

DESCRIPTIONS OF PUPAE OF THREE PSYCHODINAE SPECIES (DIPTERA: PSYCHODIDAE) FROM ARGENTINA

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Abstract.— The pupae of *Alepie montana* Bravo, *Alepie truncata* Bravo, Lago et Castro and *Psychoda simillima* Tonnoir, belonging to the subfamily Psychodinae, are described and illustrated. The pupae of *A. montana* and *A. truncata* were collected in tree holes in the city of San Ramón de la Nueva Orán, Province of Salta and the pupa of *P. simillima* in small pool on the nameless stream near El Hoyo city, Province of Chubut, Argentina. The pupa of *P. simillima* is similar to other pupae of the genus *Psychoda* Latreille, being distinguished by some features in the last segment and by respiratory trumpet. These are the first pupae described of any species of the genus *Alepie* Enderlein.



Key words.— immature stages, pupae, *Psychoda*, *Alepie*, phytotelmata.

INTRODUCTION

Psychodidae includes several important nuisance and medically relevant species (Mullen and Durden 2009). However, their immature stages generally have been little studied due to the difficulty in finding their natural breeding sites, and the problems involved in laboratory rearing (Ward 1972). Many larvae and pupae from the subfamily Psychodinae have been observed breeding in abundance in bromeliads (Wagner and Hribar 2004, Wagner and Svensson 2006, Wagner *et al.* 2008, Frank and Lounibos 2009, Bravo *et al.* 2010, Wagner *et al.* 2010), and have been also found in tree holes (Quate 1954, Ibáñez-Bernal 2000, Curler and Moulton 2012), making the phytotelmata one of the largest breeding sites for Psychodinae larvae and

pupae (Frank and Lounibos 2009). Other larval habitats include margins of streams and ponds, ditches, septic tanks, and drains (Mullen and Durden 2009).

The Psychodinae pupae are rarely described. In general, pupae of all Psychodinae are somewhat uniform in shape, making it difficult to differentiate them to species level (Wagner 2000). Most descriptions are from southeast United States, including *Nemopalpus nearcticus* Mahmood et Alexander, 1992, *Threticus thelyceratus* Curler et Moulton, 2010, *Clytocerus americanus* Kincaid, 1901 (Curler and Moulton, 2011); from Asia, species of *Neotelmatoscopus* Tonnoir, 1933 from Nepal, Sri Lanka and Thailand (Curler and Courtney 2009), and *Psychoda ochra* Quate, 1962 from North Borneo. Few descriptions are available from the Neotropical region, such as *Alepie apearalba*

Wagner, Richardson et Richardson, 2010 from Saba, Netherlands Antilles, *Psychoda romeroi* Bravo, Lopes et Bastos, 2010 from Brazil, and a photograph of *Alepiea zavortinki* Wagner, Richardson et Richardson, 2008 from Puerto Rico. In Argentina the knowledge void of the pupal stages is much larger, as the pupae of only one species, *Maruina pebeta* Ibáñez-Bernal, 1994, has been published (Omad 2012).

The aim of this paper is to describe the pupae of two species of the genus *Alepiea* Enderlein, 1937 collected in tree holes and pupae of a species of the genus *Psychoda* Latreille, 1796 found in a small pool near a stream, in Argentina.

MATERIAL AND METHODS

The pupae of *Alepiea montana* Bravo, 2008 and *A. truncata* Bravo, Lago et Castro, 2004 were collected in tree holes (up to two meters high) in the city of Orán, Province of Salta (Figs 1a, 1b), and in a wooded area of the yunga rainforest, during field sampling carried out in the months of January to April of 2011 and 2012 as part of a larger study on mosquito larval habitats. Samples were collected using a siphon bottle, following the general procedure described by Müller and Marcondes (2006) and Mangudo *et al.* (2010).

The pupae of *Psychoda simillima* Tonnoir, 1929 were collected with pipette and D-net from a small pool besides a nameless stream 7 km south to the city of El Hoyo, in Chubut province. The pupae were placed individually in vials with water of the site and transported to the laboratory, where they were reared until adult emergence. The adults were killed introducing an alcohol swab in the rearing container and preserved in 70% ethanol.

