

The nymph of *Anisagrion* Selys 1876, based on the discovery of *A. inornatum* (Selys, 1876) in Ecuador (Odonata: Coenagrionidae)

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Abstract The final instar nymph of *Anisagrion inornatum* is described and illustrated based on five specimens (one reared) from southern Ecuador. It is the first to be discovered for the genus. The nymph of *Anisagrion inornatum* differs from its closest relative, *Apanisagrion lais*, by: (1) antenna shorter in relation to head length (ratio 1.35 in *An. inornatum* vs 1.55 in *Ap. lais*); (2) fewer palpal and premental setae (5 palpal and 4 or 5 premental setae in *An. inornatum* vs 6–8 palpal and 5–8 premental setae in *Ap. lais*); (3) venter of S3–S8 with medial dark stripe. The nymphs were found in a slow shallow seep overgrown with emergent wetland plants.

Keywords Zygoptera · *Anisagrion* · Nymph

Abbreviations

S1–10 Abdominal segments 1 through 10
antm Antennomere

Introduction

Of the 50 genera of New World Coenagrionidae (Zygoptera), 24, i.e., nearly half, are unknown in the nymph stage (see Garrison et al. 2010); all of the unknown genera are Neotropical and most occur only in South America. *Anisagrion* Selys, 1876, which is known from southern Mexico to Panama, Venezuela and Ecuador, is one of the unknown genera, as the nymph of none of the four species has been previously discovered. I collected several specimens of *Anisagrion inornatum* (Selys, 1876) in

Loja Province in southern Ecuador, March, 2008. The following description, the first for the genus, is based on five final instar nymphs (one male emerged 3 April 2008).

Methodology

Drawings of mouthparts and abdominal segments were made with aid of a camera lucida. Caudal lamellae were slide-mounted and photographed with a Nikon D700 digital camera mounted on a Wild stereomicroscope. Measurements (mm) were made with a calibrated ocular micrometer at various magnifications. Head length was measured from anterior-most margin of right compound eye to posterior-most margin of right postero-lateral lobe. Mandibular formula follows Watson (1956). Prementum length (excluding hinge) and width are maximum dimensions. Abdomen length and total length were measured only on unreared nymphs, with each abdominal segment partly telescoped into the preceding segment, approximating the living condition; these measurements do not include cerci or caudal lamellae. Segment 10 (S10) was fully extended and its length was measured dorso-medially. Four specimens are deposited in the Florida State Collection of Arthropods, one in the Colección Entomológica del Instituto de Ecología, A.C., Xalapa, Mexico.

Description of final stadium nymph of *Anisagrion inornatum*

Relatively stocky nymph, medium brown, head mottled with tan, legs tan, abdomen appearing granular except on

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two submedian pale stripes (Fig. 1); caudal lamellae markedly tracheated.

Head Maximum width 2.2–2.3 times length (see Methods). Eyes gray-black, unpatterned. Frons predominantly dark to light brown with pale round spot posterior to antennal base. Postero-lateral lobes rounded, each with 12–15 posterior sharp spinules. Antenna 7 segmented, about 2.0 mm long (1.34–1.38 times head length), mostly pale except antm2 dark basally and narrowly along outer margin (Fig. 2); antm3 longest (0.50–0.52 mm), approximate ratios 1 : 1.5 : 2 : 1.2 : 0.9 : 0.7 : 0.5 (antm1 length given a value of 1); a few very fine pale setae on antm1–6. Mandibular formula: *L* 1+2 3 4 5 0 *a* *b*, *R* 1+2 3 4 5 *y* *a*. Labium: articulation of prementum/postmentum lies between bases of coxae II; prementum sub-triangular (Fig. 3), about 5.6 mm long, 4.55 mm wide at anterior widest point (ratio length to maximum width 1.22–1.24); anterior margin strongly convex, finely crenulated; usually 4 large premental setae per side (one side on reared male had two small basal seta and three large distal setae); lateral margin with 12–15 spinules; latero-distal corner (at base of palp) with three or four pale spinules. Labial palp: dorsal margin with five long setae; distal margin between movable hook and distal tooth with six or seven small teeth, three or four small dorsal teeth, and two or three larger ventral teeth (Fig. 4); movable hook curved, 0.6 mm long, about 0.75 times length of outer palpal margin.

