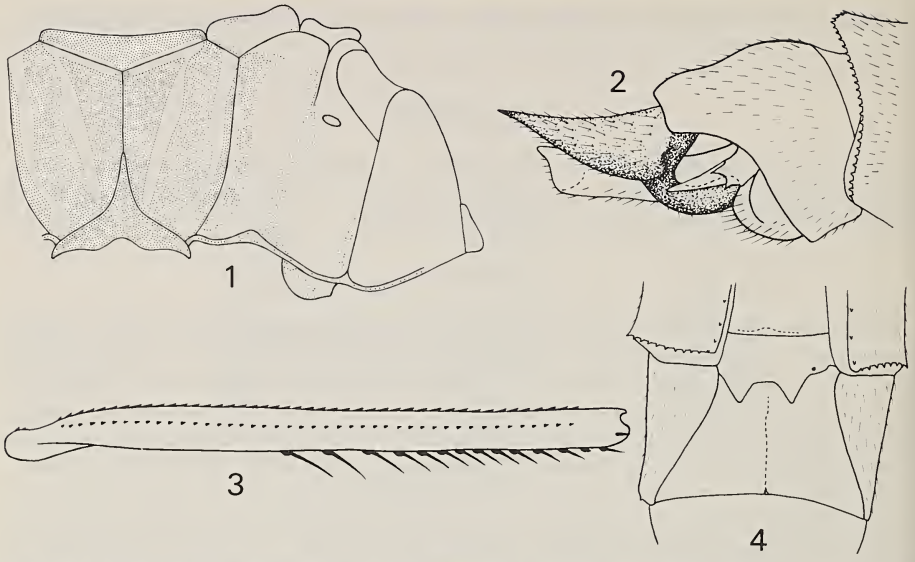
(figures 1-4)

Material. — Argentina: Misiones, Parque Nacional Iguazú, Ñandú, 7.II.1979, 8 ♂ (3 ♂ in author's collection), 8.II.1979, 1 ♂, all G. Jurzitza leg., (CJ). — Brazil: Santa Catarina, 1 ♀, Lüderwaldt leg., (coll. R. Martin 1920, MP); Rio Grande do Sul, no further data, 1♂, (FSC); Goiás, Jatai, I.1955, 2♀, A. B. M. Machado leg., (CM).

This species was described from a single male specimen taken by Walthère de Selys in the botanical garden ("Jardin botanique") of Rio de Janeiro, Brazil.

There are two males of *C. waltheri* in the collection of Edm. de Selys Longchamps at Brussels. One of them bears at the pin the labels "95", "95", "Jardin W.", "Cyanogomphus waltheri S. ♂" (in Selys's handwriting), and "Det. Williamson". This specimen fits the original description in all respects and must be regarded to be the holotype. The type lacks the right branch of the inferior caudal appendage (fig. 2). This was perhaps removed by Williamson in order to study the inferior spur of the superior caudal appendages. The latters were incorrectly pictured by Menger (Williamson 1916: pl. 8, (fig. 3) as in the depiction the superior appendages lack the inferior spur that is typical of the males of the *Agriogomphus* complex. Belle (1970) published a photograph of the right pair of wings of the holotype.

The other male, which was apparently added later to Selys's collection, was labelled "Theresop Fruhst". (doubtless Teresópolis Fruhstorfer) and "'Det. Kennedy". Williamson (1916) published a photograph of its right pair of wings. The venation of the wings of this male is slightly different from that of the type. The fore wings of the holotype have 14 (right) and 15 (left) antenodal cross-veins (cf. Selys, 1873). The male from Teresópolis has 14 antenodal cross-



Figs. 1-4. *Cyanogomphus waltheri* Selys: (1) diagram of pterothorax of holotype male; - (2) tenth abdominal segment and caudal appendages of holotype male, right lateral view, showing inferior spur of superior appendages; - (3) left third tibia of holotype male, left lateral view; - (4) ninth abdominal segment and vulvar lamina, ventral view.

veins in either fore wing. The basal subcostal cross-veins vary in these two males. The type has no basal subcostal cross-vein in the right fore wing and a partly developed one in the right hind wing. The male from Teresópolis has two basal subcostal cross-veins in the left fore wing. This male has also a partly developed extra cubito-anal cross-vein in the left fore wing. The spines of the outer row of the third tibiae and tarsi of the males are slightly modified (fig. 3).