The pupal exuviae and adults were mounted in slides using potassium hydroxide to clear specimens and Canada balsam as a mounting medium. Drawings were prepared with a drawing mirror on a Leica MZ6 at 40x magnification. The morphological terminology follows that of McAlpine (1981) and the specific Psychodidae terminology follows Bravo (2006) and Bravo *et al.* (2010). The specimens were deposited in the collection of the Laboratorio de Investigaciones en Ecología y Sistemática Animal (LIESA), Universidad Nacional de la Patagonia San Juan Bosco (UNPSJB), Esquel, Chubut Province, Argentina.

RESULTS

Psychoda simillima Tonnoir, 1929 (Figs 2a–d)

Psychoda simillima Tonnoir, 1929: 8, Figs 10–12.—Bravo *et al.* 2006: 11; Omad and Rossi 2012: 66; Cordeiro *et al.* 2013: 5–7 (redescription of male and the first description of female).

Description. Pupa. Exuviae brown; oval shaped in dorsal view (Fig. 2a). Abdominal segment 8 with distal margin of tergites and sternites with small spines; eighth tergite triangular, ending in two small dark spines in dorsal view (Fig. 2a); eighth sternite with two small spines on the basis and terminates in a pair of small stout pointed processes (Figs 2b, 2c). Tip of the legs extending to the same level as the edge of the wing. Respiratory horn four times as long as the central width, with a groove about three-quarters of the length from the tip of the horn toward the base; with two small setae beside the respiratory horn (Fig. 2d).

Material examined. ARGENTINA, Chubut Province. Puerto Patriada (42°08'17"S, 71°31'56"W). 1 pupa, 18.X.2012, pipette. Leg. P. Pessacq & D. Anjos-Santos (LIESA). 2 pupae. Same locality, date and collectors as before (LIESA). 1 pupa, 22.XI.2012, D-net. Leg G. Omad (LIESA).

Distribution. Bariloche, Río Negro Province, Argentina (Tonnoir 1929), El Hoyo, Chubut Province, Argentina (present work).

Alepiea truncata Bravo, Lago et Castro, 2004 (Figs 3a–d)

Alepiea truncata Bravo, Lago et Castro, 2004: 597, Figs 46–50.—Ježek *et al.* 2011: 200; Omad 2012: 263 (first record for Argentina).

Description. Pupa. Color light brown; body ovoid from dorsal view (Fig. 3a); abdomen with eight segments, distal margin of abdominal tergites with microtrichia. Distal margin of abdominal sternites with large spines. In dorsal view the eighth segment is bulbous and ends abruptly. Tips of legs extending at the same level as the wing covers (Fig. 3b); in ventral view the eighth segments is piriform and ends in two small spines (Fig. 3b). Respiratory horn seven and a half long as its central width with irregular single row of pits extending all the way down from the tip of the horn to the base (Fig. 3d).

Material examined. Argentina, Salta province, San Ramón de la Nueva Orán (23°11'38.11"S, 64°18'5.54"W). 1 pupa, 7.IV.2011, funnel trap. Leg. C. Mangudo (LIESA). 5 pupae, same locality date and collector (LIESA).

Distribution. Ituberá, Brazil (Bravo *et al.* 2004), Orán, Salta Province, Argentina (present work).

Alepiea montana Bravo, 2008 (Figs 4a–d)

Alepiea montana Bravo, 2008: 53, Figs 1–11.—Ježek *et al.* 2011: 199.

Description. Pupa. Color light brown; body ovoid from dorsal view (Fig. 4a). Abdomen with eight segments, distal margin of abdominal tergites with very thin spines like hairs. In dorsal view the eighth segment is bulbous and ends in two small light brown spines (Fig. 4a). Distal margin of abdominal sternites

