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## Description of the final instar larva of *Limnetron antarcticum* Förster and notes on its female (Anisoptera: Aeshnidae)

ALEJANDRO DEL PALACIO & JAVIER MUZÓN

Instituto de Limnología “Dr. Raúl A. Ringuelet” (CCT-La Plata), CC 712 – 1900 La Plata, Argentina.

E-mail: [adelpalacio@ilpla.edu.ar](mailto:adelpalacio@ilpla.edu.ar); [muzon@ilpla.edu.ar](mailto:muzon@ilpla.edu.ar)

### Abstract

The final instar larva of *Limnetron antarcticum* Förster is described and illustrated for the first time based on one specimen collected in Misiones Province, Argentina. It is compared with *L. debile* (Karsch). Color pattern and ovipositor morphology of the female imago are described.

**Key words:** Anisoptera, Aeshnidae, *Limnetron*, larva, female

### Introduction

The neotropical genus *Limnetron* Förster comprises two medium to large aeshnids, *L. antarcticum* Förster and *L. debile* (Karsch). It has been included in Brachytrini (Santos 1970) or Gynacanthini (De Marmels 2000), and based on vesica spermalis morphology, it is considered related to the genera *Allopetalia* Selys and *Boyeria* McLachlan (von Ellenrieder 2002).

*Limnetron* species are inhabitants of streams within forests (Garrison et al. 2006), for which there are few records restricted to small areas in Peru, Paraguay, southeastern Brazil and northern Argentina. In Argentina *Limnetron antarcticum* was recorded from the paranaense forest in Misiones province, and an unidentified species from the yungas forest in Salta and Jujuy provinces (von Ellenrieder & Muzón 2008).

At present, only the last larval instar of *Limnetron debile* has been described (Santos 1970; Assis et al. 2000). The aim of this paper is, based on recent collections in natural protected areas from Misiones province, Argentina, to provide a description and diagnosis of the larva of *L. antarcticum*. Due to the fact that *L. antarcticum* is known only from males, we provide also a brief description of the female imago.

