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Description of the Larva of *Popanomyia kerteszi* James & Woodley (Diptera: Stratiomyidae) and Identification Key to Immature Stages of Pachygastrinae

Karina I de S Marques[1], Roberto de Xerez[2]

[1]*Instituto de Biologia, Univ. Federal Rural do Rio de Janeiro, C. postal 74524, 23851-970, Seropédica, RJ; karina_ufrrj@yahoo.com.br*
[2]*Lab. de Biologia e Ecologia de Diptera, Depto. de Biologia Animal, Instituto de Biologia, Univ. Federal Rural do Rio de Janeiro, Rodovia BR 465, km 7, 23890-000, Seropédica, RJ; rdexerez@ufrrj.br*

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Descrição da Larva de *Popanomyia kerteszi* James & Woodley (Diptera: Stratiomyidae) e Chave de Identificação para os Estágios Imaturos de Pachygastrinae

RESUMO - A larva de *Popanomyia kerteszi* James & Woodley é descrita com base em indivíduos coletados sob casca de troncos de árvores em estágio inicial de decomposição, na Ilha da Marambaia (23º04'15''S, 43º53'59''W, nível do mar), RJ. O imaturo de *P. kerteszi* foi comparado com outras espécies de Pachygastrinae e uma chave de identificação para os imaturos descritos desta subfamília é apresentada. É feito um novo registro de *P. kerteszi* para o Rio de Janeiro.

PALAVRAS-CHAVE: Brasil, Neotropical, novo registro, taxonomia

ABSTRACT - The larva of *Popanomyia kerteszi* James & Woodley is described based on individuals collected under tree barks in initial stages of decomposition in Marambaia island (23º04'15''S, 43º53'59''W, at sea level), Rio de Janeiro state, Brazil. The immatures of *P. kerteszi* were compared with other species of the subfamily Pachygastrinae and an identification key to the described immature stages of this subfamily is presented. This is also the first record of *P. kerteszi* to Rio de Janeiro.

KEY WORDS: Brazil, Neotropical, new record, taxonomy

Larvae of Stratiomyidae are considered detritus feeders (Rozkošný 1982) and play an important role in organic matter decomposition. Studies on immature stages are rare; nevertheless, it is known that immatures of this family occur in a huge diversity of habitats. Rozkošný (1982) cited that larvae of Clitellariinae can be found buried in swamp mud, under water or associated with moss; larvae of Stratiomyinae on the edge of water bodies, and larvae of Nemotelinae on detritus of rivers and lake edges, and in salt water habitats. Pujol-Luz & Xerez (1999) and Xerez *et al* (2002, 2003a,b collected larvae of Pachygastrinae under decomposed fallen tree barks.

There are few studies on Pachygastrinae immature stages in the Neotropics and the number of publications on the taxonomy of the group is even lower (*e.g.* Xerez & Pujol-Luz 2001, Lopes *et al* 2006). The group is currently represented by 56 genera and 137 species in the Neotropical region (Woodley 2001, Pujol-Luz & Galinkin 2004).

The richness of characters that the immatures frequently exhibit, the use of immature-associated information in many different biological studies or their importance for the establishment of more natural classifications, make studies on immatures extremely useful (Papavero 1994).

In this study we described the larva of *Popanomyia kerteszi* James & Woodley and compared it to immatures of Neotropical species already described [except for *Eupachygaster alexanderi* (Bréthes) and *Zabrachia stoichoides* James]. We also extended the identification key of Xerez *et al* (2003b) to five species (*Engicerus major* Lindner, *Manotes crassimanus* James, *Pedinocera longicornis* Kertész, *Popanomyia femoralis* Kertész and *P. kerteszi*).

Material and Methods

The larvae of *P. kerteszi* were collected in Marambaia island, Mangaratiba municipality, State of Rio de Janeiro (23º04'15''S, 43º53'59''W, at sea level). The island has an area of approximately 42 km^2, its relief varies from

lowland and midland to rocky elevations. It is located in the Tropical Atlantic morphoclimatic domain, exhibiting a super-humid mesothermal climate, with low or no water deficit and warm temperatures throughout the year (Pereira *et al* 1990).

