A review of Palaearctic *Teuchophorus*, with a new species from Bulgaria
(Diptera: Dolichopodidae)

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Abstract

The Palaearctic species of *Teuchophorus* are reviewed and a key provided to males. *T. chaetifemoratus* is described as new from Bulgaria. The male of this species is easily recognized by the ventral and posteroventral rows of strong curved bristles on the hind femur and, in contrast to all other Palaearctic species, its hind tibia does not show any peculiar chaetotaxy. It shares the same habitat preference as most of its Western European congeners, whereas Mediterranean species occur in more open habitats. *T. simplex* Mik is recorded for the first time from Bulgaria. *T. bisetus* Loew is reinstated as a distinct species, whereas *T. tenuemarginatus* Strobl most probably does not belong to *Teuchophorus* and is regarded as nomen dubium. In contrast to the literature, European, African and some Oriental *Teuchophorus* species have 6 dorso-central bristles instead of 5, and the entire generic range encompasses 4 to 6 dorso-central bristles. Two morphological features are found in both sexes of all *Teuchophorus* species and are the only reliable characters to separate this genus from *Sympycnus* (sensu lato): the oblique position of crossvein dm-cu and the anterior bend at the base of the distal section of vein M₁.

Key words: *Teuchophorus chaetifemoratus*, *Teuchophorus bisetus*, *Teuchophorus tenuemarginatus*, *Sympycnus*, Europe, Palaearctic, ecology

Introduction

*Teuchophorus* Loew is a genus of small (1.5–4 mm), rather stout species in the subfamily Sympycninae, mostly featuring a basal swelling of the costal vein and modified hind tibiae in the male (e.g. Becker 1917–1918; Parent 1938; d’Assis Fonseca 1978). In the Old World tropics, these characters seem to become more diffuse which renders the separation of this genus with *Sympycnus* Loew considerably more difficult (Meuffels & Grootaert 2004). Another diagnostic feature used by most authors to define *Teuchophorus* is the presence of 5 dorsocentrals (versus 6 in *Sympycnus*).

*Teuchophorus* seems most diverse in the Oriental (53 species) and Australasian Regions (37 species) (e.g. Grootaert 2006; Meuffels & Grootaert 1986, 2004). Other regions have fewer numbers of described species: Palaearctic (17), Afrotropical (7) and Nearctic Regions (4). In the Oriental Region, more than 10 species are known from Thailand, Singapore, China and Indonesia, whereas Indonesian New Guinea and Papua New Guinea are the only known hotspots in the Australasian realm. Thus far only two species have been reported from Australia itself (Bickel 1983) and none from New Zealand.

Central and Western European species (*T. calcaratus* (Meigen), *T. monacanthus* Loew, *T. nigricosta* von Roser, *T. simplex* Mik, *T. spinigerellus* Zetterstedt) are closely related and form a distinct clade within Euro-
pean Sympycninae (Bernasconi et al., in press). This fauna has been documented for more than one century, in contrast to that of the Mediterranean basin where two species (Grootaert et al. 1995; Meuffels & Grootaert 1990) were discovered only after 1990. Since the Mediterranean as a region remains largely uncollected, it probably supports additional new species.

In the summer of 2006, the junior author collected a large sample of Teuchophorus specimens in a humid forest habitat in the Rhodopes Mountains in Bulgaria. In addition to the abundant T. simplex (42 males), he noticed 4 males that did not match the description of any of the extant species. It is described below as Teuchophorus chaetifemoratus sp.n.

During the process of gathering morphological data to build a key to Palaeartic species, we noted that two species, T. bisetus Loew and T. tenuemarginatus Strobl, had an uncertain status. The result of our attempts to unravel their true identity are recorded here. A key to Teuchophorus species of the Palaeartic Region is given. Finally, features considered by previous authors as useful in characterizing Teuchophorus at the genus level are contrasted against newly gathered data in this genus and Sympycnus, and the ecology in Teuchophorus is discussed.

