A REVIEW OF AFROTROPICAL *TANYTARSUS* VAN DER WULP (DIPTERA: CHIRONOMIDAE)

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Tanytarsus ankasaensis sp. n., *T. aterrimus* Freeman, *T. congens* Lehmann, *T. elisabethae* sp. n., *T. flexistilus* Freeman, *T. formosanus* Kieffer, *T. harei* sp. n., *T. luctuosus* Freeman, *T. mcmillani* Freeman, *T. spadiceonotatus* Freeman, *T. trifidus* Freeman and *T. zariae* Freeman are described, all as male imago. Pupae and larvae of *T. elisabethae*, *T. flexistilus*, *T. spadiceonotatus* and *T. trifidus* are described for the first time. Pupae of *T. formosanus* and *T. luctuosus* are also described and figured. Keys to males, pupae and larvae of recognized Afrotropical *Tanytarsus* species, and an annotated checklist of the Afrotropical *Tanytarsus* species, as well as a list of the Ghanaian species with distributional records are given. *T. formosae* Kieffer, 1923a, *T. horni* Goetghebuer, *T. aculeus* Chaudhuri et al., 1988 and *T. fuscimarginalis* Chaudhuri et al., 1984 are claimed to be new junior synonyms of *T. formosanus*. *T. atroxitarsus* Chaudhuri & Datta, 1992 is claimed to be a new junior synonym of *T. mcmillani* Freeman. *Rheotanytarsus formosae* Kieffer, 1921 recently transferred to *Tanytarsus*, is found to be a senior secondary homonym of *T. formosae* Kieffer, 1923a. Lectotypes and paralectotypes are designated for *T. formosanus* Kieffer and for *T. formosae* (Kieffer, 1921).

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Although chironomid research in Africa never has reached the same intensity as in the Holarctic region, quite a few papers have been produced. Freeman (1955, 1956, 1957a, 1957b, 1958) treated close to 600 African species including synonyms and his works are the most comprehensive on African Chironomidae to date. It is nevertheless evident, that only a small portion of the African chironomid fauna is known. Many undescribed species, including seven of *Tanytarsus* van der Wulp, 1874 (Ekrem 1999, this work) were discovered in a few weeks of field work in Ghana (1993–4). Unfortunately, many of the old descriptions of Afrotropical *Tanytarsus* species are of poor quality and some of the types are apparently lost. This has possibly resulted in some misidentifications through the years, and the need for redescrptions and updated keys for African *Tanytarsus* is evident. *Tanytarsus* is one of the most species-rich genera of the family Chironomidae, with at least 85 described species from the Holarctic region (Cranston et al. 1989). In the Catalogue of the Diptera of the Afrotropical region, Freeman & Cranston (1980) list 24 species of *Tanytarsus*. Six of these, however, are listed by Freeman (1958) as unrecognised species de-

scribed by Kieffer, one species belongs to the genus *Rheotanytarsus* (Kyerematen & Sæther 2000), and two species, *T. nigricornis* and *T. subreflexens*, were placed in the genus *Virgatanytarsus* by Pinder (1982). Stur & Ekrem (2000) give a review of other Afrotropical species previously described in *Tanytarsus*. With the addition of the three new species described below, 26 *Tanytarsus* species are now recognized from the Afrotropical region. This paper was initiated as part of a world revision of the *Tanytarsus eminulus*, *gregarius*, *lugens* and *mendax* species groups (Reiss & Fittkau 1971). Species in these groups have, in addition to other characters, spines between the anal point crests of the male hypopygium. For that reason, only Afrotropical species possessing such spines are red-described here. However, all recognized species are included in the key to Afrotropical *Tanytarsus* males.

METHODS AND MORPHOLOGY

The terminology and abbreviations follows Sæther (1980), with the additions and corrections given by Sæther (1990). The term ‘shoulders’ is used for the posteriormarginal lobes of the male anal tergite and the

term 'taeniae' (Langton 1994) is used for the filamentous setae (LS) of the pupal abdomen. The material that needed to be prepared for light microscopy is mounted or remounted in either Canada balsam or Euparal according to the procedures described by Sæther (1969). Measurements are taken according to Schlee (1966) with the additions given by Ekrem (1999). The shape of the median volsella lamellae is often difficult to see and squeezing or dissection of the hypopygium is often necessary to examine this character properly.

The following abbreviations are used: Deutsches Entomologisches Institut, Eberswalde, Germany (DEI), INRS-Eau, University of Quebec, Canada (UQC), Insect collections, Department of Zoology, University of Burdwan, India (UBI), The International Commission of Zoological Nomenclature (ICZN), Museum National d'Histoire Naturelle, Paris, France (MNHN), Museum of Zoology, University of Bergen, Norway (ZMBN), The Natural History Museum, London, UK (BMNH), Naturhistorisches Museum Wien, Vienna, Austria (NMW), Pupal exuviae (Pex) and the Zoologische Staatssammlung München, Munich, Germany (ZSM).

Tanytarsus ankasaensis sp. n.

Type material. Holotype ♂ Ghana, Western Region, Ankasa Game Production Reserve, 7-11.12.1993, leg. NUFU-project (ZMBN Type No. 353). Paratype 1♂ (ZMBN) Ghana, Great Accra Region, Stream by Institute of Aquatic Biology, Malaise trap, 19-23.X.1992, leg. NUFU-project.

Etymology

Tanytarsus ankasaensis is named after the type locality, the Ankasa Game Production Reserve.

Diagnosis

The new species differs from other *Tanytarsus* species by the following combination of characters: Small size, wing length c. 1 mm; $LR_1 > 3.4$; $AR < 1$; male anal tergite with median setae; strong, trifold spines between well developed anal crests; small microtrichia-free area around anal point base; superior volsella with dorsolateral microtrichia; 3 median, 2 dorsal and 2 lateral setae; digitus slender, not reaching

beyond median margin of superior volsella; gonostylus narrow with parallel sides.

Description

Male imago (n = 2). – Total length 1.92-2.08 mm. Wing length 1.11-1.14 mm. Total length/wing length 1.68-1.87. Coloration. Cleared specimens with head light brown, darker brown eyes; thorax with brown patches dorsally and laterally on scutum, scutellum, halteres and postnotum; legs light brownish; abdomen light yellowish.

Head. – Antenna normally developed, AR 0.81-0.92. Thirteenth flagellomere 365-374 µm long. Longest antennal seta c. 430 µm long. Distance between eyes 129-162 µm. Frontal tubercles small, c. 10 µm long. Temporal bristles 8-10; 2-3 inner verticals, 3 outer verticals, 3-4 postorbitals. Clypeus triangular, 58-65 µm long with 12-15 setae. Tentorium 103-104 µm long, 23-24 µm wide at sieve pore. Stipes 112-113 µm long, 9-14 µm wide. Width of cibarial pump 39-40 µm. Lengths of palp segments (in µm) (palpomere 5 lost in both specimens): 23-25, 26-29, 101-107, 103-108.

Thorax. – Dorsocentrals 5-8, acrostichals 8-11, prealars 1, scutellars 2-4. 5-6 setae on halteres.

Wing. – VR 1.23-1.33. Sc bare, R with 14-25 setae, R_1 with 15-16, R_{4+5} with 24, M_{1+2} with 32-42, M_{3+4} with 23-25, Cu with 4-17, Cu_1 with 13-17, PCu with 0-19 and An with 14-23 setae. Cells: m with 0-5 setae, r_{4+5} with 79-100, m_{1+2} with 83-140 including on false vein, m_{3+4} with 23-66, cu with 0-18 and an with 0-13 setae.

Legs. – Spur on front tibia 29-30 µm long including scale. Spurs of middle tibia 25-30 µm long including 14 µm long comb and 20 µm long including 14 µm long comb; of hind tibia 32 µm long including 13-18 µm long comb and 29 µm long including 13-16 µm long comb. Lengths and proportions of legs see table 1.

Hypopygium (fig. 1). – Tergite IX 86-98 µm long with 2-6 median and 12-14 apical setae; apical margin with shoulders; 2 lateral teeth barely recognisable; microtrichia absent in a small area around base of anal point. Anal point 43-45 µm long, 12-20 µm wide at base and 4-6 µm wide at apex. Anal point with 4 strong trifold spines between well developed anal crests. Anal tergite bands curved caudally, almost reaching anal

Table 1. *T. ankasaensis*. Lengths (in µm) and proportions of legs (n = 1-2).

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR	BV	SV	BR
p ₁	578-598	252-258	891	388	323	258	113	3.45	1.60	0.94	4.4
p ₂	526-587	439-443	274-299	116-126	68-94	40-42	26-29	0.62-0.68	4.60-4.94	3.43-3.52	4.2-5.8
p ₃	522-543	576-578	371-407	226-238	216-230	116-133	58-61	0.64-0.71	2.27-2.42	2.70-3.02	3.5-4.8

point. Transverse sternapodeme 43–45 μm long, phal-lapodeme 86–91 μm long. Gonocoxite 82–98 μm long, gonostylus 66–77 μm long. Superior volsella (fig. 2) tapered towards a median elongated apex; bearing 2 setae dorsally; 2 setae laterally and 3 setae medially with the apical 2 much stronger than the basal one; dorsolateral microtrichia present. Digitus medium long and slender not reaching beyond median margin of superior volsella. Median volsella short 14–23 μm long with c. 10, 20–21 μm long, subulate lamellae. Inferior volsella relatively straight, club shaped, 59 μm long, with c. 13 apical setae. HR 1.25–1.26, HV 2.49–3.15.

Remarks

Tanytarsus ankasaensis keys to the *T. mendax* species group (Cranston et al. 1989), and fits the group diagnosis when ignoring the low antennal ratio. It differs from all other species in this group by having a $\text{LR}_1 > 3.4$, a well developed digitus and dorsolateral microtrichia on superior volsella.

The Ankasa Game Production Reserve (5°17'N, 2°35'W), is situated in the south-west part of Ghana close to the Côte d'Ivoire border. The vegetation consists of wet, tropical rainforest, annual rainfall is 1750–2000 mm, and the area is rich in both fast and slow flowing rivers and streams. The height of the forest canopy rarely exceeds 40 metres and has a high diversity of species (Hall & Swaine 1981).

The Institute of Aquatic Biology is located in the Great Accra region. A small slow flowing stream runs through a relatively dry area nearby. The Malaise trap was put up by the stream under the trees along the river bed.

Tanytarsus aterrimus Freeman

Tanytarsus aterrimus Freeman, 1954: 179, 1958: 338. Holotype 1 ♂ (BMNH) Cape Province, Assegaibos Gate, Berg River, 14.VIII.1953, paratypes: 2 ♂ and 1 ♀ as holotype, 1 ♀ Cape Province, Tulbargh Barrage, 12.XI.1953, leg K. M. F. Scott. [examined].

Diagnosis

The species differs from other *Tanytarsus* species by the following combination of characters: hypopy-

gium with 2 median setae on anal tergite; anal tergite bands of Y- type; anal point long and slender with spines between well developed anal crests; superior volsella well developed, roughly square, without microtrichia; digitus large, extending beyond median margin of superior volsella, one seta at base; median volsella with 2–3 pectinate and several setiform lamellae. Antennal ratio 0.8–1.0, LR_1 2.5–2.7. Frontal tubercles well developed.

Description

Male imago (n = 2–3). – Total length 3.4–3.6 mm. Wing length 2.0–2.1 mm. Total length/wing length 1.7. Coloration. Cleared specimens with head light brown, dark brown pedicel, apodemes and eyes; thorax with dark brown patches anteriorly and laterally on scutum, on postnotum and on preepisternum; anteprepronotum, scutellum and halteres somewhat lighter; legs mostly light brown, but darker femur and tibia of mid and hind legs; all tergites brown.

Head. – Antenna normally developed, AR 0.89–0.99. Thirteenth flagellomere 468–481 μm long. Longest antennal seta c. 550 μm long. Distance between eyes 164 μm . Frontal tubercles well developed, c. 16 μm long. Temporal bristles 12–14; including 3–5 inner verticals, 4–6 outer verticals and 4–5 postorbitals. Clypeus semi-circular, 64–71 μm long with 10–15 setae. Tentorium 152–161 μm long, 29–42 μm wide at sieve pore. Stipes 168–194 μm long, 39 μm wide. Cibarial pump 64–77 μm wide. Lengths of palp segments (in μm): 26–42, 36–42, 116–129, 113–161, 161.

Thorax. – Dorsocentrals 6–10, acrostichals 7–8, prealars 1, scutellars 6. Halteres with 7 setae.

Wing. – VR 1.15–1.21. Sc bare, R with 26–30 setae, R_1 with 17–23, R_{4+5} with 24–29 M_{1+2} with 64–75, M_{3+4} with 35–38, Cu with 9–12, Cu_1 with 23–26, PCu with 13–19 and An with 27–37 setae. Cell m with 6 setae, r_{4+5} and m_{1+2} with c. 170 including on false vein, m_{3+4} with c. 80, cu and an combined with 23–70.

Legs. – Spur on front tibia c. 36 μm long including scale. Spurs of middle tibia 36–42 μm long including 13–19 μm long comb and 26–29 μm long including 13–19 μm long comb; of hind tibia 45–48 μm long including 19–26 μm long comb and 23–39 μm long including 16–23 μm long comb. Middle tibiae with 8 sensilla chaeticae. Lengths and proportions of legs see table 2.

Table 2. *T. aterrimus*. Lengths (in μm) and proportions of legs.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR	BV	SV	BR
p ₁	736–775	413–433	1085–1118	478–543	365–430	284–307	129	2.58–2.63	1.65–1.78	1.06–1.08	2.7–2.9
p ₂	720–811	652–694	375–391	213–236	149–168	100–103	80–87	0.57	3.17–3.22	3.66–3.79	5.8–6.3
p ₃	814–898	853–927	585–601	326–352	281–317	174–178	110–113	0.65–0.69	2.51–2.55	2.85–3.04	5.3–5.8

Hypopygium (fig. 3). – Tergite IX 119-133 µm long with 2 median and 12 apical setae; apical margin without shoulders; lateral teeth not visible; microtrichia absent in small areas on either side of base of anal point. Anal point slender, 66-72 µm long, 16-21 µm wide at base and 6 µm wide at apex, with 7-9 spines between well developed anal crests. Anal tergite bands of Y- type. Transverse sternapodeme 51-66 µm long, phallapodeme 117-123 µm long. Gonocoxite 152-170 µm long, gonostylus 150-164 µm long. Superior volsella roughly square; bearing 6 small dorsal setae and 3 median setae; dorsolateral microtrichia absent; digitus long, reaching well beyond median margin of superior volsella, slightly S- shaped with 1 seta placed near base. Median volsella (fig. 4) 51-57 µm long including 2-3, 27-33 µm long, pectinate and setiform lamellae. Inferior volsella slightly S- shaped, 109-111 µm long. HR 1.00-1.04, HV 2.19-2.25.

Remarks

T. aterrimus keys to the *T. norvegicus* species group (Cranston et al. 1989) and fits the group diagnosis (Reiss & Fittkau 1971) when ignoring the high density of hairs on the wings.

Tanytarsus congus Lehmann

Tanytarsus congus Lehmann, 1981: 48. Holotype ♂ (ZSM) Zaire, Kinsangani, Simisimi- stream, 24.III.1975; 1 ♂ as holotype except 13.III.1975. Both types collected and mounted by J. Lehmann [examined].

Additional material examined: 2 ♂ (ZMBN) Ghana, Western Region, Ankasa game production reserve, malaise trap, 6-12.XII.1993; 1 ♂ (ZMBN) Ghana, Eastern Region, Kibi, Subri-stream, XI.1993; 1 ♂ (ZMBN) Ghana, Central Region, Kakum forest reserve, malaise trap, 8-18.XI.1993; 1 ♂ (ZMBN) Senegal, Kedougou, 15.X.1972, leg. C. Dejoux; 1 ♂ (ZMBN) Senegal, Dioulacoulon, 21.III.1973, leg. C. Dejoux.

Diagnosis

T. congus is separable from other *Tanytarsus* by the following combination of characters: AR 0.60 – 0.80;

LR₁ > 3.30; hypopygium: Spines in one row between well developed anal crests, superior volsella oval with dorsolateral, small patch of microtrichia, 2 apical seta where 1 is sitting on small ventral projection, digitus with swollen apex reaching beyond superior volsella at its median posterior margin, carrying 1 seta placed at c. ½ length of digitus; median volsella relatively short with 3 distal pectinate and 2 normal setae; inferior volsella S-shaped.

Description

Male imago (n = 4-6). – Total length 1.80-2.15, 2.0 mm. Wing length 0.91-1.20, 1.06 mm. Total length/wing length 1.85-2.15, 1.94. Coloration. Cleared specimens with light yellowish head, dark brown antennae and eyes; thorax light brown with slightly darker bands dorsally on scutum; legs yellowish with darker apical bands on femur and tibia; wings transparent with somewhat darken veins; abdomen light brown.

