

Two new Neotropical species of *Perithreticus* Vaillant 1973 (Diptera: Psychodidae, Psychodinae)

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ABSTRACT

The genus *Perithreticus* is recorded for the first time from Central America and the Caribbean. Two new species are described and figured: *P. arboscandens* Kvifte & Andersen, n. sp. from Zurquí, San José Province, Costa Rica and *P. guantanamera* Kvifte & Andersen, n. sp. from Alexander von Humboldt National Park, Guantánamo Province, Cuba. The generic diagnosis is emended to accommodate the newly described species, and a key to the males of the *Perithreticus* species of the world is presented.

RESUMEN

El género *Perithreticus* es registrado por primera vez para la región de Centroamérica y el Caribe. Dos nuevas especies son descritas e ilustradas, *P. arboscandens* Kvifte & Andersen, n. sp. de Zurquí, provincia de San José, Costa Rica y *P. guantanamera* Kvifte & Andersen, n. sp. del Parque Nacional Alejandro de Humboldt, provincia de Guantánamo, Cuba. La diagnosis del género es enmendada para acomodar las nuevas especies y se presenta una clave para los machos de las especies de *Perithreticus* del mundo.

ARTICLE HISTORY

Received 23 March 2016
Accepted 2 June 2016

KEYWORDS

Psychodidae; Psychodinae;
Perithreticus; new species;
Costa Rica; Cuba

Introduction

The genus *Perithreticus* Vaillant, 1973 was originally described for two Nearctic species previously placed in *Psychoda* Latreille, 1796, with *Psychoda bishoppi* Del Rosario, 1936 as type species (Vaillant 1973). This genus was not accepted as valid by subsequent workers on Nearctic Psychodidae (e.g. Quate & Vockeroth 1981), probably due to its definition being very brief. The first comprehensive diagnosis of the genus was provided by Kvifte (2015), who added one Afrotropical species and removed one Nearctic. However, *Perithreticus* remains a poorly studied taxon.

In the present paper we use recently collected material from Cuba and Costa Rica to expand the range of the genus to Central America and the Caribbean. Two new species are described based on adult males and the genus diagnosis given in Kvifte (2015) is modified to accommodate the two species. Finally, a key to the males of the four species now included in *Perithreticus* is presented.

Materials and methods

The Cuban specimens were macerated in KOH for 24 h, treated with acetic acid and 100% ethanol for 5–10 min, dissected in 100% ethanol and mounted in euparal on microscope slides. The Costa Rican specimens were collected during the Zurquí All Diptera Biodiversity Inventory and slide-mounted in Canada Balsam by the ZADBI preparation team (see Borkent & Brown 2015). Locality data are quoted directly from the locality labels of the relevant specimens.

Morphological terminology is according to Kvifte (2015). Measurements are given in μm to an accuracy of 1 μm , and are listed as ranges, followed by the means when four or more specimens are measured, followed by the number of specimens measured in parenthesis. Wing length is measured in mm to an accuracy of 0.01 mm, measured from the end of the basal costal node to the apex of the wing, while wing width is measured at the wing's widest point.

The type specimens are deposited in the following collections:

LACM – Los Angeles County Museum of Natural History, Los Angeles, USA.

MNCR – Museo Nacional de Costa Rica, San Jose, Costa Rica.

ZMBN – Department of Natural History, University Museum of Bergen, Bergen, Norway.

Results

Perithreticus Vaillant

Perithreticus Vaillant, 1973: 355.

Type species: *Psychoda bishoppi* Del Rosario, 1936.

Other included species: *Perithreticus anderseni* Kvifte, 2015; *P. arboscandens* Kvifte & Andersen, n. sp.; *P. guantanamera* Kvifte & Andersen, n. sp.

