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A new species of Larsia Fittkau, 1962 (Diptera: Chironomidae: Tanypodinae) from phytotelmata of Aechmea distichantha Lemaire, 1853 (Bromeliaceae) in Argentina

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A new species of *Larsia* Fittkau, 1962 (Diptera: Chironomidae: Tanypodinae) from phytotelmata of *Aechmea distichantha* Lemaire, 1853 (Bromeliaceae) in Argentina

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A new species of *Larsia* Fittkau, 1962, viz. *Larsia angusticornis* sp. n., is described and adults and immatures are figured. The study is based on larvae collected from phytotelmata of the bromeliad *Aechmea distichantha* Lemaire, 1853 in northeastern Argentina that were reared to the adult stage. The pupa bears thoracic horns unusual for the genus, which distinguish this new species from other *Larsia* species.

http://zoobank.org/urn:lsid:zoobank.org:pub:41DFD96D-98E2-4FFC-9CDE-C290BCA84D45

Keywords: Diptera; Chironomidae; *Larsia*; *Aechmea*; new species; immature stages; phytotelmata; Argentina

Introduction

According to the latest world catalogue of Chironomidae (Ashe and O'Connor 2009, 2012), the cosmopolitan genus *Larsia* Fittkau, 1962 includes seven species from the Neotropical Region: *L. fittkaui* Sublette and Sasa, 1994 (Guatemala), *L. gelhausi* Oliveira and Silva, 2011 (Brazil), *L. hamadae* Oliveira and Silva, 2011 (Brazil), *L. labarthae* Serpa-Filho, 2005 (Brazil), *L. pallescens* Edwards, 1931 (Argentina), *L. planensis* Johannsen, 1946 (Guatemala and Mexico) and *L. reissi* Sublette and Sasa, 1994 (Guatemala). However, *L. planensis* should not be included since there are no published records for this species from the Neotropics. In addition, *L. berneri* Beck and Beck, 1966 and *L. indistincta* Beck and Beck, 1966 (= *L. hamadae* as possible junior synonym) have been identified from Brazil and *L. decolorata* Malloch, 1915 from Cuba and Panama (Bohdan Bilyj, personal communication, June 19, 2014).

The male adult of *Larsia* is characterized by the presence of a scutal tubercle, lyrate tibial spurs on all legs, absence of the R_2 vein in the wing, and a conical or bilobed anal point (Murray and Fittkau 1989; Niitsuma 2001; Oliveira and Silva 2011). In the pupa, the characteristics of the thoracic horns are used to distinguish the species (Fittkau and Murray 1986; Niitsuma 2001). The larva is characterized by the following characters: relatively long antenna, at least three times longer than the mandible, the ring organ of the basal maxillary segment located in distal half, and the inner apical extension of the dorsomentum directed medially (Epler 2001).

Immatures inhabit both lentic and lotic environments such as marshes, ponds, littoral zone of lakes, and slow moving sections of rivers and streams (Epler 2001). In addition,

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larvae of *Larsia* were found associated with phytotelmata of two species of *Eryngium* L., 1753 (Campos 2010). Phytotelmata are cavities formed by terrestrial plants, which allow water to collect. These impounded sites are created by structures such as modified leaves, leaf axils, flowers, stem cavities, open fruits, or fallen leaves (Fish 1983). The trapped water can be regarded as an aquatic microcosm that provides a suitable habitat for the development of numerous Diptera, including different species of Chironomidae (Donato and Paggi 2005, 2008). Bromeliads (Bromeliaceae) are especially adapted to develop phytotelmata, from which more than 470 species of aquatic animals have been recorded (Sodré, Rocha, and Messias 2010). *Aechmea distichantha* Lemaire, 1853 is a bromeliad with an erect rosette of arching strap-shaped leaves, distributed in the deciduous, mixed, and evergreen forests in southern Brazil, Bolivia, Paraguay, Uruguay, and northern Argentina (Montero, Feruglio, and Barberis 2010).

In this paper, we describe adult male and female, as well as both larva and pupa of a new species of *Larsia*, viz. *L. angusticornis* sp. n., breeding in the phytotelmata created by the leaf axils of the bromeliad *A. distichantha*.