Head. – AR 0.61-0.76, 0.68. Thirteenth flagellomere 257-345, 315 µm long. Longest antennal seta 400-561, 458 µm long. Distance between eyes 129-149, 139 µm. Temporal bristles 8-9; 3 inner verticals, 2-3 outer verticals, 3 post orbitals. Clypeus 57-99, 77 µm long with c. 15 setae. Tentorium 73-95, 86 µm long, 18-24 µm wide at sieve pore. Stipes 84-100, 94 µm long. Lengths of palpomeres (in µm): 24-28, 26; 22-28, 26; 66-96, 83; 84-103, 93; 146-180, 161.

Thorax. – Dorsocentrals 5-6, acrosticals 9-10, prealars 1, scutellars 4. 4-5 setae on halteres.

Wing. – VR 1.19-1.34, 1.27. Sc bare, R with 12-17 setae, R₁ with 14-18, R₄₊₅ with 28-34, M₁₊₂ with 24-32, M₃₊₄ with 18-20, Cu with 7-13, Cu₁ with 11-16, PCu with 6-26 and An with 12-16 setae. Cells: m with c. 5 setae, r₄₊₅ with c. 70-120, m₁₊₂ with c. 90-150 including on false vein, m₃₊₄ with c. 40-60, cu and an combined with c. 20-60 setae.

Legs. – Spur on front tibia 18-33 µm long. Spurs of middle tibia 28-33 µm long including 12-18 µm long comb and 21-29 µm long including 11-15 µm long comb; of hind tibia 33-37 µm including 15-21 µm

Table 3. *T. congus* Lengths (in µm) and proportions of legs (n = 5, unless otherwise stated).

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	484-711, 574	198-275, 232	694-851, 759(4)	290-396, 339(4)	226-315, 280(3)	198-240, 225(3)	99-108, 102(3)
p ₂	429-568, 486	341-458, 393	209-268, 230	84-136, 102	51-66, 60	33-70, 49	29-37, 33
p ₃	447-520, 480	444-568, 494	326-407, 353	180-220, 196	172-205, 167	92-117, 101 (4)	51-60, 55 (3)
	LR	BV	SV	BR			
p ₁	3.30-3.57, 3.43 (4)	1.57-1.74, 1.62 (3)	0.96-0.99, 0.97 (3)	3.2-4.3, 3.7 (3)			
p ₂	0.53-0.60, 0.58	3.77-5.19, 4.60	3.69-4.04, 3.83	3.6-6.2, 4.7			
p ₃	0.71-0.74, 0.72	2.44-2.62, 2.54 (4)	2.50-2.88, 2.77	4.9-7.5, 6.4			

comb and 29–37 μm including 11–18 μm comb. Lengths and proportions of legs see table 3.

Hypopygium (fig. 5). – Tergite IX 74–86, 80 μm long with 2–4 median, 10–12 apical setae. Anal point 43–53, 46 μm long, 10–18, 15 μm wide at base and 4–5 μm wide at apex. Anal point with well developed anal crests with 3–7 robust spines in between. Anal tergite bands curved towards but not reaching anal point or connecting with each other. Transverse sternapodeme 33–55, 42 μm long, phallapodeme 67–87, 77 μm long. Gonocoxite 72–113, 92 μm long. Gonostylus 70–87, 81 μm long. Superior volsella bearing 5–6 small setae dorsally, one setae apically and one seta venteromedially on a small projection; a small field of microtrichia present laterally. Digitus (fig. 6) long, extending well beyond the median side of superior volsella, with enlarged apex and 1 seta placed at c. $\frac{1}{2}$ length. Median volsella short and stump 4–8 μm long with 2 normal setae in addition to 3 strong 10–20 μm long pectinate setae. Inferior volsella S-shaped, 57–66, 63 μm long, with c. 10 setae where 4 are stronger than the other 6. HR 1.03–1.32, 1.14; HV 2.41–2.57, 2.50.

Remarks

T. congens keys to the *T. chinyensis* species group (Cranston et al. 1989), and is probably most closely related to *T. pseudocongens* Ekrem, 1999. At least one Nigerian specimen, labelled '*Tanytarsus congens*' collected by Hare in a light trap at Opi Lake (Hare & Carter 1987) belongs to the probable sister species *T. pseudocongens*, but it is possible that the other three specimens collected at Opi Lake are *T. congens* since the two species have an overlapping distribution in Ghana. Lehmann (1981) found the larvae of *T. congens* between moss in fast running areas of the Simisimi Stream.

Tanytarsus elisabethae sp. n.

Type material. Holotype ♂ (BMNH) Nigeria, Opi Lake A, emergence trap, 15–16.IX.1979, leg. L. Hare; 36 paratypes: 4♂, 12 Pex as holotype but collected 14–31.I.1979; 1♂ with associated Pex as holotype but collected 13–14.I.1979; 1 single reared ♂ (ZMBM) larva as holotype except 26–29.XI.1978; 1 single reared ♀ pupa as holotype except 15–25.I.1978; 2♂ (UQC) as previous except 28.I–7.II.1979; 2♂, 3 Pex as previous except 28.I–14.II.1979; 1♂ as previous except 28.I–7.1979; 1 single reared ♀ larva as previous except 11–18.II.1979; 1 single reared ♀ pupa as previous except 28.I–8.II.1979; 1 single reared ♀ larva as previous except 26–29.XI.1978; 1♂, 2 Pex mass reared as previous except 14–27.I.1979; 1♂ as previous except 11–28.II.1979, 1 single reared ♂ larva (ZSM) as previous except 11–31.III.1979.

Etymology

Tanytarsus elisabethae is named after my wife and colleague Elisabeth Stur for all help, fruitful scientific discussions and much patience.

Diagnosis

Tanytarsus elisabethae differs from other *Tanytarsus* species by the following combination of characters: Wings rather setose, but Cu almost always bare; frontal tubercles medium long (14–22 μm) and slim; LR₁ > 3.1; AR > 1; scutal tubercle well developed; male anal tergite with two long median setae; anal point long and thin, sometimes missing the usual small spines, small microtrichia-free area at base; superior volsella roughly oval, tapering toward apex, with dorsolateral microtrichia, 3 median, 3–5 dorsal and lateral setae; digitus absent; gonostylus with straight median margin, lateral margin narrowing gradually towards a rather thin apex. Pupa with well developed conical cephalic tubercles; thoracic horn long, thin, with short row of chaetae which are c. 2× longer than width of horn; posterior thoracic mound weak; precorneals in triangular pattern, two setae usually more than twice as large as third; lateral anteprenotal small (c. 27 μm); armament of tergites consisting of spinules or small spines in elongate, anterior patches; segment VI, VII and VIII with 1, 2 and 5 lateral taeniae respectively; anal fringe < 25, > 16 taeniae. Larval antenna c. 0.7–0.8× as long as head capsule; Antennal pedestal relatively long, 0.24–0.28× the length of head capsule. Lauterborn organs small, including pedestals reaching just beyond antennal segment five; SI, SII, chaetae and chaetulae basales plumose, SIII and chaetulae laterales simple; mandible with large apical tooth and one dorsal tooth.

Description

Male imago (n=10 unless otherwise stated). – Total length 2.2–2.8, 2.5 mm. Wing length 1.21–1.43, 1.33 mm. Total length/wing length 1.76–1.99. Coloration. Cleared specimens pale greenish with brown eyes.

Head. – Antenna normally developed, AR 1.11–1.23, 1.15. Thirteen flagellomere 432–540, 498 μm long. Longest antennal seta c. 500 μm long. Distance between eyes c. 150 μm . Frontal tubercles medium large, 14–22, 17 μm long. Temporal bristles 8–11; 3 inner verticals, 2–4 outer verticals, 2–4 postorbitals. Clypeus triangular 50–72, 62 μm long with 11–16, 14 setae. Tentorium 104–119, 114 μm long, 28 μm wide at sieve pore. Stipes 119–144, 131 (3) μm long, 14 (3) μm wide. Width of cibarial pump 40–50, 45 μm . Lengths of palp segments (in μm , n = 8): 29–36, 32; 29–47, 35; 79–108, 97; 90–115, 102; 158–220, 189 (6).

Thorax (fig. 10). – Scutal tubercle well developed; dorsocentrals 5–7; acrostichals 12–18, 17; prealars 1; scutellars 4–6, 4; halteres with 5–6 setae.

Wing. VR 1.13–1.25, 1.17. Sc bare; R with 18–27,

23 setae; R_1 with 14-26, 20; R_{4+5} with 32-45, 39; M_{1+2} with 33-51, 42; M_{3+4} with 18-34, 24; Cu with 0-3, 0; Cu_1 with 15-20, 18; PCu with 2-12, 5 and An with 20-26, 23 setae. Cells: m with 1-11, 4 setae, r_{4+5} with c. 110-160 m_{1+2} with c. 130-150 including on false vein, m_{3+4} with 21-60, 43; cu with 0-30, 9 setae, an bare.

Legs. – Spur on front tibia 32-40, 38 μm long including scale. Spurs of middle tibia 36-43 μm long including 14-18 μm long comb and 25-32 μm long including 14-18 μm long comb; of hind tibia 36-54 μm long including 114-22 μm long comb and 25-40 μm long including 14-18 μm long comb. Lengths and proportions of legs see table 4.

Hypopygium (figs. 7, 8). – Tergite IX 84-114, 96 μm long with 2 median and 12-17 apical setae; apical margin with weak shoulders; microtrichia absent from a small area around base of anal point. Anal point 50-61, 57 μm long, 11 μm wide at base and 4-5 μm wide at apex. Anal point with 0-3, 2 weak spines between well developed anal crests. Anal tergite bands curved caudally, almost reaching anal point. Transverse sternapodeme 48-61, 55 μm long, phallapodeme 95-104, 99 μm long. Gonocoxite 109-125, 104 μm long, gonostylus 91-114, 103 μm long. Superior volsella (fig. 9) pear-shaped, tapered towards a median elongated apex; bearing 3-5 small setae dorsally and 3 setae medially with the apical 2 stronger than the basal one; dorsolateral microtrichia present. Digitus absent; median volsella short 32-41, 38 μm long including c. 22-27, 25 μm long, foliate and simple lamellae. Inferior volsella relatively straight, club shaped, 64-75, 70 μm long, c. 15 apical setae. HR 1.00-1.28, 1.11; HV 2.12-2.75, 2.43.

Pupa ($n = 8-10$). – Total length 3.1-3.8, 3.3 mm, abdomen 2.3-2.9, 2.5 mm. Coloration light brown with darker areas around shagreen and spine patches on tergites II through VI. Leg and wing sheaths brown, muscle marks dark brown.

Cephalothorax (fig. 53, 63). – Length of frontal setae 50-83, 69 μm , cephalic tubercles (fig. 53) well developed, conical, 36-61, 44 μm long; pedicel sheath

tubercle well developed. Thoracic horn (fig. 58) slender, 396-486, 431 μm long, 14-18, 16 μm wide, with a short row of 25-36, 34 μm long, chaetae. Three pre-corneals in a triangular pattern anterior and posterior precorneal strong, 65-126, 96 μm long, middle precorneal short 29-47, 33 μm long; 2 anteprenotals visible, median anteprenotal 65-83, 77 μm long, lateral anteprenotal small, 22-32, 27 μm long; 2 pairs of dorsocentrals, anterior pair 29-54, 42 (thick) and 43-86, 64 (thin) μm long, posterior pair 50-90, 70 (thick) and 40-76, 58 (thick) μm long. Only very little granulation dorsal of anterior dorsocentrals. Nose of wing sheath well developed, posterior thoracic mound small 11-18 μm long.

Abdomen (fig. 71). – Shagreen on tergite (T) II as one broad, anterior, transverse band and an additional two posterior, triangular patches; on TII as a transverse band anterior to spine patches. Pedes spurii B on TII well developed; hook row 133-180, 155 μm long, c. $\frac{1}{3}$ width of TII; length of longest spines/spinules of TIII-TVI (in μm): 7-14, 12; 14-18, 15; 11-14, 12 and 7; spines of TIII-VI in longitudinal patches, lengths of patches (in μm): 54-76, 68; 65-90, 76; 58-79, 60 and 32-58, 42. segment II with 2 D, 2 V and 3, 25 μm long L setae; segment III-V with 5 D, 2 V and 3, 30 μm long L setae; segment VI with 5 D, 3 V and 2, 36 μm long L setae and 1 lateral taeniae, 100-150 μm long; segment VII with 5 D, 3 V, 2 L setae, 36 μm long and 2 lateral taeniae, 140-200 μm long; segment VIII with 2 D, 2 filamentous V and 5, c. 200 μm long lateral taeniae; anal lobe with 2 dorsal, 90-160, 119 μm long taeniae, anal fringe (fig. 78) with 17-23, 20 taeniae, c. 360-460 μm long; posterior lateral comb of segment VIII (fig. 84) 29-47, 35 μm wide with 4-7, 5 apical teeth. Lengths of genital sacs: 209-223, 216 μm (σ , $n=3$) and 79-101, 86 μm (φ , $n=4$).

Larva ($n = 4$). – Total length not measurable.

Head. – Length of head capsule 284-295, 289 μm , width 192-202, 198 μm , length/width = 1.42-1.50, 1.46. Antennal pedestal 64-79, 74 μm long, 0.24-0.28 $\times$ the length of head capsule, with longer median

Table 4. *T. elisabethae*. Lengths (in μm) and proportions of legs.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	594-724, 666	252-328, 295	886-1073, 987(8)	421-493, 459(8)	356-410, 389(8)	302-342, 328(7)	108-119, 117(7)
p ₂	544-648, 606	464-565, 517	324-436, 369(9)	144-176, 160(9)	101-119, 110(9)	58-72, 65(9)	36-50, 45(9)
p ₃	587-706, 660	569-720, 657	495-540, 520(6)	288-299, 291(6)	250-277, 259(6)	154-166, 160(6)	72-83, 78(6)
	LR	BV	SV	BR			
p ₁	3.19-3.54, 3.33 (8)	1.47-1.53, 1.52 (7)	0.92-1.03, 0.98 (8)	3.0-5.8, 3.8 (7)			
p ₂	0.67-0.77, 0.71 (9)	3.78-4.14, 3.93 (9)	2.78-3.18, 3.07 (9)	5.0-6.8, 5.8 (8)			
p ₃	0.72-0.78, 0.76 (6)	2.35-2.47, 2.41 (6)	2.55-2.82, 2.65 (6)	5.0-7.5, 6.4 (6)			

margin but without spur. Antenna (fig. 88) 5-segmented, 0.70–0.78× longer than head capsule; lengths of segments (in μm , $n = 3$): 109–132, 124; 27–36, 31; 18–23, 21; 7–11, 10 and 4–5. AR 1.76–1.95, 1.87. Antennal blade 25 μm long, antennal seta 25–27 μm long, placed at c. $\frac{1}{2}$ length of antennal segment 1; Lauterborn organs small, including pedestals reaching just beyond antennal segment 5. Mandible (fig. 98) 89–90 μm long, 41–45 μm wide, with 1 large ventral apical tooth, 3 ventral inner teeth, and 1 dorsal apical tooth present; two outer mandibular setae present; seta subdentalis thick, c. 36–41 μm long and curved; seta interna well developed with 4 main branches. Mentum (fig. 100) 62–66, 64 μm wide with 11 teeth; median tooth somewhat paler than other teeth, with lateral notches; ventromental plate 79–85, 82 μm wide. Labrum with S I, SII, chaetae and chaetulae basales plumose; S3 long and simple; labral lamella comblike; pecten epipharyngis consisting of three plumose lobes; S III and chaetulae laterales simple; premandible with 5 teeth, premandibular brush well developed; maxilla (fig. 105) with two long and one short lacinial chaetae, palp normally developed.

Body. – Anterior and posterior parapods with simple claws; length of procercus not measurable. Eight anal setae: 3 short, 140–190 μm long and 5 long, 250–420 μm .

Remarks

Tanytarsus elisabethae keys to the *T. lugens* species group (Cranston et al. 1989), but does not fit the group diagnosis in being pale and having a lower AR, fewer spines on anal point, and a different shaped superior volsella (Reiss & Fittkau 1971). Ignoring the absence of a digitus will place *T. elisabethae* in the more similar *T. mendax* group (Cranston et al. 1989, Reiss & Fittkau 1971). The pupa keys to the *T. mendax* group (Pinder & Reiss 1986), and the larva has the relatively short Lauterborn organ pedestals which can be diagnostic for the *T. mendax* group (Ekrem et al. 1999). Among the African *Tanytarsus*, the male of *T. elisabethae* can be confused with those *T. ankasaensis*, *T. harei* and *T. formosanus*. It differs, however, from *T. ankasaensis* and *T. formosanus* by the missing digitus and differently shaped anal point and from *T. harei* by shape of anal point and the presence of dorsolateral microtrichia on superior volsella. The pupa is probably morphologically closest to *T. formosanus*, but differs by having smaller cephalic tubercles, shorter row of chaetae on thoracic horn, a much smaller middle precorneal and one lateral taenia on segment VI. The larval stage with the combination of a relatively long antennal pedestal, high AR (1.76–1.95), Lauterborn organ pedestals that reach just beyond antennal segment 5 and only one dorsal tooth on mandible can not be confused with any other de-

scribed *Tanytarsus* larvae. Two other morphologically close species are the males of *T. formosae* (Kieffer, 1921) and *T. infundibulus* Chaudhuri & Datta (in Datta et al. 1992) which differ in having a more setose wing, differently shaped anal point and missing microtrichia of superior volsella and the males of *T. nicholisi* Glover, 1973 which has pectinate lamellae on a relatively longer and thinner median volsella.