Material and Methods

The description of T. chaetifemoratus sp.n. is based on the (mounted) holotype specimen and has been checked using one mounted paratype and another paratype in 70% ethanol solution. Following the description, body parts of diagnostic value (wing, antenna, hypopygium, legs) of one paratype specimen were mounted in a semi-permanent slide for drawing. Next to the measurement of the body and wing length the following biometric ratios on (parts of) wing and antenna were calculated in two specimens to provide additional and reliable diagnostic criteria: (i) proximal / apical section of vein M₁, (ii) proximal / apical section of vein Cu₅₁; (iii) apical section of vein Cu₅₁ / outer crossvein (dm-cu), the so-called Cu₅₁ ratio (Bickel 1994), (iv) length / width of 1st flagellomere (postpedicel), (v) length of 1st flagellomere / scape and pedicel combined, and (vi) length of arista (stylus) / first three antennal joints combined; (vii) relative lengths of leg parts (femur / tibia/tarsomere 1 to 5) as recalculated against the shortest tarsomere that was converted to size 1.

In the species description, “eye size” refers to the vertical diameter of the eye and for practical reasons, the size of the palp is related to the eye size. The number of acrostichal (ac) and dorsocentral (dc) bristles reflect the number of ac and dc pairs. Only ac from the level of, and posterior to the first dc are considered. The colour of bristles and pubescence on legs applies to the coxae as well. The scale used in Figs 1–7 is mm.

Terms used for the male genitalia (Figs 3–4) follow Cumming et al. (1995). In describing the hypopygium, “dorsal” and “ventral” refer to the morphological position prior to genitalic rotation and flexion; as a result, the top of the drawing is actually the ventral face and the bottom the dorsal face. Special attention is given to the form and shape of the hypandrium [= opisthypandrium, Ulrich (1974)], epandrial setae, surstylus [= musc(u)l(at)ed appendage, Ulrich (1974, 1988); = lamella medialis, Buchmann (1961)], and cercus. A distinct epandrial lobe is lacking in this species, and ventral and dorsal epandrial processes and postponites are not visible, and possibly lacking as well.

Preservation method abbreviations: D: mounted on pin; W: preserved in 70% ethanol solution.


Institutional abbreviations: AMS: Australian Museum, Sydney, New South Wales, Australia; BPBM: Bernice P. Bishop Museum, Honolulu, Hawaii, USA; CUNI: Charles University, Prague, Czech Republic; IRSNB: Royal Belgian Institute of Natural Sciences, Brussels, Belgium; MNMS: Museo Nacional de Cien-
cies Naturales, Madrid, Spain; SOFM: National Museum of National History, Sofia, Bulgaria; OUMNH: Zoological Museum, Oxford University, Oxford, United Kingdom; VSRI: All-Russian Institute of Plant Protection, St-Petersburg, Russia; VSU: Voronezh State University, Voronezh, Russia; ZMHB: Zoologisches Museum, Humboldt-Universität zu Berlin, Berlin, Germany.

Taxonomy

*Teuchophorus chaetifemoratus* sp.n.

**Description.** **Male. Head.** Face with upper 2/5 of epistoma bluish green and lower 3/5 and clypeus silvery white; distinctly narrowing towards clypeus, not reaching lower eye margin; at clypeus 0.5 x as wide as 1st flagellomere is long. Frons shining dark metallic blue (bluish green in wet specimens, similar to *T. monacanthus*), sides slightly dusted. Occiput convex, metallic bronze green. Uppermost 6 postocular bristles dark brown, lower 8 yellowish. Postvertical bristles indistinct, equal-sized as postoculars, in line and not separated from latter. External vertical bristles strong, converging, inserted at level of posterior edge of ocellar tubercle. One pair of strong intraocular bristles. One pair of minute postocellar bristles. Palp very small, blackish brown, with brown pubescence and one strong apical brown bristle. Proboscis, blunt, 1/6 of eye, brown. Antenna almost entirely blackish brown, scape entirely, and 1st flagellomere paler on apical 1/2; scape bare, pedicel with medial ring of bristles; 1st flagellomere with rather blunt apex, 3/4 as long as wide, and 2/3 as long as scape and pedicel combined; arista dorsal, with short pubescence, 3.6 x as long as the first three antennal segments combined (Fig. 2).

**Thorax.** Mesonotum including scutellum shining dark bluish green. Pleura and postnotum dark green, slightly dusted greyish. Metaepimera mainly dark green, with lower apex pale yellow. All bristles blackish brown. Upper propleura with 1–2 minute dark setae, lower propleura with 3 small yellow prothoracic setae; 5 ac, rather strong, irregularly biserial; 6 dc, equal-sized; 1 strong and 1 minute humeral, 1 strong presutural, 1 sutural, 2 notopleural, 2 supraalar, and 1 strong and 1 minute postalar bristle; only medial pair of strong scutellar bristles present; scutellum with sparse marginal fringe of minute, white setae.

