

**PHYLLOGOMPHOIDES LITORALIS BELLE:
DESCRIPTION OF THE FINAL INSTAR LARVA
(ANISOPTERA: GOMPHIDAE)**

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Description and illustrations are presented, based on material from the Republic of Panama,
reared in the laboratory.

INTRODUCTION

The genus *Phyllogomphoides* Belle, 1970 is composed of 45 species in the neotropical region (COSTA et al., 1999). The larvae are typical stream-dwellers, usually inhabiting shady forest streams and rivers (e.g. BELLE & QUINTERO ARIAS, 1992). The larvae of 14 species are hitherto known (see NEEDHAM, 1904, 1940; NEEDHAM & WESTFALL, 1955; BELLE, 1970; NOVELO-GUTIERREZ, 1993; RAMIREZ, 1996; COSTA et al., 1999), eight of these from Central or North America. Three species, *P. appendiculatus* (Kirby), *P. insignatus* Donnelly and *P. litoralis* Belle, occur in Panama (BELLE & QUINTERO ARIAS, 1992; DONNELLY, 1992). *P. litoralis* was recorded at only two sites in Panama: the male holotype in Chiriqui province (BELLE, 1984) and two larvae collected in Panama province, W of the Panama Canal (SUHLING, 1999), which shall be described here.

DESCRIPTION

Material. — Two exuviae (reared in the lab), El Valle, Republic of Panama, 5/6-III-1998 (cf. SUHLING, 1999). The male was identified according to FÖRSTER (1999), and verified by J. Belle.

General. — Exuviae enlarged at middle and tapering caudad (Fig. 1a); total length 33.1 mm.

Head. — Wider than long, maximum width 5.5 mm, with three ocelli. Antennae 4-jointed (Fig. 1c, d), the third largest and much longer than wide (length : width ratio = 1.52 : 0.43 mm), ventrally slightly flattened; the fourth smallest (length : width ratio = 0.26 : 0.09 mm); length of the antennomeres (in mm): 0.41, 0.17, 1.52, 0.26. Antennomeres 1 to 3 laterally covered with long thin setae, the third densely covered. Posterior margin of head slightly concave, the posterior margin of the lobes covered with long setae. Frons and vertex with scale-like setae; bare areas (Fig. 1b) are: two areas anterior to the central ocellus, one area left and right, respectively, to each lateral ocellus and a triangular area in the center of the vertex with a \pm trapeziform one to each side of it.

Mouth parts. — Labium: articulation of postmentum and prementum reaching anterior margin of mesocoxae, prementum more than 1.2 times as long as wide. Prementum bare, slightly trapeziform; the base (1.74 mm) 0.6 of its distal part (3.13 mm); with a row of setae at base of ligula in ventral view (Fig. 2a). The relation between basal width and width at articulations of labial palps is 1 : 1.81. Ligula convex with a row of robust, medium-length, truncated scale-like setae, all of the same size with a thin base. Labrum in ventral view with a row of long setae on its

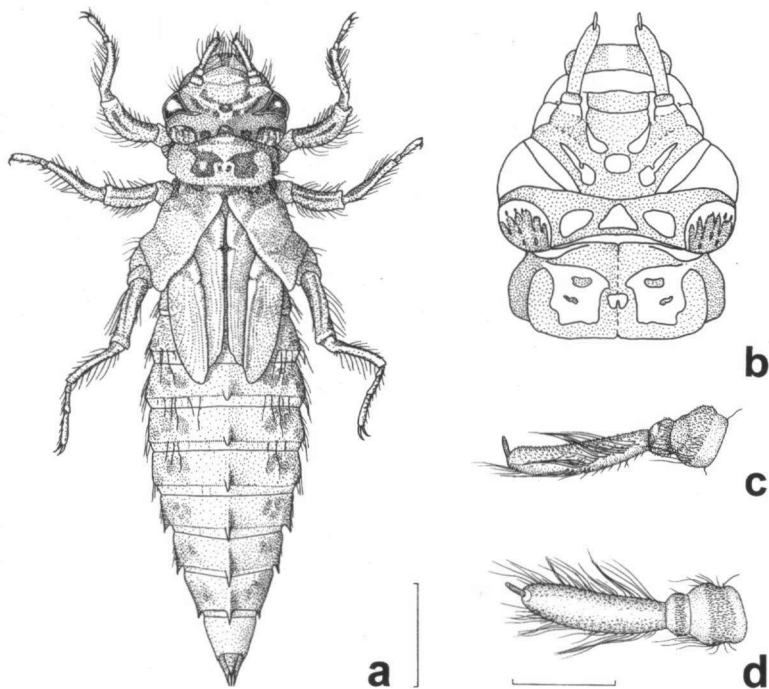


Fig. 1. *Phyllogomphoides litoralis*: (a) dorsal view of the exuviae [bar: 10 mm]; — (b) shape of the bare areas on head and thorax; — (c) left antenna lateral view; — (d) left antenna dorsal view. — [Bar for c, d: 1 mm]

