



Tanytarsus deimos group (Chironomidae, Diptera) for two distinctive species from the Neotropics

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Abstract

Two species of the genus *Tanytarsus* van der Wulp, 1874 are described: *T. deimos* Gilka, Dantas *et* Andersen, **sp. nov.** (Mexico, Panama) and *T. phobos* Dantas, Gilka *et* Andersen, **sp. nov.** (Peru). Small adult males having wings with a high venarum ratio, unpaired tibial spurs on mid and hind legs, a hypopygial anal point lanceolate without spinulae or bars, a digitus with a well-developed basal tubercle bearing a long seta, a stout median volsella, and a gonostylus distinctly shorter than the gonocoxite, are a set of characters common to the two close species for which a new group is here proposed.

Key words: Tanytarsini, taxonomy, new species, Mexico, Panama, Peru

Introduction

Tanytarsus van der Wulp, 1874 is a highly diversified genus comprising nearly 400 known species distributed worldwide. The centres of the highest species richness, in the world's tropics, however, remain far from being fully discovered. This pertains also to the Neotropical region, where from 97 *Tanytarsus* have been described, including nearly 70% of species presented as new after 2000 and 15 new species in the last three years (Reis *et al.* 2021, 2022; Dantas *et al.* 2022, 2023). The state of knowledge on both species' diversity and geographical distribution of *Tanytarsus* in the Neotropics is uneven, as most species have been described from Brazil (69), while in other countries the numbers are much lower, including Mexico (3 species), Panama (2), and Peru (7) (Dantas *et al.* 2022, 2023).

In this work, we present two further, peculiar species of *Tanytarsus*. Both are close in terms of morphological diagnostic characters, while showing features unknown in other groups of species in the genus. The analysis presented below clearly indicates a separate species group widely distributed in the Neotropics, from eastern Mexico, through Panama, to southern Peru.

Material and methods

The specimens were sampled using a net, UV light or Malaise traps, and preserved in ethanol. Microscope slides were prepared using Euparal or Canada balsam as the mounting medium, according to the procedure outlined

by Sæther (1969) and Gilka and Paasivirta (2009). The general morphological terminology follows Sæther (1980). Measurements were made using the Cell D program, and a digital camera attached to an Olympus BX 51 microscope and with microscopic measuring eyepiece. The measurements are given as ranges, followed by means (in parentheses). Illustrations were prepared using the technique of Gilka (2008). The type material will be deposited at the Department of Natural History, Bergen University Museum, Norway (ZMBN), the Museo de Historia Natural de la Universidad Nacional Mayor de San Marcos, Lima, Peru (MUSM), the Museo de Peces de Agua Dulce e Invertebrados, Universidad Autónoma de Chiriquí, Panama (MUPADI), the Invertebrates Collections of the Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil (INPA), and the Laboratory of Systematic Zoology, Department of Invertebrate Zoology and Parasitology, University of Gdańsk, Poland (LSZ DIZP).

Systematics

Family: Chironomidae Newman, 1834

Subfamily: Chironominae Newman, 1834

Tribe: Tanytarsini Zavřel, 1917

Subtribe: Tanytarsina Zavřel, 1917

Genus: *Tanytarsus* van der Wulp, 1874

Tanytarsus deimos species group

Members: *Tanytarsus deimos* Gilka, Dantas *et* Andersen, **sp. nov.**, *Tanytarsus phobos* Dantas, Gilka *et* Andersen, **sp. nov.**

Derivatio nominis. The two close species are named after Mars' moons. Both specific epithets are nouns in apposition.

Diagnostic description. Lightly coloured, small adult males (total length 1.70–2.05 mm, wing length 0.94–1.23 mm). Cubital vein of wing much longer than median vein (VR_{Cu} 1.42–1.51). Tibial spurs of mid and hind legs unpaired: each leg with only one distinct spur, second spur absent or in shape of slightly enlarged comb tooth at most. Anal tergite bands V-shaped, broadly separated. Anal point lanceolate, crests present, spinulae or bars absent. Superior volsella bean-shaped or ellipsoid with distal projection bearing prominent setal tubercles; microtrichia on dorsal surface absent. Digitus with distinct basal tubercle bearing long seta. Median volsella stout, with foliate lamellae ending close to distal part or apex of inferior volsella. Gonostylus distinctly shorter than gonocoxite (HR 1.37–1.57).