The chironomid fauna composition and the physio-chemical situation of the type locality, Opi Lake A, is described thoroughly by Hare & Carter (1984; 1987).

Tanytarsus flexistilus Freeman

Tanytarsus flexistilus Freeman, 1958: 342. Holotype ♂ (BMNH) Nigeria, Kankiya, XII.1956–I.1957, leg. B. McMillan; 1 paratype ♂ as holotype.

Additional material examined: 8♂ Ghana, Volta Region, Kpong, Volta River, light trap, 28.XI.1993, leg. NUFU-project; 1♂ (ZMBN) Ghana, Northern Region, Sogo, (White Volta, light trap, 11.II.1993, leg. NUFU-project; 1♂ (UQC) Nigeria, Opi Lake, emergence trap, 17.III.1977, leg. L. Hare; 8♂ as previous except 20.IV.1977, 13.V.1977, 15–24.I.1978, 28.I–7.II.1979, 14–27.I.1979 and 14–31.I.1979. 2 associated larvae with pharate ♀ pupae as previous except 15–18.I.1978 and 26.V–21.VI.1978; 3 associated ♂ with Pex as previous except 26.IX–5.XII.1978 and 26.XI–8.XII.1978; 1 pharate ♂ pupa as previous except 10–16.XII.1978; 1 single reared ♂ with larval and pupal exuviae as previous, except 15–18.I.1978; 1 single reared ♀ with larval and pupal exuviae as previous, except 28.I–17.II.1979; 2 associated larvae with pharate ♂ pupae as previous, except 10–16.XII.1978; 5 Pex as previous, except 13.IV–22.V.1977 and 28.I–7.II.1979; 4 larval exuviae as previous, except 13.IV–22.V.1977, 28.I–7.II.1979 and 25.VI.1980.

Diagnosis

The species differs from other *Tanytarsus* species by the following combination of characters: Male hypopygium with 3–7 median setae on anal tergite; anal point long, with only small spines between well developed anal crests; superior volsella well developed, without microtrichia, kidney-shaped, with three median setae, the middle being smaller than the other two; digitus large, thin and almost straight, extending beyond apex of superior volsella; median volsella, large, with at least three subulate lamellae and several additional setiform lamellae. Pupa with long, slender thoracic horns bare or with only few minute chaetae evenly distributed on median half, small cephalic tubercles; pedicel sheath tubercles obvious; large bulbous tubercle on antepnotum; spine patches of tergites III, IV, large with long, anally directed spines; spine patches of tergites V and VI small to minute with lateral rows of shagreen; one lateral taenia on segment VII, five setae on segment VIII. Larval an-

tenna longer than head capsule when including Lauterborn organs, only the first and the very basal part of the second antennal segments are well sclerotized; Lauterborn organs minute on pedestals as long as antennal segment two; fine haired premento-hypopharyngeal complex; SI, SII and chaetae plumose, SIII and chaetulae simple; dorsal teeth of mandible double and well developed; maxilla with two large and one small, medially directed lacinial chaetae. Middle tooth of mentum paler than other teeth, with one large notch on either side.

Description

Male imago (n = 10). – Total length 2.81-3.64, 3.27 mm. Wing length 1.51-1.81, 1.66 mm. Total length/wing length 1.81-2.09, 1.96. Coloration. Cleared specimens with head light brown, darker brown pedicel, apodemes and eyes; thorax with dark brown patches anteriorly and laterally on scutum, basally on postnotum and on preepisternum; legs light brown; abdomen pale yellowish.

Head. – Antenna normally developed with AR 1.18-1.47, 1.37. Thirteenth flagellomere 601-675 µm long. Longest antennal seta c. 580-650 µm long. Distance between eyes 178-226 µm. Frontal tubercles 16-22 µm long. Temporal bristles 10-12: 2-3 inner verticals, 3-4 outer verticals and 4-6 postorbitals. Clypeus triangular, 68-81 µm long with 11-16 setae. Tentorium 140-171, 160 µm long, 36-39 µm wide at sieve pore. Stipes 136-158, 148 µm long, c. 20 µm wide. Cibarial pump 52-68 µm wide. Lengths of palp segments (in µm): 29-36, 33; 32-36, 35; 97-120, 111; 110-129, 119; 178-245, 208.

Thorax. – Dorsocentrals 7-10, acrostichals 12-17, prealars 1, scutellars 4. Halteres with 6-11 setae.

Wing. – VR 1.17-1.24, 1.20. Brachiolum with 1 seta, Sc bare, R with 25-37 setae, R₁ with 28-44, R₄₊₅ with 41-76, M₁₊₂ with 55-66, M₃₊₄ with 33-42, Cu with 18-27, Cu₁ with 20-23, PCu with 21-41 and An with 27-44 setae. Cell m with c. 10 setae, r₄₊₅ with c. 150, m₁₊₂ with more than 200 setae including on false vein, m₃₊₄ with c. 60-90, cu and an combined with c. 60-100 setae.

Legs. – Spur on front tibia c. 45 µm long including scale. Spurs of middle tibia 36-52 µm long including 13-19 µm long comb and 29-42 µm long including 16-18 µm long comb; of hind tibia 42-58 µm long including 16-26 µm long comb and 36-52 µm long including 13-26 µm long comb. Middle tibiae with 5-7 sensilla chaeticae. Lengths and proportions of legs see table 5.

Hypopygium (figs. 11, 12). – Tergite IX 125-174, 156 µm long with 3-7 median and 14-26 apical setae; apical margin without shoulders; lateral teeth not visible. Anal point 76-94 µm long, narrow, 18-36 µm wide at base and 8-9 µm wide at apex. Anal point with 2-6 spines and an extensive field of microtrichia between well developed anal crests. Narrow anal tergite bands curved anally, ending far from anal point. Transverse sternapodeme 53-64 µm long, phal-lapodeme 119-141 µm long. Gonocoxite 144-194 µm long, gonostylus 139-191 µm long, c. 50 µm wide. Superior volsella (fig. 13) kidney-shaped, with concave median margin; bearing 2-3 dorsal setae; 3 lateral setae and 3 median setae where middle seta is shorter than other two; dorsolateral microtrichia absent; digitus long, straight, reaching well beyond apex of superior volsella. Median volsella (fig. 13) 64-86 µm long including 3 subulate and numerous setiform lamellae, 29-49 µm long. Inferior volsella relatively straight, 100-174 µm long, with strong apical setae directed both orally and anally. HR 1.02-1.17, 1.11. HV 2.04-2.35, 2.20.

Pupa (n = 8-10). – Total length 4.5-5.8, 5.2 mm. Coloration light brown, darker areas around shagreen and spine patches on tergites II through VI. Muscle marks dark brown.

Cephalothorax (fig. 54, 64). – Length of frontal setae 43-65, 56 µm, cephalic tubercles low or absent (fig. 54) < 14 µm long. Anteprepronotum with a large, c. 180 µm long and 40 µm wide bulbous tubercle. Pedicel sheath tubercle well developed. Thoracic horn (fig. 61) slender, 504-590, 518 µm long, 22-29 µm wide, with a few minute, 2-5 µm long, chaetae on middle half. Chaetae seems to be absent on some male pupae.

Table 5. *T. flexistilus*. Lengths (in µm) and proportions of legs (n = 8-10).

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	669-837, 772	359-446, 402	1095-1237, 1197	501-565, 543	462-520, 493	368-417, 394	145-162, 156
p ₂	662-785, 733	581-753, 693	371-452, 414	200-239, 224	165-187, 174	113-126, 119	68-72, 69
p ₃	717-885, 788	791-952, 877	556-646, 580	336-371, 353	307-346, 326	171-226, 204	97-108, 103
	LR	BV	SV	BR			
p ₁	2.79-3.10, 2.96	1.39-1.61, 1.49	0.94-1.03, 0.98	2.9-3.7, 3.3			
p ₂	0.58-0.64, 0.61	3.00-3.26, 3.11	3.32-3.58, 3.43	2.7-4.5, 3.9			
p ₃	0.64-0.71, 0.67	2.15-2.43, 2.28	2.70-2.99, 2.88	3.9-6.7, 4.9			

Three precorneals in a triangular pattern on a well developed tubercle, posterior precorneal strong, 101-169, 125 µm long, anterior two precorneals 29-68, 45 µm and 56-73, 67 µm long; 2 lateral anteprepronotals visible, 1 strong 65-100, 86 µm long, 1 seta mark; 2 pairs of dorsocentrals, anterior pair 94-136, 115 and 64-90, 83 µm long, posterior pair 61-108, 86 (thin) and 151-187, 168 (thick) µm long. Fine granulation dorsal of anterior dorsocentrals. Nose of wing sheath and prealar tubercle well developed.

Abdomen (fig. 72). – Shagreen on tergite (T) II, two longitudinal bands with enlarged anterior ends; pedes spurii B obvious on TII; hook row 137-216, 174 µm long, c. $\frac{1}{3}$ width of TII; length of longest spines of TIII-TVI (in µm): 97-122, 107; 101-133, 116; 11-22, 16 and 4-11, 8; spines of TIII in large, 180-259, 230 µm long, curved patches on posterior half of tergite; spines of TIV in large, 216-299, 262 µm long, straight patches on middle of tergite; spines of TV and VI in small 43-72, 55 and 22-36, 30 µm long patches anterior on tergites; segment II with 2 D, 2 V and 3, 36 µm long L setae; segment III with 5 D, 2 V and 3, 36-54 µm long L setae; segment IV with 5 D, 3 V and 3, 36-54 µm long L setae; segment V with 5 D, 3 V and 3, 36-54 µm long L setae; segment VI with 5 D, 3 V and 3, 36-54 µm long L setae; segment VII with 5 D, 3 V, 3 L setae, 36-54 µm long and 1 lateral taenia, 180-245 µm long; segment VIII with 2 D, 2 filamentous V and 5, c. 202-354 µm long lateral taeniae of which the second taenia is placed more medially than the other four; anal lobe with 2 dorsal, 230-324 µm long taeniae, anal fringe with 45-60, 500-600 µm long taeniae; posterior lateral comb of segment VIII (fig. 81) wider for females 94-119, 108 µm than for males 76-90, 82 µm, 9-13 apical teeth. Lengths of genital sacs: 256-295 µm (♂, n=3) and 130-151 µm (♀, n=4).

Larva (n = 10). – Total length c. 5.5 mm.

Head. – Length of head capsule 353-432, 386 µm, width 270-328, 289 µm, length/width = 1.24-1.43, 1.34. Antennal pedestal 54-76, 65 µm long, with longer median margin but without spur. Antenna (fig. 86) 5-segmented, including Lauterborn organs always longer than head capsule; only first and the very basal part of second antennal segment well sclerotized; lengths of segments (in µm): 230-306, 270; 162-194, 177; 22-36, 32; 9-12, 11 and 4-7, 6. AR 1.05-1.24, 1.18. Antennal blade 46-61, 54 µm long, antennal seta 25-36, 29 µm long at $\frac{2}{3}$ length of antennal segment 1. Mandible (fig. 96) 122-133, 127 µm long with 1 ventral apical tooth, 3 ventral inner teeth, 2 dorsal apical teeth present; two outer mandibular setae present; seta subdentalis thick, c. 41-61, 54 µm long and curved, reaching beyond apex of dorsal tooth; seta interna well developed with 4 main branches. Men-

tum (fig. 103) 76-97, 89 µm wide with 11 teeth; median tooth paler than other teeth, with lateral notches; ventromental plate 111-133, 122 µm wide. Labrum (fig. 106) with S I and chaetae plumose; S II plumose, on pedestal; S3 long, simple; labral lamella comblike; pecten epipharyngis consisting of three plumose lobes; chaetulae simple; premandible (figs. 90, 91) with 5 teeth, premandibular brush well developed; maxilla (fig. 104) with two long and one short lacinial chaetae, palp normally developed.

Body. – Anterior and posterior parapods with simple claws; procercus c. 54 µm long with one small dorsal and one small lateral seta. Eight anal setae: 3 short, 234-295, 264 µm long and 5 long, 504-698, 614 µm.

Remarks

Based on adult male characters, *Tanytarsus flexistilus* keys out to the *eminulus*-group (Cranston et al. 1989), and the species fits the group diagnosis (Reiss & Fittkau 1971) except for wing length which is less than 2 mm. Males of *T. flexistilus* are separated from the other species in the *T. eminulus*-group by having strongly kidney-shaped superior volsella, a medium large median volsella with three subulate and several setiform lamellae and a long, narrow anal point where the crests end at $\frac{2}{3}$ length. *T. flexistilus* keys to the same group based on pupal morphology (Pinder & Reiss 1986), and can easily be separated from the other species in the *eminulus*-group by the large sausage-formed tubercle on anteprepronotum. Diagnostic characters for larvae in the *T. eminulus*-group have not been established.

Opi lake, Nigeria, is the only water body in which larvae of this species have been collected. It is a small lake without permanent surface inlet and experience large fluctuations in water level throughout the year. The water, when measured, was very dilute (15-24 µS cm⁻¹) and somewhat acidic (pH 6.0-6.5). A thorough description of the physical and chemical conditions of the lake is given by Hare & Carter (1984). Dejoux (1976b) also found *T. flexistilus* to be more abundant in light traps at Lake Tchad when the conductivity was < 200 µS cm⁻¹. In Opi Lake, the larvae of *T. flexistilus* were more or less restricted to shallow depths < 0.7 m, on muddy substrate (Hare & Carter 1987).

Tanytarsus formosanus Kieffer

Tanytarsus formosanus Kieffer, 1912: 42. Lectotype 1 ♂ (DEI) Formosa, Tainan province, Anpin, X. 1908, leg. H. Sauter; 2 paralectotype ♂ as lectotype [examined].

Tanytarsus formosae Kieffer, 1923a: 38. Syntypes 2 ♂ (DEI) Formosa, Taihoku province, Daitotei, V.-VI.1914, leg. H. Sauter. [examined] **Syn. n.**

Tanytarsus horni Goetghebuer, 1934: 39. Holotype ♂ (NMW) Irak, Basra, 13-15.IV.1926, leg. H. Schmidt; 2 paratype ♂

(BMNH) as holotype. **Syn. n.**

- Tanytarsus aculeus* Chaudhuri et al., 1988: 239. Holotype ♂ (Type no 138, UBI), India, West Bengal, Burdwan University campus, 6.VI.1983, leg. Nandi [not examined]; paratypes: 2♂, 3 Pex (UBI) India, Burdwan, W. B., 3.V.1979, leg. S. K. Nandi [examined] **Syn. n.**
- Tanytarsus fuscimarginalis* Chaudhuri et al. 1984: 33. Holotype ♂ (Type no 64, UBI), India, West Bengal, Bolpur, 18.VIII.1977, leg. D. Chatterje [examined]; paratypes: 1♂ (UBI) as holotype [examined]; 1♂ (UBI) India, West Bengal, Burdwan, 3.VII.1978, leg. M. Gosh [examined] **Syn. n.**
- Tanytarsus nigrocinctus* Freeman, 1957a: 220. Holotype ♂ (BMNH) Uganda, Lake Victoria, 4.V.1952 (synonymised by Reiss & Fittkau 1971) [examined]; 1 paratype ♂ (BMNH) Kenya, Kitui, 29.VI.1953 [examined]. Freeman, 1958: 339; Dejoux, 1968b: 449.
- Tanytarsus horni*; Reiss & Fittkau, 1971: 121 (adult male, ecology). Cranston & Judd, 1989: 268 (adult male, distribution). Langton, 1991: 357 (pupa). Verschuren, 1997: 500 (larva).