Emended diagnosis

Eye bridge of four rows of facets, separated by 0.0–0.5 facet diameters, uppermost (posterior row) facets closer than lowermost; labellum bulbous, setose; clypeus with lateral row of strong setae; antennal flagellomeres nodiform with Y-shaped ascoids; flagellomeres 11–14 or 13–14 without internodes, diminutive; thorax with anepisternum subrectangular, delimited by clear dorsal suture, with large spiracle anteriorly; anepimeron subtriangular; tarsi without dorsal projection; wing with upper margin of R_1 strengthened and area between C and R_1 infuscated; radial fork in line with or distad to CuA_2 , both distad of medial fork; wing membrane with micropilosity only; aedeagus bilaterally symmetrical, consisting of two phallomeres, usually connected by membrane to form a spatula (separate in *P. guantanamera* n. sp.); flanked by two subtriangular to hook-shaped parameres; gonocoxites with triangular parabaasal processes converging mediodorsally; hypoproct broad, wrinkled and pilose, reaching over the bases of both surstyli, concave anteriorly; surstyli with 5–12 tenacula in single unspaced transverse row distally.

Key to the males of *Perithreticus* Vaillant of the world

1. Wing with radial fork clearly distal of medial fork (Kvifte 2015, fig. 1B) 2
 - Wing with radial and medial forks nearly aligned, separated by less than 1/10th of the wing length (Figures 5, 6). 3
2. Flagellomeres 11 and 12 without internodes. Aedeagus rod-like, with parallel-sided margins. Parameres as long as aedeagus. Surstylus with 7–11 tenacula. Tanzania *P. anderseni* Kvifte

- Flagellomeres 11 and 12 with internodes. Aedeagus ellipsoid, with convex margins. Parameres shorter than aedeagus. Surstylus with 5–6 tenacula. USA. *P. bishoppi* (Del Rosario)

3. Jugum of wing V-shaped (Figure 5). Apices of parameres and aedeagus not hooked, parameres and aedeagus of equal length (Figure 3). Surstylus with 8–10 tenacula. Costa Rica. *P. arboscandens* n. sp.
 - Jugum of wing obtusely U-shaped (Figure 6). Apices of parameres and aedeagus hooked laterad, parameres shorter than aedeagus (Figure 8). Surstylus with 5–6 tenacula. Cuba. *P. guantanamera* n. sp.

Perithreticus arboscandens n. sp. Kvifte & Andersen (Figures 1–5)

Type material

Holotype male: Costa Rica, San José Province, Moravia, Zurquí de Moravia, Tower path, loc. “ZADBI-393”, 10.046766N, 84.008070W, 18 January 2013, CDC light trap, leg ZADBI project (MNCR). Paratypes: 2 males, as holotype except Creek 2 path, loc “ZADBI-420”, 10.047612N, 84.008780W, 18–25 January 2013, canopy Malaise trap (LACM & ZMBN); 2 males, as holotype except Creek 2 path, 100 mts, loc “ZADBI-377”, 10.047721N, 84.008352W, 3–11 January 2013, flight intercept trap (MNCR & ZMBN).