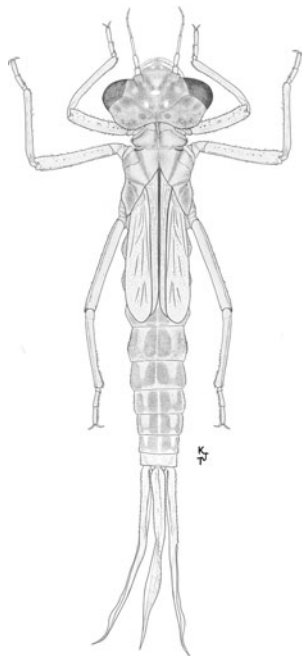


Fig. 1 Final stadium nymph of *Anisagrion inornatum*

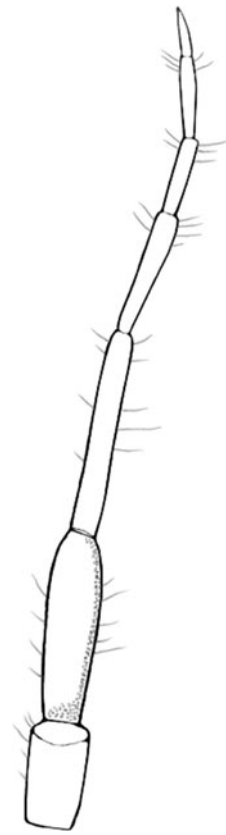


Fig. 2 Right antenna of *A. inornatum*. Bar 0.5 mm

Thorax Prothorax and anterior triangular portion of pterothorax tan. Wing pad tips reaching middle of S5. Legs pale, femora without transverse dark bands but with a narrow dark longitudinal stripe on dorsal carina; femora I–III with spinules along longitudinal carinae; tibiae I–III with spinules on carinae plus scattered long, fine pale setae, distally with ventral patch of trifid setae.

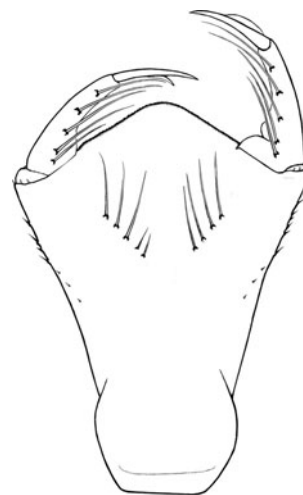


Fig. 3 Prementum of *A. inornatum*, dorsal view



Fig. 4 Apex of right palpal lobe of *A. inornatum*, frontal view. Bar 0.25 mm

Abdomen Cylindrical; S2–8 with 10–16 short spinules on conspicuous dark round bases along lateral carina in an uneven row; dorso-posterior margins of S5–9 with small widely-spaced spinules; S10 elevated posteriorly with median indentation and pale dorso-medial spinules 0.05–0.10 long (Fig. 5). Venter of S1–8 with scattered small spinules; venter of S1–7 each with narrow dark medial stripe. Female cercus triangular in lateral view, 0.42 length of cercus; male cercus more elongate, slightly concave on dorsal surface, 0.55 length of S10. Tips of female gonapophyses reaching posteriorly to level of cercus tip (Fig. 6); outer valves with complete row of 14–18 ventral spines and 4 or 5 longer fine setae, plus a few small setae along sides (Fig. 6). Caudal lamellae membranous, richly tracheated. Median lamella subovate (Fig. 7a), widest at 0.6 length, ratio of length to maximum width 2.75–2.80; without a discernible nodus; dorsal series of short basal spines about 0.33 length of lamella and consisting of 30 closely based spines, ventral series of spines shorter, extending 0.25 length of lamella and consisting of eight more widely spaced spines; lamella tip abruptly tapered to an acute point, comprising about 0.13 total length of lamella. Lateral caudal lamellae (Fig. 7b) more lanceolate, 0.44–0.48 length of abdomen, widest at

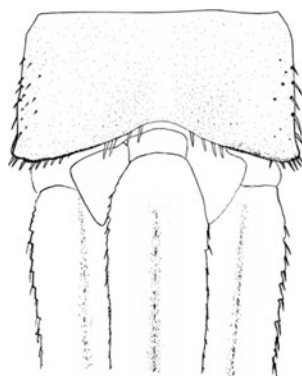


Fig. 5 Male S10 + basal portion of caudal lamellae of *A. inornatum*, dorsal view

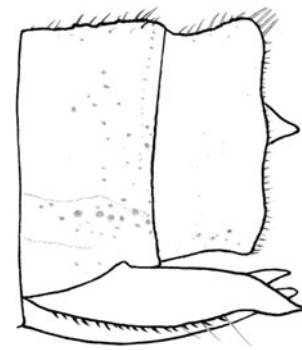


Fig. 6 Female S9–10 + gonapophyses of *A. inornatum*, caudal lamellae omitted, lateral view

0.6 lamella length, ratio of length to maximum width 3.0–3.05; nodus indiscernible; dorsal series of short spines 0.28 length of lamella and consisting of 15 spines, ventral series of spines longer, 0.40 length of lamella and consisting of 40 spines; small stout setae on lateral carina variable in size, series extending from base of lamella to about half its length; tip of lamella similar in shape to that of median lamella except shorter in relation to lamella length (<0.10).