Additional material examined: – AFRICA: 3♂ (ZSM) Algeria, Berbessa, by Montebello Plaine de la Mitidja, 24.VII.1955, leg. Clastrier; 31♂ (ZMBN) Ghana, Volta Region, Kpong, Volta River, Light trap, 28.XI.1993, leg. NUFU-project; 1♂ (ZSM) Kenya, N. Mombasa, Gei Hotel Malaika, IV.1995, leg. G. Riedel; 1♂ (ZSM) Morocco, area around Tetnan, 6.VI.1968, leg. Choumara; 1♂ (ZSM) Morocco, Rabat, 24.V.1968, leg. Choumara; 1♂ (ZSM) Sudan, Blue Nile, nr Singa, Ummbenane, 25.II.1981, leg. P. Mellor. – WEST PALAEARCTIC: 11 Pex and 10♂ (ZSM) France, Camargue, Piscine Hoffmar, 10.VII.1965, leg. Laville; 3♂ (ZSM) Spain, Marismas des Guadalquivir, o.d., leg. Tourenq; 5 Pex and 2♂ (ZSM) Italy, Sicily, Segesta, Austr. Stream, 5.IX.1952, leg. E. J. Fittkau; 1♂ (BMNH) Saudi Arabia, E. Province, Hofuf, 25°24'N 49°28'E, 28.V.1978, leg. W. Buttiker; 1♂ as previous except 18.IX.1985; 2♂ as previous except 26.VI.1978; 2♂ (BMNH) Saudi Arabia, Jawf, Al Jawf, 29°52'N 39°53'E, 610 m, 1-2.XI.1986, leg. W. Buttiker; 3♂ (BMNH) Saudi Arabia, E. Province, Dammam, 26°27'N 50°06'E, 3 m, 18-19.V.1979, leg. W. Buttiker; 1♂ (BMNH) Saudi Arabia, E. Province, Haradl, 24°09'N 49°04'E, 310 m, o.d., leg. W. Buttiker; 1♂ (ZSM) Turkey, Adana, 14.IX.1982, leg. R. Kinzelbach; – SOUTH ASIA: 1♂ (ZSM) India, Mandapam, 30-31.I.1958. 1♂ (ZSM) Thailand, Dai Inthanou, 12-19.IX.1989; 1♂ (ZSM) Thailand, Sob Pong, 23.XII.1989, leg. H. Malicky; 1♂ (ZSM) Thailand, Chatrakhan, 8-10.XII.1989, leg. H. Malicky; 1♂ (ZSM) Thailand, Ayutthaya, 3.IV.1989, leg. H. Malicky; 1♂ (ZSM) China, Province Yunnan, Buynan, Mung Lun River, 27.V.1980, leg. E. J. Fittkau; 1♂ (ZSM) China, Province Hunan, Taoyuan, 2.VI.1980, leg. E. J. Fittkau; 1♂ (ZSM) China, Province Hunan, 1.VI.1980, leg. E. J. Fittkau.

Diagnosis

T. formosanus Kieffer is separable from other *Tanytarsus* species by the following combination of characters: Head with large frontal tubercles; usually strong thoracic colorations anteriorly and dorsolaterally on scutum, basally on scutellum, postnotum, median anepisternum II, epimeron II and on preepisternum; tergites II-IV with broad median longitudinal stripe and an broad, transverse stripe posteriorly; tergites V-VI with an additional, narrow, anterior transverse stripe;

tergite VII with an anterior transverse stripe and tergite VIII with two large lateral pigmented spots; wings with sparse setation (restricted to apical $\frac{1}{3}$), Cu bare, cell r_{4+5} with more or equal amount of setae as cell m_{1+2} ; AR > 1; hypopygium: Spines in one row between well developed anal crests; superior volsella tapered towards apex which is somewhat median elongated, with lateral microtrichia, 6-8 dorsal setae of which 3 are placed laterally, 3 median setae where the two most apical are larger than the innermost seta; digitus fairly short, not reaching apex of superior volsella; median volsella relatively short with 4-6 broad, distally pointed lamellae and 15-20 setiform lamellae. Pupa with large conical cephalic tubercles; long evenly tapered thoracic horn, chaetae longer than width of horn in one row on mid $\frac{2}{3}$; strong armament on tergite III and IV with long spines in separate, longitudinal rows occupying $\frac{1}{3}$ - $\frac{1}{2}$ length of tergite; segment VII with 2 anterior L setae and 2 posterior lateral taeniae, segment VIII with 5 lateral taeniae.

Description

Male imago (n = 17-18 unless otherwise stated). – The specimens used in the description are purposely selected from the different localities I have had access to. Total length 2.5-3.9, 2.9 mm. Wing length 1.35-2.24, 1.61 mm. Total length/wing length 1.59-2.12, 1.9. Coloration. Cleared specimens with head light brown, darker brown antennae and eyes; thorax and abdomen as described in diagnosis.

Head. – Antenna normally developed, AR 1.09-1.46, 1.28 (15). Thirteenth flagellomere 446-682, 551 (15) μ m long. Longest antennal seta c. 450-600 μ m long. Distance between eyes 170-268, 196 μ m. Large frontal tubercles c. 32-60 μ m long. Temporal bristles 8-15; 1-4 inner verticals, 4-6 outer verticals, 2-5 postorbital. Clypeus 58-97, 67 (13) μ m long with 15-22 setae. Tentorium 123-161, 142 (14) μ m long, 36-42 μ m wide at sieve pore. Stipes 110-145, 133 (9) μ m long. Cibarial pump with 2 pairs of ventrolateral sensorial setae, width of cibarial pump 45-68, 55 (13) μ m. Lengths of palp segments (in μ m): 29-36, 32 (14); 29-36, 34 (14), 64-97, 78 (12); 71-113, 90 (12); 129-178, 155 (8).

Thorax. – Dorsocentrals 7-13, acrostichals 12-22, prealars 1. Scutellum with 4-8 setae. 4-7 setae on halteres.

Wing. – VR 1.04-1.16, 1.12. Sc without setae, R with 13-29, 18 setae, R₁ with 1-30, 16; R₄₊₅ with 10-23, 16 (16); M₁₊₂ with 14-52, 30; M₃₊₄ with 0-26, 9; Cu bare, Cu₁ with 0-19, 6 setae, PCu with 0-5, 1 and An with 0-30, 16 setae. Cells: m bare, r₄₊₅ with c. 80-160 setae, m₁₊₂ with 80-170 including on false vein, m₃₊₄ with 0-17, cu and an always bare.

Legs. – Spur on front tibia 29-42 μ m long including scale. Spurs of middle tibia 29-42 μ m long including 13-19 μ m long comb and 26-36 μ m long in-

cluding 13-19 μm long comb; of hind tibia 29-55 μm long including 16-26 μm long comb and 22-45 μm long including 16-23 μm long comb. Lengths and proportions of legs see table 6.

Hypopygium (fig. 14). – Tergite IX 109-162, 129 μm long with 0-5 (usually 2) median and 10-20 (usually 14-16) apical setae; apical margin with two shoulders on each side of the anal point; two lateral teeth often clearly recognizable; microtrichia absent on a large area around base of anal point. Anal point 41-76, 58 μm long, 14-24 μm wide at base and 6-8 μm wide at apex. Anal point with 3-9 robust spines between well developed anal crests. Anal tergite bands curved towards almost reaching anal point and sometimes showing a median elongation without connecting with each other. Transverse sternapodeme 41-80 μm long, phal-lapodeme 103-144 μm long. Gonocoxite 127-205, 153 μm long. Gonostylus 103-193, 134 μm long. Superior volsella (figs. 15, 16) tapered towards apex, with median elongation, 3-9 dorsal, 3-4 ventral and 3 median setae where the apical 2 are much stronger than the basal one; microtrichia present laterally and ventrolaterally. Digitus fairly small, not extending beyond the median margin of superior volsella. Median volsella short 51-82, 62 μm long including 4-6 broad, 18-41, 30 μm long, pointed lamellae in addition to c. 15-20 setiform lamellae (see Reiss & Fittkau 1971: 181, fig. 33a). Inferior volsella somewhat club-shaped, 86-144, 103 μm long, with strong setae directed orally. HR 1.06-1.32, 1.16; HV 1.93-2.60, 2.25.

Pupa (n = 8-9 unless otherwise stated). – Total length 4.2-4.7, 4.4 mm (5). Coloration light brown, apodemes and armament dark brown.

Cephalothorax (fig. 52, 67). – Length of frontal setae 68-101, 80 μm , cephalic tubercles large and conical, 48-72, 57 (5) μm long. Pedicel sheath tubercle (fig. 52) prominent, c. $\frac{1}{3}$ length of cephalic tubercles. Thoracic horn (fig. 59) evenly tapered, 432-646, 497 μm long, 25-32, 29 μm wide, with a longitudinal row of 32-54, 41 μm long chaetae situated on mid $\frac{2}{3}$ - $\frac{3}{4}$. 3 precorneals all equally long, 86-155, 108 μm , placed

in a triangular pattern; anteprenotals 1 median 61-97, 79 (4) μm long, 2 lateral 14 μm and 48-72, 62 (5) μm long; 2 pairs of dorsocentrals with 1 thin and 1 thick seta in each pair, thin setae c. 50-100 μm long, thick setae c. 40-70 μm .

Abdomen (figs. 69, 77). – Anterior, transverse band of shagreen on T II, anterior patches of shagreen on T III and VIII, S VIII and dorsally on anal lobe; pedes spurii B present on segment II and III; T II with 2 longitudinal brown point patches, hook row 151-271, 201 μm long; spines of T III 68-103, 80 μm long, in separate longitudinal rows covering $\frac{1}{3}$ - $\frac{1}{2}$ of length of tergite, bending slightly laterally in posterior part of spine patch, spines of T IV 29-97, 63 μm long in separate, straight longitudinal rows or patches covering $\frac{1}{4}$ - $\frac{1}{2}$ of length of tergite, spines of T V and VI 14-29, 22 and 10-22, 16 μm long, in anterior, small circular patches; segment II with 3 D, 3 V and 3 L setae 18-43, 30 μm long; segment III with 5 D, 2 V and 3 L setae 32-47, 38 μm long, 1-2 small sensorial setae between spine patches; segment IV with, 5 D, 3 V, 1-2 sensorial setae and 3 L setae 36-55, 45 μm long; segment V with 6 D, 3 V, 2 sensorial and 3 L setae 29-71, 46 μm long; segment VI with 5 D, 4 V, 2 sensorial and 3 L setae 29-90, 51 μm long; segment VII with 4 D, 4 V, 2 L setae 29-87, 55 μm long and 2 lateral taeniae 108-234, 160 μm long; segment VIII with 1-2 dorsal taeniae 100-178, 140 (5) μm long, 1-2 V, 5 lateral taeniae c. 180-280 μm long; anal lobe with 2 dorsal taeniae 162-291, 242 μm long; anal fringe with 35-50, 43 taeniae, c. 390-610 μm long; posterior lateral comb of segment VIII 54-84, 68 μm wide with teeth 14-29 μm long.

Larva. Described by Dejoux (1968b), Chaudhuri et al. (1988) and Verschuren (1997).

Remarks

Nomenclature and taxonomy. – Although Kieffer described *Tanytarsus formosanus*, he did not designate holo- or paratypes in his description. However, 126 out of 135 specimens in the Sauter collection (DEI) do carry 'holotype' or 'paratype' labels. Dr. F. Menzel,

Table 6. *T. formosanus*. Lengths (in μm) and proportions of legs.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	497-769, 605	297-523, 372	675-1014, 856 (13)	368-533, 454 (13)	310-426, 377 (13)	236-362, 285 (11)	97-145, 122 (12)
p ₂	510-814, 641	485-788, 604	317-449, 369 (16)	181-268, 214 (15)	139-216, 169 (15)	97-152, 115 (15)	58-100, 72 (15)
p ₃	607-943, 716	659-1066, 794	481-714, 538 (12)	281-443, 330 (12)	252-381, 288 (12)	161-242, 184 (12)	87-129, 99 (12)
	LR	BV	SV	BR			
p ₁	1.94-2.77, 2.34 (13)	1.36-1.54, 1.47 (11)	1.03-1.27, 1.14 (11)	2.6-5.0, 3.7 (13)			
p ₂	0.57-0.65, 0.62 (16)	2.51-3.04, 2.87 (15)	3.20-3.60, 3.42 (15)	3.0-7.0, 5.0 (15)			
p ₃	0.64-0.72, 0.68 (12)	2.02-2.43, 2.27 (12)	2.61-2.95, 2.80 (12)	4.0-6.0, 5.3 (10)			

responsible for the Diptera collection in Eberswalde, states that a labelling mistake by a former curator probably has been made. Therefore, the 135 specimens in the type-series collected by H. Sauter and identified by Kieffer must be regarded as syntypes. I designate a lectotype from the type series in order to fix the identity of the species. The rest of the 135 species in the type series collected X.1908 and II.1909 are paralectotypes. Seven of the 127 specimens of the Sauter collection were collected X.1912, after Kieffer's August 1921 description and thus cannot be part of the type series. Two specimens from the type series are deposited in BMNH, five in MNHN, one in NMW, and seven specimens of the type series have an unknown location.

Cranston & Judd (1989) segregated 10 specimens from Saudi Arabia as intermediates between *T. horni* Goetghebuer and *T. mcmillani* Freeman based on missing lateral microtrichia on the superior volsella of the hypopygium. Closer examination of the specimens with an interference contrast microscope, shows that microtrichia indeed are present. In addition, other characters such as wing setation and size of frontal tubercles clearly separate these specimens from the *T. mcmillani* type specimens examined (see description of *T. mcmillani*). The intermediate specimens described as *Tanytarsus ?horni* by Cranston and Judd (1989) all belong to the species *T. formosanus* Kieffer.

The paratypes and descriptions of *T. aculeus* are impossible to differentiate from *T. formosanus* and the synonymies should be granted although the holotype has been unavailable for examination. One specimen of *T. agraensis* from Bolpur carries a paratype label, but is obviously no paratype since it was collected August 1979 by D. Sinharay while the paratypes were collected in April 1974 (Singh & Kulshrestha 1975). Although the specimens labelled *T. agraensis* obviously belongs to *T. formosanus*, and the description and drawings by Singh & Kulshrestha (1975) fit the diagnostics of *T. formosanus*, a synonymy has to await examination of the type material.

Both pupae and male adults of *T. formosanus* obviously key to the *T. mendax*-group (Cranston et al. 1989; Pinder & Reiss 1986) since *T. horni* originally was placed in this group by Reiss & Fittkau (1971).

Ecology. – Although *T. formosanus* seems to be more abundant in less dilute waters (Verschuren 1997), it is also found in Opi Lake (15–25 $\mu\text{S cm}^{-1}$) (Hare & Carter 1987). The highest conductivity in which larvae have been found is 868 $\mu\text{S cm}^{-1}$ at Lake Awasha, Ethiopia (Kibret & Harrison 1989). The larvae have been recorded from both sandy and muddy

bottoms with coarse organic debris (Dejoux 1976b, Hare & Carter 1987, Verschuren 1997), and have at least in one lake shown intolerance to daily oxygen fluctuations (Petr 1972).

Tanytarsus formosanus is, despite its name, also well distributed in Africa and most southern parts the Palaearctic region.

Identity of *Rheotanytarsus formosae* Kieffer, 1921

Examination of Tanytarsini type material from Formosa (now Taiwan) revealed a few taxonomic problems that need to be solved. Kyerematen et al. (2000) examined the type material of *Rheotanytarsus formosae* Kieffer, 1921, and found it to belong to the genus *Tanytarsus*. This makes *T. formosae* (Kieffer, 1921) a senior secondary homonym of *T. formosae* Kieffer, 1923a. *T. formosae* Kieffer, 1923a is found to be a synonym of *T. formosanus* Kieffer, 1912 (see above), and thus does not need a replacement name (ICZN 1999). Re-examination of the type material of *T. formosae* (Kieffer, 1921) revealed that it consists of two species. In the material, one adult male is labelled 'holotype' and one female plus four males are labelled 'paratype'. Kieffer did not design any holo- or paratypes, and according to Dr. F. Menzel, DEI (pers. comm.), a former curator probably made a labelling mistake. All type specimens of *T. formosae* (Kieffer, 1921) are therefore to be regarded as syntypes. I designate one to be lectotype in order to fix the identity of the species, and therefore the remaining specimens of the series are paralectotypes. The paralectotypes include, however, two different morphotypes: two male specimens are conspecific with the lectotype and one male is conspecific with *T. gracistylus* Chaudhuri & Datta (in Datta et al. 1992). The female and damaged males are impossible to identify.

Tanytarsus harei sp. n.

Tanytarsus (holochlorus gp.) n. spp. (2) Hare & Carter, 1987: 69.

Type material: Holotype ♂ (BMNH) Nigeria, Opi Lake, 20–21.IV.1980, emergence trap, leg. L. Hare. 3 paratypes: 1 ♂ (UQC) as holotype except 2–3.IV.1980 in light trap; 1 ♂ (ZMBN) Senegal, Kedougou, 15.X.1972, leg. C. Dejoux; 1 ♂ (ZMBN) Côte d'Ivoire, Zoba (Man), 10.II.1981, leg. C. Dejoux.

Etymology

The species is named after Dr. Landis Hare who generously provided me with valuable reared material of several *Tanytarsus* species from Opi Lake in Nigeria.

Diagnosis

The new species differs from other *Tanytarsus* species by the following combination of characters: Eyes without dorsomedian extension; AR c. 0.9; LR₁ c. 2.6; wings with only a few setae at wing tip; hypopygium: 2 median setae on anal tergite, large microtrichia-free area around anal point; anal point with 4-5 large, trifold spines between well developed anal crests; superior volsella pear-shaped, tapering anally, with 4-5 dorsal setae, microtrichia absent; digitus absent; median volsella medium large with several foliate and simple lamellae.

Description

Male imago (n = 2 unless otherwise stated). – Total length 1.9-2.0 mm. Wing length 0.99-1.04 mm. Total length/wing length 1.8-1.9. Coloration. Body, legs and head light greenish, eyes brown.

Head. – Antenna normally developed, AR 0.90-0.93. Ultimate flagellomere 342-367 µm long. Eyes without dorsomedian extension; distance between eyes 187-205 µm. Frontal tubercles present, 15-25 µm long. Temporal bristles 8; including 2-3 inner verticals, 3 outer verticals and 2-3 postorbitals. Clypeus semicircular, 58-61 µm long with 9-10 setae. Tentorium 72-86 µm long, 20-22 µm wide at sieve pore. Stipes 97 µm long, 7-11 µm wide. Cibarial pump 36-40 µm wide. Lengths of palpomeres (in µm): 22, 25-29, 72-79, 38-97, 130-151.

