

**The pupa of *Stilobezzia punctulata* LANE from Peruvian
Amazonia
(Diptera: Ceratopogonidae)**

by

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(Accepted for publication: April, 2004).

Abstract

The pupa of *Stilobezzia punctulata* LANE, 1947, collected in small pond in Iquitos, Peru, is described and illustrated. It is distinguished from the pupa of the closely related *S. rabelloi* LANE by slight differences in the sensilla of the fourth abdominal segment, the dorsolateral setae of the cephalothorax and the respiratory organ. The respiratory organ with sharp apex and two separate rows of pores, and the presence of bifurcating abdominal setae are shared by *S. rabelloi* and *S. poikiloptera* INGRAM & MACFIE and are synapomorphic character states, which shows that these three species form a monophyletic group. In order to obtain air, the respiratory organ is probably inserted into the floating or into the dangling submerged leaves of *Pistia stratiotes* L. and/or *Nymphaea* sp. Finally, *S. punctulata* is newly recorded from Bolivia, Colombia and Mexico based on adult specimens.

Keywords: Pupa, *Stilobezzia punctulata*, monophyletic group, Peru, Amazon, new records.

Resumen

Se describe e ilustra la pupa de *Stilobezzia punctulata* LANE, 1947, capturada en una pequeña laguna en Iquitos, Perú. Esta se distingue de la pupa de *S. rabelloi* LANE, especie con la cual está estrechamente relacionada, por pequeñas diferencias en las sensilas del cuarto segmento abdominal, la seta dorsolateral del cefalotórax y el órgano respiratorio. El órgano respiratorio con ápice puntiagudo y dos hileras separadas de poros, y la presencia de una seta abdominal bifurcada son compartidas por *S. rabelloi* y *S. poikiloptera* INGRAM & MACFIE y representan sinapomorfias, revelando que estas tres especies conforman un grupo monofilético. Con el propósito de obtener aire, el órgano respiratorio probablemente se inserta en las hojas flotantes o en los peciolos sumergidos de las hojas de *Pistia stratiotes* L. y/o *Nymphaea* sp. Sobre la base de ejemplares adultos, la especie se registra por primera vez para Bolivia, Colombia y México.

Introduction

Stilobezzia KIEFFER is a large and diverse genus of Ceratopogonidae, worldwide in distribution, and the adult females are important predators on other small insects. Immature stages are found in a wide variety of aquatic and semiaquatic habitats, including streams, lake and pond margins, puddles, swamps, rice fields, rock pools, and tree holes (DE MEILLON & WIRTH 1991).

BORKENT & WIRTH (1997), in their World catalog of the Ceratopogonid listed 310 extant species of the genus. Of this number, 64 inhabit the Neotropical region (BORKENT & SPINELLI 2000), and nine of these are known as pupae.

The Neotropical species *Stilobezzia punctulata* was described by LANE (1947) based on female specimens from Rio de Janeiro, Brazil, and the male was subsequently described by LANE & FORATTINI (1958) from specimens collected in Panama and in the Brazilian state Mato Grosso.

The purpose of this paper is to provide the first description of the pupa of *S. punctulata* from material collected by Gustavo SPINELLI from a small pond in Iquitos, Peru, in August 1996, and to provide additional information about its distribution.

Material and methods

The floating pupa was collected from a sample containing mud and the hydrophytes *Pistia stratiotes* L. (Araceae) and *Nymphaea* sp. (Nymphaeaceae) from a small pond. It was isolated in a vial with a drop of water and observed daily in the laboratory, till adult emergence.

The studied exuvia was slide mounted in Canada balsam and examined, measured and drawn using a binocular compound microscope with attached camera lucida.

The material is deposited in the collection of the Museo Nacional de Historia Natural, Lima, Peru (MHNL). For pupal terminology see BORKENT & CRAIG (2001).

Results

Stilobezzia punctulata LANE (Figs. 1-11)

Stilobezzia punctulata LANE 1947: 204 (female, Brazil).

Stilobezzia (Stilobezzia) punctulata: LANE & FORATTINI 1958: 220 (male; Brazil, Panama); WIRTH 1974: 45 (catalogue of Neotropical species); BORKENT & WIRTH 1997: 112 (catalogue of World species); BORKENT & SPINELLI 2000: 54 (catalogue of Neotropical species).