**Abdomen.** Tergites and sternites concolorous, shining dark green, with 6 pubescent segments, with black pubescence and bristles. Sternites complete (without caudal invagination). Hypopygium (Figs 3–4) enclosed; genital capsule concolorous with abdomen. Hypandrium brown, triangular in ventral view; surstylus dark brown, bilobate; ventral lobe of surstylus with rather equal width along entire length, bearing two large epanidal setae; dorsal lobe of surstylus triangular, partly covered by ventral lobe and bearing one strong subapical bristle; cercus small, roundish, white.

**Wing** (Fig. 1) transparent, 3.1 x as long as wide; with dark veins and distinct basal costal swelling (MSSC). Proximal section of vein M, 0.8 x as long as apical section. Proximal section of vein CuA₁, 1.9 x as long as apical section. CuA₆ ratio 2.2. Veins R₄₊₅ and M, parallel, very slight diverging at wing apex. Wing length 1.9–2.1 mm (n = 2).

**Legs** (Figs 5–7) including coxae and trochanters largely pale yellow; with coxa II and III pale yellow with brownish tinge; femur III infuscated dorsally, especially in apical 1/2; tibia III infuscated brownish along entire length; tarsus in all legs brown from apex of 1st tarsomere onwards (in wet specimens, only tarsomeres I–III₄, apparently brown). Coxa I with sparse brown pubescence and 5 pale brown apical bristles. Femur I with two small av and one larger pv preapical bristles. Tibia I simple, without dorsal bristles and with yellow apicoventral comb. Tarsus I with tarsomere I, with distinct ventral serration of inclined bristles, bristles not as long as tarsomere is deep (MSSC). Length ratios of leg I: 6.9/7.0/3.9/1.7/1.3/1.1. Coxa II with yellowish bristles on anterior face. Femur II with one (two in paratype) thin basoventral bristle at basal 1/6, nearly as long as femur is deep (MSSC); with sparse row of small strongly inclined pv bristles along entire length;
FIGURES 1–7. *Teuchophorus chaetifemoratus* sp.n. (male paratype): 1, wing; 2, antenna; 3, hypopygium (lateral view, left); 4, hypopygium (ventral view); 5, leg I; 6, leg II; 7, leg III; cer, cercus; dsur, dorsal lobe of surstylus; eps, epandrial setae; hyp, hypandrium; ph, phallus; vsur, ventral lobe of surstylus.
with one strong av and one strong pv preapical bristle. Tibia II with two strong ad and one strong pd bristles, 2.7 x as long as tibia is wide; ad bristles inserted at about basal 1/4 and basal 3/5; with 3 ap bristles. Length ratios of leg II: 8.5/9.2/4.4/1.9/1.5/1.1/1. Coxa III with dark brown bristle, inserted at basal 1/3 and posterior 1/3. Femur III with one vt and one pv row of strong pale brown bristles on apical 4/5 (MSSC); basal bristles strongest, 1.7 x as long as femur is deep; vt bristles decreasing in length towards apex, pv bristles shortest in middle; with one strong ad and one indistinct pv preapical bristle. Tibia III slightly swollen towards apex, with two pd bristles inserted beyond basal 1/4 and basal 3/5 amid pd serration on apical 2/3; with apical pv yellow comb, and three strong and one small ap bristles. Tarsus III with tarsomere III1 with one vt bristle at basal 3/5, about as long as tarsomere is deep (not considered a MSSC, as 1–3 similar vt bristles were present in all 44 Teuchophorus female specimens of the Bulgarian sample); with preapical pv yellow comb. Length ratios of leg III: 9.2/10.3/2.7/2.9/1.9/1.3/1.

Body length 1.2 mm (dry specimen) – 1.7 mm (wet specimen).

Female. Unknown (although a sample of female Teuchophorus collected at the type locality was at our disposal, it appeared impossible to distinguish T. chaetifemoratus females from among the T. simplex specimens).

Etymology. The species name refers to the ventral and posteroventral row of strong bristles of femur III in the male.

Type material. Holotype: 1 ♂, BULGARIA: Plovdiv province, Rhodopes Mountains, Markovo, 300 m, humid grassy habitat within cool deciduous forest with clean shallow streams at the foot of the mountains, 8.vii.2006, SW, leg. M. Kechev (SOFM; D).

Paratypes: 1 ♂, same data (University of Plovdiv, D); 1 ♂, same data (IRSNB; D); 1 ♂, same data (Pollet, pers. collection; W – with one antenna, wing, leg I, II and III, and hypopygium mounted on microscopic slide).