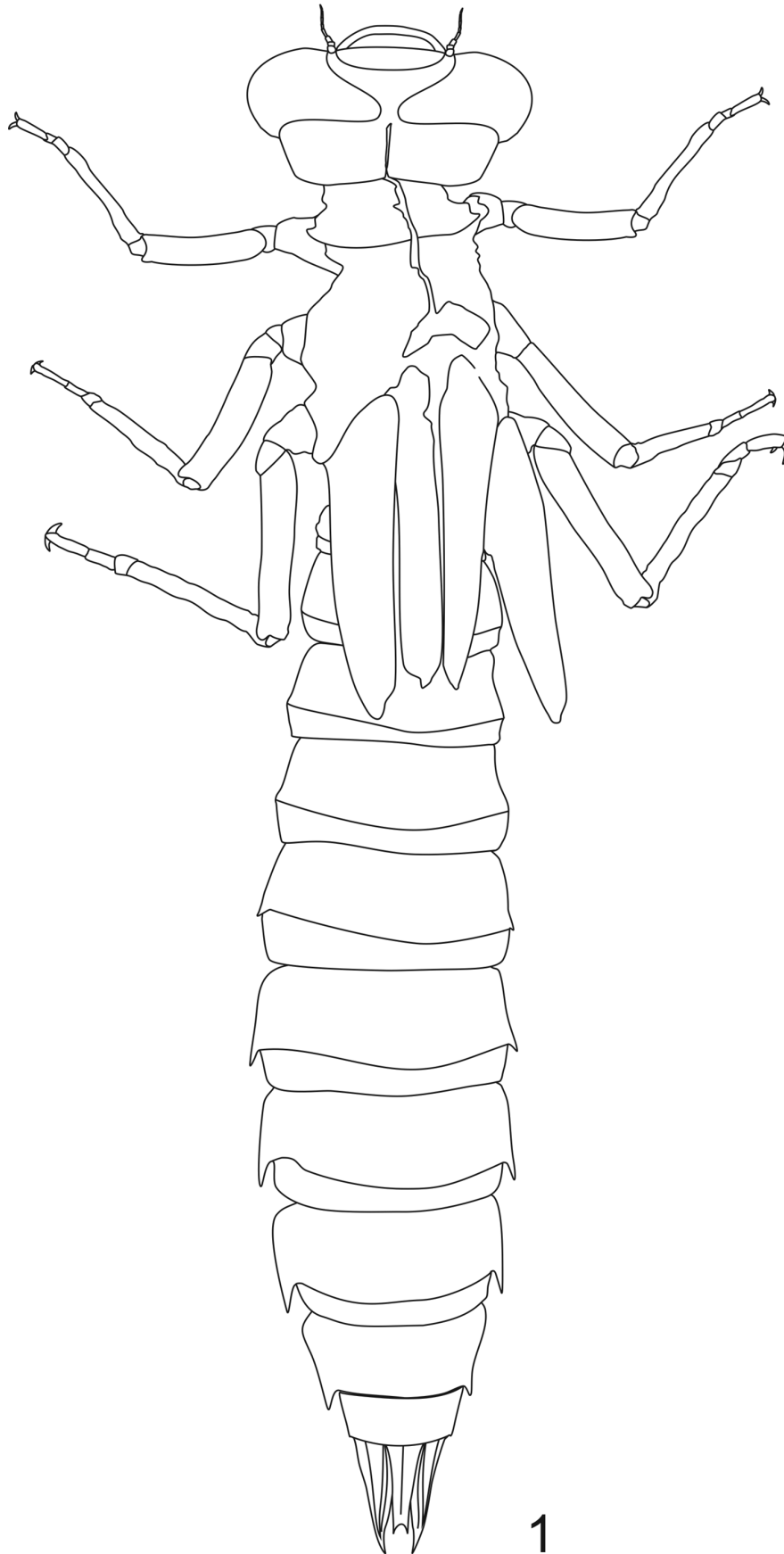
### Methodology

**Specimens examined.** Argentina, Misiones, Parque Provincial Salto Encantado, 27° 03' 45.90" S, 54° 50' 27.80" W, 325 m; 11/I/2013, coll. A. del Palacio, 1 ♀ exuvia. Parque Provincial Cruce Caballero, 17 km NE San Pedro, 580 m, 26° 30' 20" S, 53° 59' 54" W, 12–14/III/2011, coll. J. von Tschirnhaus, 1 ♂, 1 ♀. Parque Provincial Saltos del Moconá, 33 km NE El Soberbio, 290 m, 27° 09' S, 53° 54' W, 9–12/II/2011, coll. J. von Tschirnhaus, 2 ♂. Parque Provincial Uruguay-í, Destacamento de Guardaparques Uruzú, 30 km SE Andresito, Arroyo Yatebó, 270 m, 25° 53' S, 54° 13' W, 5–6/III/2011, coll. J. von Tschirnhaus, 1 ♂, 1 ♀. Parque Provincial Cuña Pirú, 5–6/IV/2011, coll. J. von Tschirnhaus, 1 ♂.

**Study sites.** All the specimens were collected in natural protected areas of the Paranaense Forest ecoregion in Misiones province, Argentina. The exuvia was collected in Parque Provincial Salto Encantado, on the wall of a cascade, about 2.5 m above the ground, and it was assigned to *Limnetron antarcticum* because a newly emerged female was collected close to it. The specimens are deposited in the Museo de La Plata collection, La Plata, Argentina.

**Terminology.** Larval mandibular formula follows Watson (1956). Abbreviations: S = abdominal segment, L = length, W = width, Fw = forewing, Hw = hindwing.

