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SHORT COMMUNICATIONS

DESCRIPTIONS OF THE LAST INSTAR LARVA AND SOME STRUCTURES IN THE PHARATE MALE ADULT OF *PRAEVIOGOMPHUS PROPRIUS* BELLE, 1995, WITH NOTES ON THE OCCURRENCE AND TAXONOMIC STATUS OF THE SPECIES (ANISOPTERA: GOMPHIDAE, OCTOGOMPHINAE)

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The ultimate instar larva, as well as wing venation and male secondary genitalia of a pharate adult, assigned to *P. proprius*, are described and figured, based on material from Teresópolis, Rio de Janeiro State, Brazil. Some notes on the collecting site are provided. The taxonomic status of the sp. and the geographic distribution of the Octogomphinae are evaluated.

INTRODUCTION

The subfamily Octogomphinae sensu CARLE (1986) is composed of eleven genera, being widely distributed in the Palearctic, Oriental, and Nearctic regions, with a few representatives in the Australian and Neotropical regions, and absent in the Ethiopian region. This is one of the few gomphid assemblages recognised as a monophyletic group, on which there are some studies on phylogeny and biogeography (CARLE, 1986; CARLE & COOK, 1984).

The record of members of this group from the Neotropical region was limited, until recently, to three species of *Neogomphus* Selys, 1858 found in the Andean regions of Chile and Argentina: *N. bidens* Selys, 1878, *N. edenticulatus* Carle & Cook, 1984, and *N. molestus* (Hagen *in* Selys, 1854) (CARLE & COOK, 1984). For several years the only conflicting information was due to a vague record from

Brazil ("Intérieur du Brésil") of an incomplete male specimen described by SELYS-LONGCHAMPS (1854) as *Hemigomphus elegans*. However, later authors regarded the specimen as the Chilean *N. molestus* (e.g. BELLE, 1978; CARLE & COOK, 1984), contesting the veracity of the Brazilian record. To add to the confusion, the specimen has apparently been lost (SCHMIDT, 1941). Recently BELLE (1995) described *Praeviogomphus proprius*, a new species and genus, from a single female specimen collected in Itatiaia, Rio de Janeiro State (RJ), Brazil, considering it undoubtedly as an Octogomphinae, close to *Neogomphus*.

In 1991 and 1996, I collected sixteen larval specimens, including one pharate male adult, in Teresópolis, RJ, Brazil, and I have assigned these to *P. proprius*. Here, I describe the last instar larva, the wing venation and secondary genitalia of the pharate male adult, and evaluate the taxonomic status of *P. proprius* and the geographic distribution and origin of the Octogomphinae.

MATERIAL AND METHODS

The material is deposited in the Coleção Entomológica do Departamento de Zoologia, I.B., UFRJ, Rio de Janeiro. The instars were assigned following LUTZ (1968).

M a t e r i a l. – BRAZIL: Rio de Janeiro (RJ), Teresópolis, Vale da Revolta (22°27'S / 42°56'W): 1 ♂ (F), 23-XI-1991, Lab. Ent. UFRJ leg.; – 1 ♂? (F-2 or F-3), 1-III-1996, Lab. Ent. UFRJ leg.; – 4 ♂ (2 F; 2 F-1 or F-2), 4 ♂ (F), 8-VI-1996, Lab. Ent. UFRJ leg.; – 2 ♂ (F, incl. 1 pharate adult), 4 ♀ (3 F; 1 F-2 or F-3), 12-X-1996, A.L. Carvalho and N. Ferreira-Jr leg.

After having been excised from the body, the right wings of the pharate male adult were removed from their wing sheaths and inflated according to the procedure described by GYGER (1939). They were then stretched out manually and carefully placed between two glass slides, allowing visual inspection under the stereoscopic microscope, and preserved in 80% ethanol. In order to study the accessory genitalia, part of the larval exuviae was carefully removed from the related regions with the aid of a forceps and fine needles.

DESCRIPTION OF ULTIMATE INSTAR LARVA

Figures 1-6

M e a s u r e m e n t s (in mm, n = 11). – Total length 20.1-23.7 (average 21.89); width of head 4.7-5.2 (average 4.96); length of antenna 2.2-2.5 (average 2.36); length of prementum 3.7-4.1 (average 3.95); width of prementum 3.2-3.6 (average 3.40); hind wing-cases 5.6-6.1 (average 5.78); length of hind femur 3.5-3.8 (average 3.60); length of abdomen (incl. caud. app.) 12.0-14.1 (average 13.16); maximum width of abdomen (seg. 6) 6.2-6.8 (average 6.43).

