

Paedarium subauratum (Blanchard, 1943) comb. nov. (Diptera, Tachinidae) parasitoid of the Southern armyworm *Spodoptera eridania* (Stoll): taxonomic redescription and biology, with notes on the genus *Paedarium* Aldrich, 1926

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Abstract. We provide a taxonomic note on *Paedarium* Aldrich, 1926, with new generic synonyms, *Neopaedarium* Blanchard, 1943 **syn. nov.** and *Velardemyia* Valencia, 1972 **syn. nov.**, and new combinations resulting from these synonyms, *Paedarium ica* (Valencia, 1972) **comb. nov.** and *Paedarium subauratum* (Blanchard, 1943) **comb. nov.** *Paedarium punctipennis* Walker, 1857, is considered an unplaced species of *Voriini*. A redescription of *P. subauratum* and notes on its biology are given. A key for species of the genus *Paedarium* is provided.

Keywords. Dexiinae; *Nothovoria*; Parasitoid; *Spodoptera eridania*; *Voriini*.

INTRODUCTION

Aldrich (1926), in his note on muscoid flies with retracted hind crossvein, described the genus *Paedarium* for the new species *Paedarium parvum*, based on a male from Jamaica. Townsend (1939) diagnosed *Paedarium* based on Aldrich's (1926) description of the type species and synonymized the monotypic genus *Vorialia* Curran, 1934 with *Paedarium*. He placed that genus within *Voriini*. Since then, Townsend's proposition has been maintained in catalogues and checklist (Guimarães, 1971; Nihei, 2016; O'Hara *et al.*, 2020).

Blanchard (1943) erected the monotypic genus *Neopaedarium* for the new species *Neopaedarium subauratum* based on two male specimens from Salta, Argentina. He placed that genus in *Voriini* and stated that it was close to *Paedarium*, from which it differs by a few characters. Blanchard (1963) redescribed *N. subauratum* from the syntypes and stated that it was only known from the type locality. These specimens were reared from *Spodoptera eridania* (Stoll, 1782) and another unidentified noctuid in potato crops.

The Southern armyworm, *S. eridania* is a polyphagous species, native to the American tropics (Pogue, 2002), that occurs widely from South America through North America (Capinera, 2018) and recently *S. eridania* invaded Africa (Goergen

et al., 2016). More than two hundred plant species belonging to 58 families were listed as natural host for *S. eridania* (Montezano *et al.*, 2014). In Brazil *S. eridania* has become an important pest of transgenic soybean, due to the low susceptibility to genetically modified soybean that expressing Cry protein from *Bacillus thuringiensis* Berliner (Eubacteriales: Bacillaceae) (Bernardi *et al.*, 2014).

During an identification work on tachinid specimens reared from *S. eridania* in São José dos Pinhais, Paraná, Brazil, we examined descriptions of some related *Voriini* genera and images of types of their type species, which allowed us to propose the synonyms of *Neopaedarium* **syn. nov.** and *Velardemyia* Valencia, 1972 **syn. nov.** with *Paedarium* and the removal of the species *Paedarium punctipennis* (Walker, 1857) from that genus. We leaved *punctipennis* as an unplaced species of *Voriini*. We provide a taxonomic note on *Paedarium* and a redescription of *Paedarium subauratum* (Blanchard, 1943) **comb. nov.** with illustrations of the male and female terminalia and notes on its biology.

MATERIAL AND METHODS

The redescription of *P. subauratum* is based on specimens reared from *S. eridania* collected in São José dos Pinhais (25°36'49"S, 49°08'01"W), Paraná,

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Brazil. A survey of *S. eridania* caterpillars was conducted weekly by the beat cloth method (Shepard *et al.*, 1974) in 10 points of two areas of genetically modified soybeans (*Glycine max* (L.) Merrill) between January and March of 2017/2018 and 2018/2019 crop season. One of the areas (non-Bt area) was planted with variety NA5909RG expressing tolerance to the herbicide glyphosate during the two crop seasons. The other area (Bt area) was planted with the variety Syn13671 IPRO in the first crop season, and with variety M5917 IPRO and Syn1561 IPRO in the second crop season. Varieties from Bt area provide tolerance to the herbicide glyphosate and express Cry1Ac protein of *Bacillus thuringiensis* (Bt) which confers resistance to target lepidopteran species (Takahashi *et al.*, 2019). The collected caterpillars were individualized in polyethylene containers (3 × 7 cm) and fed with soybean leaves from the same variety in which they were collected. The adult parasitoids which emerged from puparia were preserved in 70% ethanol for identification.