Measurements: (♂ $N=2$, ♀ $N=3$). Total length 11.0–11.7. Head length 1.40–1.45, maximum width 3.12–3.22. Prementum length 2.2, maximum width 1.8. Femur I: 1.6–1.7; femur II 2.05–2.15; femur III 2.5–2.7. Abdomen total length 7.0–7.1; S10 length 0.40–0.47; cerci length ♂ 0.26, ♀ 0.17. Median caudal lamella length 5.3–5.4; maximum width 1.93–1.95. Lateral caudal lamella length 5.15–5.30; maximum width 1.68–1.72.

Specimens examined: *Anisagrion inornatum*: Ecuador, Loja Province, seep along Rio Chamba, Vilcabamba, S04° 15.82', W079° 13.03' (elev. 1555 m); 22/VIII/2008, coll. K.J.T., one ♂ exuviae (reared) [emerged: 3/IV/2008], four final instar nymphs.

Apanisagrion lais: USA, Arizona, Cochise County, Leslie Canyon Rd., stream, N31° 35.54', W109° 30.40' (elev. 1,417 m), 22/VII/2007, four nymphs, coll. K.J.T.

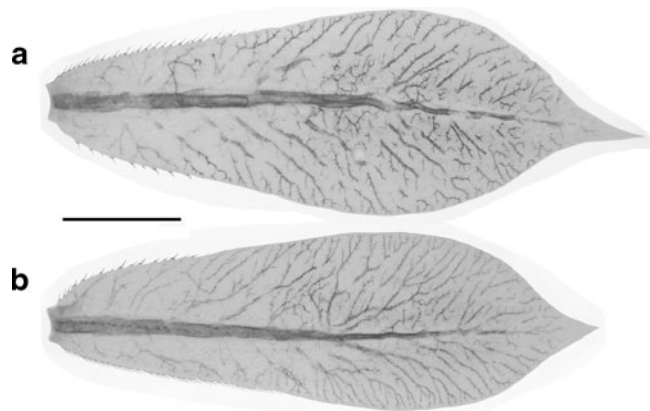


Fig. 7 Caudal lamellae of *A. inornatum*, lateral view: a) medial lamella, b) le= lateral lamella. Bar 1 mm

Discussion

The genus *Anisagrion* is most similar to *Apanisagrion* Kennedy, 1920, a monotypic genus that occurs in a relatively narrow zone from the southwest US (southern Arizona) to Honduras (Novelo-Gutiérrez 2010). Their apparent relationship is based mainly on two shared adult characteristics: the dense venation at the apex of the hind wings and a pair of chitinized triangular projections on the ental surface of the genital ligula (Garrison et al. 2010). The nymph of *Apanisagrion* was illustrated and placed in a key to Coenagrionidae genera by Westfall and May (2006) who characterized it as having seven palpal setae, five premental setae, and the outer margins of the lateral caudal lamellae convex in the apical half (the lateral lamellae were stated to be “forceps-like” in dorsal view). Novelo-Gutiérrez (2010) formally described the nymph but did not mention the lateral lamellae as being curved inward. I examined four F0 nymphs of *Apanisagrion lais* from Cochise County, Arizona, in which palpal setae varied in number from 6–8, and premental setae from 5–8. Although the lateral lamellae of one specimen appeared slightly curved inward, the others were either relatively straight or slightly curved outward. It is highly likely that preservation accounts for the curvature of lamellae, and that they are normally relatively straight.

The nymph of *An. inornatum* is very similar to that of *Ap. lais* in body shape, presence of small stout setae, and shape and tracheation of the caudal lamellae. Nymphs of *An. inornatum* differ in having only five palpal setae and four premental setae (*Ap. lais* has 6–8 palpal and 5–8 premental setae). Another difference I found was in coloration: the *Ap. lais* nymphs that I examined were pale with distinct dark markings on the sides of the thorax and the abdomen above and below the lateral carinae. *Anisagrion inornatum* nymphs

were darker overall, thus any dark markings in color pattern appeared less striking; however, on the venter of the abdomen of *An. inornatum*, each segment from S3–8 had a medial narrow dark longitudinal stripe. The venter of each segment in *Ap. lais* was uniformly pale. Whether the differences I found between *An. inornatum* and *Ap. lais* are of generic or merely specific status will have to await discovery of other species of *Anisagrion*.

Anisagrion inornatum nymphs were found in a small, shallow stream, heavily vegetated by aquatic and semi-aquatic plants, at approximately 1,550 m.a.s.l. Novelo-Gutiérrez (2010) found *Apanisagrion lais* in Mexico in a similar habitat, seepage areas alongside streams, also with emergent vegetation. In southern Arizona, I found nymphs of *Ap. lais* in a pooled area of a small stream with numerous aquatic plants.

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