Three *P. kerteszi* last instar larvae were collected under a tree bark of a fallen tree in initial stage of decomposition at Praia Grande Beach in Marambaia Island. After the collection, the larvae were packed in appropriate containers together with the substrate and pieces of the tree bark where they were found. In the laboratory, rearing and adult collection followed Pujol-Luz & Xerez (1999) and Xerez *et al* (2002). The puparium of each adult obtained was conserved in 70% ethanol and glycerin (3:1), maintained along with the adults, and incorporated to the Coleção Entomológica Costa Lima – CECL, in the Universidade Federal Rural of Rio de Janeiro. For the description, the pupae and puparium were observed under a stereoscopic microscope Olympus SZ40 and drawn under a stereoscopic microscope Wild M-5 with a drawing device. Images were acquired using a digital camera Nikon Coolpix 5400 and a scanning electron microscope Stereoscam 100 (SEM). Specimens for SEM were dried to the critical point and sputter-coated according to routine techniques. The terminology used in the description followed James (1981) and Roskošný and Kovac (1994). The specimens identification was made based on the key presented in James *et al* (1980)

Results

Distribution. Neotropical: Panama; Peru: Madre de Dios: Avispas; Brazil: Rio de Janeiro (new record).

Larva (and puparium). Length 5.8 mm, dorsoventrally flattened, lateral margin of body segments strongly arched. The cuticule exhibits the usual mosaic-like appearance, where some cells form typical patches on the ventral and dorsal regions. Brown chromatic pattern, with two darker longitudinal stripes united end-to-end on ventral region (Fig 1).