The terminology used for external morphological structures follows Cumming & Wood (2017). Terms for structures for the male terminalia follow Tschorsnig (1985) and Cumming & Wood (2017), and for the female terminalia follow McAlpine (1981).

Digital images were taken with an AmScope MU300 3.0 MP digital camera mounted on a Zeiss Stemi 508 stereomicroscope. The image plates were created using GNU Image Manipulation Program (Gimp v. 2.8).

Acronyms for institutions cited in the text: **MCZ** = Museum of Comparative Zoology, Harvard University, Cambridge, United States; **MLPA** = Museo de La Plata, Buenos Aires, Argentina; **NHMUK** = Natural History Museum, London, United Kingdom; **SENASA** = Laboratorio de Sanidad Vegetal, Servicio Nacional de Sanidad Agrária, Lima, Peru; **ZUFMS** = Coleção Zoológica de Referência, Universidade Federal de Mato Grosso do Sul, Campo Grande, Brazil.

RESULTS

Paedarium Aldrich, 1926

Vorialia Curran, 1934: 448. Type species: *Voria neotropica* Curran, 1926, by original designation. Townsend, 1939 (synonymous with *Paedarium*); Guimarães (1971) (catalogue – as *Paedarium*); Nihei (catalogue – as *Paedarium*); O'Hara *et al.*, (2020) (checklist – as *Paedarium*).

Neopaedarium Blanchard, 1943: 155. Type-species: *Neopaedarium subauratum* Blanchard, 1943, by original designation. Blanchard (1963) (redescription of the syntypes); Guimarães (1971) (catalogue); Guimarães (1977) (parasite-host catalogue); O'Hara & Henderson (2020) (world checklist of tachinid genera); O'Hara *et al.* (2020) (checklist); Torres-Domínguez *et al.*, (2020) (syntypes data). **Syn. nov.**

Velardemyia Valencia, 1972: 363. Type-species: *Velardemyia ica* Valencia, 1972, by original designation. Valencia & Valdivia (1973) (host); Guimarães

(1977) (parasite-host catalogue); Cortés & González (1989) (Voriini genera from Chile); Lozada *et al.*, (2005) (type material); O'Hara & Henderson (2020) (world checklist of tachinid genera); O'Hara *et al.* (2020) (checklist). **Syn. nov.**

Diagnosis: Species of *Paedarium* can be distinguished from the other Neotropical Voriini genera by having the following combination of characters: eyes apparently bare, with short and sparse ommatrichia; upper part of the fronto-orbital plate with a reclinate orbital seta arising outside of frontal row; fronto-orbital plate with two to three proclinate orbital setae; parafacial with hairs (often sparse) and a row of strong proclinate setae (varying in extension, can reach downwards close to the level of the vibrissae); arista apparently bare, micropubescent; facial ridge with only a few hairs and short setulae near vibrissae; second aristemere short and less than twice as long as wide; propleuron bare; postpronotal setae 4; acrostichal setae 3:3, the posterior presutural acrostichal setae closer to the transverse suture and sometimes touching it; dorsocentral setae 3:3; postsutural supra-alar setae 3; postalar setae 3, the middle seta longer and the posterior one like setula; anepimeron with a group of setulae and anepimeral seta not differentiated from surrounding setulae; subapical scutellar setae long and usually reaching to hind margins of tergite 3; wing subhyaline or subinfuscated; R_{2+3} bare; R_{4+5} setose dorsally from the base to or just beyond crossvein r-m; Cell r₄₊₅ open; discal setae absent on abdominal tergites 3 and 4.

Paedarium belongs to Voriini, whose species can usually be recognized by the following combination of characters: ocellar setae slightly proclinate and divergent; no black setulae posterior to postocular row; prosternum without setae; laterotergite with a small group of tiny infrasquamal setulae; discal medial (dm-m) crossvein very oblique; middorsal depression of syntergite 1 + 2 extending back to its hind margin; sternite 6 juxtaposing segment 7 at the right side; phallus ribbon-like (D'Aguilar, 1957; Thompson, 1961; Tschorsnig, 1985; Cortés & Gonzalez, 1989; Fleming *et al.*, 2017).

Among the Voriini genera, *Paedarium* is morphologically close to *Cyrtophloeoba* Rondani, 1856 from which it differs by having the following combination of features: the eyes not densely hairy, tergites 3 and 4 without discal setae, and R_{2+3} bare.