The males from Argentina are forming a remarkably uniform series. They are much smaller than the type (abdomen 31-33 mm; hind wing 23.5-24.5 mm; in the holotype, these measurements are 36 mm and 27 mm, respectively). The first pale antehumeral stripes of the specimens from Argentina are not or hardly connected with the pale collar while all wings have one basal subcostal cross-vein and no extra cubito-anal cross-vein.

The female from Santa Catarina is described below.

Female (hitherto unknown). — Total length 44 mm; abdomen 33 mm; hind wing 28.5 mm; greatest width of hind wing 8.5 mm; costal edge of pterostigma in fore wing 3.4 mm.

Similar to holotype male in stature and general dullness of coloration but abdomen stouter and relatively shorter. Pale (lead-grey) markings on face not so sharply defined as in holotype male and pale (lead-grey) anterior band of frons almost absent (well-developed in holotype male). First pale (dark green) antehumeral stripes not connected with pale (dark green) collar. Abdomen with pale (brownish yellow) basal markings only on segments 1 to 5 (in holotype male on segments 1 to 7). Spines of outer row of third tibiae not modified. Vulvar lamina reaching to a point almost half the way along ninth sternum, its posterior margin widely excised more or less V-shaped (fig. 4). Proportional length of abdominal segments 7, 8, 9, and 10 approximately as 57 : 40 : 21 : 10, with the caudal appendages 14 on the same scale.

Two rows of cells in trigonal interspaces. Fore wings with three rows of cells posterior to Cu2. Hind wings with four (left) and five (right) paranal cells, four postanal cells, and four rows of cells posterior to Cu2. Pterostigma surmounting 4½-5½ cells.

The females from Jataí are smaller than the female from Santa Catarina. Their measurements are: Abdomen 27 mm (middle abdominal segments of smallest female lost); hind wing 24.5-25.5

mm; costal edge of pterostigma of fore wing 2.7-2.9 mm. The pale anterior band of the frons of one of the females is rather well-developed, that of the other female is very weakly developed. The pale antehumeral stripes are hardly connected with the pale collar. The fore wings have two rows of cells posterior to Cu2, with an extra cell for a third row in one of the fore wings of each female. The hind wings have three rows of cells posterior to Cu2, one of the hind wings with an extra cell for a fourth row. One of the females has an extra cubito-anal cross-vein in the hind wings.

Cyanogomphus uncatus Fraser, 1947

(figures 5-13)

Material. — Argentina: Entre Ríos, Arroyo P. Verne, rt. 14, km 355, north of Villa San José, 16.XI.1973, 1 ♂, 6 ♀ (1 ♀ in author's collection), O. S. Flint, Jr. leg., (MNHW); Misiones, Parque Nacional Iguazú, Yacuý, 14.I.1979, 1 ♂; 15.I.1979, 1 ♀, G. Jurzitza leg., (CJ). — Brazil: Santa Catarina, Nova Teutonia, II.1951, 1 ♂, F. Plaumann leg., (CC). — Uruguay: Dept. Florida, Casupá, 20.III.1962, 1 ♂, C. S. Carbonell, P. San Martın, L. Zolessi leg.; Dept. Durazno, Arroyo del Cordobés, 23.I.1967, 1 ♂, F. Achaval leg., (URM).

This species was described on the basis of a single pair from Puerto Bemberg, Misiones, Argentina. The type specimens, which are property of the Miguel Lillo Institut, San Miguel de Tucumán, were kindly lent me for examination. They proved to be seriously damaged and incomplete. I add the data below to the original description.

Holotype male (abdominal segments 4 to 10 lost; left posterior leg and right anterior leg lost; right hind wing beyond triangle lost). — Hind wing 25.5 mm; costal edge of pterostigma in fore wing 3.0 mm.