Head. Triangular, dorsoventrally flattened, longer than wide,

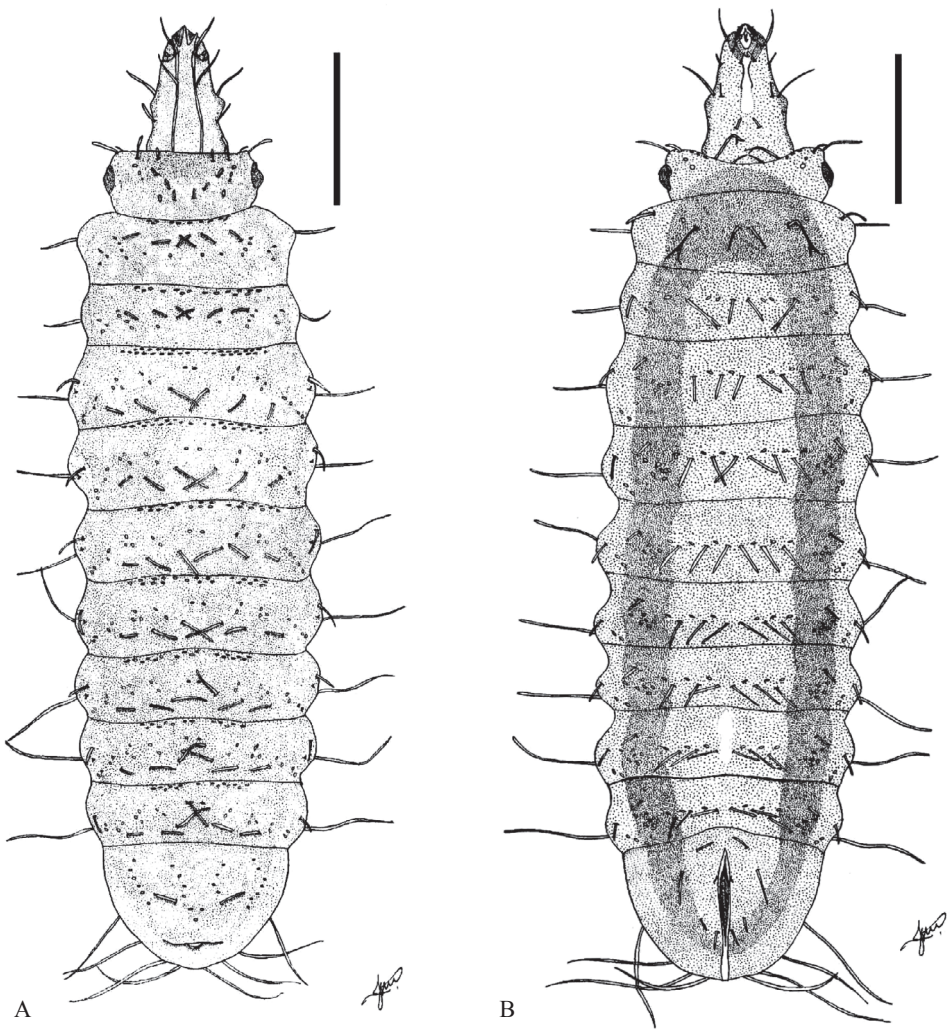

Fig1 *Popanomia kerteszi* puparium. (A) Dorsal view; (B) Ventral view. Scale = 1 mm.

well developed mandibular-maxillary complex, cylindrical brushes almost as long as the labrum, in dorsal view, triangular labrum. Short bi-segmented antennae arise from the posterior part of the head. Slightly prominent round eyes arise from the posterior part of the head. Exhibits two pairs of clypeofrontal setae, one pair of dorsolateral setae inserted above the eyes, one pair of lateral setae inserted bellow the eyes, three pairs of ventrolateral setae and three pairs of ventral setae (Figs 2A,B). Narrow ventrocranial furrow mildly ends on the posterior third of the head, and widens slightly (Fig 2C).

Thorax. First segment shorter than the others, spiracle with two pairs of setae forward, one pair of dorsolateral setae (Figs 2A,D) and one pair of ventrolateral setae; exhibits two rows of setae on the dorsum: two pairs of anterodorsal setae; the outer being longer than the inner and three pairs of dorsal setae (Fig 2A); two pairs of ventral setae; the outer being bifurcated (Fig 2B,E). Second and third segments with three pairs of dorsal setae of the same size; two pairs of ventral setae, the outer being longer and bifurcated, one pair of lateral setae and one pair of ventrolateral setae (Figs 2A,B,F).

