

## THE LARVA OF *LESTES ALFONSOI* GONZÁLEZ & NOVELO (ZYGOPTERA: LESTIDAE)

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Detailed description and illustrations are provided. A comparison with other Mexican larvae of the genus and a key to separate species are also included. Larva of *L. alfonsoi* seems not to be related to any of the known larvae of the genus, although it shares more features in common with the larva of *L. alacer*.

### INTRODUCTION

The genus *Lestes* is represented in Mexico by seven species, although the validity of two (*L. simplex* Hagen and *L. tikalus* Kormondy) has been questioned by some authors (cf. MAY, 1993). To date, larvae of the following Mexican species have been described: *L. alacer* Hagen (NOVELO-GUTIÉRREZ & GONZÁLEZ-SORIANO, 1991), *L. forficula* Rambur (CALVERT, 1928, supposition), *L. tenuatus* Rambur (GEIJSKES, 1941). WESTFALL & MAY (1996) keyed out the larva of *L. sigma* Calvert. In this paper, we describe the larva of *L. alfonsoi* González & Novelo, and compared it with other Mexican species.

### *LESTES ALFONSOI* GONZÁLEZ & NOVELO

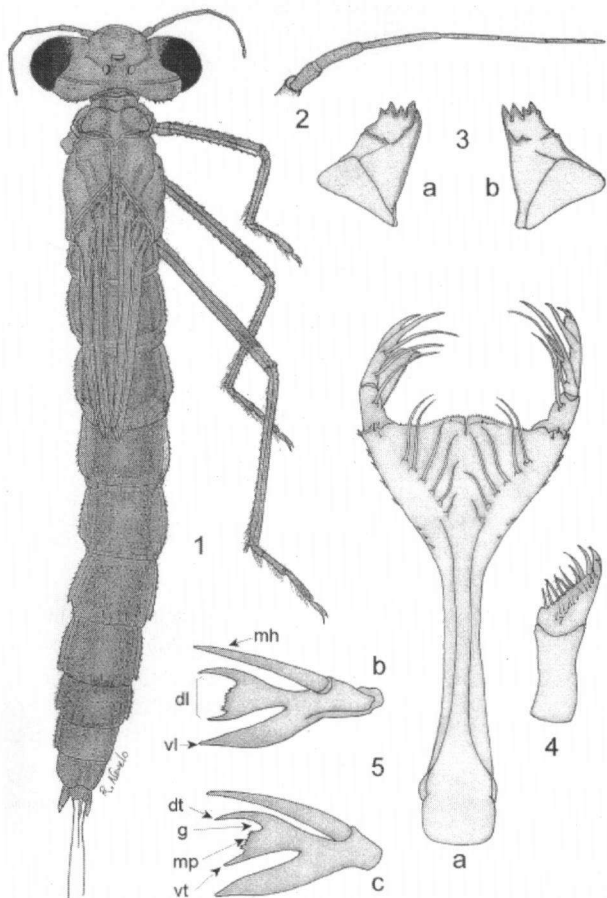
Figures 1-10

**Material.** — 5 exuviae (3♂, 2♀, reared), 2 last instar larvae (♂, ♀), 2 probably penultimate instar larvae (2♂), and 8 young instars (6♂, 2♀). MEXICO: Veracruz; Laguna de Santo Domingo, 4 km NW Huatusco (19°09'.550" N, 97°00'.267" W, alt. 1300 m), 15-VIII-1986, R. Novelo leg., 9♂, 5♀ (5 last instar larvae emerged 18/25-VIII-1986); 23-VIII-1987, R. Novelo leg., 1♂. Material is deposited at Colección Entomológica, Instituto de Ecología, A.C. (IEXA), Xalapa, México.

**DESCRIPTION.** — Larvae yellowish-brown to reddish-brown, exuviae grayish-brown, body long and slender, legs long and stalky (Fig. 1), caudal appendages almost 0.33 total body length, reddish-brown, with alternating pale and dark bands.