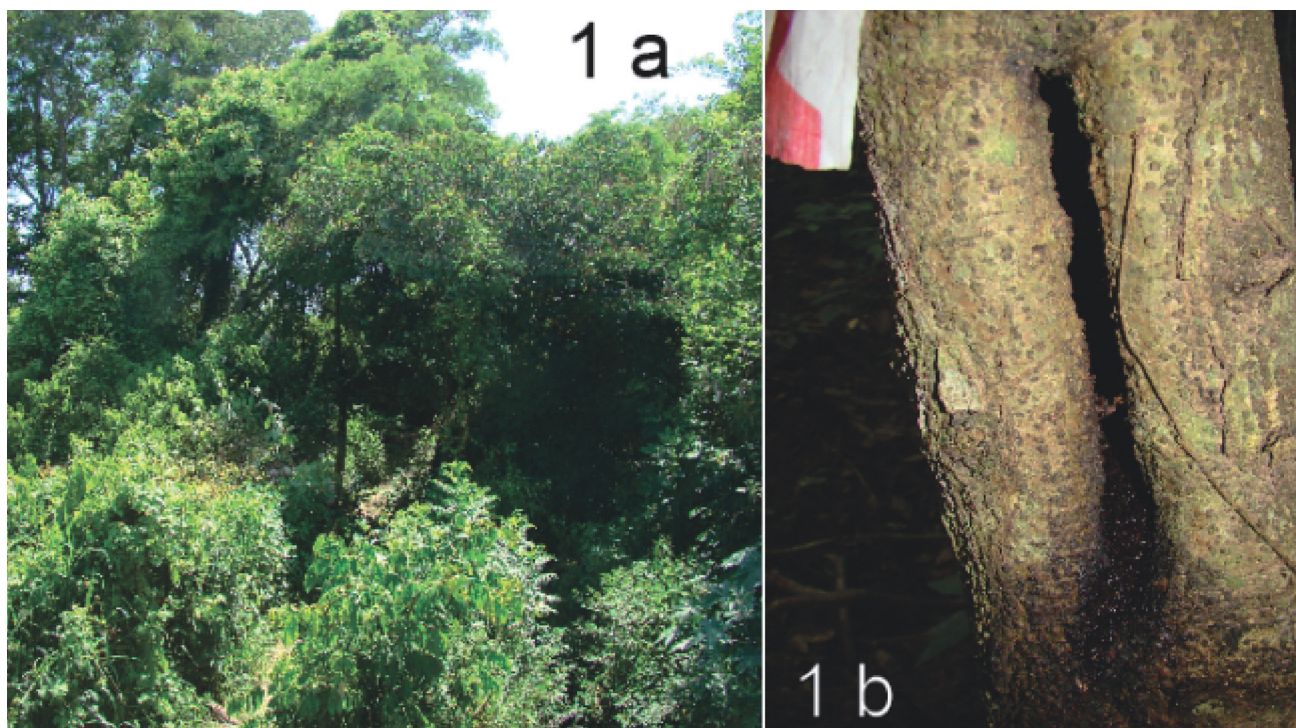


Figure 1. (a) General view of the sampling site in the wooded area of the yunga rainforest near to the city of Orán, province of Salta, Argentina; (b) tree hold where pupae of *Alepia* were collected. This figure is available in colour in the online edition of the paper (<http://www.ingentaconnect.com>, <http://www.bioone.org>).

with small spines (Fig. 4b). Tips of the wings extending beyond the tips of the legs (0.02 mm). In ventral view, segment eight ends in two slightly curved black spines, with two diminutive dark spines at the base of the segment (Fig. 4b). In lateral view, the slightly curved spines can be seen (Fig. 4c). The respiratory horn is wide at the base and thinner towards the tip, with irregular single row of pits extending from the tip down to three-quarters of the horn (Fig. 4d).

Material examined. Argentina, Salta Province, San Ramón de la Nueva Orán (23°11'38.11"S, 64°18'5.54"W). 1 pupa, 13.IV.2011, funnel trap. Leg. C. Mangudo (LIESA).

Distribution. Bahia State, Brazil (Bravo 2008), Orán, Salta Province, Argentina (present work).

DISCUSSION

In general all the Psychodinae pupae possess cylindrical body dorso-ventrally flattened and have protothoracic respiratory organs (Quate and Vockeroth 1981). The wing covers reach the midsection, in general slightly distal to the terminal portions of the legs (Ibáñez-Bernal 2000). Also characteristic are abdominal segments with one or more transverse rows of

spines forming rings, posterior segments modified, somewhat rectangular in shape with two pairs, one dorsal and one ventral, of spines (Quate and Vockeroth 1981, Ibáñez-Bernal 2000). However, while Psychodinae pupae are similar, there are some differences that may enable identification of the species. For example, the variety of form of the respiratory horns can be used as sources of diagnostic characters in the identifications not only for Psychodidae but also for the dipterous pupae in general (Satchell 1948). The pupae of *Psychoda simillima* is similar to the one of *Psychoda romeroi* but differs mostly in the respiratory horn. In *Psychoda simillima* the respiratory horn has a single groove from the tip of the horn to three-quarters down, while in *P. romeroi* the respiratory horn is longer and has double rows of irregularly distributed pits (mentioned as pinna in Ibáñez-Bernal 2000).