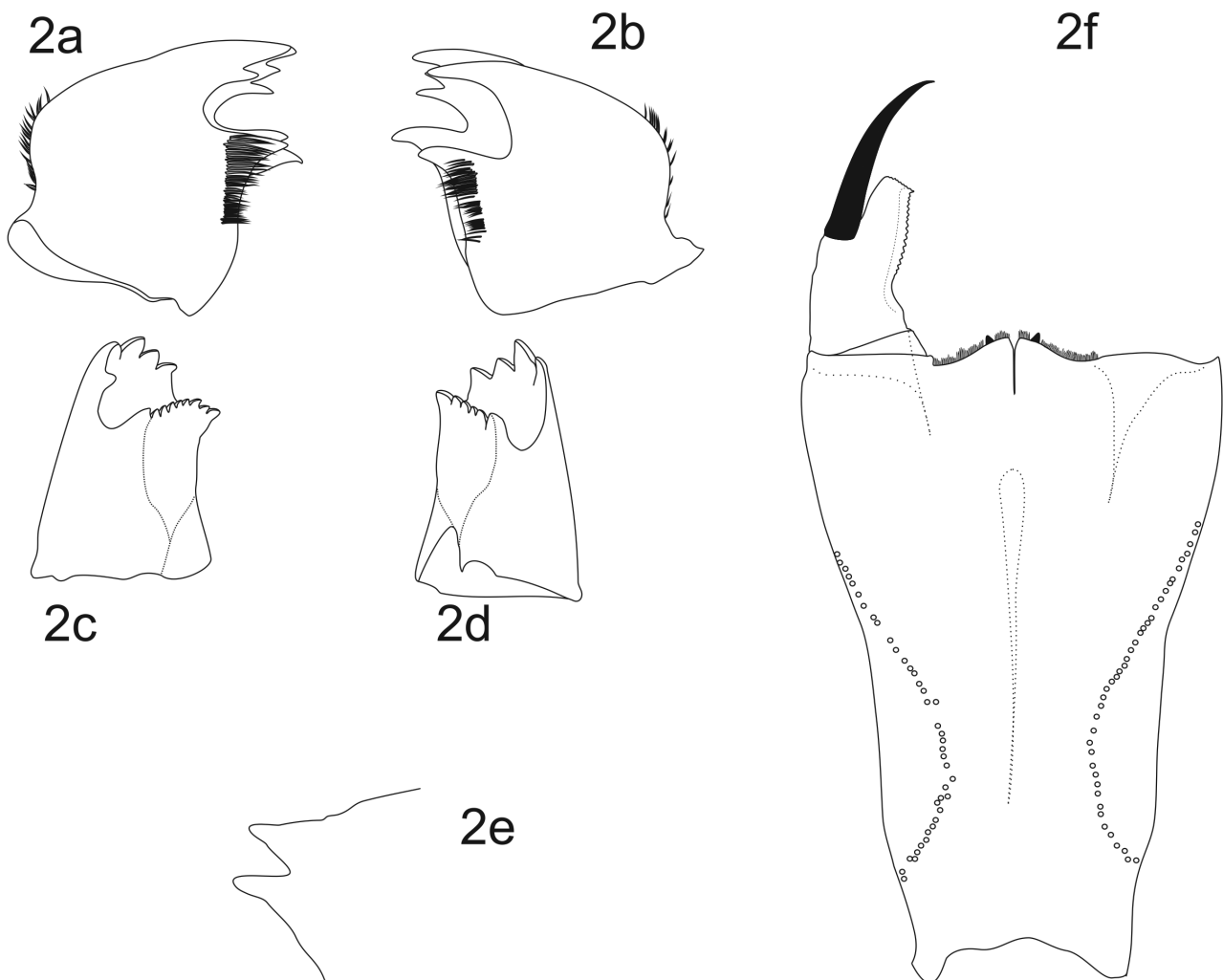
**Results**



**FIGURE 1.** *Limnetron antarcticum*, last instar larva, general dorsal view.

Description of the last instar larva of *Limnetron antarcticum* Förster

*Head.* Length 0.62 of width, broader than thorax. Brown, except pale areas on anteclypeus, frons and postlateral lobes. Postlateral lobes bluntly angled (Fig. 1), with 9–10 stripes of dark spines. Antennae 7-segmented, third antennomere longest. Mandibular formula (sensu Watson, 1958) as follows: R 1234 y a ( $m^{1,2,3,4,5,6,7}$ ) b / L 1234 0 a ( $m^{1,2,3,4}$ ) b (Figs. 2a-d). Prementum (Fig. 2f) long, reaching second coxae caudally, width 0.55 of length; anterior margin of ligula medial lobe with fringe of pale setae and one dark tooth on each side of median cleft. Labial palp sub-rectangular, infra-apical tooth acute, inner margin serrated, slightly undulated; movable hook long, 1.66 times maximum palp length, curved inward.