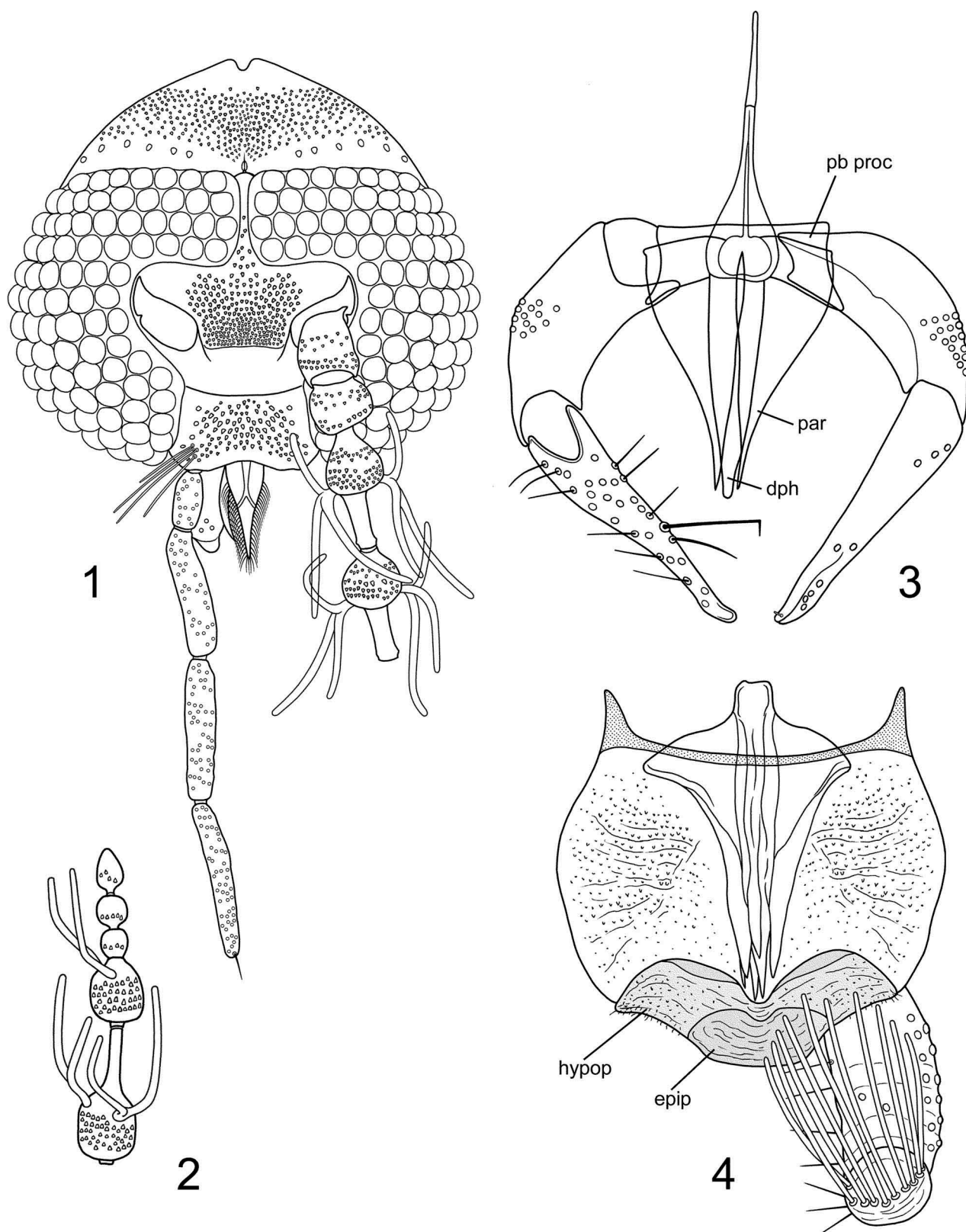
Diagnostic characters

The species can be separated from its congeners by the following combination of characters: radial and medial forks in the wing nearly aligned, jugum V-shaped, parameres and aedeagus of equal length with straight apices, surstylus with 8–10 tenacula.