So far the pupae in the genus *Alepia* have not been described. Wagner *et al.* (2008) described a new species of *Alepia*, *A. zavortinki*, reared from larvae and pupae, but the pupa is not described, only mentioned that "there are no features to distinguish the pupa of *A. zavortinki* from other psychodid pupae". In the same way, Wagner *et al.* (2010) showed a photo of the pupa of *Alepia apexalba*, but did not include a description of the specimen or the respiratory horn of the pupa.

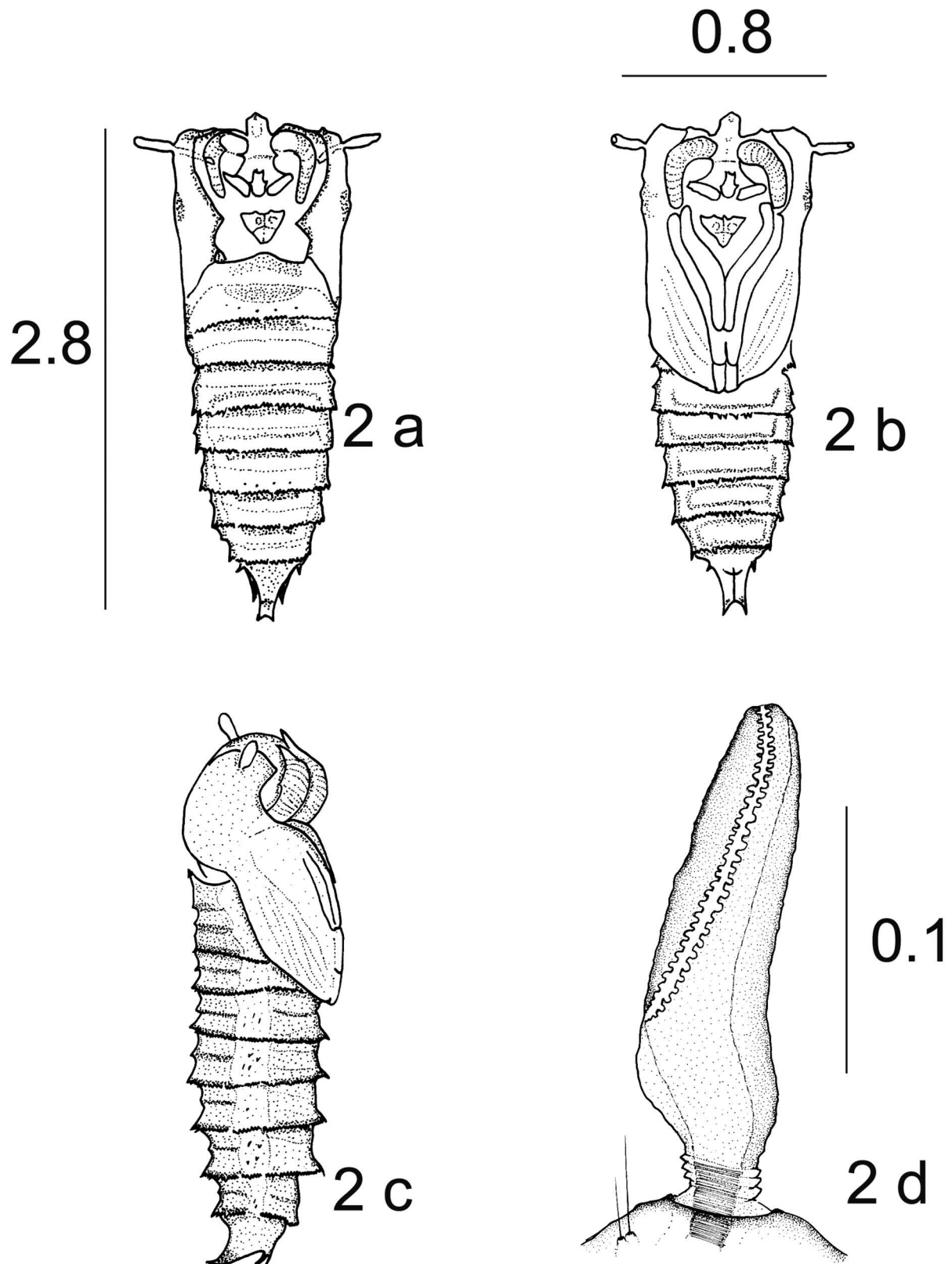


Figure 2. Pupa of *Psychoda simillima*. (a) Dorsal view; (b) frontal view; (c) lateral view and (d) respiratory horn. Scale in mm.