Diagnosis of adult

A medium- sized, brown species of the subgenus *Stilobezzia* s. str., distinguished from its Neotropical congeners by the following combination of characters: third segment of maxillary palpus stout, with sensory pit opening by a small pore; scutum with short anterior tubercle; legs yellowish peppered with dark spots; wing with three dark spots, one on r-m crossvein, the others at base and apex of second radial cell; aedeagus with a pair of dark brown lateral sclerites each with pointed tip, crossing each other near their apices; parameres a lateral pair of dark brown processes with pointed apices directed laterocaudally, and a submedian pair of parallel processes with pointed apices bent mesally.

Description of pupa

Length 2.93 mm (without apicolateral processes). Coloration of cephalothorax light brown, abdomen darker. Body surface smooth except for proximal margin of abdominal segments 3-9 slightly spiculate. Operculum (Fig. 1) barely longer than wide, surface smooth; anterior margin slightly concave, posterior margin nearly straight; two well developed anteromarginal setae located on small tubercles, basal pore present; OL 0.128 mm, OW 0.20 mm, OW/OL 1.56. One stout anterodorsal seta (Fig. 2). Two elongate dorsomedial setae on short tubercle (Fig. 3). Two very long stout dorsolateral setae (Fig. 4). Four dorsal sensilla, three of them elongate, slender setae on short tubercle, remai-

ning one pore (Fig. 5). Ventromedian setae slender, lateral one longest (Fig. 6). Two long ventrolateral setae (Fig. 7).

Thorax with short protuberance posterior to base of respiratory organs (against which posterior base of respiratory organs abuts). Respiratory organ (Fig. 8) directed anteriorly, parallel to one another, bases closely approximated, separated by swollen medial ridge; 5.5 times longer than broad, surface bare; each with swollen base, narrowing gradually to pointed apex, with groove extending from most apical of basal pores to lateral margin at apex; with basal row of five dorsal pores, apical half with row of 18 pores; tracheal tube thick at base of respiratory organ, dividing in basal portion to each pore; PRH 0.39 mm, pedicel stout 0.096 mm, P/H 0.246.

Abdomen with setae elongate, thick basally, separate from one another (none on common tubercle), each born on a well-developed, bifurcate elongate spicule. Segment 4 sensilla pattern with (Figs. 9-10) 1 d.a.s.m., 5 d.p.m., 1 l.a.s.m., 3 l.p.m., 3 v.p.m. with elongate seta; d.p.m. ii, iii pores; d.p.m. i bifurcating without plumose apices; d.p.m. iv, v bifurcating with plumose apices; v.p.m. i, ii bifurcating with plumose apices; v.p.m. iii simple with plumose apex; l.a.s.m. simple without plumose apex; l.p.m. i, iii, bifurcating; l.p.m. ii simple with plumose apex. Anal segment (segment nine) (Fig. 11) with apicolateral processes directed posteromesally, very long, slender, with fine spicules along length; base of apicolateral process with both dorsal, ventral thick spine.

Distribution

Mexico, Panama, Colombia, Brazil, Peru, Bolivia.

The species is firstly recorded from Colombia and Mexico based on two adult males, and from Bolivia based on two adult females.

Material examined. MEXICO: Tabasco: Villahermosa 6-VIII-1964 P.J. SPANGLER, 1 ♂. COLOMBIA: Magdalena: La Gloria, S.A. IX-1960 F.S. BLANTON, 1 ♂. PERU: Iquitos: Quistococha 13-VIII-1996 G. SPINELLI, 1 ♂ (with pupal exuvia). BOLIVIA: Santa Cruz: 60 mi N 2-I-1960 R.B. CUMMINGS, 2 ♀♀.

Discussion

The pupa of *S. punctulata* is almost identical to that of *S. rabelloi* LANE, which was recently described in detail by BORKENT & CRAIG (2001). However, the pupae of both species differ in a few characters. The fourth abdominal segment of *S. rabelloi* has a second d.a.s.m. sensilla which is a pore, but in *S. punctulata* there is only one d.a.s.m.; the d.p.m. sensilla of the same segment is bifurcating with plumose apices in *S. rabelloi*, but it is bifurcating without plumose apices in *S. punctulata*; the dorsolateral setae have an additional, short sensilla near their bases in *S. rabelloi* that doesn't appear in *S. punctulata*; and the apical half of the respiratory organ bear about 15 pores in *S. rabelloi*, while in *S. punctulata* it bears 18.