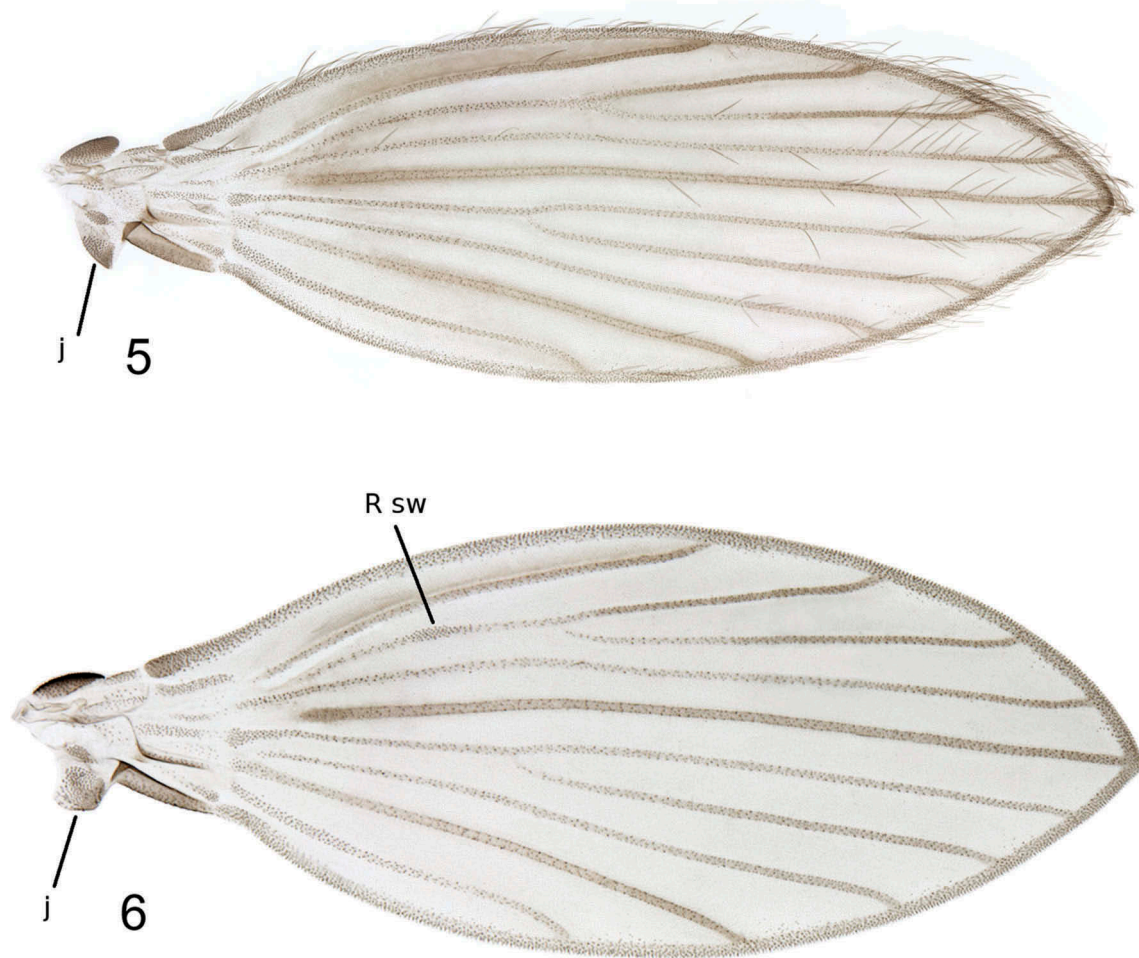
Description

Male ($n = 4$ –5, except when stated otherwise).

Head (Figure 1) wider than long; vertex 0.25 times the length of head; eye bridge of four facet rows, separated by about 0.25–0.50 facet diameters; with single row of 6 ocular setae; interocular area broader below; interocular suture T-shaped to triangular; frontal scar patch crown-shaped with median posterior extension reaching middle of eye bridge. Length of palpomeres (in μm): 51–57, 54; 95–109, 102; 104–119, 113; 112–134, 123. Labellum bulbous and setose. Antennae of 16 segments; scape cylindrical, widening in subapical fourth; pedicel spheroid, slightly wider



Figures 1–4. *Perithreticus arboscandens* n. sp. Kvitte & Andersen, male. 1, Head. 2, Terminal antennal segments. 3, Aedeagus and gonopods; left gonocoxite and paramere in ventral view, right gonocoxite and paramere in dorsal view. 4, Epandrium, proctiger and surstylus. Abbreviations: dph: distiphallus, epip: epiproct, hypop: hypoproct, par: paramere, pb proc: parabasal process.



Figures 5–6. *Perithreticus* spp., wings. 5, *P. arboscandens* n. sp. Kvifte & Andersen, male. 6, *P. guantanamera* n. sp. Kvifte & Andersen, male. Abbreviations: j: jugum, R sw: radial swelling.

than long; flagellomeres 1–10 nodiform with paired Y-shaped ascoids and smaller spiniform sensilla; flagellomere 11 without internode and with ascoids apparently V-shaped; flagellomeres 12–14 (Figure 2) diminutive without ascoids but with paired spiniform setae. Lengths of scape, pedicel and flagellomeres (in μm): 61–68, 65; 51–54, 53; 108–115, 110; 102–108, 106; 106–108(3); 108–110(3); 106–108(3); 100–106(3); 98–104(3); 96–101(3); 90–98(3); 84–90(3); 41–47(3); 18–22(3); 22–23(3); 28(1).