Taxonomic status of Teuchophorus bisetus Loew, 1871

Although Becker (1917–1918) did not indicate that he examined the type specimen, he followed Loew (1871) in acknowledging T. bisetus as a valid species on the basis of the presence of a pair of adjacent ventral bristles on tibia III, at the base of an apical swelling. Parent (1925) did not have the type specimen at his disposal but after comparing the description of the species by Loew (1871) with specimens of T. monacanthus, he concluded that T. bisetus was conspecific with T. monacanthus. The latter author based this decision on the fact that the recurrent ventral bristle in T. monacanthus actually consists of two bristles. This was confirmed through the examination of specimens of T. monacanthus from Belgium by the senior author: the main ventral bristle on tibia III is, indeed, accompanied by a much thinner bristle inserted at its medial base that only reaches 2/3 of the longer bristle. Surprisingly, Olejniecek (1981) reinstated T. bisetus as a separate species, which was followed by Negrobov et al. (1984) and Meuffels & Grootaert (2004). [Both Olejniecek (1981) and Negrobov et al. (1984) included drawings of tibia III of T. bisetus and T. monacanthus in their respective papers.] Ironically, T. bisetus was omitted from the Catalog of Palaearctic Diptera (Negrobov 1991). Attempts by the senior author to examine the type specimen of T. bisetus from the Berlin Zoological Museum were unsuccessful as it seemed to be destroyed – according to J. Ziegler, only needle and labels are present in the Berlin collection. Very recently, O. Negrobov informed us that the type series of T. bisetus as collected by explorer A.P. Fedchenko included a second specimen, deposited in the collections of the Zoological Museum of Moscow (Russia) and currently at his disposal. He acknowledged that drawings in his 1984 paper were based on this Moscow specimen, which was confirmed by I. Shamshiev.

Despite not being able to examine the type material ourselves, we conclude that T. bisetus is a valid species and separate from T. monacanthus for the following reasons: (i) comparison of the drawing of tibia III of
T. monacanthus by Olejnicek (1981) and Negrobov et al. (1984) with Belgian specimens verified the overall accuracy of the illustration including the rather flattened basal 1/2, the only slight apical swelling and its modest pubescence (Olejnicek and Negrobov did, however, overlook the second, smaller ventral bristle); (ii) on this basis, it is assumed that the drawing of tibia III of T. bisetus is equally accurate and in this case, a number of differences between both species are apparent (see key). Moreover, the primarily Central Asian distribution range of T. bisetus does not overlap with that of T. monacanthus, which seems largely European (the record of the latter species from Israel by Parvu (1997) is possibly based on a misidentification).

**Taxonomic status of “Teuchophorus tenuemarginatus” Strebl, 1909” nomen dubium**

At present, T. tenuemarginatus is considered unrecognized (Meuffels & Grootaert 2004), but these authors did not give a specific reason for their treatment of this species. The senior author tried to locate the type specimen for examination. M. Chvála kindly informed us that only a label but no type specimen was present in the Strebl collection in Admont (Austria) as, in fact, this species had been collected in Galicia (Provinz Orense) by Tabarda, an entomologist from Madrid. In this respect, Strebl (1909) suggested on page 123 of his paper: “Hingegen erhielt ich auch viele größere Tiere – teils zur Bestimmung, teils im Tausche – von mehreren spanischen Entomologen ..”. It is assumed that T. tenuemarginatus belonged to the first group and ultimately returned to Spain. Following a suggestion by A. Pont, the senior author contacted I. Izquierdo, who informed us that the type specimen could not be relocated in the collections of the Madrid museum. We assume it can be considered lost.

Nevertheless, Strebl (1909) provided a quite accurate species description that allowed us to discover more about the systematic position of this species. Below, a translation from German of Strebl’s original description is given:

“1237. tenuemarginatus 2.5 mm. ♂. Metallic, with anterior abdominal segments yellow. Costa not dilated. Legs yellow, simple.

After professor Mik presented simplex with simple hind tibiae and less dilated costa, I here also assign a species without a dilated costa [to Teuchophorus]. It does not fit the genera Chrysotus and Lamprochromus due to its uniserial acrostichals, nor Sympycnus due to its shining, steel blue frons. By all means, it is situated at the edge of the generic concept [of Teuchophorus].