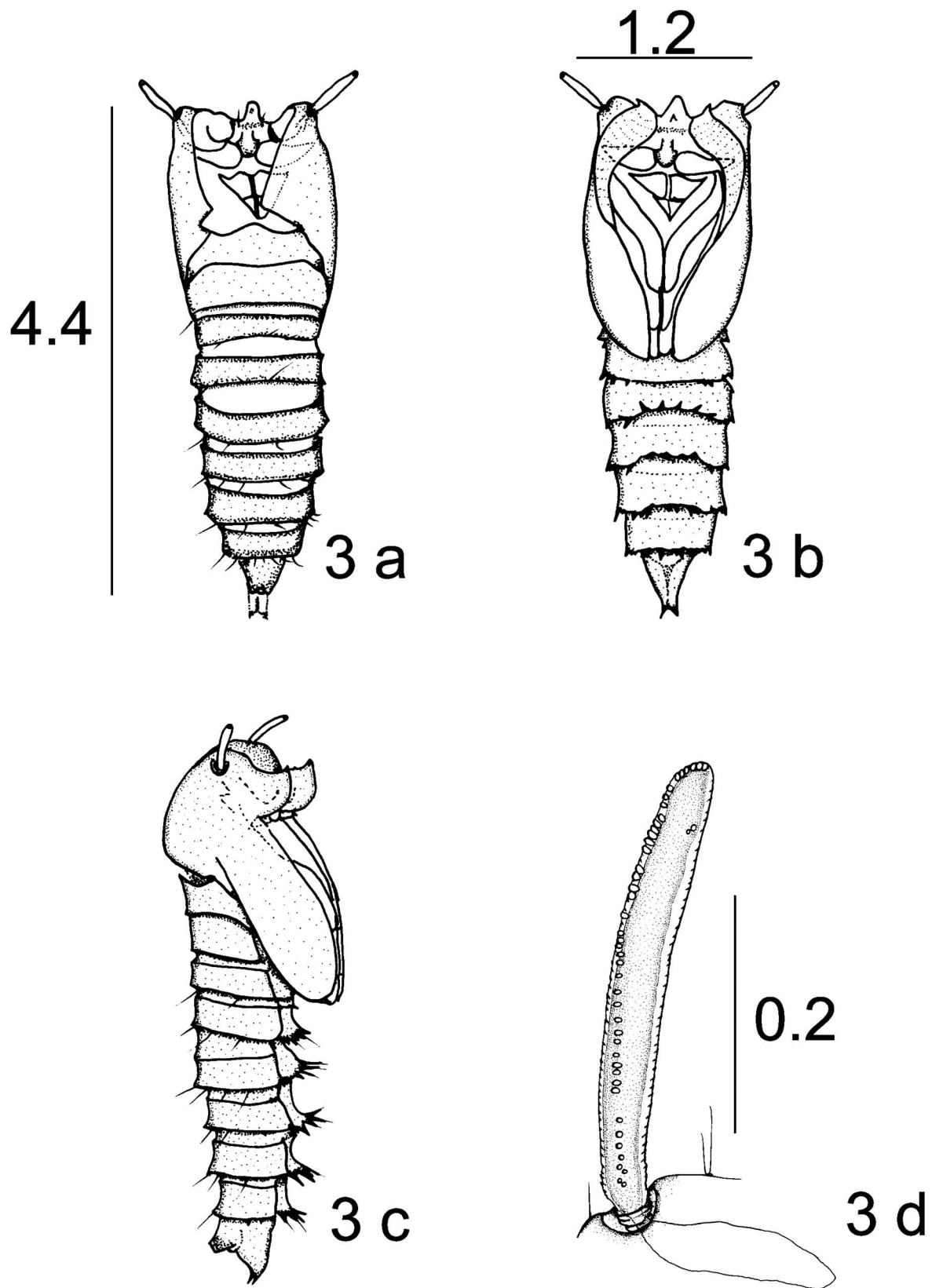


Figure 3. Pupa of *Alepiia truncata*. (a) Dorsal view; (b) frontal view; (c) lateral view and (d) respiratory horn. Scale in mm.