Thorax with anepisternum with half-circular hair patch; anepimeron triangular with straight lower margin; without ventral suture; posterior spiracle with operculum setose.

Wing (Figure 5) elongate ovate; 1.61–1.79, 1.66 mm long, 64–72, 66 mm wide; membrane only with micropilosity; area between C and R_1 infuscate; hyaline field present immediately below R_1 reaching one ninth of the length of R_{2+3} , covering one third of the area between R_1 and R_{2+3} ; radial fork narrowly distad of CuA_2 , both narrowly distad to medial fork; R_1 , R_5 and

CuA_1 with outline strongly sclerotized, origin of R_5 with darker spot; jugum V-shaped.

Terminalia (Figures 3, 4) symmetrical; hypandrium apparently reduced; gonocoxites narrowly reniform with parbasal process triangular, meeting medially (Figure 3); single medial band of setae present; gonocoxal condyles forming broad ventral band between aedeagal complex and epandrial apodemes. Gonostyles narrow acuminate, hooked apically; covered in short spiniform sensilla, with pair of longer setiform sensilla two third from base on mesal surface; one long with L-shaped apex, one straight and shorter; subapically with curved elongate setiform sensillum. Aedeagus with basiphallus laterally compressed, widening distally; distiphallus forming narrow, nearly parallel-sided spatula with distal suture pilose; parameres triangular with lateral margins slightly concave; aedeagus and parameres reaching to same level. Epandrium (Figure 4) broader than long; covered in hairs distolaterally on the ventral surface; subepandrial sclerite membranous. Surstyli cylindrical with small

expansions near base; mesal surface with long spiniform sensilla; apically with 8–10 tenacula in single transverse row. Hypoproct naked, broadly U-shaped with lateral sides expanded to lobes; epiproct pilose, following the shape of hypoproct.

Distribution

The species is known only from the type locality in Zurquí forest reserve, Costa Rica, where it was collected as part of the Zurquí All Diptera Biodiversity Inventory (ZADBI, see Borkent & Brown 2015). The type specimens were caught in Malaise traps in the forest canopy, in flight interception traps or in a CDC light trap in a mid-altitude cloud forest.

Etymology

From Latin *arbo scandens*, “tree-climbing”, referring to the type series being partially collected in canopy Malaise traps. The epithet is to be treated as a participle and its ending thus corresponding with the gender of the genus.

Perithreticus guantanamera n. sp. Kvifte & Andersen
(Figures 6–9)

Type material

Holotype male: Cuba, Guantanamo province, Baracoa, Alexander von Humboldt National Park, Monte Iberia, Arroyo del Pez Pega, a, 20°28'31"N, 77°43'46"W, stream 3, 29–31 October 2015, Malaise trap, leg. O. Bello González (ZMBN). Paratypes: 3 males as holotype (ZMBN); 1 male as holotype except stream 2 (ZMBN).

Diagnostic characters

The species can be separated from its congeners by the following combination of characters: radial and medial forks in the wing nearly aligned, jugum obtusely U-shaped, parameres shorter than aedeagus with apices hooked laterad, surstylus with 5–6 tenacula.

Description

Male ($n = 4-5$, except when stated otherwise).