Thorax. – Scutal tubercle absent. Dorsocentrals 5-6, acrostichals 12-14, prealars 1, scutellars 2, halteres with 5 setae.

Wing. – VR 1.14-1.16. Sc bare, R with 12-19 setae, R₁ with 7-10; R₄₊₅ with 8-9 setae; M bare; M₁₊₂ with 20-21 setae; M₃₊₄ with 3-7; Cu₁ with 0-3 setae; Cu, PCu and An bare. Cell m bare, r₄₊₅ with 62-65 setae, m₁₊₂ with 35-48 including on false vein, m₃₊₄, cu and an bare.

Legs. – Spur on front tibia 22-26 µm long including scale. Spurs of middle tibiae 16-26 µm long including 10 µm long comb; of hind tibiae 22-30 µm long including 13 µm long comb. Lengths and proportions of legs see table 7.

Hypopygium (fig. 17). – Tergite IX 75-82 µm long with 2 median setae, 14 apical setae; apical margin with small lateral shoulders; no lateral teeth visible; large microtrichia-free area around base of anal point.

Anal point 41-52 µm long, 11 µm wide at base, 6-9 µm wide at apex. Anal point with 4-5 large trifold spines between well developed anal crests. Anal tergite bands caudally curved, almost reaching median setae of anal point, no median elongation. Transverse sternapodeme 34-39 µm long; phallapodeme 75-82 µm long. Gonocoxite 77-100 µm long, gonostylus straight with widest width in middle, 73-95 µm long. Superior volsella (fig. 18) pear-shaped, tapering anally; bearing 4-5 dorsal setae and 3 median setae, middle seta weaker and situated close and below basal seta; dorsolateral microtrichia absent; digitus absent. Median volsella 46 µm long including 5-6, 23 µm long foliate and 5-6 simple lamellae. Inferior volsella medially curved, 46-52 µm long, with strong apical setae. HR 1.05-1.06; HV 2.1-2.6.

Remarks

Based on the adult male morphology, *Tanytarsus harei* keys to the *T. mendax* species group if the absence of a digitus is ignored (Cranston et al. 1989), and fits the group diagnosis if one ignores the smaller size and lower AR value (Reiss & Fittkau 1971). These characters seems to be good specific characters, but probably not suitable for group diagnosis on a world wide basis. The morphological closest species are probably *T. formosae* (Kieffer, 1921) and *T. infundibulus* Chaudhuri & Datta (in Datta et al. 1992) which only differ in having a more setose wing and a higher AR value, and *T. nicholli* Glover, 1973 which has pectinate lamellae on a relatively longer and thinner median volsella. Among the Afrotropical species, *T. harei* comes closest to *T. formosanus*, *T. elisabethae* and *T. ankasaensis* but differs from *T. formosanus* in being smaller, lacking a digitus, having a green body and lacking dorsolateral microtrichia on superior volsella, from *T. elisabethae* by lacking dorsolateral microtrichia on superior volsella and having a differently shaped anal point, and from *T. ankasaensis* in lacking a digitus, lacking dorsolateral microtrichia on superior volsella and in having a much lower LR₁ value.

The chironomid fauna composition and the physio-chemical situation of the type locality, Opi Lake A, is described thoroughly by Hare & Carter (1984, 1987).

Table 7. *T. harei*. Lengths (in µm) and proportions of legs

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR	BV	SV	BR
p ₁	450-468	209-234	616 (1)	313 (1)	245 (1)	216 (1)	97 (1)	2.63 (1)	1.51 (1)	1.14 (1)	3.7 (1)
p ₂	446-468	378-392	248 (1)	151 (1)	74 (1)	54 (1)	40 (1)	0.63 (1)	3.47 (1)	3.47 (1)	-
p ₃	475-504	479-518	364 (1)	209 (1)	187 (1)	126 (1)	72 (1)	0.70 (1)	2.33 (1)	2.81 (1)	6.0 (1)

Tanytarsus luctuosus Freeman

Tanytarsus luctuosus Freeman, 1958: 339. Holotype ♂ (BMNH) Cape Province, Platteklip Gorge, 22.I.1953, leg. K. M. F. Scott [examined]; paratype 1 ♂ (BMNH) Transvaal, Magoebaskloof, nr. Tzaneen, 6.V.1955, leg. A. D. Harrison [examined].

Additional material examined: 1 ♂ (ZSM) Zaire, Kivu-area, Kalengo, 11.IV.1972, leg. J. Lehmann, 1 ♂ as previous except 12.VI.1972, 1 pharate ♂ as previous except 9.IX.1972, 1 ♂ (ZMBN) Tanzania, Tanga. W. Usambara, Mazumbai, Loc. N8, XI.1990, leg. ZMBN's Tanzania expedition.

Diagnosis

The species differs from other *Tanytarsus* species by the following combination of characters: adult male with broad, transverse, brown pigmented bands on all tergites; wing relatively hairy, but cell m is bare; scutal tubercle present; frontal tubercles minute, only visible as two white dots; hypopygium with 2-4 median setae on anal tergite, anal point with 6-10 spines between well developed anal crests; superior volsella with small median tubercle, 5-7 dorsal setae and numerous dorsolateral microtrichia, digitus absent; median volsella large with numerous long, slender, simple lamellae which reaches beyond apex of inferior volsella. Pupal thoracic horn bare, 3 strong pre-corneals, cephalic tubercles developed; tergites III-VI with pairs of oval spinule patches; tergite III almost covered with shagreen, small points between spinule patches; tergites IV-VI with fields of shagreen around spinule patches; hook row large, 3/4 of segment width.

Male imago (n = 3-4 unless otherwise stated). – Total length 2.5-2.8 mm. Wing length 1.30-1.69, 1.55 mm. Total length/wing length 1.6-1.7. Coloration. Live specimens black; cleared specimens with head light brown, darker brown antennae and eyes; thorax dark brown; legs and halteres light brown; abdominal tergites with broad, transverse, dark band.

Head. – Antenna normally developed with AR 0.8-1.07, 0.99. Ultimate flagellomere 310-533, 469 µm long. Longest antennal seta c. 550 µm long. Distance

between eyes c. 160-180 µm. Minute frontal tubercles only visible as two white dots. Temporal bristles 9-10; including 3 inner verticals, 3-4 outer verticals and 3 postorbitals. Clypeus triangular, 52-55 (2) µm long with 11-14 (2) setae. Tentorium 120 (2) µm long, 29-32 (2) µm wide at sieve pore. Stipes 107-136 (2) µm long, 13 (2) µm wide. Cibarial pump 45-48 (2) µm wide. Lengths of palpomeres I-IV (in µm): 29-32 (2), 36 (2), 136 (1), 120 (1), 210 (1).

Thorax. – Scutal tubercle present. Dorsocentrals 6-9, acrostichals 10-17, prealars 1, scutellars 4-6. Halteres with 4-8 setae.

Wing. – VR 1.13-1.18. Sc bare, R with 16-31, 24 setae, R₁ with 15-19, 17; R₄₊₅ with 16-29, 22 setae; M bare; M₁₊₂ with 34-68, 50 setae; M₃₊₄ with 15-36, 25; Cu with 0-11, 4; Cu₁ with 10-21, 17; PCu with 1-24, 13 and An with 13-48, 28 setae. Cell m bare, r₄₊₅ with c. 120-180 setae, m₁₊₂ with c. 140-220 including on false vein, m₃₊₄ with c. 30-80 and cu + an together with 0-60 setae.

Legs. – Spur on front tibia 29-42 µm long including scale. Spurs of middle tibia 19-29 µm long including 10-16 µm long comb; of hind tibia 39 µm long including 16 µm long comb. Lengths and proportions of legs see table 8.

Hypopygium (fig. 21). – Tergite IX 82-103, 95 µm long with 2-4 median setae, 10-14 apical setae; apical margin without lateral shoulders; lateral teeth not visible; microtrichia-free area between anal crests. Anal point 39-55, 45 µm long, 12-16 µm wide at base and 6-8 µm wide at apex. Anal point with 6-10 spines between well developed anal crests. Anal tergite bands caudally curved, not reaching anal point, with median elongations almost connecting tergite bands. Transverse sternapodeme 31-41, 38 µm long; phallapodeme seems forked, 92-109, 100 µm long, both branches being equally long. Gonocoxite 113-135, 126 µm long, gonostylus sausage-shaped, 113-135, 127 µm long. Superior volsella more or less oval with small tubercle on median margin (figs. 22, 23); bearing 7 dorsal setae and 3 median setae, the apical 2 somewhat stronger than the basal one; dorsolateral

Table 8. *T. luctuosus*. Lengths (in µm) and proportions of legs.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	568-694, 643	313-323, 318	646-933, 836	355-533, 464	281-417 (2)	200-317 (2)	87-129 (2)
p ₂	552-688, 614	510-581, 543	342 (1)	178 (1)	120 (1)	71 (1)	58 (1)
p ₃	694-759, 728	730-766, 744	501 (1)	320 (1)	268 (1)	171 (1)	90 (1)
	LR	BV	SV	BR			
p ₁	2.06-2.92, 2.62	1.40-1.65, (2)	1.07-1.37, 1.18	4.5-5.8 (2)			
p ₂	0.59 (1)	3.77 (1)	3.70 (1)	5.0 (1)			
p ₃	0.65 (1)	2.39 (1)	3.04 (1)	7.3 (1)			

microtrichia present; digitus absent. Median volsella (fig. 24) 88-96, 93 μm long including c. 10, 40-50 μm long, simple lamellae reaching beyond apex of inferior volsella. Inferior volsella, club-shaped, medially curved, 80-92, 86 μm long, with strong apical setae. HR 0.95-1.03, 0.99; HV 2.0-2.5, 2.2.

Pupa (n = 1). – Length of abdomen 2.0 mm. Coloration pale with brown areas on cephalothorax. Muscle marks dark brown.

Cephalothorax (fig. 65). – Length of frontal setae 103 μm , cephalic tubercles round, medium high. Thoracic horn 517 μm long, 36 μm wide, bare. Three precorneals in a triangular pattern; 2 anteprenotals visible, 1 median and 1 lateral; 2 pairs of dorsocentrals. Fine granulation dorsal of anterior dorsocentrals.

Abdomen (fig. 75). – Tergite (T) II with one anterior and one posterior transverse band of shagreen, one pair of anterior spinule patches with somewhat stronger shagreen in between; hook row 200 μm long, c. $\frac{3}{4}$ width of TII; length of longest spinules of TII-TV (in μm): 6, 6, 13 and 10; spinules of TII and III in small, circular patches; patches on TIV-V more elongate; patches on TVI not visible; 3 D setae seen on TII and III; segment VIII with 5 lateral taeniae; anal fringe with c. 24 taeniae; posterior lateral comb of segment VIII (fig. 85) c. 32 μm wide, with 4 apical teeth.

Remarks

Unfortunately, only one pharate male was available for examination of pupal characters and several characters normally included in a description could not be seen or measured. Based on the adult male morphology, *Tanytarsus luctuosus* keys to the *T. lugens* species group (Cranston et al. 1989), but does not fit the group diagnosis (Reiss & Fittkau 1971) in having $AR < 1.4$, smooth apex of anal point and a particularly large median volsella with numerous simple setae. *T. luctuosus* share these characters with its probable sister species *T. usambarae* Stur & Ekrem, 2000, but differs by having a median tubercle on the superior volsella, all blackish brown abdominal tergites, and a scutal tubercle. *T. luctuosus* and *T. usambarae* co-exist in the West Usambara Mts., and both were found in the material collected by the same Malaise trap. The pupa keys to the *T. mendax* species group (Pinder & Reiss 1986), but does not resemble the pupa of any other species in the group. If one ignores the developed cephalic tubercles, pupa of *T. luctuosus* will key to the *T. curticornis* species group (Pinder & Reiss 1986). Apart from the cephalic tubercles, the pupa is quite similar to pupae of the other species in this group, especially by the shape of the thoracic horn and the tergite armament. Further decision on the systematic placement of *T. luctuosus* has to await a phylogenetic analysis of the genus.

Tanytarsus mcmillani Freeman

Tanytarsus mcmillani Freeman, 1958: 341. Holotype δ (BMNH) Nigeria, Kankiya, XII.1956-I.1957, leg. B. McMillan; paratypes: 2 δ as holotype and 1 δ (BMNH) Nigeria, Kaduna, 19.X.1956, leg. B. McMillan [all examined].

Tanytarsus atroxitaris Chaudhuri & Datta, in Datta et al., 1992: 42. Holotype δ (Type no. 196, UBI) India, W. Bengal, Jalpaiguri, 26°16'N 88°25'E, 68.5 m a.s.l., 22.III.1988, leg. A. K. De [examined]; paratype δ (UBI) as holotype except collected in Birpara, 26°43'N 89°8'E, 117.8 m a.s.l., 14.X.1990, leg. T. K. Datta [examined] Syn. n.

Additional material examined: 1 δ (BMNH) Saudi Arabia, Medina, W. J. 12.I, 26°42'N 37°15'E, 1000 m a.s.l., 14.XI.1984, leg. W. Buttiker, 1 δ (BMNH) Saudi Arabia, Makkah, W. Maraum, 22°16'N 39°44'E, 280 m a.s.l., 3-4.V.1984, leg. W. Buttiker, 1 δ (ZSM) Kamerun, Adamaoua, 31.IV.1979, leg. W. Flauke & P. Nagel.

Diagnosis

The species differs from other *Tanytarsus* species by the following combination of characters: frontal tubercles well developed; $AR > 1.0$; wings hairy, c. 10-15 setae in cell m; hypopygium with 2-8 median setae on triangular anal tergite, anal point with 4-7 small spines between well developed anal crests; microtrichia present around base of anal point; superior volsella oval with parallel sides, bearing c. 7 dorsal setae, microtrichia absent; small digitus present; median volsella medium large with several foliate and simple lamellae.

Description

Male imago (n = 7 unless otherwise stated). – Total length 2.7-3.2, 3.0 mm. Wing length 1.30-1.75, 1.60 (8) mm. Total length/wing length 1.8-2.0. Coloration. African specimens seems to be somewhat darker with brown thoracic markings and transverse stripes on tergites. Indian specimens yellowish.

Head. – Antenna normally developed with AR 1.08-1.37, 1.25. Ultimate flagellomere 340-581, 516 μm long. Longest antennal seta 340-550 μm long. Distance between eyes c. 150 μm . Frontal tubercles large, 19-23 μm long. Temporal bristles 9-12; including 3-5 inner verticals, 2-4 outer verticals and 2-4 postorbitals. Clypeus semicircular, 58-72, 65 (6) μm long with 10-20, 15 setae. Tentorium 144-161, 155 μm long, 26-48, 38 μm wide at sieve pore. Stipes 139-174, 161 (6) μm long, 13-19, 15 (4) μm wide. Cibarial pump 58-74, 66 (5) μm wide. Lengths of palpomeres (in μm): 26-43, 36; 32-43, 40; 110-133, 126; 113-144, 136; 203-245, 222 (5).

Thorax. – Scutal tubercle absent. Dorsocentrals 8-12, acrostichals 13-17, prealars 1, scutellars 4-8. Halteres with 5-6 setae.

Wing (n = 8). – VR 1.15-1.26, 1.19. Sc bare, R with 20-36, 27 setae, R_1 with 24-36, 29; R_{4+5} with 46-58,

52 setae; M bare; M_{1+2} with 50-70, 60 setae; M_{3+4} with 21-44, 37; Cu with 11-27, 18; Cu_1 with 20-27, 24; PCu with 14-42, 24 and An with 32-44, 36 setae. Cell m with 5-15 setae, r_{4+5} with c. 130-200, m_{1+2} with c. 190-250 including on false vein, m_{3+4} with c. 60-100 and cu and an combined with 40-100 setae.

Legs. – Spur on front tibia 36-42 µm long including scale. Spurs of middle tibia 32-42 µm long including 16-19 µm long comb and 23-36 µm long including 16-18 µm long comb; of hind tibia 36-50 µm long including 18-25 µm long comb and 29-42 µm long including 16-23 µm long comb. Lengths and proportions of legs see table 9.

Hypopygium (fig. 25). – Tergite IX triangular, 114-146, 128 µm long with 2-8, 4 median setae, 14-20, 16 apical setae; apical margin without lateral shoulders; two lateral teeth often visible; microtrichia-free area between anal crests, microtrichia present around base of anal point. Anal point 57-76, 67 µm long, 18-23 µm wide at base and 6-10 µm wide at apex. Anal point with 4-7, 5 spines between well developed anal crests. Anal tergite bands caudally curved, reaching median setae of anal point, no median elongation. Transverse sternapodeme 51-72, 63 (6) µm long; phallapodeme 105-129, 118 (6) µm long. Gonocoxite 133-160, 143 µm long, gonostylus with widest width in middle, 123-164, 143 µm long. Superior volsella oval with parallel sides, bearing 7 dorsal setae and 3 median setae, the middle one somewhat stronger than the other two; dorsolateral microtrichia absent; digitus present, c. half the length of superior volsella. Median volsella (fig. 26) 60-72, 63 µm long including 3-4 foliate and 12-16, 27-39, 30 µm long, simple lamellae. Inferior volsella, club-shaped, relatively straight, 72-100, 91 µm long, with strong apical setae. HR 1.00; HV 1.9-2.2, 2.1.