anterior margin, another row of setae medially. Palpus with a single moveable end-hook slightly curved inward and with internal margin serrated (Fig. 2b, c). Palpal lobes with 10-11 wide shallow teeth along inner margin and slightly blunted end-hooks (Fig. 2b, c). Inner margin of end-hook has a narrow edge between base and medial half. Mandibles are different (Fig. 2f), the external branch of the right mandible with 5 teeth, the first shorter and connected to the second. The internal branch has 4 teeth. External branch of left mandible with 4 teeth, the internal with 6 teeth, arranged in a semicircular manner (Fig. 2d), the outer teeth longer than the inner. Both mandibles with long and short hairs on lateral sides. Lateral sides of galeae with many strong, bristly hairs (Fig. 2e), with pointed end-hook. Lacinia ends with 7 sickle-like hooks, 3 dorsal incurved hooks and 4 longer ventral hooks and has setae placed caudally.

T h o r a x. — Pronotum with scale-like setae except for a pair of large subquadrangular bare areas (Fig. 1b). Synthorax with scale-like setae, sutures bare. Wing cases reaching to near middle of abdominal segment 4. Legs short and thick, strongly pubescent, with rows of long and, dorsally, scale-like, setae interrupted by bare areas. Profemur and mesofemur cylindrical and thicker than the tibiae. Hind legs flattened laterally. Tarsal formula 2-2-3.

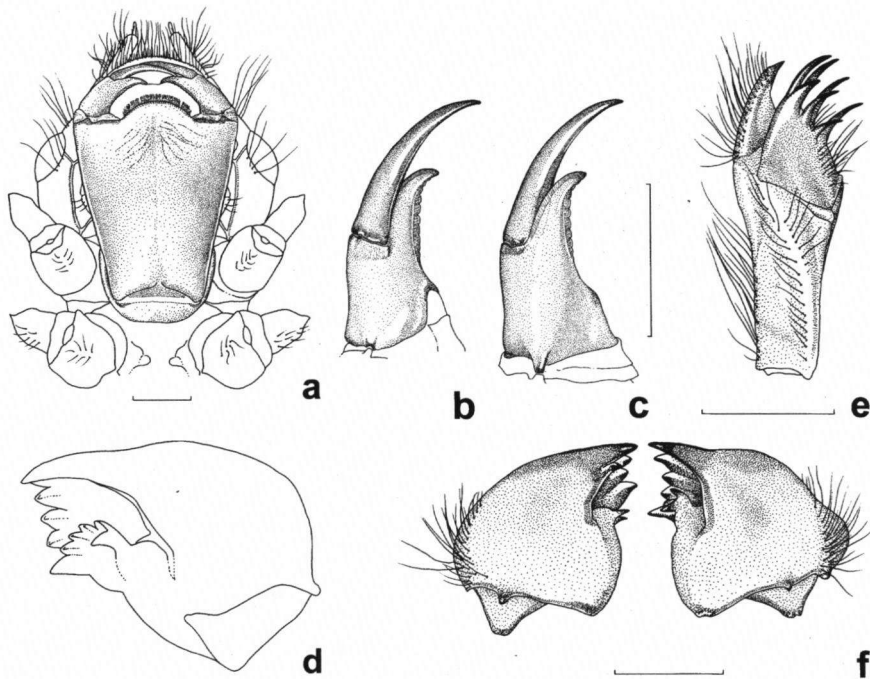


Fig. 2. *Phyllogomphoides litoralis*, morphological features: (a) prementum; — (b) left palp, dorsal view; — (c) right palp, ventral view; — (d) inner view of left mandible; — (e) right maxilla; — (f) mandibles. — [Bars: 1 mm]