Material and methods

The study is based on the material collected during 2009 and 2010 in the Santa Fe, Corrientes and Chaco Provinces of Argentina. Impounded fluids from *A. distichantha* plants were extracted using a pipette attached to a vacuum pump. Larvae were transported alive in separate vials and reared in the laboratory following the methods suggested by Epler (2001). The specimens were cleared and slide-mounted in Canada balsam. General terminology and abbreviations follows Sæther (1980), except for the abdominal chaetotaxy of the pupa, which follows Fittkau (1962), and the larval cephalic chaetotaxy, which follows Kowalyk (1985). Measurements are given as ranges followed by those of the holotype in square brackets. Types are deposited in the collection of the Museo de La Plata, Argentina (MLP).

Results

Larsia angusticornis sp. n.

Type locality

Argentina, Santa Fe Province, margin of Toba creek, 29°24′16.5″S, 60°05′2.1″W, 52 m above sea level (a.s.l.).

Type material

Holotype. ♂ (reared, with larval and pupal exuviae), 'Argentina, Santa Fe Province, margin of Toba creek, 29°24′16.5″S, 60°05′2.1″W, 52 m a.s.l., 25.IX.2009, col. R.E. Campos' (MLP). *Paratypes.* 1 ♂ (reared, with pupal exuviae), 1 ♂, 2 ♀ (reared, with larval and pupal exuviae), 'Argentina, Santa Fe Province, margin of Toba creek, 29°24′16.5″S, 60°05′2.1″W, 52 m a.s.l., 25.IX.2009, col. R.E. Campos' (MLP). 1 ♀ (reared, with pupal exuviae), 1 fourth instar larva, 'Argentina, Chaco Province, Parque Nacional Chaco, 26°43′31.4″S, 59°30′16.7″W, 74 m a.s.l., 26.IX.2009, col. R.E. Campos' (MLP). 1 ♂ (reared, with pupal exuviae), 1 ♀ (reared, with pupal exuviae), 2 fourth instar larvae, 'Argentina, Corrientes Province, Riachuelo, 27°32′42.8″S, 58°40′22.7″W, 51 m a.s.l., 28. IX.2010, col. R.E. Campos' (MLP). All types are provided with appropriate type labels.

Diagnostic characters

The new species can be distinguished by the combination of the following characters: male with cross-vein r-m pale, abdominal tergites II−V with a brown basal band, VI−VIII mostly brownish, gonocoxite brown, gonostylus dark brown, tergite IX without setae, antennal ratio (AR) 1.50−1.53; female with dorsomedial lobe of gonapophysis VIII short, not extended posteriorly; pupa with long and narrow thoracic horn, tubular atrium with some indication of an alveolar surface in the distal half, corona not discernible; abdominal segment VII with four lateral setae; larva with antennal length / mandible length ratio low (2.31−2.50), larval cephalic setation with setae S9, S10, and VP arranged in line.

Description of male adult (n = 3−4, except when stated otherwise) (Figures 1−4)

Size. Total length 3.05−3.22 [3.20] mm. Total length / wing length 1.98−2.06 [2.03].

Colouration. Head and thorax brownish; vittae contrasting dark brown. Legs and wings pale, r-m cross-vein not infuscated. Abdominal tergites II−V with brown basal band; tergites VI−VIII mostly brownish; gonocoxite brown; gonostylus dark brown.

Head. AR 1.50−1.63 [1.51]. Temporal uniserials 11−13 [12]; postorbital uniserials 3−5 [3]. Clypeus with 11−17 [14] setae. Palpomeres I−V length: 45−50 [50] μm, 75−80 [78] μm, 125−140 [130] μm, 155−167 [163] μm, 200−265 [200] μm, respectively.

Thorax. Scutal tubercle 8 high (n = 2). Antepronotum with 3−5 [5] lateral setae; humeral 5−6 [5]; dorsocentrals 30−35 [35]; acrostichals 30−44 [32]; prealars 12−14 [14]; supraalar 1 [1]. Scutellum with anterior row of 5−9 [5] thin setae and posterior row of 9−13 [13] stronger setae.

Wing (Figure 1). 1.48−1.63 [1.58] mm long; 0.42−0.45 [0.42] mm wide. L/W 3.47−3.80 [3.80]. VR 0.87−0.93 [0.89]. Brachiolum with 2 [2] distal setae, plus 1 [1] basal seta. Squama fringed with 9−15 [9] setae.