Comments: Aldrich (1926) made a series of mistakes in the description of *P. parvum*: parafacial without hairs, presutural acrostichal setae 2, presutural dorsocentral setae 1, postpronotal setae 2, postsutural supra-alar setae 2, and postalar 2. Townsend (1939) diagnosed *Paedarium* based on Aldrich's description of the type species, transcribing in his diagnosis the first three characters above, and placed *Vorialia* as a junior synonym of *Paedarium*. The type species of these genera are congeneric and differ from Aldrich's description and Townsend's diagnosis by having parafacial hairy, acrostichal setae 3:3, dorsocentral setae 3:3, postpronotal setae 4, supra-alar 3, and post-alar 3.

Blanchard (1943) stated that *Neopaedarium* was close to *Paedarium*, from which it would differ by a few characters, parafacial hairy, wing subhyaline, presutural dorso-central 3, and differentiated anepimeral seta (referring to a group of setulae). He based his statement on the erroneous description of Aldrich (1926), without examining the type of *P. parvum*, which has the same chaetotaxy pattern of the *Neopaedarium* type species and is very similar to it.

Valencia (1972), after reviewing the identification keys of Townsend (1936) and Cortés & Campos (1970) and the descriptions of the Peruvian Voriini genera, proposed the genus *Velardemyia*. He took his decision based on personal information given by Sabrosky, who had confirmed that it was a new genus. Valencia did not mention Aldrich's (1926) and Blanchard's (1943) works and did not consider the type species of *Paedarium* and *Neopaedarium*.

The type species of the genera *Neopaedarium* and *Velardemyia* are similar in their chaetotaxy and external morphology. Cortés & González (1989) suspected that *Velardemyia* could be synonymous with *Paedarium*, and indeed the type species of *Neopaedarium* and *Velardemyia* share with *P. parvum* and *P. neotropicum* the combination of characters mentioned in our diagnosis and can only be distinguished from the latter two species mainly by minor color differences. Based on the above, we confirm the synonymy of *Neopaedarium* and *Velardemyia* with *Paedarium*.

Nothovoria was described based on the female holotype of *N. praestans* and compared to *Velardemyia*, with which it shares many characters. Cortés & González (1989) distinguished the former from the latter using some characters, listed in the above diagnoses of *Paedarium*, which may vary inter and/or intraspecifically. Unfortunately, we could not access the type of *N. praestans*. The description of this species matches our diagnosis, and it is likely that it belongs to *Paedarium*, but we will not move it to this genus now, leaving this for a future revisionary study of the Neotropical Voriini.

Paedarium punctipennis differs from the above diagnosis by having discal setae on tergites 3 and 4 and by the peculiar morphology of its wings (as redescribed by Austen (1907)). Unfortunately, the type of this species is in poor condition and has a lot of molds covering important structures. From photos it is not possible to state to which genus it belongs, but we can state that it does not belong to *Paedarium*. The holotype of this species had been placed under *Cyrtophloebe* in the NHMUK as Monty Wood tentatively identified it as belonging to that genus and he labeled the holotype as: "*Cyrtophloebe*" – comb. not yet. publ. Wood '69' (Nigel Waytt – personal communication). Here we treat it as an unplaced species of Voriini until the holotype can be carefully examined.

Included species in *Paedarium*

ica (Valencia), 1972: 364 (*Velardemyia*). **Comb. nov.** Type data: holotype male (SENASA-Peru). Type locality: Perú, Ica, Arrabales. (examined by photos of holotype (Figs. 3A-C) and one paratype deposited in SENASA-

Peru). Distribution: Peru, Ica; Chile, Santa Rosa, Traiguén, Malleco). Reference: Valencia & Valdivia (1973) (host); Cortés & González, 1989 (taxonomic notes); Lozada *et al.*, (2005) (holotype data); O'Hara *et al.* (2020) (checklist); O'Hara *et al.* (2021) (catalogue).

neotropicum (Curran), 1934: 109 (*Voria*). Type data: holotype male (NHMUK). Type locality: Jamaica, West Indies, Mona and Hope Gardens. (examined by photos – <https://www.gbif.org/occurrence/3059207830>). Distribution: known only from Jamaica. References: Townsend (1939) (moved to *Paedarium*); Guimarães (1971) (catalogue); Nihei (catalogue, holotype data); O'Hara *et al.* (2020) (checklist).

parvum Aldrich, 1926: 22. Type data: holotype male (MCZ-USA). Type locality: Jamaica, Montego Bay. (examined by photos – <https://mczbase.mcz.harvard.edu/guid/MCZ:Ent:7742>). Distribution: Known only from Jamaica. References: Townsend (1939) (Diagnosis of *Paedarium*); Guimarães (1971) (catalogue); O'Hara *et al.* (2020) (checklist).

subauratum (Blanchard), 1943: 155 (*Neopaedarium*). **Comb. nov.** Type data: syntypes male (MLPA-Argentina). Type locality: Argentina, Salta. (examined by photo of one syntype in Torres-Domínguez *et al.*, (2020)). Distribution: Argentina, Salta; Brazil, São José dos Pinhais, Paraná. References: Blanchard (1963) (redescription, host); Guimarães (1971) (catalogue); Guimarães (1977) (host-parasite catalogue); O'Hara *et al.* (2020) (checklist); Torres-Domínguez *et al.*, (2020) (syntypes data).