The sharply pointed, anteriorly directed respiratory organ of the pupa of *S. punctulata*, appears to be related to its capacity to obtain air from the leaves of "huama" *Pistia stratioides* and/or *Nymphaea* sp., the two dominant hydrophytes present in the pond. This respiratory organ is probably inserted into the floating or into the dangling submerged leaves.

Only 27 species of *Stilobezzia* (including the species described here), which represents less than the 10 % of the presently named species of the genus, are known in the

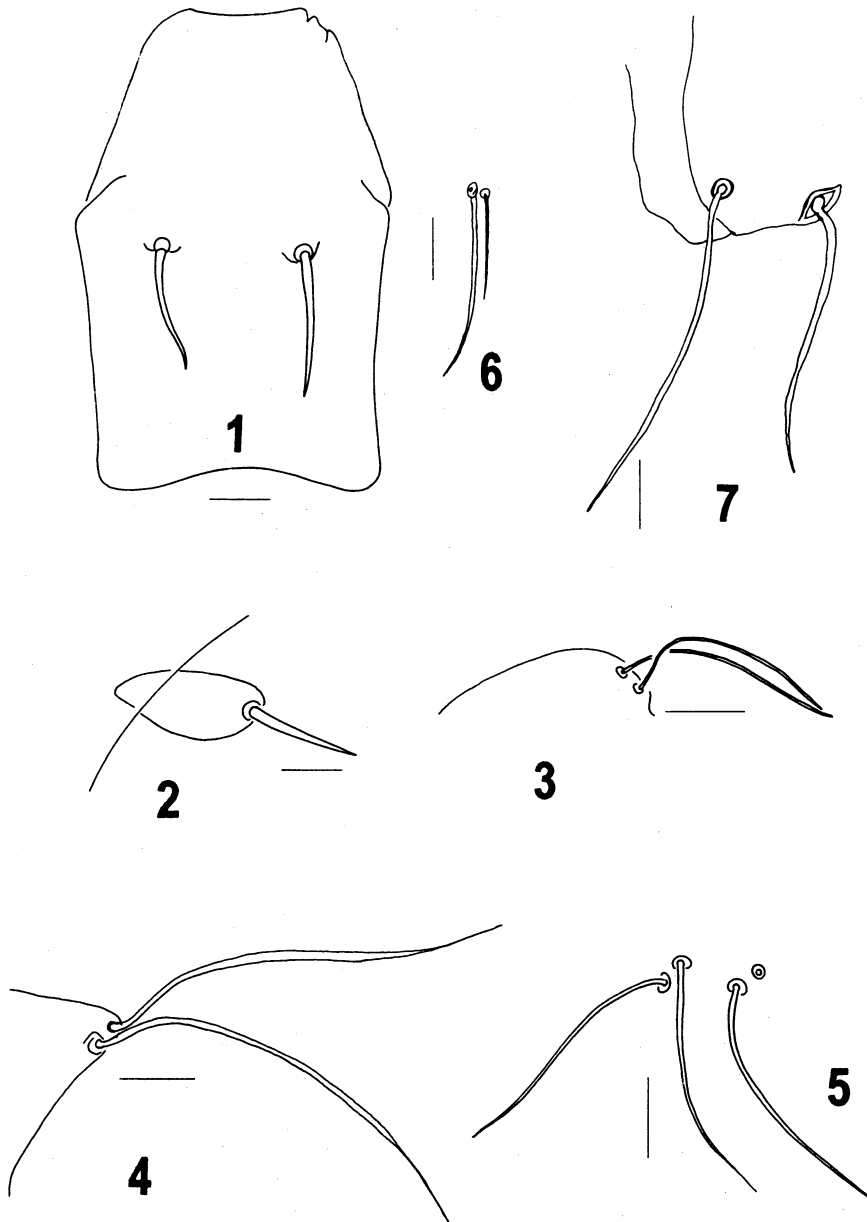
pupal stage, and almost all of these have a respiratory organ with a rounded apex. However, the pupa of *S. punctulata* and the ones of *S. rabelloi* and the African species *S. poikiloptera* INGRAM & MACFIE (1922), bear a highly modified respiratory organ, with a sharp apex and two separate rows of pores. This character, together with the presence of bifurcating abdominal setae, and the elongate apicolateral processes are virtually unique within the Ceratopogonidae, and clearly derived features indicating that *S. punctulata*, *S. rabelloi* and *S. poikiloptera* are closely related, suggesting that these three species form a monophyletic group.