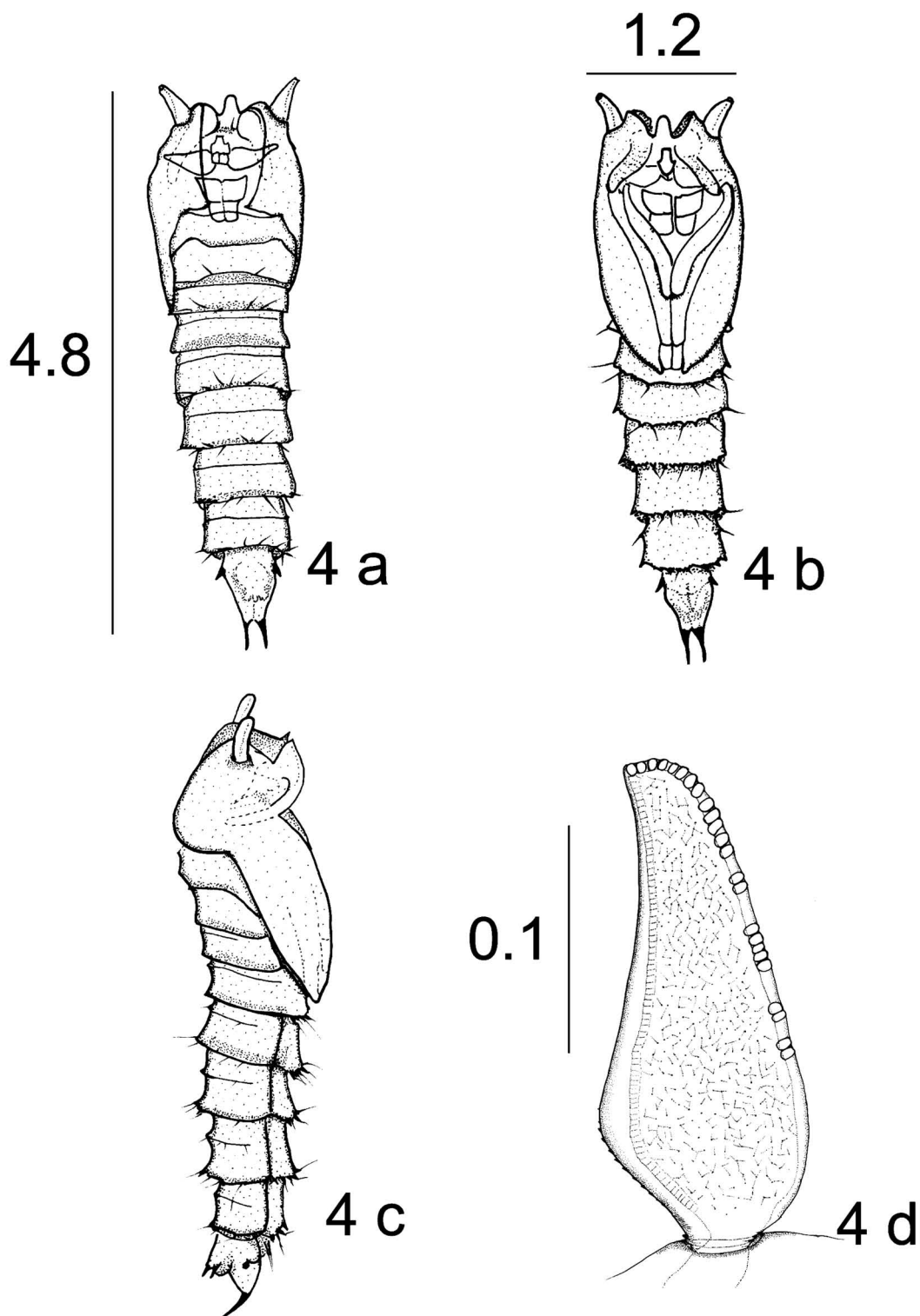


Figure 4. Pupa of *Alepiia montana*. (a) Dorsal view; (b) frontal view; (c) lateral view and (d) respiratory horn. Scale in mm.

ACKNOWLEDGMENTS

This paper was partially funded by Consejo Nacional de Investigaciones Científicas y Técnicas CONICET, SECYT-Universidad Nacional de Córdoba and CIUNSA. The senior author wants to thank to Dr. Pablo Pessacq for valuable comments on the manuscript. G. Omad, C. Mangudo and D. Anjos-Santos holds a doctoral scholarship from CONICET. R.M. Gleiser is a Career Member of CONICET-Argentina. This is scientific contribution No 98 from LIESA.

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Received: May 2, 2013

Accepted: August 12, 2013