Eyes touching, face hardly visible below the antennae, with pollinosity. Frons wide, shining steel blue. Antenna very short; the 1st flagellomere blunt, triangular, hardly as long as wide, densely pubescent; arista long, pubescent, inserted nearly basidorsal. Probosics and palp minute. Thorax and scutellum metallic green on dorsum, weakly pollinose, slightly shining, without sutural spot. 6 dc, about 2 x as long as the uniserial ac. Scutellum with two marginal bristles. Squamal fringe black, halter yellowish white. Abdomen strongly compressed, with dense, black pubescence; 1st abdominal segment with strong marginal bristles; first 3 abdominal segments nearly completely reddish yellow, the following shining dark green; with small, bare hypopygium. Coxae, femora and tibiae pale yellow with only coxa II with greyish outer spot, and coxa III with apical ¼ blackish brown with strong bristle; all femora and tibia I entirely bare. Tibia II with 3 bristles near basis, and with 1 dorsal bristle at basal 1/3 and 2/3. Tibia III with 1 anterior bristle at 1/2, and with 3 alternating postero-dorsal bristles. Tarsus slender, simple; with tarsomeres 1–4 dark near apex, and tarsomere 5 entirely dark; tarsomere I(–II) distinctly longer than I(–II)2; tarsus III swollen, with tarsomere III, 2/3 as long as tarsomere III. Wing smoky, with black veins; veins R2+3, R4+5 and M1 nearly parallel, with R4+5 reaching wing apex exactly in middle between R2+3 and M1, latter reaching wing apex where costa ends. Outer crossvein (dm-cu) perpendicular [against CuA,?], slightly longer than 1/2 of apical section of CuA, Anal vein weak, short.”

After comparing the characters from this species description with those listed in Table 1 (and assuming that Strebl presented an accurate account of his observations), we must conclude that T. tenuemarginatus
probable does not belong in *Teuchophorus*. Most convincing is the perpendicular position of crossvein dm-cu, but also the lack of any peculiar chaetotaxy in tibia and femur II and III, and the yellow anterior abdominal segments point in this direction. The other features do not contradict the generic concept of *Teuchophorus* though. At the same time, it remains uncertain to which genus *T. tenuemarginatus* does belong. *Lamprochroenus* species and some *Rhaphium (fasciatum Meigen, quadrispinosum (Strobl))* also show pale anterior abdominal segments, but all have a distinct sutural spot on the thorax, and the shape of the 1st flagellomere is largely different. In any case, on the basis of the above arguments *T. tenuemarginatus* is considered nomen dubium and is consequently not included in the following key.

**TABLE 1.** Diagnostic features separating *Teuchophorus* and *Sympycnus*. Character states in bold considered synapomorphies present in all representatives.

<table>
<thead>
<tr>
<th>Characters</th>
<th>Teuchophorus</th>
<th>Sympycnus</th>
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<tbody>
<tr>
<td><strong>Head</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- face (♂)</td>
<td>- eyes approximating to touching</td>
<td>- narrow, only slightly narrowed towards clypeus</td>
</tr>
<tr>
<td>- face (♀)</td>
<td>- rather flat</td>
<td>- clypeus sometimes bulging</td>
</tr>
<tr>
<td>- frons</td>
<td>- distinctly shining metallic, at least in part</td>
<td>- usually strongly dusted</td>
</tr>
<tr>
<td>- proboscis (♀)</td>
<td>- small (as in ♂)</td>
<td>- massive, protruding</td>
</tr>
<tr>
<td><strong>Thorax - abdomen</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- metepimeron</td>
<td>- pubescent (in Nearctic species)</td>
<td>- bare</td>
</tr>
<tr>
<td>- shape abdomen</td>
<td>- tapering, usually stout</td>
<td>- cylindrical, usually slender</td>
</tr>
<tr>
<td><strong>Wing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- costa (♂)</td>
<td>- often slightly to distinctly swollen in basal part (MSSC)</td>
<td>- simple, not swollen</td>
</tr>
<tr>
<td>- outer crossvein (dm-cu)</td>
<td>- oblique, with anterior angle of cell dm clearly larger than 90°</td>
<td>- perpendicular, with anterior angle of cell dm about 90°</td>
</tr>
<tr>
<td>- basis of vein M₁</td>
<td>- with distinct anterior curve</td>
<td>- straight</td>
</tr>
<tr>
<td><strong>Legs (♂)</strong></td>
<td></td>
<td></td>
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<tr>
<td>- femur II</td>
<td>- often with strong basoventral bristles (MSSC)</td>
<td>- usually devoid of strong basoventral bristles</td>
</tr>
<tr>
<td>- femur - tibia III</td>
<td>- often with peculiar chaetotaxy (especially tibia III)(MSSC)</td>
<td>- usually with normal chaetotaxy</td>
</tr>
<tr>
<td>- tibia III (apex)</td>
<td>- with peculiar dorsal spur (in Nearctic species)(MSSC)</td>
<td>- simple</td>
</tr>
<tr>
<td>- tarsus I-III</td>
<td>- mostly simple</td>
<td>- usually with specific ornamentations (MSSC)</td>
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**Key to Palaearctic *Teuchophorus* (males)**