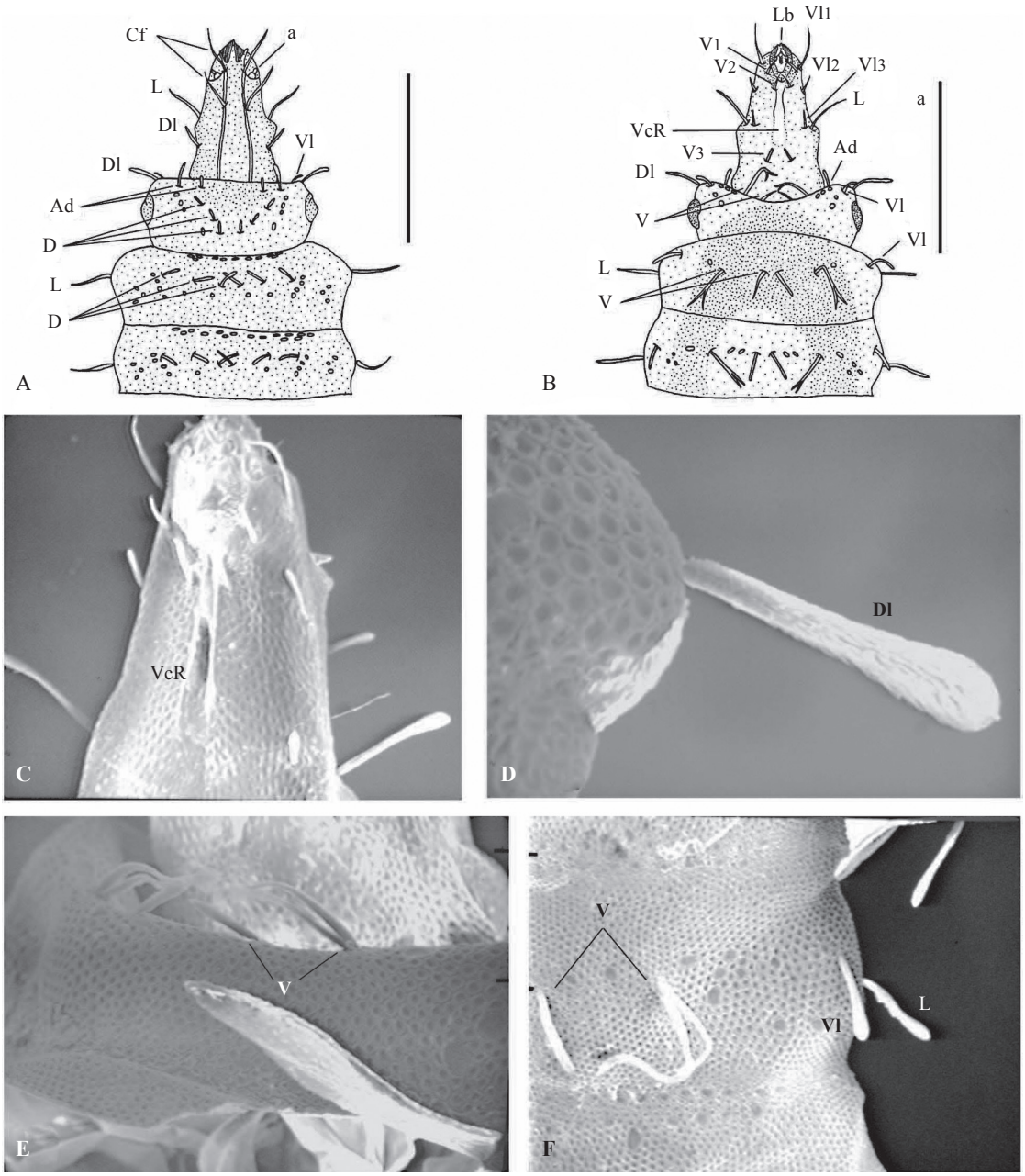

Fig 2 Head, first, second and third thoracic segments of *Popanomia kerteszi* puparium (similar on larvae). A) Dorsal view; B) Ventral view; C) SEM of the ventrocranial furrow in detail; D) SEM of dorsolateral setae of the first thoracic segment details ; E) SEM of first thoracic segment: ventral view, bifurcated setae in detail ; F) SEM of the third thoracic segment: ventral view, ventral setae in detail . (a) Antenna, (Ad) Anterodorsal setae, (cf) Clypeofrontal setae, (D) Dorsal setae, (Dl) Dorsolateral setae, (L) Lateral setae, (Lb) Labrum, (VcR) Ventrocranial furrow, (V) Ventral setae, (Vl) Ventrolateral setae. Scale = 1 mm.

Abdomen. Segments 1 to 7 have the same shape, with a row of three pairs of dorsal setae in descending order of size from the inner to the outer pair; three pairs of ventral setae of the same size (Figs 3A,B). Four pairs of lateral abdominal setae (one pair of dorsolateral setae, one pair of lateral setae, two pairs of ventrolateral setae) (Fig 3C); ventromedial line of the sixth segment with a peculiar sternal patch dilated on anterior portion and with a slender anterior end (Figs 3B,D); pupal respiratory horn present from the first to the sixth abdominal segments, forming a triangle with the lateral and dorsolateral setae (only in pupae) (Figs 3A,C); 8th segment rounded with one pair of dorsocentral setae; five pairs of ventral setae; two pairs of lateral setae, one pair of subapical setae and one pair of apical setae (Figs 3A,B).

Material examined. Brazil: Rio de Janeiro State: Marambaia Island, 25.vi.2002 (one larvae-last instar) and 16.viii.2002 (two larvae-last instar), R de Xerez and G G Vianna *leg*.; Ibidem, R de Xerez and R R Silva *leg*.; 3 puparia: 3 males (emerged: 29.vii.2002, 19.ix.2002, 04.x.2002).