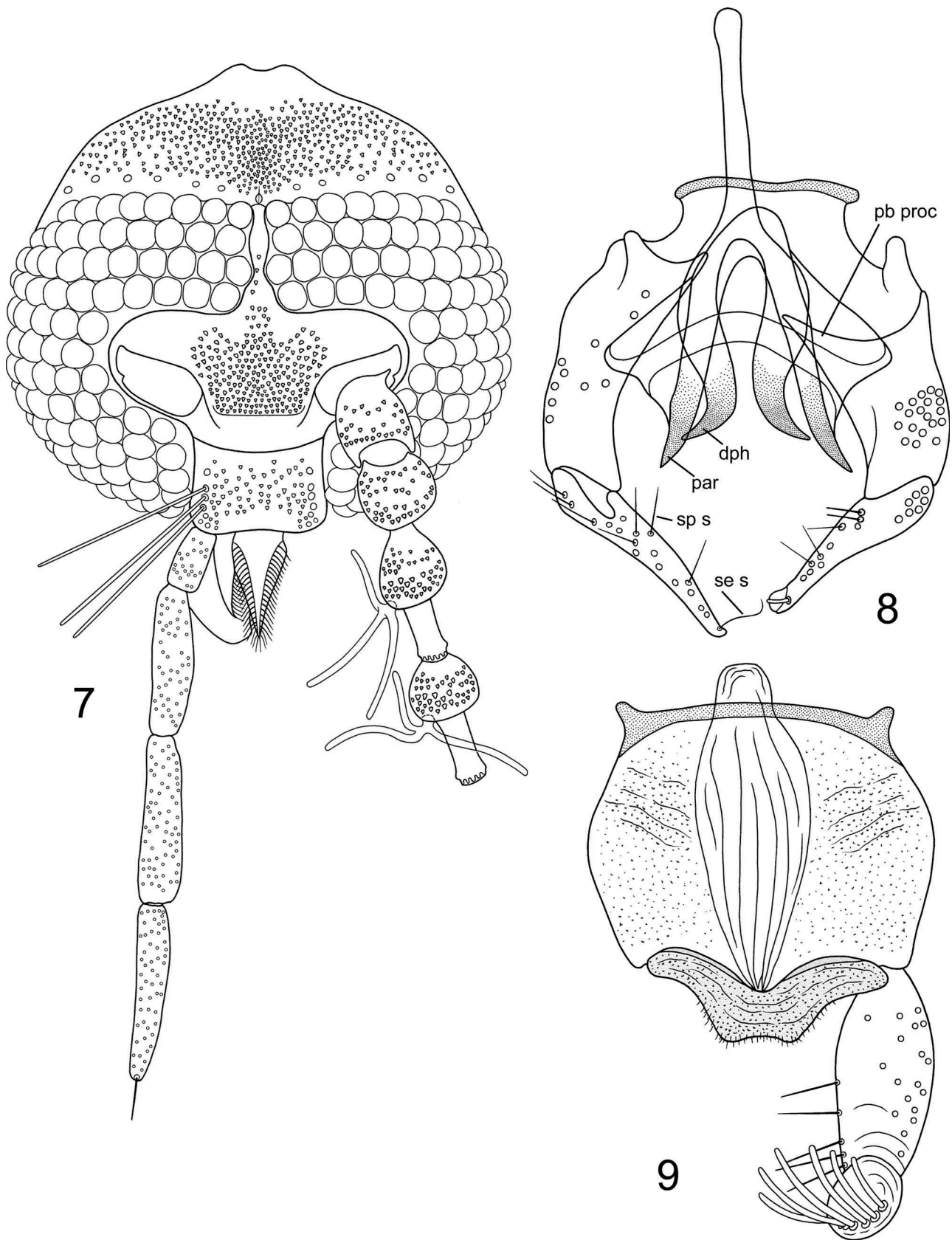
Head (Figure 7) about as wide as long, vertex 0.20 the length of head; eye bridge of four facet rows, separated by 0.00–0.25 facet diameters; with single row of 5–6 ocular setae; interocular area broader below; interocular suture complete, T-shaped with two posterior spurs; frontal scar patch rectangular with median posterior extension reaching middle of eye bridge (reaching uppermost facet row of eye bridge in some paratypes). Length of palpomeres (in μm): 41–47, 44; 88–97(3); 102–106(3); 108–115(3).

Labellum bulbous and setose. Antennae of 16 segments; scape cylindrical, widening in distal two thirds; pedicel spheroid, about as wide as long; flagellomeres 1–10 nodiform with paired Y-shaped ascoids and smaller spiniform sensilla; flagellomere 11 without internode or ascoids but with spiniform sensilla; flagellomeres 12–14 diminutive, terminal flagellomere with apical setiform sensilla. Length of scape, pedicel and flagellomeres (in μm): 55–65, 60; 44–48, 47; 92–97, 94; 80–89, 85; 83–87(3); 80–84(3); 80–83(3); 79–83(3); 77–80(3); 72–76(2); 70–72(2); 66–68(2); 32–33(2); 19–21(2); 19–21(2); 25(1).