Legs. Tibial spurs (Figure 2): of protibia 15−20 [15] μm long, 18 μm wide (n = 1), with 14 teeth (n = 1); of mesotibia 20−25 [20] μm long (n = 2), 13−15 [13] μm wide (n = 2), with 9 [9] teeth and 20−28 [20] μm long (n = 2), 17 [17] μm wide (n = 1), with 10 [10] teeth (n = 2); of metatibia 25 [25] μm long (n = 2), 15 [15] μm wide, with 9 teeth (n = 1), and 25 [25] μm long (n = 2), 15 [15] μm wide, with 10−12 [10] teeth (n = 2). Metatibial comb with 5−6 [5] poorly differentiated setae. Tarsal claws (Figure 3) apically pointed; pulvilli about 1/3 as long as claws. Lengths and proportions of legs as in Table 1.

Hypopygium (Figure 4). Tergite IX without setae; anal point conical. Phallapodeme 22−25 [25] μm long (n = 2). Transverse sternapodeme 65−73 [73] μm long, with oral projection 13−18 [13] μm long. Gonocoxite 188−205 [205] μm long. Gonostylus 135−163 [140] μm long; megaseta 10−13 [13] μm long. HR 1.20−1.46 [1.46].

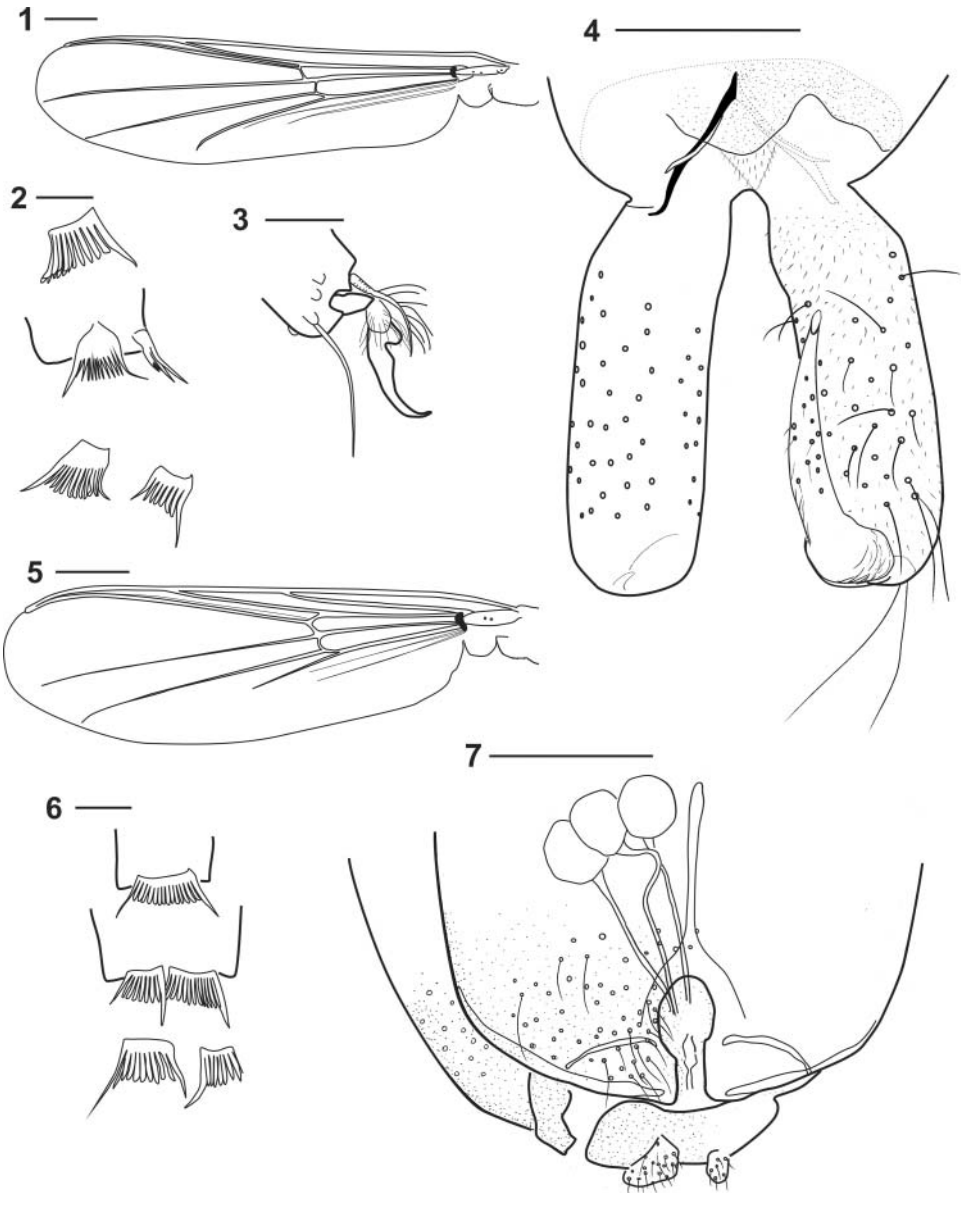
Description of female adult (n = 4, except when stated otherwise) (Figures 5−7)