A key to males of all Palaearctic species is presented below, including the new species but with the exception of *Teuchophorus sinensis* Yang & Saigusa (known from Korea and China). Drawings of tibia III of most species are included in Olejnicek (1981) and Negrovob et al. (1984). Females are not included because they have few useful diagnostic characters (females of over half of the European species have not been associated with males). Moreover, not all characters used in the keys by Parent (1938) and d’Assis Fonseca (1978) are considered reliable and some show intraspecific variation. *T. spinigerellus* females, however, can be readily separated from other Western European species by their metallic blue frons (metallic green in *T. simplex*, *T.

1. Femur III with one ventral and one posteroventral row of slightly curved, pale brown bristles, decreasing in length towards apex; basal bristles 1.7 x as long as femur is deep; tibia III without conspicuous chaetotaxy ................................................................. T. chaetifemoratus sp.n. – Europe (Bulgaria)

- Femur III without strong ventral or posteroventral bristles; tibia III with conspicuous chaetotaxy, long bristles or serration .............................................................. T. bisetus – Europe; Caucasus

2. Tibia III with peculiar ventral chaetotaxy, including plate-, comb-like or strong recurrent bristles ........ 2

- Tibia III with unmodified, sometimes strong, bristles ........................................................................ 9

3. Tibia III swollen at apex, often distinctly bended ............................................................................... 4

- Tibia III not swollen nor bended ........................................................................................................ 7

4. Tibia III with fan of flattened black bristles on short shaft, inserted near middle ................................. T. calcaratus (Meigen) – Europe; Caucasus

- Tibia III without such fan ................................................................................................................... 5

5. Tibia III with slight swelling on apical 1/2, with 2 blunt, unequal-sized ventral bristles near middle, strongest bristle slightly longer than 2 x tibial depth ........................................................................................................ T. pseudobipilosus Negrobov, Grichanov & Shamshev – Tajikistan

- Tibia III with distinct swelling on about apical 1/3 ............................................................................. 6

6. Tibia III with one strong black ventral spine and one very thin, indistinct adjacent bristle at about apical 1/3, slightly directed towards tibial basis; apical swelling with sparse pubescence ...................................................................................................................... T. monacanthus Loew – Europe; Caucasus; Israel

- Tibia III with 2 blunt, subequal-sized ventral bristles, inserted beyond apical 1/3 amid fine dense pubescence ...................................................................................... T. bisetus Loew – Tajikistan (“Turkestan”); Uzbekistan; Iraq

7. Tibia III with black ventral bristles arranged in black plate-like process at basal 1/4 ................................ T. rohdendorfi Stackelberg – Uzbekistan; Kirgizia

- Tibia III with flat black ventral bristles arranged in a comb-like structure near middle ........................ 8

8. Tibia III with comb just before 1/2, with 3 basal erect equal-sized blunt bristles, 1 more apical, longer and curved blunt bristle and 1 apical, shorter acute bristle ..................................................................................................................... T. ussurianus Negrobov, Grichanov & Shamshev – Far East Russia; Japan; China

- Tibia III with comb at 1/2, with 5 basal erect equal-sized blunt bristles, 1 more apical bifurcate blunt bristle and an apical distinctly longer, leaf-like processus .......................................................... T. nigrigosta von Roser – Europe

9. Tibia III swollen in apical 1/2 ................................................................................................................ 10

- Tibia III not swollen ............................................................................................................................. 14

10. Tibia III with apical swelling limited to less than apical 1/3; swelling with tuft of short bristles, about as long as swelling is deep ................................................................. 11

- Tibia III gradually swollen towards apex; ventral bristles not arranged as tuft, but at least one bristle 4-5 x as long as tibia is deep .............................................................................. 12

11. Tibia III with apical swelling on less than apical 1/3; small tuft of about 4 setae situated basad of apical swelling, at apical 1/4 of tibia III ................................................................. T. cristatus Meuffels & Grootaert – Europe (Italy, Sicily)