Much of body granulated. Ground colour yellowish brown, with faint dark patterned thorax and abdomen (Fig. 1).

H e a d. – Triangular in dorsal view, widest at level of middle of eyes. Portion of frons between antennae pronounced, convex apically. Eyes black. Third segment of antennae flattened dorsoventrally, oval and concave in dorsal view, being about three times longer than two basal segments taken together, fringed ventrally and

laterally with long setae (Fig. 2). Fourth segment very short, button-like, bordered by a fringe of short and capitate setae. Mandibles (Figs 3, 4) with molar ridge apparently somewhat movable; tooth 4 of right mandible divided into three lobes; mandibular formula following WATSON (1955):

L 1234 0 a($m^{1,2,3}$) bb'.
R 1234 y a($m^{1,2,3}$) b

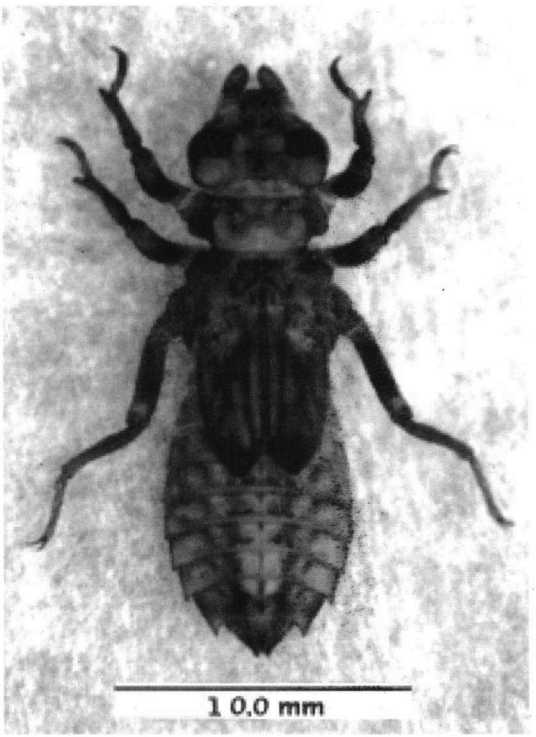
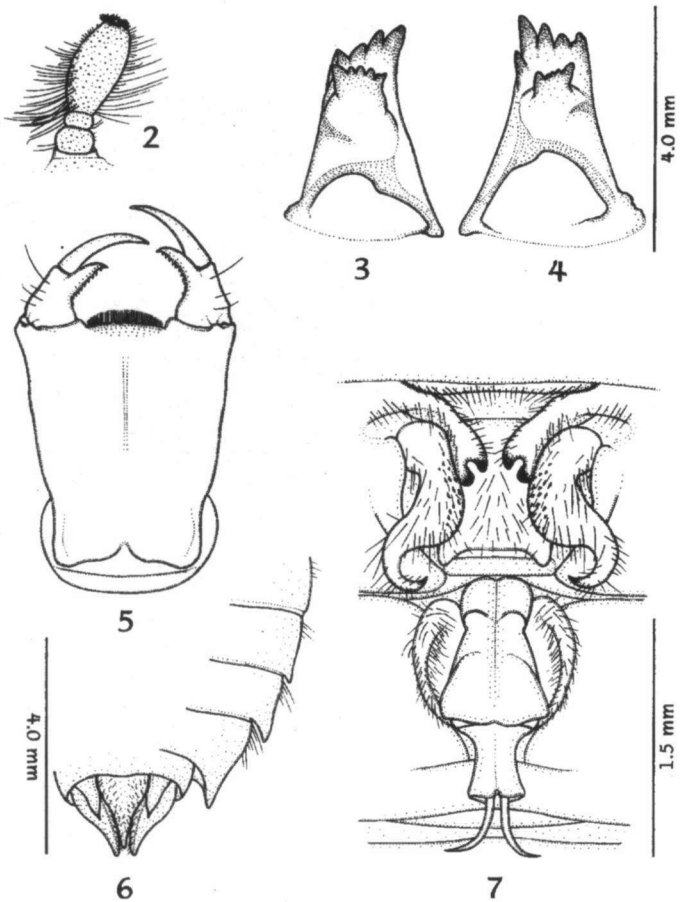


Fig. 1. *Praeviogomphus proprius* Belle, female ultimate instar larva, dorsal view.