Size. Total length 2.00−2.98 mm (n = 2). Total length / wing length 1.48−1.71 (n = 2).

Colouration. As in male, except abdomen uniformly pale brown.

Head. AR 0.15−0.16; ratio of last two flagellomeres 1.64−1.80. Temporal setae uniserial 8−11; postorbitals uniserial 6−8. Clypeus with 19−29 setae. Palpomere I−V lengths: 38−50 μm, 75−93 μm, 120−150 μm, 140−175 μm, 238 μm (n = 1), respectively.

Thorax. Antepronotum with 2−3 lateral setae; humeral 5 (n = 1); dorsocentrals 67 (n = 1); acrostichals 31−39 (n = 3); prealars 19−22 (n = 2); supraalar 1. Scutellum with anterior row of 13−16 thin setae and posterior row of 11−14 stronger setae.



Figures 1–7. *Larsia angusticornis* sp. n., adults. Male: (1) wing; (2) tibial spurs on fore leg (top), mid leg (middle; the outer spur in lateral view), and hind leg (bottom); (3) lateral view of ta_5 claw and pulvilli; (4) hypopygium, dorsal. Female: (5) wing; (6) tibial spurs on fore leg (top), mid leg (middle), and hind leg (bottom); (7) genitalia. Scale bars = 20 μm for Figures 2, 3, 6; 100 μm for Figure 4; 200 μm for Figures 1, 5, 7.

Wing (Figure 5). 1.35–1.74 mm long; 0.53–0.61 mm wide. L/W 2.57–2.84. VR 0.86–0.94. Brachiolum with 2–3 distal setae, plus 1 basal seta. Squama fringed with 8–18 setae.

Legs. Tibial spurs (Figure 6): of protibia 20 μm long, 25 μm wide, with 12–16 teeth; of mesotibia 25–28 μm long, 13–18 μm wide, with 9 teeth and 28 μm long (n = 2),

Table 1. Lengths (μm) and proportions of legs of *Larsia angusticornis* sp. n., male (n = 3 for p_1 and p_2; n = 5 for p_3); value for the holotype in brackets.

	fe	Ti	ta_1	ta_2	ta_3
p_1	720–780 [780]	870–940 [905]	610–690 [690]	340–390 [390]	240–255 [250]
p_2	770–895 [895]	780–880 [870]	510–600 [570]	240–275 [275]	180–195 [193]
p_3	720–770 [770]	940–1030 [950]	650–730 [730]	350–425 [425]	260–290 [290]
	ta_4	ta_5	LR	BV	SV
p_1	105–180 [180]	110–115 [105]	0.70–0.76 [0.76]	2.56–2.80 [2.56]	2.42–2.61 [2.44]
p_2	110–130 [130]	90–95 [90]	0.65–0.70 [0.66]	3.27–3.63 [3.39]	2.82–3.10 [3.10]
p_3	170–190 [190]	90–115 [110]	0.68–0.74 [0.70]	2.51–2.76 [2.51]	2.40–2.55 [2.49]

15–20 μm wide (n = 2), with 11–15 teeth; of metatibia 27–33 μm long, 15 μm wide, with 7–9 teeth, and 25–28 μm long (n = 2), 15–18 μm wide, with 11–14 teeth. Metatibial comb with 4–5 poorly differentiated setae. Lengths and proportions of legs as in Table 2.

Genitalia (Figure 7). GpVIII lobe reduced, not projecting posteriorly. Seminal capsule clear, ovoid, 53–70 μm long (n = 3); spermathecal ducts with uniform width; notum 125–140 long μm (n = 2), notum length / seminal capsule length 2.34–2.41; tergite IX and segment X without setae. Cercus 25–40 μm long.