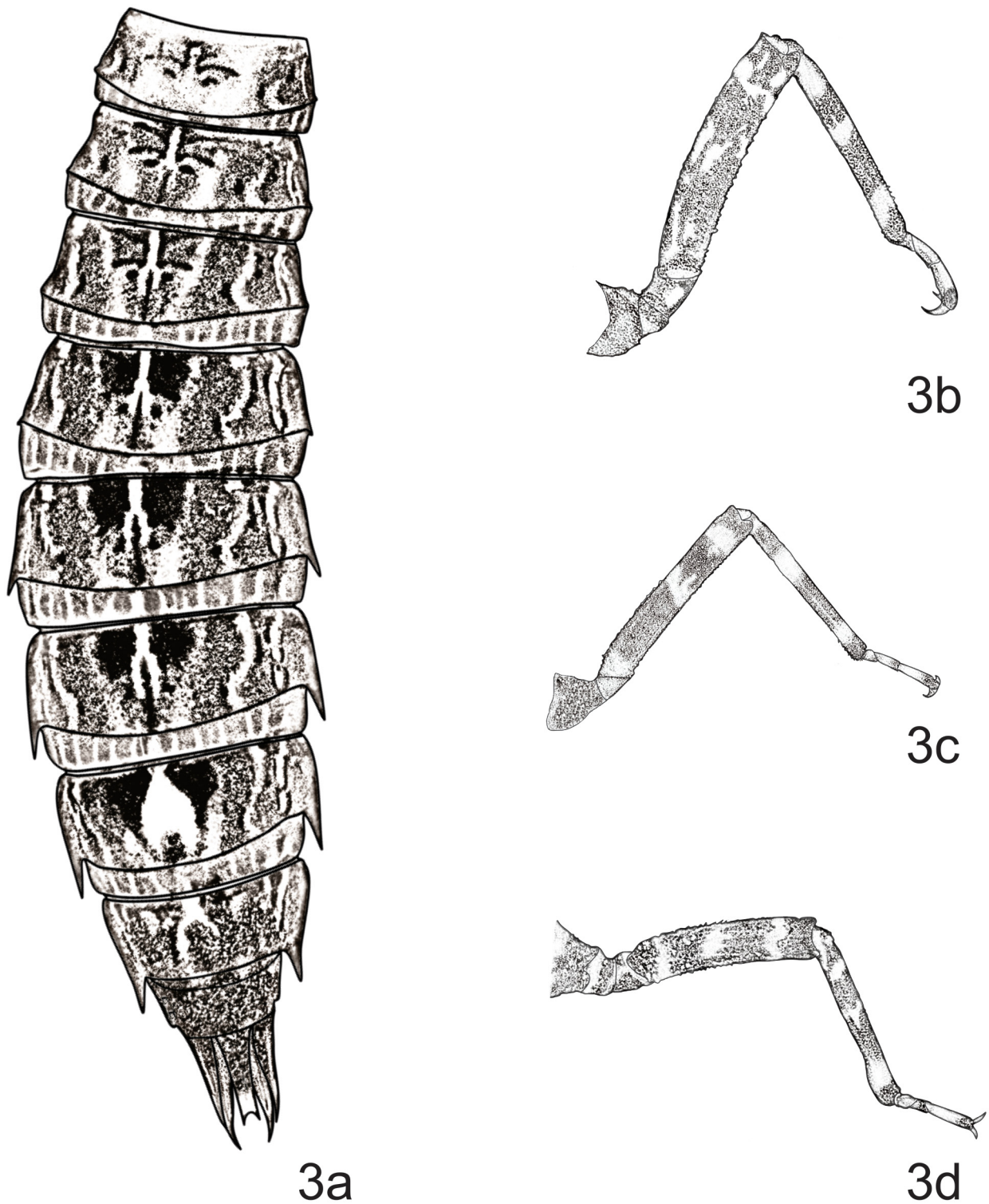
**FIGURE 2.** *Limnetron antarcticum* last instar larva, (a) right mandible, lateral view; (b) left mandible, lateral view; (c) right mandible, inner view; (d) left mandible, inner view; (e) prothoracic apophyses, dorsal view; (f) prementum, dorsal view.

*Thorax.* Prothorax brownish, with two middorsal and two lateral dark stripes, lateral ones reaching pleural suture of mesothorax; wingpads black with two pale spots at base and 0.5 distal (nodal), external one reaching anterior margin of S4. Prothoracic processes (Fig. 2e) slender and pointed, approximately of same size. Femora and tibiae each with three pale annular bands (Figs. 3b-d).

*Abdomen.* Slender, widest on S7, dorsal color pattern as in Fig. 3a, S10 uniformly dark brown. Lateral spines present on S5–9, those on S5 poorly developed and on S8 the longest. Gonapophyses surpassing anterior margin of S10. Sterna uniformly pale, except gonapophyses dark. Epiproct caudally notched, shorter than paraprocts. Cerci conical, slightly longer than epiproct. Epiproct, cerci and paraprocts darkish brown with a subapical pale stripe.