Anterior ridge of frons, in frontal view, undulate. Transversing occipital ridge distinct, slightly concave in middle and fringed with hairs. No first pale antehumeral stripes. Second pale antehumeral stripe immediately in front of humeral sutures present but obscured. Posterior side of tibiae pale brown. Spines of outer row on third tibiae thickened at base and much shorter than those of inner row. Spines of outer row on second tibiae becoming modified distally but in a much less degree than those on third tibae. Spines on joints of third and second tarsi also modified but more marked on third tarsi than on second tarsi. Tip of posterior hamules tufted with hairs. Anterior hamules with a conspicuous antero-lateral groove.

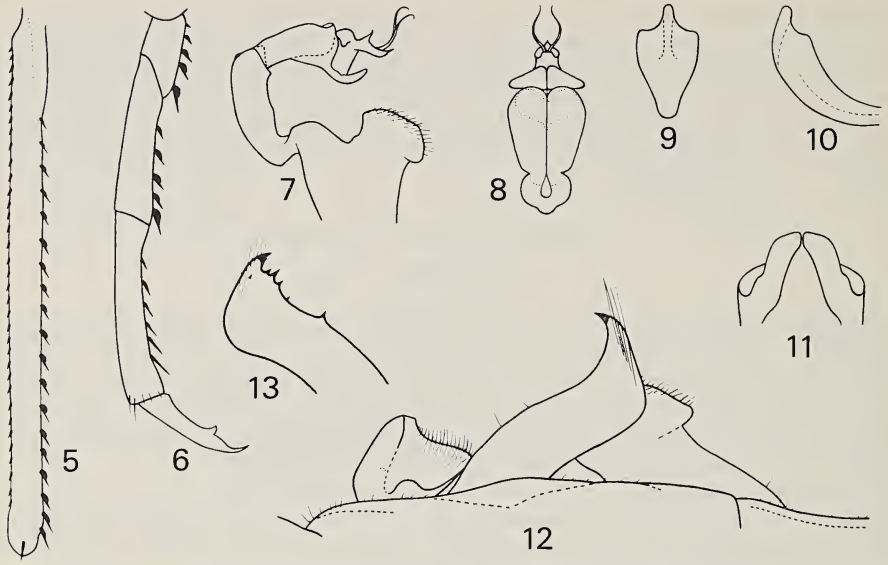
Basal subcostal cross-vein present in fore wings, absent in hind wings. Second primary antenodal cross-vein the fifth. Sectors of arculus widely separated at their origin. Trigonal interspace with two rows of cells from triangle out, that in hind wings starting with an extra initial cell at hind angle of discoidal triangle. Hind wings with a three-celled anal triangle, four paranal cells (the third as large as the second but larger than the first and the fourth), three postanal cells, and three rows of cells posterior to Cu2.

Allotype female (head lost; abdominal segments 4 to 10 lost; tip of right hind wing lost). — Hind wing 28 mm; costal edge of pterostigma in fore wing 3.5 mm.

Coloration similar to holotype but first pale antehumeral stripes present, short and very obscured (visible when temporarily restored with alcohol). No differentiation in spines on tibiae and tarsi.

Basal subcostal cross-vein present in all wings. Trigonal interspaces as in holotype. Hind wings with three rows of cells posterior to Cu2.

The male from Entre Ríos (figs. 5-12) lacks the tenth abdominal segment with the caudal appendages. It differs from the holotype in the following particulars: (1) size smaller (hind wing 24 mm; costal edge of pterostigma in fore wing 2.5 mm); — (2) accessory genitalia more slender; — (3) antero-lateral groove of anterior hamules less deep and indistinct; — (4) anterior ridge of frons, in frontal view, more or less an angular line; — (5) face pale yellow, the vertical part of frons with brown hue; — (6) first pale antehumeral stripes present; — (7) abdomen brown, becoming dark brown only on apex of segments 4 to 6. Further the vertex, occiput, and rear of the head are brown (not blackish); the superior welt-like swelling behind the compound eyes is



Figs. 5-12. *Cyanogomphus uncatus* Fraser, male from Entre Ríos, Argentina: (5) right third tibia, right lateral view; - (6) right third tarsi and claws, right lateral view; - (7) penis, right lateral view; - (8) end segment of penis, ventral view; - (9) penis guard, frontal view; - (10) the same, right lateral view; - (11) anterior genital hamules, frontal view; - (12) accessory genitalia, right lateral view; - (13) male from Dept. Florida, Uruguay. Left posterior hamule, left lateral view.

dark brown. The labium and adjacent mouth parts are pale-white. The colour pattern of the pterothorax resembles that of the Brazilean female of this species figured earlier by me (Belle, 1970) but the first pale antehumeral stripes are short and they do not reach to the collar. The tibiae are black with a pale-yellow posterior side. A basal subcostal cross-vein is present in all wings although that in the right hind wing is only partly developed.