Abdomen. — Enlarged at middle, length 21.8 mm, maximum width 6.4 mm; with long setae at its lateral margins and at the posterior margin of each segment (Fig. 1a, 3a); posterior margins of segments 5-9 in dorsal view with a row of little spiniform setae; all tergites covered with granulous, scale-like setae. Segments 7-9 with lateral spines, largest on 9; those on 7 slightly outcurved, on 8 and 9 parallel (Fig. 3b). Tergites 2-9 with dorsal hooks, gradually increasing in size rearwards; hooks on 2-6 with rounded bases, those on 7-9 with straight elongate bases covering almost the whole tergite (Fig. 3a); hooks on 8 and 9 slightly overlapping the respective next tergite, that on 7 overlapping the intersegmental skin of 7 and reaching the anterior margin of 8; the other hooks shorter. Sternite of segment 10 (2.1 mm) slightly longer than sternite of 9 (2.0 mm). Gonapophyses evident in female (Fig. 3c). Caudal appendages equal, 0.5 of segment 10; apically part acutely pointed and light in colour.

BIOLOGY. — Both larvae were collected in streams running into a vulcano crater valley at 600 m above sea level, the channels being between 1.5 and 2 m wide and 0.2 to 0.4 m deep. One site was in a high slope region with waterfalls. The larva was collected in a short, more or less plain stretch, in the stream-shade of some large stones, where it co-occurred with *Erpetogomphus sabaleticus* and *E. tristani*. The bottom substrate consisted of coarse detritus on gravel. The second larva was found in coarse detritus in a reach, which mainly had sandy bottom, at the floor of the valley. Both sites were shaded by trees. Introduced into an aquarium, the larvae dug themselves rapidly into sand. The adults emerged at the end of May and at the beginning of June, almost three months after they were caught.

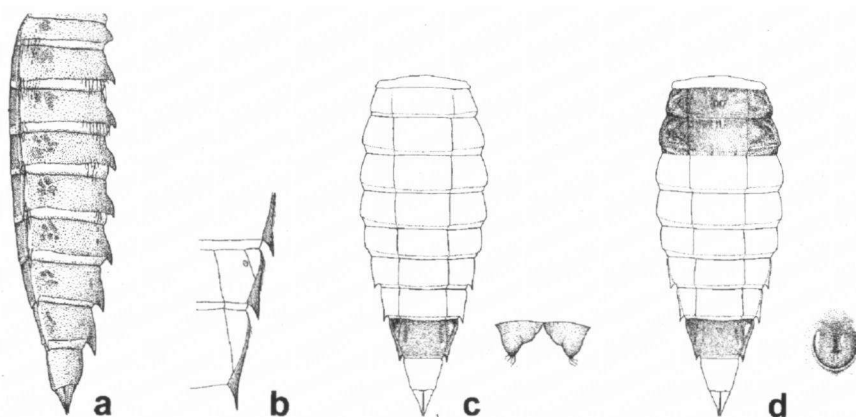


Fig. 3. *Phyllogomphoides litoralis*, abdomen: (a) dorsal spines [bar: 5 mm]; — (b) lateral spines on abdominal segments 7-9; — (c) female gonapophysis; — (d) male characters.

DISCUSSION

Of the three species of *Phyllogomphoides* known from Panama, only the larva of *P. litoralis* is described. The larva, described by NEEDHAM (1940) as *P. bifasciatus* (Selys), is probably referable to *P. appendiculatus* (BELLE, 1993; BELLE & QUINTERO ARIAS, 1992). Therefore, the larvae of two Panamanian species may be known. That of *P. litoralis* is in all morphological features very close to *P. bifasciatus* (see RAMIREZ, 1996).

According to BELLE & QUINTERO ARIAS (1992), *P. litoralis* fits into the 'semicircularis' group (group 3) of *Phyllogomphoides*, as defined by BELLE (1970, 1982). NOVELO-GUTIERREZ (1993) used the three groups of Belle to define the two main lineages of *Phyllogomphoides*, one South American, the other mainly Central American and corresponding to group 3 of BELLE (1982), each characterized by larval morphology. The species here described agrees in all six characters, given by NOVELO-GUTIERREZ (1993) for the Central American lineage.

Though all the characters used by NOVELO-GUTIERREZ (1993) are useable to identify the two lineages, there appear to be problems in creating a key using shapes of the labium and ligula or of the lateral and dorsal spines. We draw attention to the shape of the bare areas on the head and thorax, which may be more specific characters.

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