**Measurements** (N=1, in mm). Total length (with caudal appendages) 38.16; head max. W 4.6; head max. L 7.4; antennae total L 3.48; third antennomere 0.62; prementum max. L 5.6; prementum max.W 3.1; palp max. L

0.25; palp max. W 0.08; palp movable hook L 0.16; femur I L 0.44; femur II 0.46; femur III 0.51; tibia I L 0.41; tibia II 0.44; tibia III 0.50; internal wing pads L 9.8; external wing pads 8.8; max. L of abdominal segment, VI 2.5; VII 2.4; VIII 2.2; IX 1.6; X 1.0; lateral spines (inner margin) on segment VI 0.72; VII 1.2; VIII 1.4; IX 1.3; cerci 2.66; paraprocts 3.51; epiproct 2.54; internal gonapophyses 3.88.

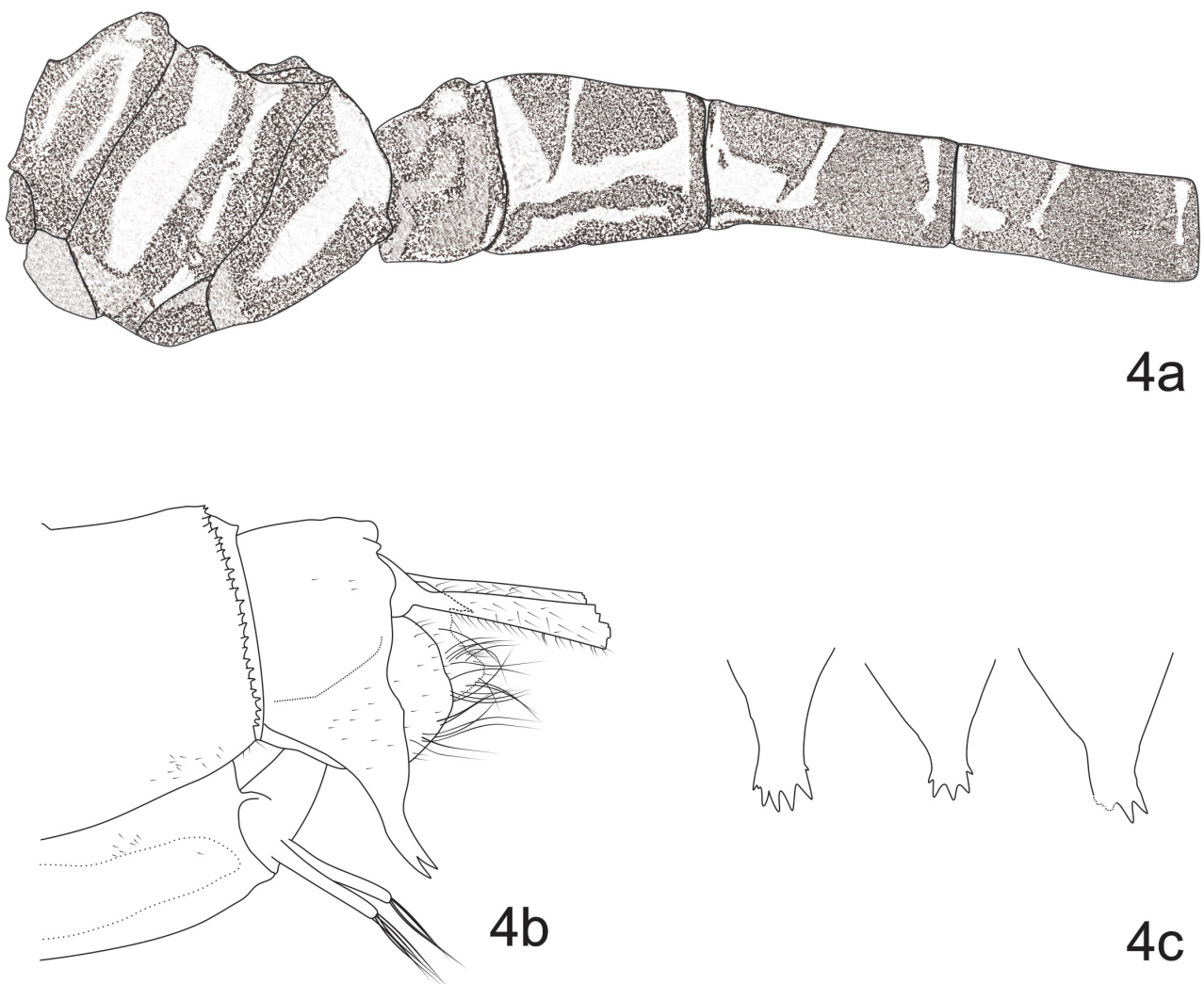


**FIGURE 3.** *Limnetron antarcticum*, last instar larva, (a) abdominal dorsal color pattern; (b) leg I, color pattern; (c) leg II, color pattern; (d) leg III, color pattern.

**Diagnosis.** Larvae of *Limnetron debile* and *L. antarcticum* are very similar in appearance, color pattern and

size. Taking into account the brief description and figures given by Santos (1970), both species have a color pattern characterized by black wing pads, femora and tibiae with three pale annular bands and triangular dorsal dark spots on S4–8; mandibles (only described for *L. antarcticum*) have a general aeshnid formula characterized by a molar crest with two prominent teeth; anterior margin of ligula medial lobe with fringe of setae and one dark tooth on each side of the median cleft; labial palp sub-rectangular with an acute infra-apical tooth; abdomen with lateral spines on S5–9, those on S5 poorly developed; gonapophyses (only described for *L. antarcticum*) surpassing anterior margin of S10; epiproct caudally notched; cerci slightly longer than epiproct; paraproct carina without spines. The description of *L. debile* does not provide enough information to differentiate both species.

As stated before, *Limnetron* was considered related both to generalized Gynacanthini as *Racenaeschna* (De Marmels 2000) and to *Allopetalia* and *Boyeria* (von Ellenrieder 2002). Based on larval characters *Limnetron* shares with these three genera (De Marmels 1990, 2000; Needham et al. 2000) the general shape of labial palp, the presence of lateral spines on S5–9 and labial morphology, but differs by the notched epiproct (spinose