The male from Misiones is more in agreement with the holotype. The measurements are: Total length 41.5 mm; abdomen 32.5 mm; hind wing 25 mm; costal edge of pterostigma in fore wing 3.1 mm. The tibiae are black but the first pair has a narrow line along posterior margin. A basal subcostal cross-vein is present in all wings.

The male from Santa Catarina is larger than the holotype. The measurements are: Total length 43.5 mm; abdomen 34 mm; hind wing 26 mm; costal edge of pterostigma in fore wing 3.0 mm. The posterior margin of the occiput is distinctly convex. There are no second pale antehumeral stripes but there are short and very narrow first pale antehumeral stripes. The tibiae are black but the outer posterior margin of the first pair of tibiae is paler. The upper side of the subtriangle is connected with the inner side of the discoidal triangle. All wings have a basal subcostal cross-vein.

The two males from Uruguay are the smallest of the series. Their measurements are: Total length 40-41 mm; abdomen 30.5-31.5 mm; hind wing 22.5-23 mm; costal edge of pterostigma in fore wing 2.6 mm. Both specimens have the first antehumeral stripes very short and narrow, the posterior margin of the occipital plate a straight line, and the tibiae black on the anterior side and yellow on the posterior side. There is no second pale antehumeral stripe. The hind wings of the male from Dept. Durazno have no basal subcostal cross-vein. The posterior hamules of the male from Dept. Florida have six (left) and four (right) additional spines on the inferior margin (fig. 13).

St. Quentin (1973) recorded a male of *C. uncatus* from southern Brazil which has the discoidal triangle in the hind wings two-celled. I have asked Dr. A. Kaltenbach to look for this specimen

known to be in the collection of the Vienna Museum of Natural History. This he has kindly done but he could not locate it (Dr. Kaltenbach 1976, personal communication).

The present females have also a pale face, obscured in one female, pale green in the female from Misiones. The first pale antehumeral stripes are in some females short and very narrow and even they are absent in the female from Misiones. In frontal view, the anterior ridge of the frons is slightly undulate and in some females nearly straight. One female has no basal subcostal crossvein in one of the hind wings.

The difference in the armature of the tibiae and tarsi of the two sexes constitutes a secondary sexual character hitherto unnoticed in *Cyanogomphus*. This character is very striking in *C. uncatus* but it is inconspicuous in its congeners. In the modification of certain tibial spines *C. uncatus* agrees with the species of *Epigomphus* Hagen *in* Selys, 1854 (cf. Calvert, 1903, 1920).

C. waltheri and *C. uncatus* are the two representatives of the genus with a distinct occipital ridge. The occiput of the other congeners is round above with a line of hairs to mark the place of the usual crest.

Cyanogomphus minutus Belle, 1970

Material. — Venezuela: Bolivar, El Dorado-Brasil (km 85), 20.VII.1971, 1 ♀, Duque leg., (MBC).

This species, hitherto known from Surinam only, is apparently distributed along the whole northern coastal region of South America.

The extent of the pale markings is strongly variable in this species. The dorsum of the pterothorax of some specimens is almost entirely dark brown. The present female belongs to the darker specimens.

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PERSONALIA

De redactie maakt tot haar leedwezen bekend dat zij bericht ontving van het overlijden van ons lid Dr. J. G. Betrem op 16 juli 1980 op de leeftijd van 81 jaar. De heer Betrem, die gespecialiseerd was in de systematiek van de Scoliidae, was lid van de NEV sinds 1921.

CORRECTIE. Pag. 114: the heads of the flies have mistakely been placed upside down; no. 3 is the head of *consimilis*, no. 1 of *frutetorum*.