Key to species of *Paedarium*

- R_{4+5} setose dorsally from the base to beyond crossvein r-m, exceeding the latter by twice the crossvein r-m length.... *Paedarium neotropicum*
— R_{4+5} setose dorsally from the base up to the crossvein r-m or exceeding the latter up to one time the crossvein r-m length..... 2
- Vertex, ocellar triangle, fronto-orbital plate, postocular plate, and parafacial with goldish-yellow pruinosity, the basal half of the latter sometimes varying from goldish-yellow to yellowish-gray; tergite 5 with gold pruinosity on basal half..... *Paedarium subauratum*
— Not agreeing with above color combinations..... 3
- Pedicle two-thirds the length of the postpedicel; abdomen with dense basal pruinosity on tergites 3, 4 and 5, fading towards the apex, width of the transverse bands undefined..... *Paedarium parvum*
— Pedicle four-fifths of the length of the postpedicel; abdomen with dense basal pruinosity on tergites 3, 4 and 5, the width of the transverse bands more defined (Figs. 3A and B)..... *Paedarium ica*

Paedarium subauratum (Blanchard) comb. nov. (Fig. 1A-D)

Type material: According to Torres-Domínguez *et al.* (2020), two males syntypes, glued on card, labeled: "S noctuido de papa / Urundel / Salta [upperside] / 10-VIII-1937 / Koehler lg [underside]" handwritten on

white paper; "Cotipo" handwritten on blue paper, black frame; "Neopaedarium / subauratum / Blnchd [handwritten] /det. E.E. Blanchard [printed]" on white paper, black frame; "3329" handwritten on white paper; "Museo La Plata" printed on white paper. One syntype documented with one photo.

Diagnosis: This species differs from all others species of the genus by having the following combination of features: vertex, ocellar triangle, fronto-orbital plate, postocular plate and parafacial goldish-yellow pruinosity, the basal half of the parafacial sometimes varying from yellowish-gray to goldish-yellow; R_{4+5} setose from the base up to the r-m crossvein or surpassing the latter by up to one time the r-m crossvein length; abdomen, in dorsal view, subshining black, tergites 3 and 4 with grayish-white pruinosity on basal half, and tergite 5 with gold pruinosity on basal half.

Paedarium subauratum differs from *P. neotropicum* by having vein R_{4+5} setose from the base up to the r-m crossvein or surpassing the latter by up to one time the r-m crossvein length; differs from *P. ica* and *P. parvum* by having the following combination of features: vertex, ocellar triangle, fronto-orbital plate, postocular plate, parafacial with goldish-yellow pruinosity (the basal half of parafacial sometimes varying from yellowish-gray to goldish-yellow), and tergite 5 with gold pruinosity on basal half.

Description: Male: Body length: 6.37-6.66 mm, wing length: 5.00-5.20 mm.

Coloration: Vertex, ocellar triangle, fronto-orbital plate, postocular plate, and parafacial with goldish-yellow pruinosity, the basal half of the latter sometimes varying from goldish-yellow to yellowish-gray; face, facial ridge, gena, and occiput with grayish-white pruinosity; frontal vitta brown; scape brown to reddish-brown; pedicel light reddish-orange; postpedicel black; palpus yellow; proboscis brown; thorax black in ground color with gray pruinosity; scutum with four black longitudinal stripes: two outside of the dorsocentral rows and two outside of acrostichal rows, the latter interrupted in halfway between transverse suture and scutoscutellar suture; a less intense black stripe between the acrostichal rows in the posterior half of the postsutural area more or less continuous on the scutellum from certain angle; legs black with gray pruinosity from certain angle, intense on the posterior portion of the anterior femur; wing subhyaline; tegula black; basicosta brown; upper and lower calypters subopaline white, with very short hairs of the same color on margin; abdomen, in dorsal view, subshining black, tergites 3 and 4 with grayish-white pruinosity on basal half, and tergite 5 with gold pruinosity on basal half.