Remarks

Datta et al. (1992) described *T. atroxitaris* from India as a separate species, but examination of the holotype and one paratype has shown that the diagnostic characters they used are either not species specific or

have been misinterpreted. The ‘digitus’ of *T. atroxitaris* pictured in Datta et al. (1992: 58, fig. 5) has upon examination of the specimen used to create the drawing, been identified as a dorsal fold of the superior volsella, and a result of the mounting procedure. Based on the adult male morphology, *Tanytarsus mcmillani* keys to the *T. lugens* species group (Cranston et al. 1989), but does not fit the group diagnosis (Reiss & Fittkau 1971) in having $AR < 1.4$, smooth apex of anal point and a digitus which is c. half the length of superior volsella. A certain group placement has to await a phylogenetic analysis of the genus.

Tanytarsus spadiceonotatus Freeman

Tanytarsus spadiceonotatus Freeman, 1958: 341. Holotype ♂ (BMNH) Nigeria, Kankiya, XII.1956-I.1957, leg. B. McMillan, paratype 2♂ and 2♀ as holotype [examined].

Additional material examined: 2♂ (ZSM) Ghana, Volta Region, Lake Volta, 5.VII.1966, leg. T. Petr, 1♂ (ZSM) Tchad, Tchadsee, Fort Lamy, 15.V.1965, leg. C. Dejoux, 1♂ (ZSM) South Africa, Krüger National Park, 2.V.1991, UV-Light Trap, leg. I. Pajor.

Diagnosis

The species differs from other *Tanytarsus* species by the following combination of characters: frontal tubercles well developed; $AR > 1.0$; wings with only a few setae on wing tip; hypopygium with 2-4 median setae on anal tergite, anal point with 4-7 small spines between well developed anal crests; superior volsella almost quadrate, posteromedian corner drawn out to a median directed point, 4-6 dorsal setae, microtrichia absent; small, rounded digitus present; median volsella medium large with several foliate and simple lamellae; 3 inner setae on gonocoxite, gonostylus long, narrow and parallel sided. Pupal thoracic horn with long chaetae (at least 2× longer than width of horn) in one row; small cephalic tubercles; pedicel sheath tubercles obvious; spine patches of tergites III, IV, large with long, anally directed spines; spine patches of tergites V

Table 9. *T. mcmillani*. Lengths (in µm) and proportions of legs.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	738-824, 777	371-436, 400	1214-1217 (2)	504 (1)	420 (1)	342 (1)	155 (1)
p ₂	598-740, 692	581-685, 639	371-417, 397 (5)	180-226, 201 (5)	126-155, 144 (5)	76-103, 91 (5)	58-68, 63 (5)
p ₃	665-824, 772	720-859, 807 (6)	511-610, 569 (4)	328-346, 340 (4)	284-317, 299 (4)	166-209, 189 (4)	97 (2)
	LR	BV	SV	BR			
p ₁	2.91-3.19 (2)	1.69 (1)	0.98 (1)	3.1-3.3 (2)			
p ₂	0.60-0.62, 0.61 (4)	3.16-4.00, 3.51 (4)	3.37-3.48, 3.42 (4)	3.1-6.3, 4.4 (4)			
p ₃	0.67-0.71, 0.69 (4)	2.34 (2)	2.74-2.91, 2.84 (4)	3.7-8, 5.3 (4)			

and VI small to minute with lateral rows of shagreen; 2-3 lateral taeniae on segment VII, five on segment VIII; less than 15 taeniae in anal fringe. Larval antenna longer than head capsule when including Lauterborn organs, only the first and $\frac{2}{3}$ of the second antennal segments are well sclerotized; Lauterborn organs minute on pedestals as long as antennal segment two + three; $AR > 2.0$; SI, SII, chaetae and chaetulae basales plumose, SIII and chaetulae laterales simple; mandible with one dorsal tooth well developed, two small spines basally on mola; premandible with four teeth; maxilla with two large and one small, medially directed lacinial chaetae. Middle tooth of mentum paler than other teeth, one large notch on either side.

Male imago ($n = 6$ unless otherwise stated). – Total length 2.4–2.8, 2.6 (5) mm. Wing length 1.25–1.40, 1.30 mm. Total length/wing length 1.8–2.2, 2.0 (5). Coloration. Cleared specimens with head pale, antennae and eyes brown; thorax pale with brown patches anteriorly and laterally on scutum, on median anepisternum II, preepisternum, epimeron II, postnotum and basally on scutellum and anepisternum; abdominal tergites with posterior, brown transverse stripe.

Head. – Antenna normally developed, AR 1.03–1.12, 1.06. Ultimate flagellomere 365–452, 430 μm long. Longest antennal seta c. 500 μm long. Distance between eyes c. 184–216, 200 μm . Frontal tubercles well developed, c. 15 μm long. Temporal bristles 10–11; including 3–4 inner verticals, 3–4 outer verticals and 3–4 postorbitals. Clypeus semicircular, 48–74, 55 μm long with 11–15 setae. Tentorium 113–129, 123 (5) μm long, 23–29, 26 (5) μm wide at sieve pore. Stipes 87–94, 91 (4) μm long, 10 (4) μm wide. Cibarial pump 48–52, 50 (4) μm wide. Lengths of palpomeres (in μm): 23–29; 26–32; 52–64, 57 (5); 68–81, 77 (5); 113–132, 126 (4).

Thorax. – Scutal tubercle absent. Dorsocentrals 4–8, acrostichals 9–12, prealars 1, scutellars 4. Halteres with 3–4 setae (3).

Wing. – VR 1.17–1.31, 1.24. Sc bare, R with 0–12,

6 setae, R_1 with 0–2, 0; R_{4+5} with 1–11, 6 setae; M bare; M_{1+2} with 20–25, 23 setae; M_{3+4} with 0–5, 2; Cu_1 with 0–6, 2 setae; Cu, PCu and An bare. Cell m bare, r_{4+5} with c. 30–50 setae, m_{1+2} with c. 20–40 including on false vein, m_{3+4} with 0–2 setae and cu + an bare.

Legs. – Spur on front tibia 26–32 μm long including scale. Spurs of middle tibia 16–19 μm long including 10–13 μm long comb; of hind tibia 23–32 μm long including 13–16 μm long comb. Middle tibia with 5–6 sensilla chaeticae. Lengths and proportions of legs see table 10.

Hypopygium (fig. 35). – Tergite IX 98–115, 107 μm long with 2–4 median setae, 10–14 apical setae; apical margin without lateral shoulders; microtrichia-free area between anal crests. Anal point 47–70, 54 μm long, 14–21, 16 μm wide at base and 6–8 μm wide at apex. Anal point with 4–7, 5 spines between well developed anal crests. Anal tergite bands caudally curved, not reaching median setae of anal point, no median elongation. Transverse sternapodeme 39–47, 42 μm long; phallapodeme 92–100, 96 μm long. Gonocoxite 111–123, 117 (5) μm long with three inner setae, gonostylus sausage-shaped, 109–119, 113 (5) μm long. Superior volsella almost quadrate, posteromedian corner drawn out to a median directed point, 4–6 dorsal setae, microtrichia absent; small rounded digitus present. Median volsella (fig. 36) 37–47, 41 μm long including 3–4 falciform and 8–10, 16–25 μm long, simple lamellae. Inferior volsella relatively straight, 66–82, 77 μm long, with strong apical setae. HR 0.97–1.09, 1.03 (5); HV 2.11–2.39, 2.25 (4).

Female paratypes do exist but can not be associated with males with certainty.

Pupa ($n = 10$). – Total length 3.2–4.0, 3.8 mm; abdomen length 2.5–3.0, 2.6. Coloration light brown with darker areas around shagreen and spine patches on tergites II through VI. Muscle marks dark brown.

Cephalothorax (fig. 57, 66). – Length of frontal setae 45–62, 52 μm , cephalic tubercles low 18–22, 19 (fig. 57). Pedicel sheath tubercle well developed. Tho-

Table 10. *T. spadiceonotatus*. Lengths (in μm) and proportions of legs.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	452–523, 489	274–300, 288	636–717, 683 (5)	310–352, 338 (5)	258–297, 276 (5)	178–197, 191 (5)	81–97, 89 (5)
p ₂	446–507, 484	410–475, 452	252–258, 255 (3)	132–139, 136 (3)	97 (3)	64–71, 66 (3)	55 (3)
p ₃	484–589, 525	543–656, 613	384–417, 398 (4)	194–258, 229 (4)	178–223, 204 (4)	129–139, 133 (3)	71–84, 75 (3)
	LR	BV	SV	BR			
p ₁	2.21–2.51, 2.37 (5)	1.57–1.71, 1.63 (5)	1.06–1.22, 1.14 (5)	3.1–3.3, 3.2 (4)			
p ₂	0.56–0.61, 0.58 (3)	3.10–3.38, 3.28 (3)	3.40–3.65, 3.53 (3)	4.5–5.5, 4.9 (3)			
p ₃	0.63–0.66, 0.65 (4)	2.28–2.57, 2.41 (3)	2.79–2.97, 2.89 (4)	5.5–7.3, 6.2 (3)			

racic horn (fig. 60) 360-504, 438 μm long, 22-29, 25 μm wide, with a row of 112-152, 126 μm long chaetae basal $\frac{2}{3}$. Three precorneals in a triangular pattern, posterior precorneal, 76-112, 88 μm long, anterior two precorneals 50-79, 63 μm and 50-94, 68 μm long; 1 lateral anteprepronotals visible 47-70, 54 μm long, 1 median anteprepronotals 47-76, 61; 2 pairs of dorsocentrals, anterior pair 36-61, 47 (thin) μm and 36-54, 42 (thick) μm long, posterior pair 47-72, 62 (thin) and 54-72, 64 (thick) μm long. Fine granulation along scutal suture. Nose of wing sheath and prealar tubercle well developed.

Abdomen (fig. 70, 79). – Shagreen on tergite (T) II as in fig. 70; pedes spurii B absent; hook row 90-126, 106 μm long, c. $\frac{1}{3}$ width of TII; length of longest spines of TIII-TVI (in μm): 61-90, 68; 43-61, 51; 10-18, 13 and 7-11, 8; spines of TIII in large, 137-176, 154 μm long, diagonal patches on posterior half of tergite; spines of TIV in large, 154-202, 172 μm long, straight patches on middle of tergite; spines of TV and VI in small 40-54, 47 and 22-36, 31 μm long patches anteriorly on tergites; segment II-VI with 3, 30 μm long L setae; segment VII sometimes with one L setae, c. 45 μm long and 2-3 lateral taeniae, c. 160-200 μm long; segment VIII with 5, c. 230-300 μm long lateral taeniae; anal lobe with 2 dorsal, 234-450, 330 (8) μm long taeniae, anal fringe with 10-14, 11 c. 250-300 μm long taeniae; posterior lateral comb of segment VIII (fig. 83) 43-72, 54 (9) μm wide with 9-14 (9) apical teeth. Lengths of genital sacs: 202-234, 217 μm (δ , n=4) and 90-94, 92 μm (η , n=5).

Larva (n = 10 unless otherwise stated). – Total length c. 3,8 mm.

Head. – Length of head capsule 252-274, 263 μm , width 198-216, 209 μm , length/width = 1.24-1.31, 1.27. Antennal pedestal 66-90, 78 μm long, with an indication of a medially directed spur. Antenna (fig. 87) 5-segmented, including Lauterborn organs always longer than head capsule; only first and basal $\frac{2}{3}$ of second antennal segment well sclerotized; lengths of segments (in μm): 124-156, 138; 34-50, 40; 9-14, 13 (8); 5-7, 5 (8) and 2-3, 3 (8). AR 2.05-2.43, 2.27 (8). Antennal blade 16-30, 26 (8) μm long, antennal seta 30-52, 43 (7) μm long at $\frac{2}{3}$ length of antennal segment 1. Mandible (fig. 97) 89-100, 93 (9) μm long, 43-57, 46 (9) wide with 1 ventral apical tooth, 3 ventral inner teeth, and 1 dorsal apical tooth present; two basal molar spines; two outer mandibular setae present; seta subdentalis thick, c. 41-45, 43 μm long and curved, reaching beyond apex of dorsal tooth; seta interna well developed with 4 main branches. Premandible (fig. 92) with 4 teeth. Mentum (fig. 102) 54-68, 60 μm wide with 11 teeth; median tooth paler than other teeth, with lateral notches; ventromental plate 83-93, 87 μm wide. Labrum with S I, SII, chaetae and chaetulae

basales plumose; chaetulae laterales simple; S3 long and simple; labral lamella comblike; pecten epipharyngis consisting of three plumose lobes; maxilla with two long and one short lacinial chaetae, palp normally developed.

Body. – Anterior and posterior parapods with simple claws; procercus c. 54 (1) μm long with one small dorsal and one small lateral seta. Seven anal setae: 4 short, c. 140-200 μm and 3 long, c. 280-330 μm long. Four large anal tubules c. 144 (1) mm long.

Remarks

Based on the adult male morphology, *Tanytarsus spadiceonotatus* keys to the *T. lugens* species group (Cranston et al. 1989), but does not fit the group diagnosis (Reiss & Fittkau 1971) in having AR < 1.4, smooth apex of anal point, an almost quadrate superior volsella and in being smaller than the European species in the group. Ignoring the small digitus, *T. spadiceonotatus* will key to the *T. mendax* group (Cranston et al. 1989), but differs from the other members in this group in having smaller frontal tubercles, no digitus and a different shape of the superior volsella. The pupae of *T. spadiceonotatus* will key to the *T. eminulus* species group when regarding the cephalic tubercles to be low and the spine patches of TIII to be posteriorly diverging. The single row of long chaetae on the thoracic horn, however, is a character typical for members of the *T. mendax* group. It is not possible to indicate a placement for the larva of *T. spadiceonotatus* yet, and a conclusive systematic placement for this species has to await a phylogenetic analysis of the genus *Tanytarsus*.

Tanytarsus trifidus Freeman

Tanytarsus trifidus Freeman, 1958: 343. Holotype δ (BMNH) Nigeria, Kankiya, XII.1956- I.1957, leg. B. McMillan; paratypes 2 δ as holotype and 1 δ as holotype except in Nigeria, Zaria, XII.1956 [examined].

Additional material examined: 5 δ (ZMBN) Ghana, Central Region, Kakum forest reserve, Malaise trap, 8.-18. XI.1994, leg. NUFU- project; 5 δ (ZMBN) Ghana, Western Region, Ankasa game production reserve, Malaise trap, 7.-11. XII.1993, leg. NUFU- project; 1 δ (UQC) Nigeria, Opi Lake, emergence trap, 26. III.1977, leg. L. Hare; 9 δ as previous except 10. V.1977, 13-26. V.1977, 27. IV-10. V.1978, 12-22. XI.1978, 14-27. I.1979, 14-31. I.1979 and 9-10. II.1980; 1 η as previous except 26. III.1977; 2 associated η with Pex as previous except 21-27. V.1978 and 9-11. XII.1978; 2 associated δ with Pex as previous except 10. V.1978 and 14-20. I.1979; 10 Pex as previous except 13. IV-17. V.1977, 28. I-7. II.1979 and 14-31. I.1979; 1 single reared δ with larval and pupal exuviae as previous, except 28. IV.1977.

Diagnosis

Tanytarsus trifidus differs from other *Tanytarsus* species by the following combination of characters: Hypopygium with 2-6 median setae on anal tergite; anal point somewhat triangular with spines between well developed anal crests; superior volsella well developed with concave median margin; digitus large, S-formed when squeezed, bearing one seta at half length; median volsella, small, with three pectinate lamellae that are almost only visible if the hypopygium is squeezed. Pupal thoracic horns long, slender with small chaetae evenly distributed on apical halves, medium long cephalic tubercles with longer frontal setae; frontal apotome and anterodorsal part of cephalothorax granulated; pedicel sheath tubercles small or absent; hook row c. $\frac{2}{3}$ width of tergite II; spine patches of tergites III, IV, V and VI relatively small, elongate on anterior parts of tergites; lateral taeniae on segment V through VIII. Larva with fine haired premento-hypopharyngeal complex; dorsal tooth of mandible well developed; Middle tooth of mentum pale with one large notch on either side; ventromental plate with very weak striation; six anal setae on procerus.

Description

Male imago (n = 7-10). – Total length 1.5-2.1, 1.9 mm. Wing length 0.95-1.34, 1.13 mm. Total length/wing length 1.60-1.81, 1.72. Coloration. Cleared specimens with head light brown, darker brown pedicel, apodemes and eyes; thorax with dark brown patches anteriorly and laterally on scutum, basally on postnotum and on preepisternum; legs light brown; abdomen pale yellowish.