Labium short, reaching posteriorly to level of first coxae. Prementum trapezoidal, two times longer than width of basal margin, regularly enlarged apically; median border slightly convex, bordered by a fringe of setae, with three rigid dark triangular denticles, one third the lenght of the setae (Fig. 5). Lateral lobe of labial palps incurved, with a terminal truncate denticle, its inner margin with about 10 or 11 denticles getting smaller towards base, each truncated so as to point caudad, with a few setae among them. External margin of palpal lobe with some scarce and long setae. Movable hooks almost two times longer than external margin of palpal lobe.

T h o r a x. – Prothorax somewhat wider than head. Fore and middle tibiae each with strong burrowing hook (Fig. 1). Tarsal formula 2-2-3. All legs fringed with setae, especially prominent on first two pairs. Wing-cases nearly parallel, extending to posterior margin of abdominal segment 4.

A b d o m e n. – Widest on segments 5 and 6, tapered slowly and regularly to apex. No dorsal hooks or rudiments. Blunt lateral spines present on segments 7-9 (Fig. 6). Female gonapophyses very short. Epiproct almost as long as paraprocts. Cerci half as long as paraprocts. Male projection on the epiproct concave apically and reaching approximately one-third of appendage.



Figs 2-7. *Praeviogomphus proprius* Belle: Figs 2-6: female ultimate instar larva: (2) left antenna, dorsal view; – (3) left mandible, inner side; – (4) right mandible, inner side; – (5) labium, ventral view; – (6) anal appendages and right lateral spines, dorsal view. – Fig. 7: Pharate male adult, secondary genitalia, ventral view (apex of penis exposed).

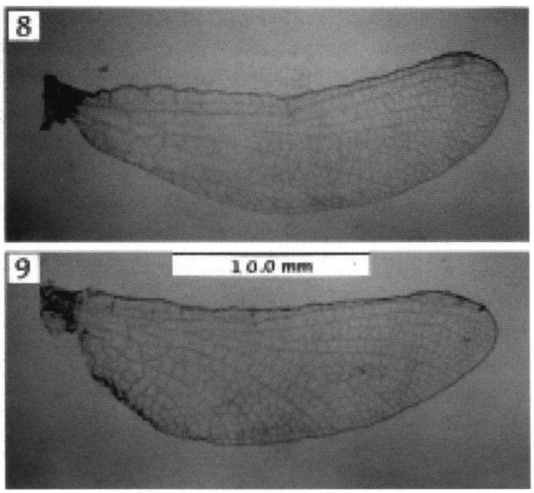
DESCRIPTION OF THE PHARATE MALE ADULT

Figures 7-9

Wing venation as in Figures 8 and 9.

Basal subcostal cross-vein absent. Hind wing with second primary antenodal cross-vein the sixth in both wings, about mid-way between first primary antenodal cross-vein and nodus. In fore wing the distance between nodus and proximal end of stigma three and a half times as long as costal edge of stigma. Nodal index 15:16

/ 12:13. Stigma (including its ridges) in fore wing long, more than three times as long as wide. Brace vein of pterostigma present. Anterior sector of arculus in fore wing nearer to R+M than to Cu. Discoidal triangles, supratriangles and subtriangles one-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. Fore wing with distance between base of middle fork and subnodus three times as long as distance between subnodus and oblique vein. Two rows of cells between R2 and R3 in both wings beginning mid-way between nodus and pterostigma. Trigonal interspace with two cells near discoidal triangle. Hind wing with one intermediate cross-vein. Hind wing without anal loop, with 5 or 6 (?) paranal cells and with area behind Cu2 4 or 5 (?) cells wide.



Figs 8-9. *Praeviogomphus proprius* Belle, pharate male adult: (8) right fore wing; – (9) right hind wing. – [Due to the condition of the material, better photographs could not be furnished]

Male secondary genitalia (Fig. 7). – Anterior lamina not specially developed. Anterior hamuli somewhat enlarged apically; apex dark with two separate obtuse lobes; posterior lobe slightly larger than anterior. Posterior hamuli large, S-shaped, strongly hooked apically (its upper third tapers into a hook whose inner curvature is about a semicircle); anterior surface with dark denticles. Penduncle (vesicle) of penis deeply divided by an acute median notch into a pair of valves that together enclose tip of folded penis; prepuce sclerotized and directed posteriorly; segment 4 greatly enlarged, ending dorsally in a horn with a pair of lash-like cornua, divergent, directed ventro-laterally.