Head: Eyes apparently bare, with short and sparse ommatrichia; vertex about 0.30x head width in dorsal view;

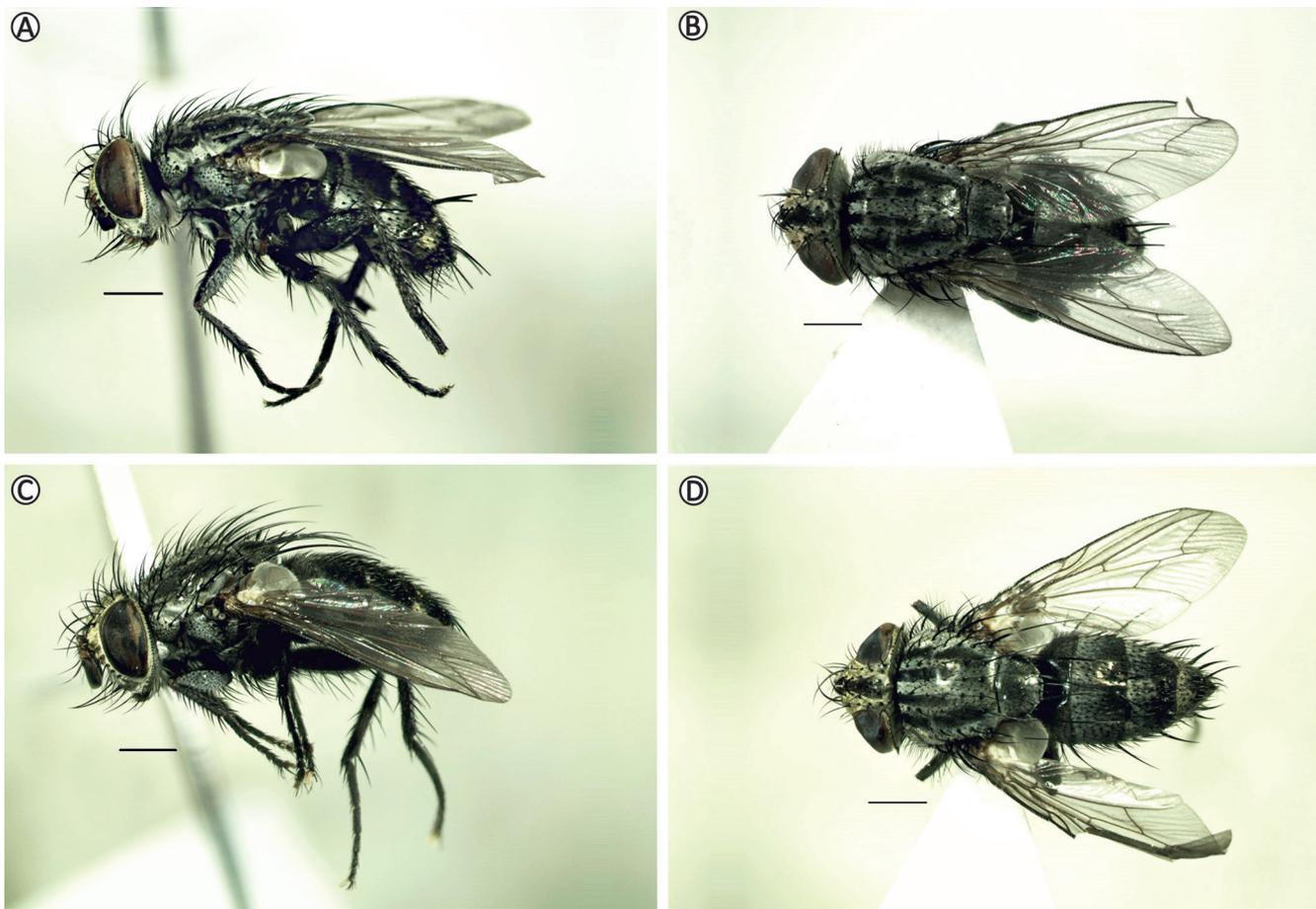


Figure 1. *Paedarium subauratum*: (A-B) female in lateral and dorsal views, respectively. *Paedarium subauratum*: (C-D) male in lateral and dorsal view, respectively. Scale 1 mm.