Description of pupa (n = 5–7, except when stated otherwise) (Figures 8–12)

Size. Total length 3.65–4.15 [3.73] mm.

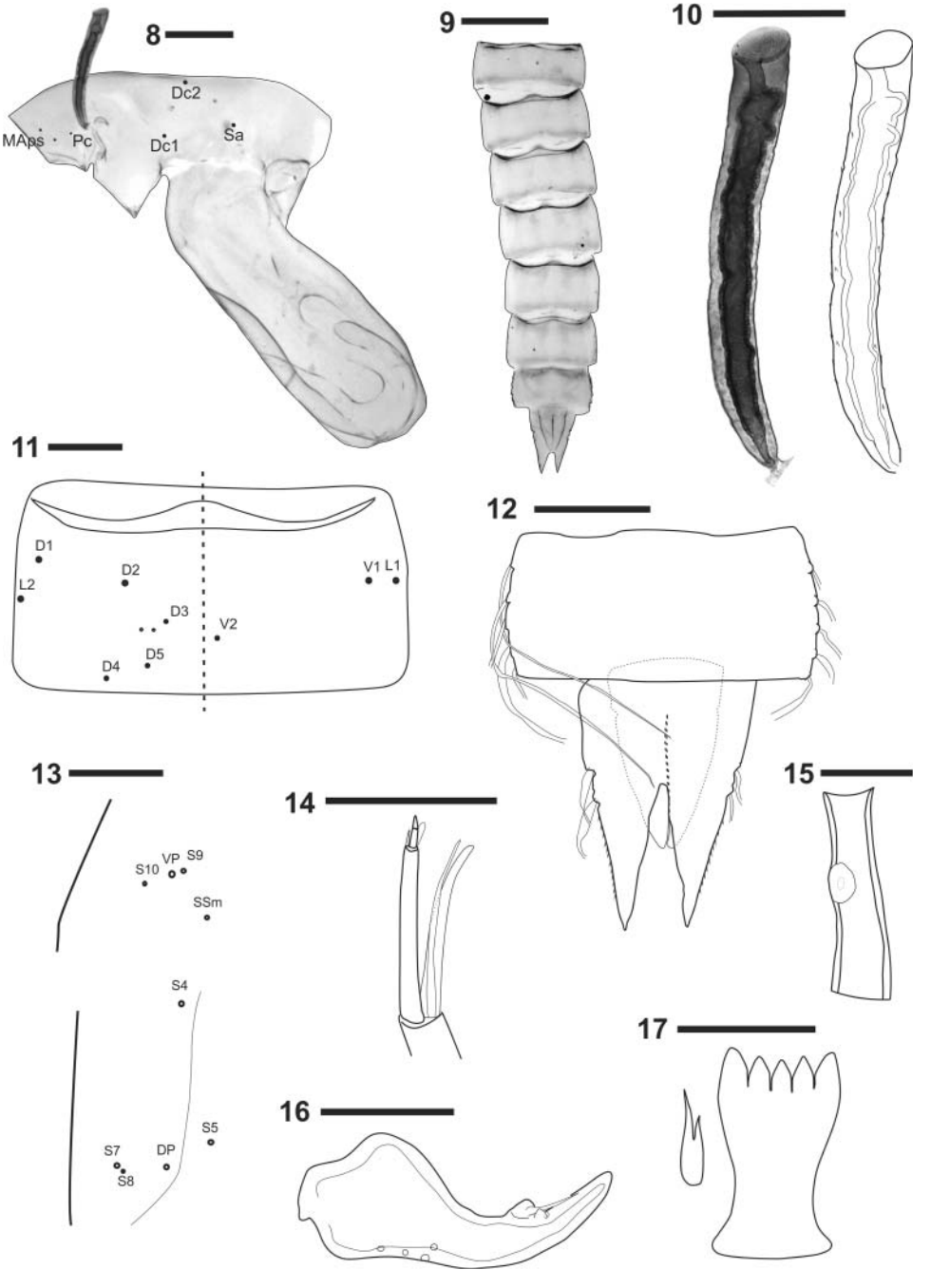
Colouration. Cephalothorax yellowish, with clearer maculation (Figure 8). Abdomen pale brown to yellowish brown, faint pattern as in Figure 9. In some specimens, tergites II–VI with a pale brown apical band and VII–VIII with a pale brown basal band.