NOTES ON COLLECTING SITE AND BIOLOGY

The specimens were collected in a small first order section of the Rio Paquequer, in Teresópolis, RJ (22°27'S / 42°56'W), alt. 1100 m, in an area of well preserved primary rain forest. The stream bed is mainly composed of coarse sand, pebbles, and boulders, with allochthonous organic matter deposits occurring in some points. Except for some pools, the stream is quite shallow (depth 5-20 cm). The mean annual temperature and rainfall are, respectively, 17.8°C and 169.4 mm, with the

driest period between May and September, and June being the driest month.

The odonate fauna at this site is rich. Larvae of the following species were also found: *Hetaerina brightwelli* (Kirby), *Heteragrion* spp. (two species), *Argia sordida* Hag., *Limnetron debile* (Karsch), *Limnetron* [?] sp., *Epigomphus paludosus* Hag., *Progomphus gracilis* Hag., *P. complicatus* Sel., *Neocordulia setifera* (Hag.), and *Brechmorhoga nubecula* (Ramb.).

Although this site has been intermittently surveyed for seven successive years (1991-1997), *P. proprius* was recorded only four times, once in 1991 and three times in 1996 (exhaustively searched in the last two field trips). Furthermore, larvae were always found in the same stream site, not occurring a few metres downstream. These insects are strictly fossorial, living up to 5 cm down in the sandy substrate found in shallow pools, especially in areas protected by boulders where the flow is less intense. When they are taken from the water, the larvae remain inactive, with the legs held close to the body, as if they were dead. After return to the water, the larvae remain inactive for some minutes, and then quickly try to burrow. They could not be reared in the laboratory.

DISCUSSION

The studied material was assigned to *P. proprius* on the basis of wing venation in the pharate male adult (Figs 8, 9), which is nearly identical to that found in the female studied by BELLE (1992), except for the anal region of the hind wing, which exhibits sexual dimorphism. Teresópolis is very close to the type locality, Itatiaia (160 km approx.), and although located in distinct mountain ranges, the two sites have a very similar odonate fauna (SANTOS, 1970). However, confirmation of the studied material as *P. proprius* is quite difficult at the moment, even if we had a female from Teresópolis, since the females of closely related species are generally very similar in this family. Furthermore, the species is rare, and the chances of obtaining mating pairs are small.

According to the keys for the genera of neotropical Gomphidae, the larvae (e.g. BELLE, 1992; NEEDHAM, 1944), and the adults (based on the pharate male adult) (e.g. NEEDHAM, 1940; BELLE, 1988) of the studied material belong to *Neogomphus*. The identification keys for the species of *Neogomphus* assign the pharate male adult to *N. molestus* (CARLE & COOK, 1984), and the larvae to *N. bidens* (BELLE, 1992; NEEDHAM & BULLOCK, 1943). These two species are currently known only from Chile.

The only difference pointed out by BELLE (1992) between *P. proprius* and the species of *Neogomphus* is the number of paranal cells in the hind wing, which is five or six in the former and always four in *Neogomphus*. Although this difference is potentially a variable character, the pharate male adult has more than four paranal cells, probably six: four behind the anal triangle and possibly two at the anal triangle (the venation in this region was not very distinct in the hind wing of the pharate

adult male specimen). *P. proprius* may in the future, be regarded as a species in *Neogomphus*, or may even be synonymized with *N. elegans* (Sel.), since the latter is considered as a valid species by some authors (e.g. DAVIES & TOBIN, 1985).

CARLE & COOK (1984) have hypothesised a vicariant pattern for the history of the Octogomphinae, based on geographical distribution patterns. They consider Laurasia as the centre of origin of the Octogomphinae, implying a Mesozoic origin for the group. Due to the presence of some members of this subfamily in restricted areas of Australia and southwestern South America, they considered two different hypotheses: (1) the radiation of the members of the group before the complete separation of the Pangaean supercontinent; and (2) the presence of links between Laurasia and Gondwana through the present arch of Indonesian islands, in the late Cretaceous and early Cenozoic. The occurrence of a member of this group in southeastern Brazil suggests that the origin of the Octogomphinae probably occurred prior to the Laurasia formation. Long distance dispersal is unlikely, due to the species' peculiar biology. The larvae are intimately associated with restricted lotic environments, and the adults probably do not move far away from their breeding sites, due to their short flight period, similar to that in *Neogomphus* species (CARLE & COOK, 1984).

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