in *Racenaeschna* and *Allopetalia*, variable in *Boyeria*) and the cerci slightly longer than epiproct (shorter in all of them). Particularly, *Limnetron* shares with *Racenaeschna* the postlateral lobes of the head bluntly angled, the inner margin of labial palp slightly undulated and the prothoracic processes blunt and of approximately the same size.



**FIGURE 4.** *Limnetron antarcticum*, female imago, (a) pterothorax and S1–4 color pattern, lateral view; (b) S9–10 lateral view; (c) S10 posterior process spines, posterior view.

#### Description of the female adult of *Limnetron antarcticum* Förster

*Head.* Labium, external portions of mandibles and labrum yellowish; clypeus and frons olive green, frontoclypeal suture yellowish, postfrons darker medially, vertex black, occipital triangle dark brown.

*Thorax.* Prothorax pale brown, except posterior lobe pale greenish blue. Pterothorax brown with green stripes as in Fig. 4a. Femur I pale brown except apical 0.20 black, internal surface pale greenish blue; tibia I black; femora and tibiae II–III reddish brown, darker at apical 0.20; tarsi black. Wings hyaline or infumated, 20–23 and 16 antenodal crossveins in Fw and Hw respectively.

*Abdomen* (Fig. 4). Brown, with pale greenish spots on S1–7 (Fig. 4a). On S1 only a dorsally diffuse pale spot; S2 in lateral view with three pale stripes, anterior, posterior and medial (following the transverse carina), all stripes confluent mid-laterally, in addition a latero-ventral pale stripe almost as long as S2; S3 as S2 but without connection between medial and posterior stripes and latero-ventral stripe reduced to anterior 0.25 of S3 length; S4–6 as S3 but connection between anterior and medial stripes becoming lost progressively caudad and without latero-ventral pale stripe; S7 only with traces of stripes; S8–10 dark brown; cerci, epiproct and paraprocts black. Cerci broken, but longer than S10. Epiproct with subapical spine; posterior process of S10 bearing 4–5 apical spines (Figs. 4b-c).

**Measurements** (N=3). Total length (without cerci)  $5.26 \pm 0.07$  cm; femur III length  $6.5 \pm 0.1$  mm, Fw length  $4.07 \pm 0.002$  cm, Hw length  $3.93 \pm 0.002$  cm, Fw pterostigma length  $2.91 \pm 0.003$  mm.

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