Cephalothorax. Thoracic horn long and tubular (Figures 8, 10). Length 310–380 [350] μm; width 40–58 [43] μm; L/W 6.20–8.90 [8.14]; respiratory atrium mostly tubular, with some indication of alveolar surface in distal half; plastron plate encompassing the entire apical width of horn, 28–38 [28] μm long (n = 4); corona adpressed to plastron plate; duct 20–30 [20] μm long, 13–18 [13] μm wide. Thoracic comb with 8–10 blunt teeth [9], basal lobe distinct. Thoracic setal arrangement as in Figure 8.

Abdomen. Tergites I and III–VIII with shagreen composed of 2–7 spinules, serially arranged in transverse arched rows. Sternite II with spinules 3–5 μm long, arranged in

Table 2. Lengths (μm) and proportions of legs of *Larsia angusticornis* sp. n., female (n = 4).

	fe	Ti	ta_1	ta_2	ta_3
P_1	680–750	780–910	550–650	290–350	200–240
P_2	780–880	720–870	480–550	210–250	150–175
P_3	670–830	925–1075	590–730	300–370	220–290
	ta_4	ta_5	LR	BV	SV
P_1	140–170	90–110	0.68–0.71	2.63–2.79	2.57–2.65
P_2	100–120	80–90	0.60–0.67	3.45–3.67	3.10–3.27
P_3	140–170	80–110	0.62–0.72	2.74–2.95	2.53–2.80



Figures 8–17. *Larsia angusticornis* sp. n., immatures. Pupa: (8) cephalothorax; (9) abdominal pattern, segment I lacking; (10) thoracic horn, photo and drawing; (11) sternite (right) and tergite (left) of abdominal segment IV; (12), abdominal segment VIII and anal lobe. Fourth instar larva: (13) ventral (top) and dorsal (bottom) cephalic setation; (14) antennal flagellum; (15) basal segment of maxillary palpus; 16, mandible; (17) ligula and paraligula. Scale bars = 20 μm for Figures 14, 15; 50 μm for Figures 13, 16, 17; 100 μm for Figures 10, 11; 200 μm for Figures 8, 12; 500 μm for Figure 9.

transverse rows. Chaetotaxy of abdominal segment IV as in Figure 11. Segment VII with 4 lateral setae; segment VIII with 5 lateral setae. LS_1 VII setae located 0.41−0.51 [0.40] from anterior margin and 0.28−0.39 [0.28] on VIII. Anal lobe 400−450 [430] μm long (Figure 12). Anterior macrosetae located 0.35−0.47 [0.37] from the anterior margin and posterior macrosetae 0.46−0.64 [0.49]. Inner margins without spinules. Male genital sac 275−310 [310] μm (n = 2) long; reaching 0.69−0.72 [0.72] (n = 2) of the length of anal lobe.

Description of fourth instar larva (n = 5−8, except when stated otherwise) (Figures 13−17)

Size. Total length 3.3−3.7 mm (n = 2). Head capsule 490−640 [530] μm long. CI 1.43−1.53 (n = 2).

Colouration. Head and antenna pale. Apex of mandible and ligula dark brown. Claws of posterior parapods brownish.

Cephalic chaetotaxy (Figure 13). Ventral: S9 and S10 in line with VP, diagonal to the longitudinal axis of head capsule. Dorsal: S5 anterior to DP; S7 and S8 close to each other.

Antenna. AR 3.71−5.40 [3.71]. Flagellum as in Figure 14. A_1 215−250 [215] μm long, ring organ situated 0.60−0.64 [0.60] from base; blade and accessory blade subequal 50−60 [59] μm long. A_2 38−52 [52] μm long, style 3−4 μm long, peg sensillum 5−8 μm long. Blade/A_{2-4} 0.89−1.20 [1.02]; A_3 4−6 [4] μm long; A_4 2−4 [2] μm long.

Maxillary palp (Figure 15). Basal segment 38−50 [45] μm long, L/W 3.30−4.70 [4.50]; ring organ located 0.49−0.60 [0.50] from base. A_1/PMx 4.78−6.30 [4.78].

Mandible (Figure 16). 115−133 [118] μm long. A_1L/Md 1.82−2.01 [2.01]; A_{1-4} L/Md 2.31−2.50 [2.31].