- Tibia III with apical swelling occupying more than apical 1/3; large tuft of more than 10 setae situated on apical swelling, at about apical 1/6 of tibia III ......................................................................................... T. spinigerellus Zetterstedt – Europe; Caucasus; Kazakhstan; Egypt

12. Tibia III with several long ventral bristles on about apical 2/3, 4 bristles about 4 x as long as tibia is deep ................................................................................................................ T. rozkosnyi Olejnicek – Afghanistan; Uzbekistan

- Tibia III with only 1-2 long ventral bristles in apical 1/2 ........................................................................ 13

13. Tibia III with one blunt posteroventral bristle at basal 1/4, 2 x as long as tibia is deep; with one long,
curved posteroventral bristle at about apical 1/3, 4 x as long as tibia is deep, with 4 smaller bristles at its basis and followed by serration of short stout bristles towards apex. Femur II with 1 strong basal bristle. Tibia II with 1 strong bristle at basal 3/5. Squamal fringe black ............................................................... T. samraoui Grootaert, Stark & Meuffels – Algeria
- Tibia III with basal 1/3 devoid of ventral bristles; with 2 very long anteroventral bristles beyond 1/2, about 5 x as long as tibia is deep, followed by 1 (postero)ventral row of shorter setae towards apex, setae on average 2 x as long as tibia is deep. Femur II with 4 strong basal posteroventral bristles. Tibia II with 2 strong ventral bristles at about 1/2 and 3/5. Squamal fringe pale brownish ............................................................... T. bipilosus Becker – Southern Europe (Spain, Canary Islands, Madeira); Caucasus; Algeria

14. Tibia III with one long ventral bristle at 1/2, about 5 x as long as tibia is deep. Antenna with scape and pedicel yellow, and 1st flagellomere black ............................................................... T. monochaetus Negrobov, Grichanov & Shamshev – Tajikistan
- Tibia III with one ventral row of bristles along entire length ................................................................. 15
15. Tibia III with one row of about 9 long ventral bristles, 3-4 x as long as tibia is deep. Antenna entirely black ........................................................................................................T. gissaricus Negrobov & Grichanov – Tajikistan
- Tibia III with one row of numerous shorter bristles, as long or slightly longer than tibia is deep. Antenna with scape and pedicel brownish black, and 1st flagellomere black ....................T. simplex Mik – Europe

Discussion

The separation of Teuchophorus from Sympycnus

An in-depth comparison between Teuchophorus and all other Sympycninæ is not the goal of the present paper and many symyclynine genera have useful generic features that make them easily recognized. However, in recent years, the limits between Teuchophorus and Sympycnus have become quite diffuse (e.g., Meuffels & Grootaert 2004) and in this respect, an attempt to find a clear-cut diagnosis seemed useful.

Becker (1917–1918), Parent (1938), d’Assis Fonseca (1978), and Meuffels & Grootaert (1986, 2004) mentioned 5 dc as characteristic for Teuchophorus, while Grootaert (2006) suggested a more variable 4–5 dc. The first three authors even used this character in their keys to genera to contrast with Sympycnus, which has 6 dc. However, this information on Teuchophorus, and in Palæarctic and Nearctic species in particular, is incorrect as shown by the examination of five Western European (T. calcaratus, T. monacanthus, T. nigricosta, T. simplex, T. spinigerellus) and one Nearctic species (T. clavigerellus Wheeler), as well as the study of species descriptions (including species of the synonymized Negrobovia Grichanov; Grichanov 2000). Holarctic Teuchophorus, including T. cristulatus Meuffels & Grootaert and T. samraoui Grootaert, Stark & Meuffels, have 6 well developed dc instead of 5 (our examinations showed that some specimens had 5 dc at one side and 6 on the other, but the vast majority of the examined specimens showed 6 pairs of dc). We agree that a generic concept should not be founded on a minor part of the world fauna and, indeed, in Australasian and Oriental species, 5 dc seem to be the rule. But even here, species with 6 dc have recently been discovered (e.g. T. neesoennis Grootaert, T. antennatus Grootaert) and consequently, the correct range of this character for Teuchophorus should be 4–6 dc. As Sympycnus usually has 6 dc, this character becomes invalid for diagnostic purposes at the generic level.