Discussion

The dorsoventrally flattened head distinguishes *P. kerteszi* from *Dactylodeictes lopesi* Lindner (that has non-flattened head) and from *Chalcidomorphina aurata* Enderlain (with head moderately flattened), being alike *Cosmariomyia argyrosticta* Kertész, *E. major*, *M. crassimanus*, *P. longicornis*, *P. femoralis*, *Psephiocera modesta* (Lindner) and *Vittiger schnusei* Kertész. The slightly prominent eyes distinguish *P. kerteszi* from *C. aurata*, *C. argyrosticta*, *D. lopesi*, *E. major*, *P. femoralis* and *P. modesta*. The second and third thoracic segments with three pairs of dorsal setae of the same size, the same happens to *C. argyrosticta*, *E. major* and *M. crassimanus*, and on the latter the observation is based on a drawing attached to the description. Like in *E. major*, *M. crassimanus*, *P. longicornis*, *P. femoralis* and *V. schnusei*, the dorsal setae on abdominal segments decrease in size from the inner pair to the outer pair. On the other hand, the ventral setae on the same segments are of the same size, as in *E. major*, *P. longicornis*, *P. modesta* and *V. schnusei*. The sternal ventromedial path on the sixth segment is unique and resembled the one from *M. crassimanus*, *P. femoralis*,