inner vertical and outer vertical setae well developed, the first slight reclinate and subparallel, the later divergent and about two-thirds inner vertical setae length; ocellar setae well-developed and slightly proclinate and divergent; fronto-orbital plate with about five setae, upper and lower frontal setae reclinate, the intermediary setae convergent; the lower frontal seta situated just above the lower margin of the pedicel; upper part of the fronto-orbital plate with reclinate orbital seta arising outside of frontal row; fronto-orbital plate with two to three proclinate orbital setae, the middle one sometimes setula-like; parafacial usually with a row of three to five strong proclinate setae and scanty black hairs descending from fronto-orbital plate; fronto-orbital plate wider than parafacial; postpedicel about 1.65x length of pedi-

cel; pedicel about 2.0x length of scape; facial ridge with hair-like setae on lower one-fourth, sometimes with one or two setulae smaller than half the length of the vibrissa; one or two genal setae on the posterior margin; a row of four to five setae shorter than or equal to half the length of the vibrissae extending from the subvibrissal ridge to the lower cranial margin of the postgena.

Thorax: Acrostichal setae 3 + 3, the posterior acrostichal presutural seta shorter and closer to the transverse suture; dorsocentral setae 3 + 3; intra-alar setae 2 + 3; supra-alar setae 2 + 3, the anterior presutural and postsutural setae shorter; three postalar setae, the second seta longer and stronger; three katepisternal setae, almost aligned and equidistant, the middle one being slightly