**H e a d.** — Almost 3 times wider than long, surface smooth, only a few short spines on posterior margin of cephalic lobes, cephalic lobes not bulging, occiput widely concave; a black line on the hind margin of the median ocellus and on the mesial

margin of each lateral ocellus. Antennae yellow, 7-segmented (Fig. 2), 3rd antennomere the longest, 7th the shortest, relative size of antennomeres: 0.40, 0.60, 1.0, 0.65, 0.55, 0.40, 0.25, lacking visible setae. Labrum widely emarginated apically, with some few, scattered, short setae on emargination. Mandibles: left mandible (Fig. 3a) with five incisor cusps, ventral cusp the largest, and with a small extra cusp at its base, molar lobe vestigial, represented by a transverse, low, sharp rim; right mandible (Fig. 3b) with four incisor cusps, molar lobe vestigial, represented by two separated cusps. Maxillae: galeolaciniae (Fig. 4) with seven teeth, three long slightly incurved teeth on dorsal margin, preceded by a row of 5-6 short, robust, stiff setae, three short slightly incurved teeth



Figs 1-5. *Lestes alfonsoi* details of the larval morphology: (1) last instar larva (♂), dorsal view (left legs and caudal appendages omitted); — (2) right antenna, lateral view; — (3) mandibles, dorsointernal view: (a) left mandible, (b) right mandible; — (4) galeolacinia, dorsal view (maxillary palp omitted); — (5) labium: (a) prementum, dorsal view, (b) left labial palp, frontal view, (c) right labial palp, frontal view, *L. alacer* larva [dl: dorsal lobe; dt: dorsal tooth; g: gap; mh: movable hook; mp: median process; vl: ventral lobe; vt: ventral tooth].

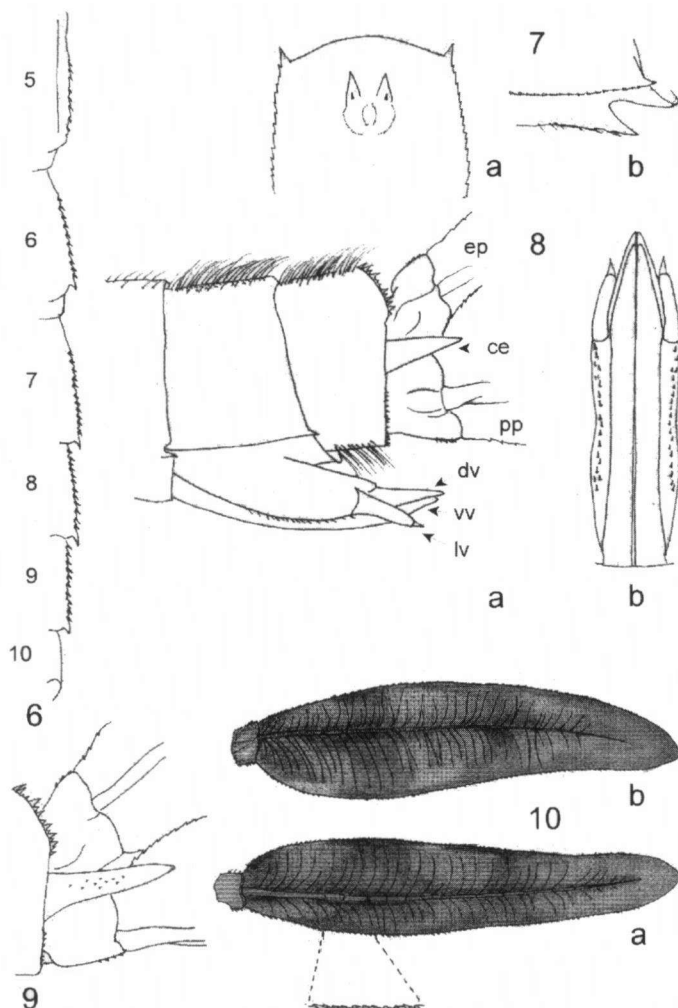
on ventral margin, preceded by a row of 10-11 short delicate setae, apical tooth the largest, maxillary palp shorter than galeolacinia, ending in a robust blunt spine. Labium: Prementum-postmentum articulation reaching basal half of metasternum; prementum long (Fig. 5a), a little more twice longer than its widest part, basal 0.60 narrow then suddenly widened on apical 0.40, with 4 +2 or 5 +1 premental setae, lateral margins with a row of minute, scattered, spiniform setae on apical 0.40; ligula well developed, its apical margin serrated (Fig. 5a), serrations truncate, short and robust, median cleft narrow and deep, with a small spine on each side; labial palp (Fig. 5b) divided in two lobes: the dorsal lobe ending in two robust sharp teeth separated each other by a truncate-serrated median process, the ventral lobe ending in a sharp, incurved, stout tooth, its internal margin serrulated, serrulations sharp and close-packed; three palpal setae, one at palp's base and two on movable hook, movable hook sharp, longer than palpal lobes; two small setae near to movable hook's articulation.