Tanytarsus deimos Gilka, Dantas *et* Andersen, **sp. nov.**

<https://zoobank.org/urn:lsid:zoobank.org:act:5360EF22-683C-491C-94AE-9C2B399E40F0>

(Fig. 1A–E)

Type material. Holotype, adult male: MEXICO, Nuevo León, Allende, Río Ramos at Raíces, (25°14'53"N 100°02'07"W, 470 m a.s.l.), 20 September 1998, hand net + UV light trap, leg. T. Andersen & A. Contreras-Ramos, prep. G. Ramirez (ZMBN, No. chi18500). Paratypes, 2 adult males: PANAMA, Chiriqui Prov., Río Chirigagua, (8.48139N 82.54788W, 128 m a.s.l.), 12 April 2021, UV light trap, 1 male, leg. Y. Aguirre & T. Ríos (MUPADI); Ngäbe Buglé Com., Quebrada Martínéz (8.79484N 82.19047W, 480 m a.s.l.), 9 April 2019, UV light trap, 1 male, leg. Y. Aguirre & T. Ríos (LSZ DIZP).

Diagnosis. Mid and hind legs tibiae each with one distinct spur, second spur as slightly enlarged comb tooth at most. Distal margin of tergite IX with short and curved setae; tergite bands smooth, without projections. Anal point narrow, with slender crests. Superior volsella bean-shaped, with small setal tubercles on posteromedian margin; digitus long, reaching well beyond apex of superior volsella, slightly curved or sinuous, tapering to round apex.



FIGURE 1. *Tanytarsus deimos* sp. nov., male. **A**—hypopygium; **B**—posterolateral shoulder of anal tergite and lateral tooth, variations; **C**—anal point, variations; **D**—superior volsella and digitus, variations; **E**—median volsella (magnified $\times 1.5$ relative to A).

Description. Adult male (n = 3)

Body size and proportions. Total length 1.70–2.05 (1.90) mm. Wing length 0.94–1.20 (1.10) mm. Total length/wing length ratio 1.61–1.80 (1.73). Wing length/length of profemur ratio 1.96–2.07 (2.01).

Colouration. Eyes black, head capsule, antenna and palps yellow to light brown. Scutal vittae, postnotum and sternum light brown, ground colour of thorax, scutellum, haltere, legs and abdomen yellow, hypopygium slightly darker. Wing veins yellow to pale brown, membrane transparent, with yellowish undertone.

Head. Eyes bare, with well-developed dorsomedian extensions. Antenna with 13 flagellomeres; ultimate flagellomere 139–274 μm long (n = 2); AR 0.31–0.61 (n = 2). Frontal tubercles subcylindrical/conical with round apex, 5–15 μm long. Tentorium 95–105 μm long. Temporal setae 6–9 on each side. Clypeus with 13–18 setae. Lengths of palpomeres 1–5 (in μm): 28–32 (30), 28–31 (29), 64–83 (75), 67–91 (80), 111–159 (130); third palpomere with 1–2 sensilla clavata 10–14 μm long, placed subapically.

Thorax. Ac 12–14, restricted to anterior region of scutum; Dc 6–8 on each side, uniserial; Pa 1 on each side; Scts 5–8. Scutum slightly projected anteriorly, overreaching anteprenotum.

Wing. Obovate, with anal lobe weak. Sc, R_{2+3} (fading between R_1 and R_{4+5} running close each other), proximal 1/5 of R_{4+5} , proximal 1/3 of M_{1+2} , M and RM bare, other veins with macrotrichia; membrane with macrotrichia covering most of cell r_{4+5} and distal 1/3 part of m (with row above proximal half of M_{3+4} and distal part of Cu), in m_{3+4} restricted to distal half, in cu and an restricted to posterior wing margin. Brachiolum with 1 seta. VR_{Cu} 1.42–1.48 (1.44).

Legs. Foreleg tibia with straight lanceolate spur 16–20 μm long. Tibial combs of mid and hind legs separated, teeth up to 12–16 (mid leg) and 15–18 μm long (hind leg), only one comb with distinct, slightly curved or straight spur: 26–30 (mid leg) and 28–36 μm long (hind leg), second comb without spur, with single tooth slightly enlarged at most: 14–18 (mid leg) and 16–20 μm long (hind leg). Basitarsus of mid leg with 1 sensillum chaeticum (n = 1). Lengths and proportions of legs as in Table 1.

TABLE 1. Lengths (in μm) and proportions of leg segments of *Tanytarsus deimos* sp. nov., male.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR	BV	SV
P ₁	470–588 (546)	257–345 (304)	647	338	257	206	103	1.88	1.74	1.43
P ₂	470–588 (544)	331–441 (402)	257	147	103	73	59	0.58	3.33	3.95
P ₃	522–632 (593)	419–559 (507)	397	235	184	118	74	0.71	2.59	2.98