Head. – Antenna normally developed, AR 0.50-0.81, 0.62. Thirteenth flagellomere 226-355, 301 μ m long. Longest antennal seta c. 310-450 μ m long. Distance between eyes 113-149, 132 μ m small frontal tubercles, c. 4 μ m long. Temporal bristles 6-10; including 1-3 inner verticals, 2-5 outer verticals and 2-4 postorbitals. Clypeus semicircular, 43-55 μ m long with 10-14 setae. Tentorium 82-126, 102 μ m long,

16-29 μ m wide at sieve pore. Stipes 74-120, 104 μ m long, 8-12 μ m wide. Cibarial pump 31-58 μ m wide. Lengths of palp segments (in μ m): 20-27, 24; 26-32, 28; 70-101, 88; 78-109, 90; 137-168, 153.

Thorax. – Dorsocentrals 4-8, acrostichals 10-18, prealars 1, scutellars 4. Halteres with 4-6 setae.

Wing. – VR 1.12-1.40, 1.23. Brachiolium with 1 seta, Sc bare, R with 13-18 setae, R_1 with 13-17, R_{4+5} with 21-28, M_{1+2} with 21-38, M_{3+4} with 20-29, Cu with 10-27, Cu_1 with 12-19, PCU with 19-32 and An with 12-24 setae. Cell m bare, r_{4+5} with 66-140 setae, m_{1+2} with 94-200 setae including on false vein, m_{3+4} with 28-75, cu with 10-84 and an with 3-24.

Legs. – Spur on front tibia c. 25 μ m long including scale. Spurs of middle tibia 24-30 μ m long including 12-16 μ m long comb and 18-27 μ m long including 12-16 μ m long comb; of hind tibia 29-43 μ m long including 12-16 μ m long comb and 21-32 μ m long including 12-16 μ m long comb. Middle tibiae with 0-4 sensilla chaeticae. Lengths and proportions of legs see table 11.

Hypopygium (figs. 48, 49). – Tergite IX 58-94, 76 μ m long with 2-6 median and 10-12 apical setae; apical margin without shoulders; lateral teeth not visible; microtrichia absent in small areas on either side of base of anal point. Anal point somewhat triangular, 25-36 μ m long, 10-19 μ m wide at base and 4-5 μ m wide at apex. Anal point with 2-6 spines between well developed anal crests. Broad anal tergite bands curved apically, ending far from anal point. Transverse sternapodeme 29-41, 37 μ m long, phallapodeme 70-98, 82 μ m long. Gonocoxite 72-111, 99 μ m long, gonostylus 60-100, 84 μ m long. Superior volsella (fig. 50) with concave median margin; bearing 2-3 small dorsal setae; 2-3 small lateral setae and 2 median setae; dorso-lateral microtrichia absent; digitus long, reaching well beyond median margin of superior volsella, S-shaped with 1 seta placed on small tubercle at half length. Median volsella (fig. 51) 4-6 μ m long with 3, 10-14 μ m long, pectinate lamellae. Inferior volsella relatively straight, 43-74, 64 μ m long. HR 1.04-1.24, 1.17; HV 2.07-2.86, 2.36.

Table 11. *T. trifidus*. Lengths (in μ m) and proportions of legs.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	449-585, 515	203-255, 237	655-866, 730	296-397, 346	250-320, 283	187-220, 207	82-107, 92
p ₂	433-552, 501	351-488, 466	199-313, 258	90-145, 111	55-97, 74	39-58, 46	31-48, 38
p ₃	437-575, 517	452-633, 533	292-410, 341	176-233, 197	148-203, 175	90-116, 103	55-71, 61
	LR	BV	SV	BR			
p ₁	2.88-3.41, 3.16	1.52-1.72, 1.60	0.97-1.06, 1.02	2.7-3.5, 3.1			
p ₂	0.54-0.64, 0.60	3.88-4.57, 4.25	3.32-4.08, 3.70	3.6-6.3, 5.1			
p ₃	0.65-0.70, 0.68	2.42-2.55, 2.50	2.81-3.04, 2.93	5.0-5.8, 5.4			

Pupa (n = 10). – Total length 2.2–2.8, 2.5 mm. Coloration light brown.

Cephalothorax (fig. 55, 68). – Length of frontal setae 51–98, 74 μ m, cephalic tubercles relative small, conical (fig. 55), 16–27, 19 μ m long. Frontal apotome (fig. 55) with patches of granulation anterior of cephalic tubercles. Pedicel sheath tubercle small or absent. Thoracic horn slender, 449–566, 502 μ m long, 12–27 μ m wide, with small, 2–5 μ m long, chaetae, evenly distributed on apical half. Three precorneals in a triangular pattern, one precorneal strong, 60–103, 80 μ m long, the other two precorneals 29–48, 43 μ m long; anteprenotals 3: median 38–47, 55 μ m long, laterals 24–60, 40 and 7–12 μ m long; 2 pairs of dorsocentrals with 1 thin and 1 thick seta in each pair, anterior pair 31–50, 42 (thin) and 19–34, 27 (thick) μ m long, posterior pair 36–65, 51 (thin) and 36–46, 40 (thick) μ m long. Fine granulation dorsal of anterior dorsocentrals. Nose of wing sheath well developed c. 15 μ m long.

Abdomen (figs. 74, 76). – Shagreen on tergite (T) II as in fig. 76; pedes spurii B on TII weak; hook row 132–168, 148 μ m long, c. $\frac{2}{3}$ width of TII; spines of TIII–VI 2–10 μ m long, in anterior, small, elongated patches; segment I with 2 D and 2 L setae, segment II with 2 D, 2 V and 3, 12–24 μ m long L setae; segment III with 5 D, 2 V and 3, 12–24 μ m long L setae; segment IV with 5 D, 3 V and 3, 12–24 μ m long L setae; segment V with 5 D, 3 V and 3, c. 100 μ m long lateral taeniae; segment VI with 5 D, 4 V and 3, c. 100 μ m long lateral taeniae; segment VII with 4 D, 4 V and 4, c. 100–140 μ m long lateral taeniae; segment VIII with 1 D, 1 V and 5, c. 100–150 μ m long lateral taeniae of which the third seta is placed more medially than the other four; anal lobe with 2 dorsal, c. 150 μ m long taeniae, anal fringe with 14–17, 240–350, 330 μ m long taeniae; posterior lateral comb of segment VIII (fig. 84) 12–19 μ m wide with 7–9 apical teeth.

Larva (n = 1). – Length of head capsule 269 μ m, width 199 μ m, length/width = 1.35.

Head. – Antenna unfortunately missing from the slide. Antennal pedastal 53 μ m long. Mandible (fig. 94) 98 μ m long with 3 ventral inner teeth, and 1 dorsal apical tooth present; two outer mandibular setae present; seta subdentalis thick, c. 36 μ m long and curved, reaching well beyond apex of dorsal tooth; seta interna well developed with 4 main branches. Mentum (fig. 101) 55 μ m wide with 11 teeth; median tooth pale with large lateral notches; ventromental plate, 84 μ m wide, with very weak striation; premento-hypopharyngeal consisting of a hairlike comb (fig. 101). S3 simple, other labral structures not visible.

Body. – Anterior and posterior parapods with simple claws; procercus with 6 anal setae: 2 short, c. 120 μ m long and 4 long c. 240 μ m long.

Remarks

Diagnosis and description of larva is based on parts of one exuvia with missing antennae, and is therefore incomplete. Based on adult male characters, *Tanytarsus trifidus* keys out to the *chinyensis*-group (Cranston et al. 1989), and the species fulfils all the requirements given by Reiss & Fittkau (1971) in the group diagnosis. After examining material of the species *Tanytarsus brundini*, *T. chinyensis*, *T. cretensis* and *T. curticornis* located in the Zoologische Staatssammlung München, it is clear that the presence of one seta on the digitus itself and two setae on the median margin of superior volsella might be diagnostic characters for the *T. chinyensis* species group. Males of *T. trifidus* separates from the other species in the *T. chinyensis*-group by having a low AR (0.60), a strongly S-shaped digitus with one seta at half length and a small median volsella with three pectinate lamellae. *T. trifidus* keys to the same group based on pupal morphology (Pinder & Reiss 1986). Unfortunately, the number of lateral taeniae on segment VIII is used by Pinder & Reiss (1986) as a separating character in the key to *Tanytarsus* species groups. This characters has shown to be intraspecifically variable, and the number of lateral taeniae on segment VIII can even be different on either side of the same specimen! After examining associated material of *T. brundini*, *T. chinyensis*, *T. cretensis*, *T. curticornis* and *T. trifidus*, the following combination of characters seems to be diagnostic for pupae of the *T. chinyensis*-group: Cephalic tubercles small; chaetae small, evenly distributed on at least apical $\frac{1}{2}$ of thoracic horn; tergite spines short, in elongated anterior spine patches on segments III–VI. *T. trifidus* pupae can be separated from the other species in the *chinyensis*-group by the following combination of characters: granulated frontal apotome, slender thoracic horn with very short chaetae (2–5 μ m) on apical $\frac{1}{2}$, the small amount of taeniae in anal fringe (<17) and the lateral taeniae on segment V–VIII. According to Hofmann (1971), larvae with a very long tapered spur distally on the antennal pedastal characterizes the larvae of the *T. chinyensis* species group. No such spurs are recognizable on the larval exuvia available for *T. trifidus*, but the spurs could have been lost together with the antennae.

In Opi Lake, *T. trifidus* was common in the whole sampled depth range (0–1 m), and found on muddy substrate (Hare & Carter 1987).

Tanytarsus zariae Freeman

Tanytarsus zariae Freeman, 1958: 342. Holotype ♂ (BNMH) Nigeria, Zaria, 11.XI.1956, leg. B. McMillan, paratypes 1 ♂ as holotype, 1 ♂ (BNMH) Ghana, Red Volta, Nangodi, 8.X.1954, leg. G. Crisp [examined].

Additional material examined: 1 ♂ (ZMBN) Ghana, Eastern Region, Boti Falls, light trap, 14.XI.1994, leg. NUFU-project; 2 ♂ (ZMBN) Burkina Faso, Lanviera, 26.VI.1973, leg. C. Dejoux; 1 ♂ (ZMBN) Benin, Vossa, 10.XI.1982, leg. C. Dejoux.

Diagnosis

The species differs from other *Tanytarsus* species by the following combination of characters: frontal tubercles well developed; $AR > 1.1$; wings hairy with c. 10 setae in cell m; hypopygium with 3-6 median setae on anal tergite, anal point with apical tubercle, 4-6 small spines and microtrichia between well developed anal crests; superior volsella kidney-shaped with 5-6 long, dorsal setae, microtrichia absent; digitus long, usually reaching well beyond posteromedian margin of superior volsella; median volsella medium large with several foliate and simple lamellae; gonostylus with widest width at $\frac{1}{3}$ length.

Description

Male imago (n = 4 unless otherwise stated). – Total length 2.4-3.0, 2.7 mm. Wing length 1.39-1.68, 1.51 (3) mm. Total length/wing length 1.7-2.0, 1.8. Coloration. Cleared specimens light greenish with light brownish eyes, antennae, stripes anteriorly and laterally on scutum and on postnotum.

Head. – Antenna normally developed with AR 1.12-1.22, 1.19 (3). Ultimate flagellomere 523-572, 549 (3) μ m long. Longest antennal seta c. 500 μ m long. Distance between eyes c. 145-168, 162 μ m. Frontal tubercles well developed, c. 18 μ m long. Temporal bristles 9-11; including 2-3 inner verticals, 3-4 outer verticals and 3-4 postorbitals. Clypeus semicircular, 64-94 (2) μ m long with 11-17 setae. Tentorium 139-155, 147 μ m long, 32-36, 34 μ m wide at sieve pore. Stipes 139-155, 146 (3) μ m long, 10-13 (3) μ m wide. Cibarial pump 55-68, 58 μ m wide. Lengths of palpomeres (in μ m): 32-39; 32-42; 94-168, 126; 107-149, 123; 200-284, 229.

Thorax. – Scutal tubercle absent. Dorsocentrals 6-9, acrostichals 14-18, prealars 1, scutellars 5-6, halteres with 6-9 setae.

Wing. – VR 1.22-1.28, 1.25. Sc bare, R with 21-32, 27 setae, R_1 with 28-39, 34; R_{4+5} with 57-72, 64 setae; M bare; M_{1+2} with 54-68, 62 (3) setae; M_{3+4} with 34-41, 37 (3) setae; Cu with 17-21, 19; Cu_1 with 21-24, 23; PCu with 22-29, 25 and An with 26-31, 28 setae. Cell m with c. 10 setae, r_{4+5} with c. 150-200 setae, m_{1+2} with c. 250 including on false vein, m_{3+4} with c. 80 and cu + an with c. 100 setae.

Legs. – Spur on front tibia 36-42 μ m long including scale. Spurs of middle tibia 32-45 μ m long including 16-23 μ m long comb; of hind tibia 42-52 μ m long including 19-25 μ m long comb. Middle tibia with 6-7 sensilla chaeticae. Lengths and proportions of legs see table 12.

Hypopygium (fig. 43). – Tergite IX 109-127, 120 μ m long with 4-6 median setae, 20-24 apical setae; apical margin without lateral shoulders, but seems divided into three lappets; microtrichia present between spines of anal point. Anal point 51-66, 58 μ m long, 21-27, 24 μ m wide at base and 2-4 μ m wide at apex. Anal point with 4-6 spines between well developed anal crests. Anal tergite bands short, caudally curved. Transverse sternapodeme 41-57, 50 μ m long; phallopodeme 107-123, 115 μ m long. Gonocoxite 133-148, 139 μ m long with three inner setae, gonostylus with widest width at $\frac{1}{3}$ length, 123-131, 127 μ m long. Superior volsella (fig. 44) oval with parallel edges, 4-5 long, dorsal setae, microtrichia absent; digitus long, reaching beyond posteromedian margin of superior volsella. Median volsella (fig. 44) 51-66, 57 μ m long including 3-4 falciform and 13-14, 25-35 μ m long, simple lamellae. Inferior volsella thick, relatively straight, 88-98, 94 μ m long, with strong apical setae. HR 1.03-1.13, 1.09; HV 2.17-2.27, 2.21 (3).

Remarks

Based on the adult male morphology, *Tanytarsus zariae* keys to the *T. eminulus* species group (Cranston et al. 1989), and fit the group diagnosis except for the narrow apical tubercle of the anal point (Reiss & Fittkau 1971).

Table 12. *T. zariae*. Lengths (in μ m) and proportions of legs.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	833-1052, 901	355-420, 384	1256-1650, 1403 (3)	533-707, 600 (3)	455-559, 502 (3)	381-475, 425 (3)	168-191, 181 (3)
p ₂	669-875, 688	636-743, 671	404-517 (2)	236-265 (2)	136-168 (2)	17-97 (2)	48-61 (2)
p ₃	795-930, 845 (3)	789-930, 848 (3)	559-682, 606 (3)	336-404, 360 (3)	294-362, 323 (3)	178-226, 201 (3)	87-97, 93 (3)
	LR	BV	SV	BR			
p ₁	3.35-3.84, 3.53 (3)	1.55-1.62, 1.59 (3)	0.89-0.97, 0.94 (3)	2.7-3.2, 3.0 (3)			
p ₂	0.63 (2)	3.55-3.61 (2)	3.13-3.35 (2)	4.4-5.8 (2)			
p ₃	0.70-0.73, 0.72 (3)	3.34-2.39, 2.36 (3)	2.73-2.83, 2.80 (3)	4.1-6.7, 5.4 (3)			

DISCUSSION

As the systematic discussion after each species description indicates, Afrotropical *Tanytarsus* species do not fit well in the European species groups erected by Reiss & Fittkau (1971) (see also Ekrem 1999), and most of the group diagnoses have to be emended quite a bit to fit certain species. It is no doubt that a world revision including phylogenetic analyses of the genus *Tanytarsus* is required to test the existing and create possible new species groups.