Hypopharyngeal complex. Ligula (Figure 17) 68−85 [75] μm long, 40−47 μm wide; toothed margin weakly concave; paraligula bifid, 30−38 [30] μm long. Hypopharyngeal pectin with 13−14 teeth.

Abdomen. Procercus 133−150 [133] μm long; L/W 3.30−4.80 [4.75]; with 7 apical macrosetae 350−450 [430] μm long. Anal tubules tapered, 180−215 μm long (n = 2). Claws on posterior parapods simple with large ones lamellate on outer margins.

Etymology

The species name refers to the Latin '*angustus*' meaning narrow and '*cornu*' meaning horn, referring to the long and narrow pupal thoracic horn. The name is an adjective in the nominative singular.

Discussion

Taxonomy

In the male adult of *Larsia*, the abdominal colour pattern is the character most widely used to distinguish the species within the genus. The male of *L. angusticornis* sp. n. shares with *L. gelhausi* a similar abdominal colour pattern, distinguishing them from the rest of the Neotropical *Larsia* species. Both species also share a pale cross-vein r-m and tergite IX without setae, but could be distinguished because in *L. gelhausi,* the gonocoxite and gonostylus are pale brown (dark brown in *L. angusticornis* sp. n.) and the AR is

1.03−1.11 (1.50−1.53 in *L. angusticornis* sp. n). No clear differences were found between females of *L. angusticornis* sp. n. and other *Larsia* species. Similar to *L. fittkaui* and *L. labartheae*, *L. angusticornis* sp. n. has a short and not extended posteriorly dorsomedial lobe of the gonapophysis VIII. The adults of *L. pallescens* need to be slide-mounted and re-examined to provide a more detailed description before a more detailed comparison can be made with the other Neotropic species.

All described pupae of *Larsia* have elongate thoracic horn, 3.5−4.0 times as long as broad, the horn sac is alveolar, and the corona is present. In contrast, the pupa of *L. angusticornis* sp. n. is characterized by the long, narrow thoracic horn, 6.20−8.90 times as long as broad, the tubular atrium with only some indication of an alveolar surface, and the corona in the distal half is not discernible. It is important to remark that a pupa of *Larsia* with similar thoracic horn has been observed in an undescribed species from Brazil from a non phytotelmata habitat (Bohdan Bilyj, personal communication, 19 June 2014). However, this pupa has only three LS-setae on segment VII, and the larval antenna has darkened A_2, distinguishing it from *L. angusticornis* sp. n.

The arrangement of the larval cephalic setation is commonly used to distinguish the species of *Larsia*. In most species of the genus, S10 is lateral to posterolateral to S9, the VP is posterior, posterolateral or mediolateral to S9, closer to S9 than S10, arranged diagonally, transversely, or in triangle, distant anteriorly to SSm. In *L. angusticornis* sp. n., the cephalic setae S9, S10, and the VP are arranged in line, somewhat similar to *L. decolorata* and *L. indistincta* (Epler 2001). However, the larva of the new species is distinguished from *L. decolorata* and *L. indistincta* by the antennal length/mandible length ratio. In *L. decolorata* and *L. indistincta*, the antenna is at least three times longer than the mandible, while this ratio in *L. angusticornis* sp. n. is 2.31−2.50, appearing to be the smallest for the genus.

Bionomics and distribution

The immature stages of *Larsia angusticornis* sp. n. were found breeding in leaf axils of *Aechmea distichantha* growing in both forested and open areas. The larvae were collected together with Ostracoda and immature stages of some insect orders, such as Diptera (Culicidae, Ceratopogonidae, Corethrellidae, Ephydridae, and Psychodidae) and Coleoptera (Scyrtidae). Among the Culicidae, we collected *Culex imitator* Theobald, 1903, *Toxorhynchites haemorrhoidalis separatus* (Lynch Arribálzaga, 1891), and *Wyeomyia muehlensi* (Petrocchi, 1927). The larvae of *L. angusticornis* sp. n. are carnivorous and could prey on small individuals of the biota inhabiting *A. distichanta* phytotelmata, but could also serve as prey for the predator mosquito *T. haemorrhoidalis separatus*.

At present, *Larsia angusticornis* sp. n. is known from the Chaco, Santa Fe, and Corrientes Provinces. Its distribution might also extend into the northwestern provinces of Argentina, as well as into southern Brazil, Bolivia, Paraguay, and Uruguay following the distribution of *A. distichantha*.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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