Hypopygium. Tergite IX covered with dense short microtrichia except for median area, surface between anal point crests and small fields lateral to anal point base, 1 median seta placed between tergite bands, 3–5 short and curved setae on each side of anal point (+2 setae ventrally); tergite bands smooth, without projections, ending close to anal crests (Fig. 1A); posterolateral shoulders of anal tergite well-developed, usually with single-lobed teeth (Fig. 1A, B). Anal point narrow, with slender crests (Fig. 1A, C). Superior volsella 35–40 μm long, bean-shaped, with 3 setae on posteromedian margin and 2–3 setae dorsally; digitus 30–32 μm long, reaching well beyond apex of superior volsella, slightly curved or sinuous, tapering to round apex; prominent tubercle bearing long seta at base of digitus, as shown in Fig. 1A, D. Median volsella robust, 45–48 μm long, with slender foliate lamellae ending close to apex of inferior volsella (Fig. 1A, E). Inferior volsella 55–65 μm long, with swollen distal half, tapering to tip bearing prominent tubercles (Fig. 1A). Phallapodeme ~60–70 μm long, fading anteriorly; transverse sternapodeme 50–60 μm long, with strong horn-shaped oral projections. Gonocoxite 79–86 μm long. Gonostylus 52–64 μm long, slightly swollen at mid length, tapering to apex bearing prominent tubercle. HR 1.37–1.52 (1.43), HV 3.06–3.28 (3.20).

Female and immature stages. Unknown.

Geographical distribution and bionomics. The examined specimens come from sites distributed in ecoregions with the humid subtropical/tropical climate in southeastern part of Northern Mexico and in western Panama. The sampling data indicate that *Tanytarsus deimos* develops in streams and lowland rivers at altitudes of ~130–500 m. In Mexico, the specimen was collected at a fast-flowing lowland river with stony and sandy substratum (cf. Kyerematen & Andersen 2002); in Panama, adult males were sampled at upper/middle course of small rivers/streams. Specimens

taken in Mexico (September) and in Panama (April) have slightly different body and wing lengths proportionally correlated with values of antennal and venarum ratios (AR, VR_{Cu}).

***Tanytarsus phobos* Dantas, Gilka et Andersen, sp. nov.**

<https://zoobank.org/urn:lsid:zoobank.org:act:A0500C50-0AA5-42A1-89D4-F8F5720EDD8B>
(Fig. 2A–D)

Type material. Holotype, adult male: PERU, Cusco, Quincemil, Araza river tributary (13°20'10"S, 70°50'57"W, 874 m a.s.l.), 23–31 August 2012, Malaise trap, leg. J.A. Rafael, R.R. Cavichioli & D.M. Takiya (MUSM). Paratypes, 3 males, same data as holotype (INPA).

Diagnosis. Mid and hind legs tibiae each with one distinct spur, second spur absent. Distal margin of tergite IX with long and slightly curved setae; tergite bands with two pairs of sail-like membranous projections. Anal point stout, with well-developed crests. Superior volsella more or less ellipsoid, with distal projection bearing prominent setal tubercles; digitus relatively short, ending at mid length of superior volsella, swollen distally, pointed.

Description. Adult male (n = 4)

Body size and proportions. Total length 1.78–1.90 (1.81) mm. Wing length 1.04–1.23 (1.13) mm. Total length/wing length ratio 1.53–1.70 (1.60). Wing length/length of profemur ratio 2.45–2.47 (2.46).

Colouration. Eyes black, head capsule, antenna and palps yellow to light brown. Scutal vittae, postnotum and sternum light brown, ground colour of thorax, scutellum and haltere yellow to pale brown. Legs and abdomen yellow. Wing veins yellowish to light brown, membrane transparent with yellow undertone.

Head. Eyes bare, with well-developed dorsomedian extensions. Antenna with 13 flagellomeres; ultimate flagellomere 93 µm long (n = 1); AR 0.23 (n = 1). Frontal tubercles 7–10 µm long. Tentorium 80–90 µm long. Temporal setae 6–8 on each side. Clypeus with 15–16 setae. Lengths of palpomeres 1–4 (in µm): 18–20 (19), 20–23 (22), 53–55 (54), 65–75 (72), fifth palpomere missing; third palpomere with 2 sensilla clavata 10–13 µm long, placed subapically.

Thorax. Ac 10–14, restricted to anterior region of scutum; Dc 10–12 on each side, uniserial; Pa 1 on each side; Scts 6–8. Scutum projected anteriorly, overreaching antepronotum.

Wing. Obovate, with anal lobe reduced. Venation pattern and chaetotaxy similar to that of *Tanytarsus deimos* (see above). VR_{Cu} 1.50–1.51 (1.50).

Legs. Foreleg tibia with straight lanceolate spur 15–20 µm long. Tibial combs of mid and hind legs separated, teeth up to 12–14 (mid leg) and 13–16 µm long (hind leg), only one comb with slightly curved or straight spur: 21–25 (mid leg) and 24–25 µm long (hind leg), second comb without spur. Basitarsus of mid leg with 2–3 sensilla chaetica (n = 2). Lengths and proportions of legs as in Table 2.