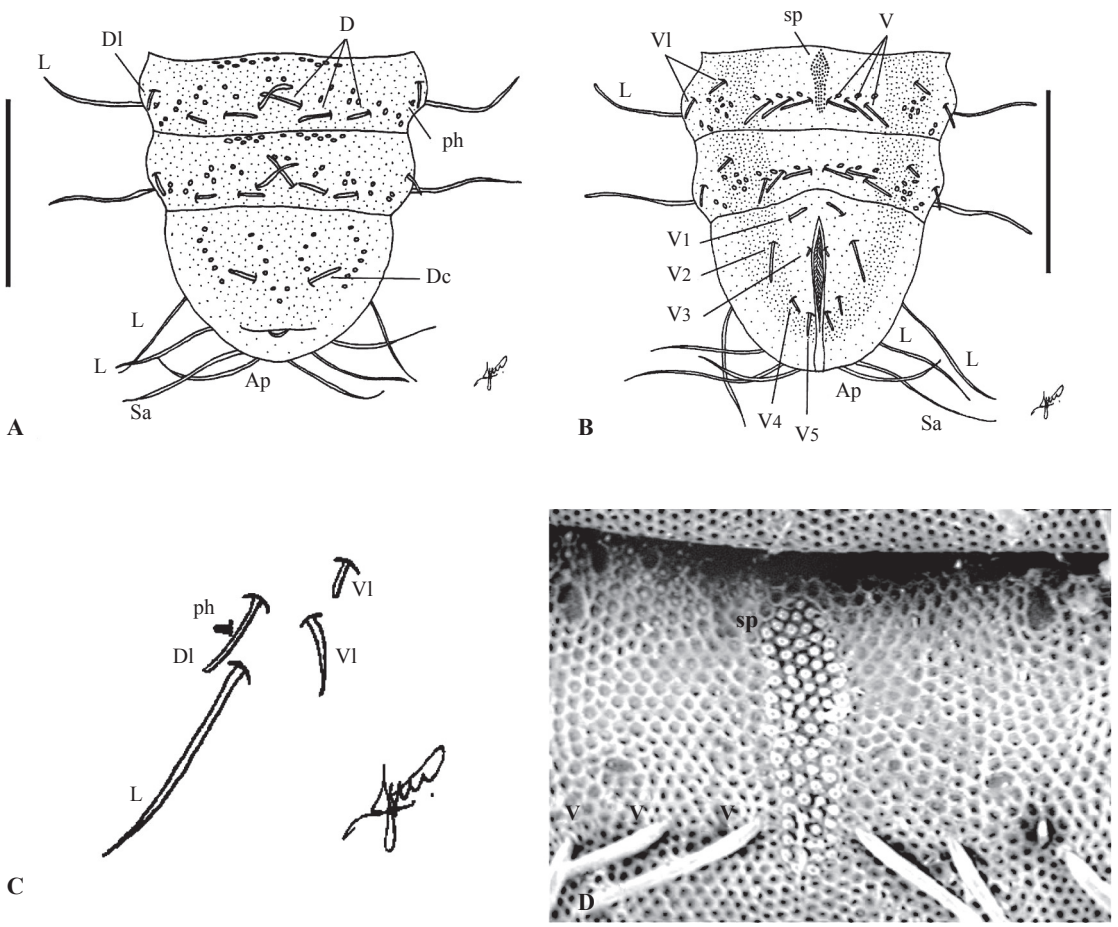

Fig 3 Sixth, seventh and eighth abdominal segments of *Popanomia kerteszi* puparium. A) Dorsal view; B), Ventral view; C) Disposition at the lateral region of 1st to 6th pupal abdominal segments; D) SEM of sixth thoracic segment: ventral view, sternal patch in detail. Abbreviations: (Ap) Apical setae, (D) Dorsal setae, (Dl) Dorsolateral setae, (L) Lateral setae, (ph) Pupal respiratory horn, (Sa) Subapical setae, (sp) Sternal patch, (V) Ventral setae, (Vl) Ventrolateral setae. Scale = 1 mm.

P. modesta and from *V. schnusei*, with the anterior portion slightly dilated, but without the slender anterior end as in *P. kerteszi*. The pupal respiratory horn occurs from the first to the sixth segment as in *C. aurata*, *C. argyrosticta*, *D. lopesi*, *M. crassimanus*, *P. longicornis* and *P. femoralis* pupae.

A feature showed here for the first time, which can be taken into consideration for diagnosis, is the ventrocranial furrow, which differs in shape in each species and is also easily visible. Located on the ventral part of the head, it is a depression, widening from the anterior to the posterior part in ventromedial line.

The sternal patch on Pachygastrinae pupae is not a secure feature for species identification, since among immature individuals of the same species a variation was observed, and its shape can be the same and/or very alike in more than one species. For example, *M. crassimanus*, *P. femoralis*, *P. modesta* and *V. schnusei* exhibit, according to their descriptions, the same shape of the sternal patch, and the one of de *P. kerteszi* is alike.

The shape and texture of setae must be used as diagnostic features for species identification in immature individuals. This is so because the number of pairs of setae on body segments is identical in all compared species (but *D. lopesi* that has three pairs of anterodorsal setae and two pairs of dorsal setae on the first thoracic segment), what makes the identification difficult when the number of immatures is higher.

The comparison of the immatures stages of *P. kerteszi* with other nine already described immatures stages of Neotropical Pachygastrinae allowed to widen the key of Xerez *et al* (2003b), as follows.

Identification Key to Already Described Immature Stages of Pachygastrinae

1 Pupal respiratory horn present from 1st to 6th abdominal segment…….2
1'Pupal respiratory horn present from 1st to 7th abdominal segment…….8

2 Head dorsoventrally flattened or moderately flattened....3
2'Head not dorsoventrally flattened head……..... ..... *Dactylodeictes lopesi*

3 Ventro-abdominal setae of the same size.....…..4
3'Ventro-abdominal setae of different sizes.....……..5

4 Second and third thoracic segments with dorsal setae of the same size, rounded dorso-abdominal setae…..……..……..*Popanomyia kerteszi*
4'Second and third thoracic segments with dorsal setae decreasing in size from the inner to the outer; dorso-abdominal setae not as above.….*Pedinocera longicornis*

5 Abdominal segments with the outer ventral pair of setae shorter than the inner ones……...*Popanomyia femoralis*
5'Abdominal segments with the outer ventral pair of setae longer than the inner ones…….....……6

6 All body setae, or most of them with feathery appearance.....….*Manotes crassimanus*
6'Setae not as above.....7

7 Abdominal segments with dorsal setae decreasing in size from inner to outer pair.…….*Cosmariomyia argyrosticta*
7'Abdominal segments with dorsal setae decreasing in size from outer to inner pair...……*Chalcidomorphina aurata*

8 Abdominal segments with dorsal setae decreasing in size from outer to inner pair…....…….*Psephiocera modesta*
8'Abdominal segments with dorsal setae not as above…..9

9 Median pair of dorsal setae on 2th to 6th abdominal segments longer than the inner pair.....…….*Engicerus major*
9'Median pair of dorsal setae on 2th to 6th abdominal segments shorter than the inner pair…….....….*Vittiger schnusei*

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