Thorax with anepisternum with trapezoid hair patch; anepimeron triangular with sinusoid lower margin, lower suture reaching two thirds into sclerite; posterior spiracle with operculum setose.

Wing (Figure 6) ovate, 1.15–1.27, 1.22 mm long, 0.51–0.54, 0.52 mm wide; membrane only with micropilosity; area between C and R_1 infuscate; hyaline field present immediately below R_1 reaching one third of the length of R_{2+3} , covering one half the area between R_1 and R_{2+3} ; radial fork narrowly distad of CuA_2 , both narrowly distad to medial fork; R_1 , R_5 and CuA_1 with outline strongly sclerotized, origin of R_5 with faint dark spot; R_{2+3} with small swelling at mid-point, jugum obtusely U-shaped.

Terminalia (Figures 8, 9) symmetrical; hypandrium membranous, straight, translucent; gonocoxites reniform with parbasal process triangular, not meeting medially; single medial band of setae present; gonocoxal condyles forming broad ventral band fusing with epandrial apodemes; about three times broader in the middle than laterally. Gonostyles narrow acuminate, hooked apically; covered in short spiniform sensillae, with three longer spiniform sensilla on mesal surface; subapically with curved elongate setiform sensillum. Aedeagus with basiphallus laterally compressed in dorsal view, ovoid in lateral view; widening distally, fused with distiphallus; distiphallus comprised of two leaf-shaped phallomeres with distal apices curved laterally; parameres subtriangular with apices slightly laterad curved; V-shaped at junction with aedeagus and subepandrial membrane; connected through broad ventral band arising from parameral bases; parameres reaching further caudally than aedeagus. Epandrium (Figure 9) as broad as long, with hairs on ventrodorsal surface; subepandrial sclerite membranous. Surstyli subcylindrical, curved, slightly tapering towards apex; mesal surface with long spiniform sensilla; apically with 5–6 tenacula in single transverse row. Hypoproct pilose, broadly U-shaped with lateral sides expanded to lobes; epiproct pilose, present as narrow transverse band with medial triangular expansion.



Figures 7–9. *Perithreticus guantanamo* n. sp. Kvifte & Andersen, male. 7, Head. 8, Aedeagus and gonopods; left gonocoxite and paramere in ventral view, right gonocoxite and paramere in dorsal view. 9, Epandrium, proctiger and surstylus. Abbreviations: dph: distiphallus, par: paramere, pb proc: parabasal process, se s: setiform sensillum, sp s: spiniform sensilla.

Distribution

The type specimens were all collected in Malaise traps along streams in Monte Iberia in Alexander von Humboldt National Park, eastern Cuba. The park constitutes the core area of Cuchillas del Toa Biosphere Reserve and covers 684 km² land area. The park, along with the rest of Cuchillas del Toa, was declared a World Heritage Site by UNESCO in 2001 and is regarded as one of the most important biosphere reserves in the Caribbean basin. The reserve protects tropical wet forest from sea level up to above 1100 m altitude and has a high biodiversity of both fauna and flora (Fong et al. 2005). Due to the toxic nature of the underlying serpentinite rocks, plant species have been forced to adapt, and no less than 70% of the plant species are endemic, as are nearly all 20 species of amphibians, 45% of the reptiles and many of the birds.

Etymology

From Spanish *guantanamera*, “she from Guantanamo”, referring both to the type locality in the Guantanamo province and to the 1929 song by Cuban singer and songwriter Joseíto Fernández. The epithet is to be treated as a noun in apposition.

Acknowledgments

We are indebted to Art Borkent and Brian Brown for specimens from the ZADBI project, and to Greg Curler and Sergio Ibañez-Bernal who facilitated GMK’s involvement in this project. We also thank Norvis Hernández and the other personnel involved in the conservation of the Alexander von Humboldt National Park for all help during the field-

work. Finally, helpful comments from Rüdiger Wagner and an anonymous reviewer greatly improved the manuscript.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

Financial support for the study of Cuban midges was given by Meltzers Høyskolefond and by the University Museum of Bergen.

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