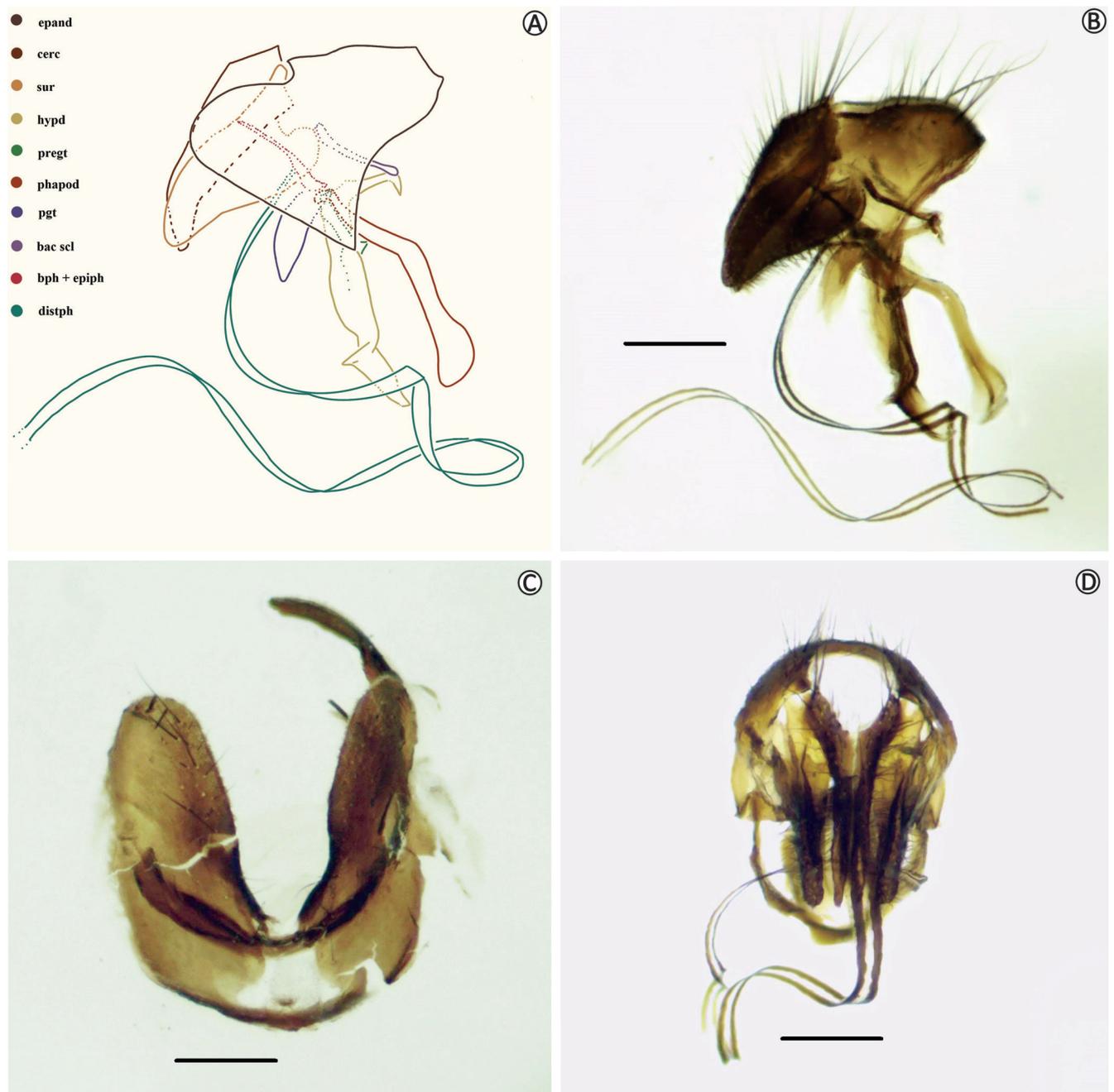


Figure 2. *Paedarium subauratum*, male: (A-B) terminalia in lateral view. (C) sternite 5 in ventral view. (D) terminalia in posterior view. (Abbreviations: bac scl, bacilliform sclerite; bhp + epiph, basiphallus + epiphallus; cerc, cercus; distph, distiphallus; epand, epandrium; phapod, phallapodema; hypd, hypandrium; ptg, postgonite; pregt, pregonite; sur, surstylus). Scale: 0.25 mm.

lower than the other; scutellum with one pair of basal, one pair of lateral (the longest setae on scutellum), and one pair of apical setae crossed and horizontal; two pairs of preapical scutellar setae, one pair positioned between the apical scutellar setae and another pair more externally to the latter, both pairs are shorter, thinner, and slightly more erected than the apical scutellar seta; a group of six to eight discal setae, smaller and more erected than preapical setae. Wing with vein R_{4+5} setose from the base up to the crossvein r-m or exceeding the latter by up to one time the crossvein r-m length.

Legs: Tarsal claws longer than tarsomere 5; mid tibia with six or seven anterodorsal setae, at least two longer setae interspersed among shorter setae, two or three short posterodorsal setae, and one or two short ventral setae; hind tibia with six to eight anterodorsal setae, of which two longer setae than the others, two or three posterodorsal setae.

Abdomen: Syntergite 1 + 2 with mid-dorsal depression extending back to its hind margin, without median marginal setae, and with one or two lateral marginal setae on each side; tergite 3 with a pair of median marginal setae and two to three lateral marginal setae on each side; tergite 4 with a pair of median marginal setae and two or more lateral marginal setae; tergite 5 with a row of discal setae and a row of smaller median marginal setae.

Terminalia (Fig. 2A-D): Segment 7 + 8 large and convex, wider at the sides than in the middle, with only one spiracle at the left side; tergite 6 is divided into two small hemitergites, connected to the tergites 5 and segment 7 by a broad membrane (as Tschorsnig's (1985) fig. 9d);

epandrium in profile with ventrolateral margin convex, expanding backwards covering the base of surstylus and portion of the base of cercus; cercus with stiff erect setulae decreasing in size from base to apex; cercus in profile gently narrowing from base to apex and slightly bent inward subapically; cercus in posterior view, narrow, elongated, and not fused; surstylus with short, stiff, and erect setulae on the outer and inner surfaces, the inner surface slightly excavated; surstylus in profile broad basally and tapered gradually to rounded apex; basiphallus lengthened by the epiphallus, extending behind the insertion of the distiphallus; distiphallus connected ventrally on the basiphallus; distiphallus long and ribbon-like; pregonites plate-like and fused along the length; postgonite narrowed from the base to apex, connected to the base of hypandrium.

Female: Like male, except for, vertex about 0.35 head width in dorsal view, tarsal claws shorter and abdomen slightly less elongated.

Female terminalia (Fig. 4) with overlapping tergites and sternites; tergite 6 large, straight anteriorly and rounded posteriorly, with one spiracle on each lateral edge, posterior edge with a row of setae; presence of one spiracle on each side in the ventral membrane anterior to tergite 6; tergite 7 similar in shape to tergite 6, but narrower, with a row of smaller setae posteriorly; tergite 8 apparently divided into two small, irregular and poorly sclerotized hemitergites; sternite 5 trapezoid, posteriorly wider and with a row of setae; sternite 6 large, straight posteriorly and rounded anteriorly, with a row of setae posteriorly; sternite 7 similar in shape to sternite 6, about the same size, with a row of setae posteriorly; the setae become more widely spaced and smaller from sternite 5 to sternite 7; sternite 8 subquadrangular, poorly scler-



Figure 3. *Paedarium ica*: (A-B) male in lateral and dorsal view, respectively (holotype photos courtesy of Graciano Tejada – SENASA). (C) Holotype labels.