TABLE 2. Lengths (in µm) and proportions of leg segments of *Tanytarsus phobos* sp. nov., male.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR	BV	SV
p ₁	420–475	246–266	587	303	210	180	100	2.39	1.65	1.23
p ₂	493–555	330–390	187–210	105–122	87–88	51–62	49	0.57–0.58	3.46	4.25–4.40
p ₃	508–597	438–520	–	–	–	–	–	–	–	–

Hypopygium. Tergite IX covered with dense short microtrichia except for median area and surface between anal point crests, 1 median seta placed between tergite bands, 4 long and slightly curved setae on each side of anal point (+2 setae ventrally); tergite bands with two pairs of sail-like membranous projections, distally almost/or reaching anal crests; posterolateral shoulders of anal tergite well-developed (Fig. 2A, B), sometimes with single-lobed teeth (n = 1) similar to that of *Tanytarsus deimos* (see above). Anal point stout, with well-developed crests (Fig. 2A). Superior volsella 36–47 (40) µm long, more or less ellipsoid, with distal projection bearing 3–4 setae placed on prominent tubercles, and 3 long setae dorsally; digitus relatively short (14–15 µm), ending at mid length of superior volsella, swollen distally, pointed; prominent tubercle bearing long seta at base of digitus, as shown in Fig. 2A, C. Median volsella stout, 40–44 µm long, with foliate lamellae ending close to distal part of inferior volsella (Fig. 2A, D). Inferior volsella 57–60 µm long, with swollen distal half, tapering to tip bearing prominent tubercles (Fig. 2A). Phallapodeme ~50 µm long, fading anteriorly; transverse sternapodeme 48–53 µm long, with strong horn-shaped

oral projections. Gonocoxite 85–90 μm long. Gonostylus 56–60 μm long, swollen at mid length, tapering to apex bearing prominent tubercle. HR 1.50–1.57 (1.55), HV 3.17–3.20 (3.19).



FIGURE 2. *Tanytarsus phobos* sp. nov., male. **A**—hypopygium; **B**—membranous projections of anal tergite band; **C**—superior volsella and digitus, variations; **D**—median volsella; B and D magnified $\times 2$ relative to A.

Female and immature stages. Unknown.

Geographical distribution and bionomics. *Tanytarsus phobos* is known only from the type locality in the highlands of Amazonian Forest in Peru. All specimens were collected using a Malaise trap set over a small rocky-bottomed stream surrounded by dense vegetation. This region is known for its numerous long and narrow valleys, mountain streams and warm, humid, and rainy weather (Pulgar-Vidal 1996, Brack & Mendiola 2004). As noted by Brack & Mendiola (2004), this ecoregion is a significant centre of endemism; however, it has been rapidly degraded by human activities, particularly those related to occupation along roads.

Discussion

A set of peculiar characters common to both species presented above clearly indicates a separate group in the genus *Tanytarsus* (see the group diagnosis). Here is a support of our concept.

In *Tanytarsus*, the ratio of the length of the cubital to the medial vein (VR_{Cu}) rarely reaches values close to or slightly above 1.4 and usually is noted in the smallest male adults with wings ~1 mm long. Both species of the *deimos* group are characterized by high VR_{Cu} values, even exceeding 1.5 in *T. phobos*, although the two species are not the smallest known *Tanytarsus* (cf. Dantas *et al.* 2023). An interesting exception is the fossil *Tanytarsus serafini* Gilka, 2010, in male of which VR_{Cu} ranges between 1.70–1.82 and is defined as one of the diagnostic characters for the monotypic *serafini* group (Gilka 2010, Gilka *et al.* 2013).

The structure of the tibial combs and spurs is the key character used in diagnoses for Chironomidae, including the Tanytarsini and this tribe's genera. In *Tanytarsus*, usually each of the paired combs of mid and hind legs has a spur, either straight or bent, sometimes of diverse shape and length on the same tibia (cf. Gilka 2011). The presence of only one spur on each leg is a unique character.

The digitus is typical of the tribe Tanytarsini (most members of the subtribe Tanytarsina). A definition of this hypopygial appendage in Chironomidae has recently been presented, including variations of its structure (Zakrzewska *et al.* 2023). The digitus armed with a small setal tubercle is a rare character in *Tanytarsus*, e.g. known from the *excavatus* group (cf. Gilka 2011). The tubercle, but larger and with a long seta is found in the two species described here. While the tubercle is identical in both the species (group character), the shape of the digitus is completely different making separation of *T. deimos* and *T. phobos* easy.

Yet another character common for the two species is the stout median volsella, as well as the lanceolate anal point without bars or spinulae known from the majority of *Tanytarsus*, and the gonostylus, contrary to most the genus members, much shorter than the gonocoxite.

The anal tergite bands of *T. phobos* with two pairs of sail-like membranous projections are known exclusively from this species, thus the structures are treated as autapomorphic.

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