**T h o r a x.** — Pronotum concolorous, trapezoidal, transversally divided in two lobes, the anterior lobe the shortest. Synthorax: mesepisternum with a longitudinal dark stripe contiguous to pleural suture; mesepimeron with an inferolateral dark stripe continuous with an almost full-width, dark, metepisternal band; a dark inferolateral stripe on metepisternum; meso- and metinfraepisternum pale. Anterior and posterior wing pads reaching basal 0.45 and basal 0.65 of abdominal segment 4, respectively. Legs long and slender (e.g. hind legs, when fully extended, well beyond of posterior margin of abdominal segment 8), anterior (external) and posterior (internal) margins with a row of small spiniform setae; femora reddish-yellow, with a subapical pale ring; tibia yellowish; tarsomeres 1 and 2, and basal 0.40 of tarsomere 3 yellowish, apical 0.60 of tarsomere 3 reddish (Fig. 1); tarsal claws yellow.

**A b d o m e n** yellowish-brown, cylindric, slightly narrowing caudad; tergites 4-10 with minute spiniform setae, rows of long, white, abundant, delicate setae on the midline of tergites 8-10, as well as on sternite 10; posterior margins of segments 1-9 smooth, posterior margin of segment 10 with robust sharp spines on dorsum, and minute spines on venter, sides smooth; segments 1-9 with lateral keels bearing a row of small spiniform setae, lateral keels on 6-9 ending in an acute spine (Fig. 6). Male gonapophyses (Fig. 7) short (i.e.: not reaching posterior margin of sternite 9 [Fig. 7a]), pyramidal, sharply pointed, with a row of 3-5 small spiniform setae on basal 0.65 (Fig. 7b) of their ventral border. Female gonapophyses (Fig. 8) long, almost reaching the line of detachment of the laminar portion of the paraproct (Fig. 8a); lateral valvae, in ventral view (Fig. 8b), mostly convergent excepting their extreme acute tips, which are divergent, their ventral edges with a row of spiniform setae on the middle third; dorsal and ventral valvae longer than lateral ones, dorsal valvae the longest (Fig. 8a); inferior margin of ventral valvae smooth. Male cerci conical (Fig. 9), enlarged, acutely pointed, longer than segment 10, basal 0.75 yellowish-brown, apical 0.25 yellow, a row of minute spiniform setae on external side. Female cerci conical (Fig. 8a), acutely pointed, 0.70 the length of segment 10, concolorous.

Caudal appendages: Paraprocts and epiproct laminar (Fig. 10), their ventral and dorsal

margins serrated except at apical 0.15, each serration bears a minute spiniform setae, laterally carinated, carina segmented; color pattern consisting of alternating pale and dark bands. Dorsal and ventral margins of paraproct roughly parallel (Fig. 10a), slightly convergent at 0.75 of their length, ending in a rounded tip, 5 times longer than its widest part, tracheoles branching more or less at the same distance from each other,



Figs 6-10. *Lestes alfonsoi* details of the larval morphology: (6) left lateral margin of abdominal segments 5-10, ventral view; — (7) male gonapophyses: (a) ventral view, (b) left lateral view; — (8) female gonapophyses: (a) left lateral view of abdominal segments 8-10 [Ce: cercus; Ep: epiproct; Dv: dorsal valvae; Lv: lateral valvae; Pp: paraproct; Vv: ventral valvae], (b) valvae, ventral view; — (9) male cercus, left lateral view; — (10) caudal appendages: (a) left paraproct, lateral view, (b) epiproct, left lateral view.

thus paraproct appearing transversally stripped. Epiproct slightly downcurved (Fig. 10b), its dorsal margin convex all the way, inferior margin sinuated, ending in a rounded tip, 4 times longer than its widest part.