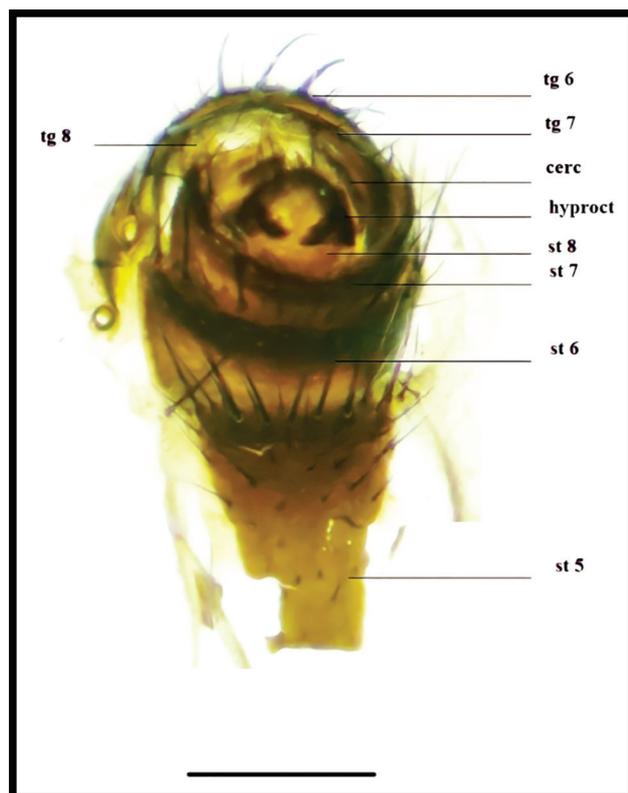


Figure 4. *Paedarium subauratum*, female: terminalia in posteroventral view. (Abbreviation: cerc, cercus; hyproct, hypoproct; st, sternite; tg, tergite). Scale: 0.25 mm.

itized (in ventral view covering most of the hypoproct), apparently without setulae, with several salient micropunctuations; hypoproct V-shaped with small setulae; cercus finger-shaped with setulae.

Distribution: Argentina (Salta) and Brazil (São José dos Pinhais – Paraná (new record)).

Material examined: 14 males and 19 females, São José dos Pinhais, 25°36'46.0"S 49°08'21.5"W, Paraná, Brazil, (09.ii.2018, 15.ii.2018, 01.ii.2018, 22.ii.2018, 31.i.2019, 07.ii.2019, 28.ii.2019, 14.iii.2019), Tamara A. Takahashi col., Host. *Spodoptera eridania*, (ZUFMS).

Note on the biology of *P. subauratum*

In the two crop seasons, a total of 220 *S. eridania* larvae were collected from the non-Bt area, and 248 from Bt area, which 31.82% and 17.34% were parasitized by natural enemies, respectively. From the total of parasitized caterpillars, *P. subauratum* emerged from 10 (non-Bt area) and 3 (Bt area) individuals, and represented 14.29 and 6.98% of parasitism, respectively. *Paedarium subauratum* is a larval-pupal parasitoid of *S. eridania*, this species completed its life cycle and emerged from the host caterpillar in 92.31% of the samples, and 7.69% from the host pupae. It is a gregarious endoparasitoid, with 1-6 parasitoids developing in one host caterpillar (mean = 2.54 ± 0.25 , N = 13). The development time of puparium-adult is 11.50 ± 0.71 days at $25 \pm 3^\circ\text{C}$ and the

sex ratio (female offspring/total offspring) is female biased (mean = 0.60 ± 0.09 , N = 33), which favors biological control because it increases the chances of parasitism in the field and the establishment of the species.

Unplaced species of Voriini

punctipennis Walker, 1857: 208 (? *Sarcophaga*). Type data: holotype female? (NHMUK). Type locality: Colombia. (examined by photos). Distribution: known only from Colombia. References: Austen (1907) (note on type *Sarcophaga? punctipennis* – treated as female); Aldrich (1930) (notes on type of *Sarcophaga? punctipennis* – treated as male); Guimarães (1971) (catalogue as *Paedarium*); Nihei (catalogue as *Paedarium*, holotype data – treated as female); O'Hara *et al.* (2020) (checklist as *Paedarium*). (The holotype seems to be a male, but due to the condition of the specimen it is difficult to see the terminalia (Nigel Wyatt, personal communication)).

AUTHORS' CONTRIBUTIONS: R.T. performed the writing of the manuscript, identified the material, and took the pictures and worked on the illustration. T.A.T. contributed with the caterpillars collected in the field, biological data, prepared the pictures and substantially revised the work. The authors have corrected and approved the final manuscript.

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