Another character used by Becker (1917–1918) to separate both genera was the number of pubescent abdominal segments, with Teuchophorus having 5 and Sympycnus 6. As correctly stated by Meuffels & Grootaert (2004) and confirmed during the examination of the specimens mentioned above, Teuchophorus males always have 6 pubescent abdominal segments whereas only females show 5. As this also holds true for Sympycnus (confirmed during examination of S. desoutteri Parent and S. aenicoxa (Meigen)), this character too must be removed from the list of useful diagnostic features at the genus level, although it can be used to distinguish males.
Some characters remain useful to distinguish *Teuchophorus* from *Sympycnus*, but are not shared by all representatives and should be used in combination (see Table 1). Only two features seem to be encountered solely in *Teuchophorus* and are generic autopomorphies: the oblique position of the outer crossvein dm-cu, and the anterior curve at the basis of vein M₁. Both have been mentioned in the literature before, the first by Parent (1938) and d’Assis Fonseca (1978), and the second by Meuffels & Grootaert (1986, 2004).

**Teuchophorus** ecology

At present, *Teuchophorus* has the greatest diversity in South East Asia and New Guinea. Still, this region is poorly sampled or certain parts are totally unexplored (and its habitats currently rapidly deteriorating), and many more species can be expected to be discovered, as has been shown in part by Grootaert (2006). In this part of the world, an ecological radiation of *Teuchophorus* is also observed: whereas most species are encountered near streams and puddles in swamp forests, mangroves and primary and secondary rain forests, representatives of the *T. pectinatus* species group seem largely restricted to mangroves and those of the *T. pauper* species group to acidic swampy habitats (Grootaert 2006). On the other hand, the relatively large species of the *T. gratiosus* species group, recognized by the strongly enlarged 1st flagellomere and highly reduced arista, seem arboreal in swamp forests and are mainly collected by fogging and with Malaise traps (Meuffels & Grootaert 2004; Grootaert 2006). In Singapore, even sandy beaches are occupied by species of this genus.

In Europe, *Teuchophorus* demonstrates a distinctly hygrophilous behaviour and, with the exception of *T. spinigerellus*, Western European species seem to be confined to cool and humid, wooded mesotrophic to eutrophic habitats, near shallow, stagnant or running water. In these sites, they are found sometimes in high abundances and multi-species assemblages on low vegetation or on muddy soils. Contrarily, *T. spinigerellus* is a typical inhabitant of reed marshes. In Flanders (northern Belgium), only *T. spinigerellus* can be termed common as it has been found in 10% or more (20.4%) of the UTM 5 km squares sampled since 1981, and shows no recent decrease (Pollet 2000). None of the other species seems currently on the decline either, but *T. calcaratus*, *T. nigricosta* and *T. monacanthus* are considered fairly rare (recorded from ca. 5 to 10% of the sampled UTM 5-km squares), whereas *T. simplex* is the only rare species (recorded from ca. 2 to 5% of the sampled UTM 5-km squares) (Pollet 2000).

In the Mediterranean region, *Teuchophorus* species apparently occur more often in open humid habitats. In Sicily, *T. cristulatus* was discovered along the outflow of a river (Terme Segestane) of 3-m width and 0.5-m depth, with a bed largely covered by pebbles and only locally with mud. Most interesting was the presence of a 3–5 m wide reed bed on its banks as recorded by Meuffels & Grootaert (1990) and the single collected specimen might as well have originated from this habitat. *Teuchophorus samraouii*, on the other hand, was encountered in numbers in a muddy meadow along a small river in the El Kala nature reserve in Algeria, an ecologically heterogenous area with permanent and temporary ponds, swamps, rivers and a large number of humid, vegetated sites (Grootaert et al. 1995).

As mentioned before, *Teuchophorus chaetifemoratus* sp.n. was collected together with *T. simplex* within a cool deciduous forest in Bulgaria and apparently shares the same habitat preference. Both species represent new records for this country as previously only *T. monacanthus* and *T. spinigerellus* were recorded from Bulgaria (Pollet 2004). It is very likely that further sampling of humid forests will ultimately also yield *T. calcaratus* and *T. nigricosta*. The discovery of *T. chaetifemoratus*, though, remains surprising, in particular from a morphological perspective. It does not share with its European congeners any of the distinct MSSCs present in the mid and hind leg and, on this basis, seems less related. Hopefully, a phylogenetic analysis using molecular markers like the cytochrome oxidase subunit I (COI) gene (Caterino et al. 2000) and the 12S rDNA gene (Beati & Keirans 2001) allow us to reveal its true phylogenetic position in the near future.
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