Acknowledgments

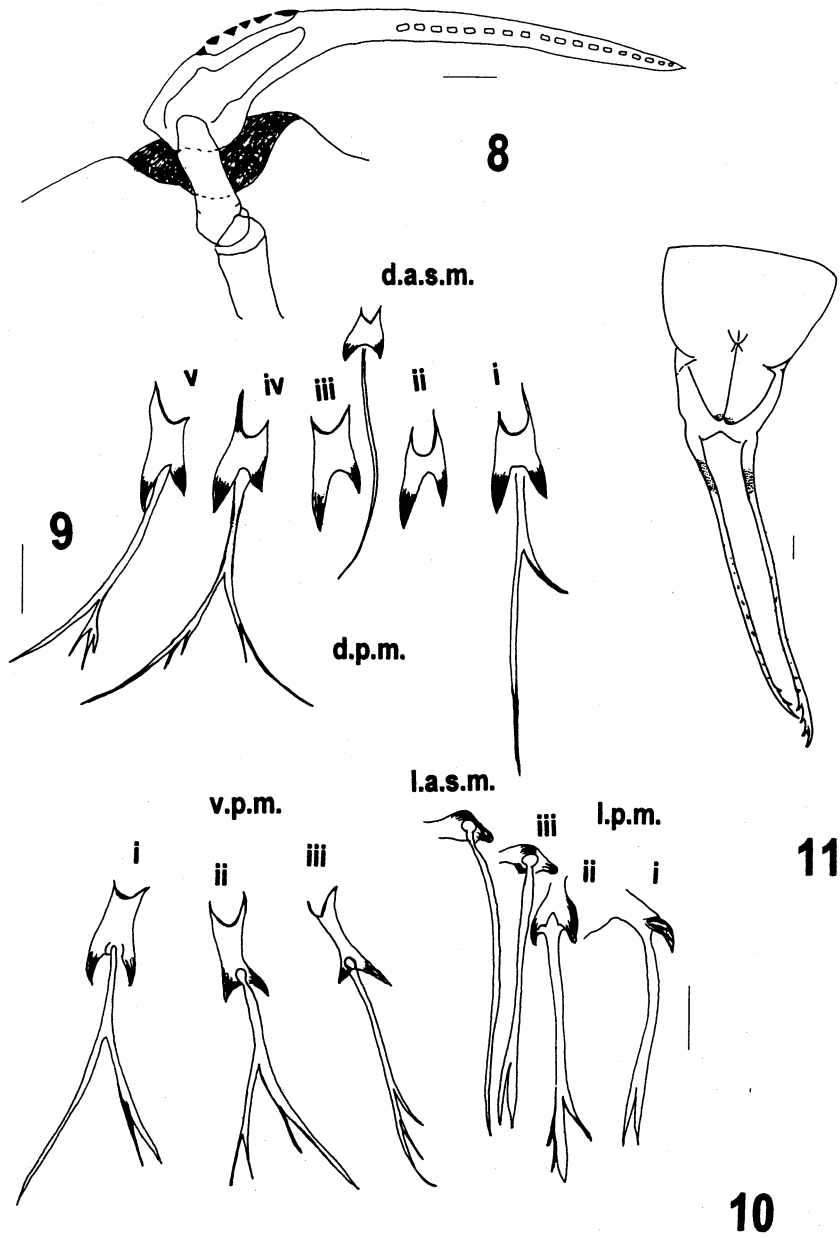
We greatly acknowledge Drs. Art Borkent and Gustavo Spinelli for the critical review of the manuscript. Our gratitude also to Dr. Randy Mercer, who kindly sent important information about the hydrophites present in the Iquitos pond.

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Figs. 1-7:
Stilobezzia punctulata LANE, pupa. 1: operculum; 2: anterodorsal seta; 3: dorsomedial setae; 4: dorsolateral setae; 5: dorsal setae; 6: ventromedian setae; 7: ventrolateral setae. Scale bars: 0.05 mm.



Figs. 8-11:
Stilobezzia punctulata LANE, pupa. 8: respiratory organ; 9: d.a.s.m. and d.p.m. sensillae; 10: v.p.m.,
 l.a.s.m. and l.p.m. sensillae; 11: anal segment. Scale bars: 0.05 mm.