**Measurements** (in mm). — Last instar larvae (in ethanol): total length (excluding caudal appendages) 18.0-18.2; maximum width of head 3.8-3.9; hind femur 4.5-4.7; paraprocts 8.5-9.0; epiproct 8.0-8.6; male cerci 0.9; female cerci 0.5. Exuviae (in ethanol): TL (excl. c. app.) 14.5-16.9; MWH 3.8-4.0; HF 4.2-4.3; Pp 7.7-8.7; Ep 6.8-8.4; Mc 0.7-0.9; Fc 0.5.

**REMARKS.** — The male last instar larva was observed bearing many individuals of hydrae on his body as follows: margin of occiput, base of right antenna, maxillary stipes, base of submentum; pro- and metatrochanters, anterior lobe of prothorax, posterior margin of pronotum, meso- and metasternum, base of wing sheaths; basal portion of abdominal segments 2-7 immediately up and down of lateral keels, behind gonapophyses, at base of 10th sternite, inferolaterally on basal lobe of epiproct, and on internal side of cerci.

Larvae inhabit in a shady shallow pond; most of specimens were caught in a place covered with emergent grasses; others in a patch of sedges *Juncus effusus* L. (Juncaceae).

## DISCUSSION

The larva of *Lestes alfonsoi* is easily distinguishable from other known larvae of Mexican species of *Lestes* by the following combination of features: Head with no particular dark markings, excepting the black lines on ocelli; 6 premental setae; prementum-postmentum articulation reaching only to middle metasternum; a shallow notch between the dorsal tooth and the truncate-serrated process of the dorsal lobe of labial palp (see Fig. 5b, arrow); lateral spines on abdominal segments 6-9; female gonapophyses reaching posterior margin of the basal lobe of paraprocts, lateral valvae shorter than central ones; and paraprocts 5 times longer than its widest part. Larvae of *L. alfonsoi* share the following features with other *Lestes* larvae: Head with no particular dark markings (*alacer*, *forcicula*), 6 premental setae (*alacer*), a small spine to each side of median cleft of ligula (*alacer*), lateral spines on abdominal segments 6-9 (*tenuatus*), shape of caudal appendages (*alacer*, *tenuatus*), color pattern of caudal appendages (*forcicula*). In spite of sharing more features with the larva of *L. alacer*, the larva of *L. alfonsoi* does not appear closely related to that species because of important differences in the labial palp, female gonapophyses, lateral spines on abdomen, and caudal appendages coloration.

## A KEY TO THE MEXICAN LARVAE OF *LESTES*

(Modified and adapted from WESTFALL & MAY, 1996)

- 1 Palpal lobe with short, denticulate process very small and rounded apically ..... *sigma*
- Palpal lobe with short, denticulate process of normal size and truncate apically (Figs 5c,d) ..... 2
- 2 Lateral spines on abdominal segments 5-9 ..... 3
- Lateral spines on abdominal segments 6-9 (occasionally a minute spine on 5 in *tenuatus*) ..... 4

- 3 Caudal appendages mostly pale with very little light brown marking; paraproct 5 times longer than its widest part; premental setae 6-7; slender proximal part of prementum about twice the length of the expanded distal part ..... *alacer*
- Caudal appendages mostly dark with distinct darker brown markings; paraproct 6.5 times longer than its widest part; premental setae 5; slender proximal part of prementum 2.75 times the length of the expanded distal part ..... *forficula*
- 4 Notch between the dorsal tooth and the truncate process of the dorsal lobe of labial palp deeper than its widest part; lateral valvae of female gonapophyses longer than central ones; prementum-postmentum articulation reaching posterior margin of metasternum; premental setae 5 ..... *tenuatus*
- Notch between the dorsal tooth and the truncate process of the dorsal lobe of labial palp as deep as its widest part; lateral valvae of female gonapophyses shorter than central valvae; prementum-postmentum articulation reaching the basal half of metasternum; 6 premental setae ..... *alfonsoi*
- LARVAE UNKNOWN: *simplex*, *tikalus*.

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