SPECIES LISTS AND KEYS

Afrotropical *Tanytarsus* species and their distribution

- T. ankasaensis* sp. n. Ghana
T. aterrimus Freeman, 1954. South Africa, Zimbabwe (Freeman 1958, Freeman & Cranston 1980, Harrison 1997)
T. atomarius Kieffer, 1918. South Africa, ? Seychelles (Freeman 1958)
T. atrocinctus Goetghebuer, 1936. Democratic Republic of Congo (Freeman 1958)
T. balteatus Freeman, 1955. (Misspelled *balateatus* in Freeman & Cranston 1980) Sudan, Nigeria, Uganda, Democratic Republic of Congo, South Africa, Tchad, Central African Republic, India, Nepal (Freeman 1958, Dejoux 1968c, 1976a, Reiss 1971, Datta et al. 1992)
T. bifurcus Freeman, 1958. Burkina Faso, Tchad, Mali, Nigeria, Ghana (Dejoux 1968a, 1968c, 1974, Freeman & Cranston 1980)
T. congas Lehmann, 1981. Democratic Republic of Congo (Lehmann 1981), Ghana, Senegal (new records)
T. elisabethae sp. n. Nigeria
T. flexistilus Freeman, 1958. Burkina Faso, Tchad, Nigeria (Dejoux 1968a, 1968c, Hare & Carter 1987), Ghana (new record)
T. formosanus Kieffer, 1912. AFRICA: Central African Republic, Tchad, Nigeria, Ghana, Togo, Benin, Sudan, Kenya, Democratic Republic of Congo, Uganda, Burkina Faso, South Africa (Freeman 1957a, 1958, Dejoux 1968a, 1968b, 1968c, 1976a, 1976b, 1984 Petr 1972, Hare & Carter 1987, Harrison 1987, Verschuren 1997). WEST PALAEARCTIC: South France, South Spain, Middle East (Goetghebuer 1934, Reiss & Fittkau 1971, Langton 1991, Laville & Tourenq 1968, Laville & Reiss 1992). SOUTH ASIA: Taiwan, Hubei Province, China, India, Sumatra, Thailand (Kieffer 1923a, Hashimoto et al. 1981, Chaudhuri et al. 1984, Kikuchi & Sasa 1990, Chaudhuri et al. 1992, Wang & Zheng 1992, Mazumdar et al. 1998)
T. harei sp. n. Nigeria, Senegal, Côte d'Ivoire

- T. kakumensis* Ekrem, 1999. Ghana
T. luctuosus Freeman, 1958. South Africa, Zimbabwe, Democratic Republic of Congo, Tanzania (Lehmann 1979, Freeman & Cranston 1980, Stur & Ekrem 2000)
T. mcmillani Freeman, 1958. Senegal, Nigeria, Tchad, Saudi Arabia, Cameroun, India (Dejoux 1974, Freeman & Cranston 1980, Cranston & Judd 1989, Datta et al. 1992)
T. minutipalpus Ekrem & Harrison, 1999. Ethiopia, Kenya, Tanzania
T. nocticola Kieffer, 1911. Egypt, Sudan, Democratic Republic of Congo (Freeman 1958, Freeman & Cranston 1980)
T. pallidissimus Kieffer, 1911. Seychelles (Freeman & Cranston 1980)
T. pallidulus Freeman, 1954. South Africa, Mozambique, Nigeria, Zimbabwe, Democratic Republic of Congo, Saudi Arabia (Freeman & Cranston 1980, Cranston & Judd 1989)
T. pseudocongas Ekrem, 1999. Ghana, Nigeria (new record)
T. saetheri Ekrem, 1999. Ghana, Côte d'Ivoire (new record)
T. spadiceonotatus Freeman, 1958. Nigeria, Tchad, Zimbabwe, Senegal, Burkina Faso (Dejoux 1968a, 1968c, 1974, 1976a, 1977, Freeman & Cranston 1980, Hare & Carter 1987)
T. spiesi Ekrem, 1999. Ghana
T. superpenicillatus Ekrem, 1999. Ghana
T. tossai Ekrem, 1999. Ghana, Nigeria (new record)
T. trifidus Freeman, 1958. Nigeria, Madagascar, Ghana, Burkina Faso, Saudi Arabia, Central African Republic, Senegal, Mali, Tchad (Dejoux 1968a, 1968c, 1974, 1976a, Hare & Carter 1987, Cranston & Judd 1989)
T. usambarae Stur & Ekrem, 2000. Tanzania
T. zariae Freeman, 1958. Nigeria, Tchad, Ghana, Senegal, Benin (Dejoux 1968a, 1968c, 1974, 1984)

***Tanytarsus* species of Ghana**

- T. ankasaensis* sp. n. (Western region: Ankasa Game Production Reserve; Great Accra region: Accra)
T. bifurcus Freeman, 1958. (Northern region: Sogo)
T. congas Lehmann, 1981. (Western region: Ankasa Game Production Reserve; Eastern region: Subri stream; Central region: Kakum Forest Reserve)
T. flexistilus Freeman, 1958. (Northern region: at Sogo river; Volta region: Kpong)
T. formosanus Kieffer, 1912. (Volta region: Kpong)
T. kakumensis Ekrem, 1999. (Central region: Kakum Forest Reserve)
T. pseudocongas Ekrem, 1999. (Western region: Ankasa Game Production Reserve; Volta Region: Agumatsa waterfalls)

- T. saetheri* Ekrem, 1999. (Western region: Ankasa Game Production Reserve)
T. spiei Ekrem, 1999. (Central Region, Kakum Forest Reserve)
T. superpenicillatus Ekrem, 1999. (Eastern region: Bothi waterfalls; Eastern region: Subri stream)
T. tossai Ekrem, 1999. (Western region: Ankasa Game Production Reserve; Volta region: Agumatsa waterfalls)
T. trifidus Freeman, 1958. (Central region: Kakum Forest Reserve; Western region: Ankasa Game Production Reserve)
T. zariae Freeman, 1958. (Eastern region: Bothi waterfalls)

Key to Afrotropical *Tanytarsus* males

Tanytarsus africanus Kieffer, 1913, *T. misorus* Kieffer, 1913, *T. tropicalis* Kieffer, 1913, *T. brachyopsis* Kieffer, 1913, *T. apicalis* Kieffer, 1913, *T. nilobius* Kieffer, 1923b and *Hexatanytarsus albiradix* Kieffer, 1923b are all regarded as doubtful species by Freeman (1958).

1. Anal point without spines or with one pair of lamellae between crests.....2
 - Anal point with stout spines between anal crests (figs. 1, 3, 5, 7)8
2. Digitus long, clearly extending beyond inner margin of superior volsella3
 - Digitus not extending beyond inner margin of superior volsella7
3. Superior volsella almost square with convex inner margin, median volsella very long with setae in a fan-like arrangement reaching apex of inferior volsella (Freeman 1958: 334, fig. 10b)
 - *T. balteatus*
 - Superior volsella of different shape with apical, median directed point, median volsella not reaching apex of inferior volsella.....4
4. Anal point bifid, with one pair of lamellae between crests (Freeman 1958: 334, fig. 10g)
 - *T. bifurcus*
 - Anal point simple.....5
5. Median volsella broad and knob like, inferior volsella short, as long or only a little longer than apex of gonocoxite (Freeman 1958: 334, fig. 10f, misspelled 'noticolor') *T. nocticola*
 - Both median and inferior volsella longer than above6
6. Superior volsella large with an obvious projection on lateral margin, digitus with broad base, inferior volsella reaching to about ½ length of gonostylus (Freeman 1958, p. 334, fig. 10h)
 - *T. atomarius*
 - Superior volsella medium sized, digitus with narrow base, inferior volsella reaching to about ½ length of gonostylus (Freeman 1958: 334, fig.

- 10i) *T. pallidissimus*
7. Superior volsella roughly oval, inferior volsella with parallel margins (Freeman 1958: 334, fig. 10c) *T. pallidulus*
 - Superior volsella L-shaped, with broad base, inferior volsella club shaped (Freeman 1958: 334, fig. 10) *T. atrocinctus*
8. Digitus of superior volsella with one seta (fig. 6) .
 -9
 - Digitus absent or without seta11
9. Median volsella with three pectinate lamellae, digitus S-shaped (figs. 50, 51) *T. trifidus*
 - Median volsella with falciform and pectinate lamellae, digitus straight with swollen apex10
10. Seta on digitus placed basally, AR less than 0.45, LR, less than 2.90 (figs. 30, 31) ... *T. pseudocongus*
 - Seta on digitus placed at ½ length, AR larger than 0.6, LR, larger than 3.0 (figs. 5, 6) *T. congus*
11. Superior volsella roughly square, anal tergite bands of Y-type ending between crests of anal point (fig. 3) *T. aterrimus*
 - Superior volsella elongate or with several pointy edges, anal tergite bands never of Y-type12
12. Digitus clearly overreaching median margin or apex of superior volsella (figs. 11, 32, 37)13
 - Digitus never much longer than apex of superior volsella17
13. Crests of anal point long and parallel sided, superior volsella elongate14
 - Crests of anal point short or V-shaped, superior volsella round or triangular (figs. 32, 37)16
14. Superior volsella with deep median invagination (figs. 11, 13) *T. flexistilus*
 - Superior volsella with fairly straight median margin15
15. Microtrichia present between spines of anal point, tip of anal point with small tubercle (fig. 43) *T. zariae*
 - Microtrichia absent between spines of anal point, tip without small tubercle21
16. Long V-shaped anal crests, superior volsella with dorsolateral microtrichia, digitus with median microtrichia (figs. 32, 33) *T. saetheri*
 - Anal crests short, no microtrichia on superior volsella or digitus (fig. 37) *T. spiei*
17. Palpomeres normally developed and digitus absent or minute and median volsella long, always reaching past apex of superior volsella not counting its lamellae (figs. 19, 39)18
 - Palpomeres reduced or digitus easily distinguishable or median volsella (without lamellae) not reaching beyond apex of superior volsella (fig. 17)22
18. Gonostyli very short, HR > 1.6 (fig. 19)
 - *T. kakumensis*
 - Gonostyli not reduced19

19. Lamellae of median volsella reaching tip of gonostylus (fig. 39) *T. superpenicillatus*
 - Lamellae of median volsella long and setiform but never reaching apex of gonostylus (fig. 45)20
20. Scutal tubercle present, small posteromedian tubercle on superior volsella (figs. 21, 22, 23) *T. luctuosus*
 - Scutal tubercle absent, small posterolateral tubercle on superior volsella (figs. 45, 46) *T. usambarae*
21. Large microtrichia-free area at base of anal point (figs. 14, 17)22
 - Microtrichia present at anal point base (fig. 25)27
22. Anal point with swollen apex, gonostyli narrow and parallel sided, lamellae of median volsellae bent caudally (fig. 41) *T. tossai*
 - Anal point with normal, rounded apex, gonostyli not narrow or parallel sided, lamellae of median volsellae not bent caudally (figs. 7, 27)23
23. Palpomeres reduced, median setae absent from anal tergite (fig. 27) *T. minutipalpus*
 - Palpomeres normal, 2 or more median setae present on anal tergite24
24. Scutal tubercle well developed. Anal point long and thin with small spines between relatively low anal crests (figs. 7, 10) *T. elisabethae*
 - Scutal tubercle absent. Anal point wide with large spines between well developed anal crests (figs. 1, 14, 17)25
25. Small midges with wing length less than 1.2 mm, LR₁ larger than 3.3 *T. ankasaensis*
 - Medium large midges with wing length larger than 1.3 mm, LR₁ less than 2.826
26. Digitus and dorsolateral microtrichia on superior volsella present (figs. 14, 15, 16) .. *T. formosanus*
 - Digitus and dorsolateral microtrichia on superior volsella absent (figs. 17, 18) *T. harei*
27. Anal tergite triangular, small spines between anal crests, veins Cu₁, Cu₂, PCu and An hairy (fig. 25) *T. mcmillani*
 - Anal tergite roughly quadrate, large spines between anal crests, veins Cu₁, Cu₂, PCu and An all bare (fig. 35) *T. spadiceonotatus*

Key to known Afrotropical *Tanytarsus* pupae

1. Antepronotum with large sausage-shaped tubercle (fig. 64) *T. flexistilus*
 - Antepronotum without such large tubercle2
2. One pair of anterior spinule patches in addition to shagreen present on tergite II (fig. 75) *T. luctuosus*
 - Only shagreen present on tergite II3
3. Thoracic horn bare, cephalic tubercles as long as frontal setae (figs. 56, 62) *T. minutipalpus*

- Thoracic horn with chaetae, cephalic tubercles shorter than frontal setae4
4. Chaetae of thoracic horn small and evenly distributed on distal half, posterolateral comb less than 25 µm wide (figs. 68, 80) *T. trifidus*
 - Chaetae of thoracic horn in one row, posterolateral comb more than 25 µm wide (figs. 63, 66, 82, 84)5
 5. Thoracic horn with chaetae more than two times longer than width of horn. Less than 15 taeniae in anal fringe (figs. 60, 79) *T. spadiceonotatus*
 - Chaetae of thoracic horn about as long as width of horn. More than 16 taeniae in anal fringe (figs. 58, 59, 78)6
 6. Thoracic horn long and thin, row of chaetae 1/3 length of horn. Armament of tergites III-VI of equally short spinules (figs. 58, 70) ... *T. elisabethae*
 - Thoracic horn wider, row of chaetae 2/3 length of horn. Spines on tergites III-IV much longer than spinules of tergites V-VI (figs. 59, 69, 77) *T. formosanus*

Key to known Afrotropical *Tanytarsus* larvae

1. Only one dorsal tooth present on mandible (fig. 94, 97, 98)2
 - Two or more dorsal teeth present on mandible4
2. Small species, antennal pedestal about 55 µm long, mentum about 55 µm wide, ventromental plates with very weak striation (fig. 101) *T. trifidus*
 - Larger species, antennal pedestal longer than 62 µm, mentum wider than 61 µm, ventromental plates with obvious striation (figs. 100, 102)3
3. Antenna with Lauterborn organs barely reaching beyond antennal segment 5 (fig. 88) *T. elisabethae*
 - Antenna with Lauterborn organs reaching far beyond antennal segment 5 (fig. 87) *T. spadiceonotatus*
4. Styli of Lauterborn organs about the length of antennal segment 3, three dorsal teeth, proximal tooth is a large and rectangular (fig. 95) *T. minutipalpus*
 - Styli of Lauterborn organs longer than antennal segment 3, mandible with two dorsal teeth5
5. Antenna including Lauterborn organs about the same length or longer than head capsule, Lauterborn organs with styli more than 3 times the length of antennal segment 3-5 combined (fig. 86) *T. flexistilus*
 - Antenna including Lauterborn organs not as long as length of head capsule, Lauterborn organs with styli barely reaching beyond tip of antenna (De-joux 1968: 450, fig. 6) *T. formosanus*

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Figs. 1-8. Male imagines. – *Tanytarsus ankasaensis* sp. n.: 1, hypopygium; 2, superior volsella. – *T. aterrimus*: 3, hypopygium; 4, median volsella. – *T. congus*: 5, hypopygium; 6, digitus and median volsella. – *T. elisabethae* sp. n.: 7, hypopygium; 8, hypopygium lateral view.

Figs. 9-18. Male imagines. – *Tanytarsus elisabethae* sp. n.: 9, superior and median volsellae; 10, thorax. – *T. flexistilus*: 11, hypopygium; 12, hypopygium lateral view; 13, superior and median volsellae. – *T. formosanus*: 14, hypopygium; 15, 16, variation on superior volsella. – *T. harei* sp. n.: 17, hypopygium; 18, superior volsella.

Figs. 19-29. Male imagines. – *Tanytarsus kakumensis* (modified from Ekrem 1999): 19, hypopygium; 20, median volsella. – *T. luctuosus*: 21, hypopygium; 22, 23, variation on superior volsella; 24, median volsella. – *T. mcmillani*: 25, hypopygium; 26, median volsella. – *T. minutipalpus* (modified from Ekrem & Harrison 1999): 27, hypopygium; 28, superior volsella; 29, median volsella.

Figs. 30-38. Male imagines. – *Tanytarsus pseudocongrus* (modified from Ekrem 1999): 30, hypopygium; 31, digitus and median volsella. – *T. saetheri* (modified from Ekrem 1999): 32, hypopygium; 33, superior volsella and digitus; 34, median volsella. – *T. spadicenotatus*: 35, hypopygium; 36, median volsella. – *T. spiesi* (modified from Ekrem 1999): 37, hypopygium; 38, median volsella.

Figs. 39–47. Male imagines. – *Tanytarsus superpenicillatus* (modified from Ekrem 1999): 39, hypopygium; 40, median volsella. – *T. tossai* (modified from Ekrem 1999): 41, hypopygium; 42, superior volsella and digitus. – *T. zariae*: 43, hypopygium; 44, superior volsella, digitus and median volsella. – *T. usambarae* (modified from Stur & Ekrem 2000): 45, hypopygium; 46, superior volsella; 47, median volsella.

Figs. 48-51. Male imago. – *Tanytarsus trifidus*: 48, hypopygium; 49, hypopygium lateral view; 50, superior volsella and digitus; 51, median volsella. – Figs. 52-57. Pupal frontal apotomes. – 52, *T. formosanus*; 53, *T. elisabethae*; 54, *T. flexistilus*; 55, *T. trifidus*; 56, *T. minutipalpus*; 57, *T. spadiceonotatus*.

Figs. 58-68. Pupal cephalothoraces and thoracic horns. – 58, 63, *Tanytarsus elisabethae*; 59, 67, *T. formosanus*; 60, 66, *T. spadiceonotatus*; 61, 64, *T. flexistilus*; 62, *T. minutipalpus* (modified from Ekrem & Harrison 1999); 65, *T. luctuosus*; 68, *T. trifidus*.

Figs. 69-85. Pupal armament, anal lobes and posterolateral combs. – 69, 77, *T. formosanus*; 70, 79, 83, *T. spadiceonotatus*; 71, 78, 84, *Tanytarsus elisabethae*; 72, 81, *T. flexistilus*; 73, 82, *T. minutipalpus* (modified from Ekrem & Harrison 1999); 74, 76, 80, *T. trifidus*; 75, 85, *T. luctuosus*.

Figs. 86-98. Larval antennae, mandibles and premandibles. – 86, 90, 91, 96, *T. flexistilus*; 87, 92, 97, *T. spadiceonotatus*; 88, 98, *Tanytarsus elisabethae*; 89, 93, 95, *T. minutipalpus* (modified from Ekrem & Harrison 1999); 94, *T. trifidus*.

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