

## ***Tipula (Yamatotipula) moesta* Riedel and related species in Finland (Diptera, Tipulidae)**

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We studied species of the *moesta* group of *Tipula (Yamatotipula)* found in Finland. The three species are redescribed and illustrated, and their morphology, distribution and ecology are discussed. *Tipula moesta* Riedel, 1919, is an arctic species found in northernmost Finland. *Tipula chonsaniana* Alexander, 1945, *stat. rev.*, is here considered distinct from *T. moesta* and is reported for the first time from Finland and West Palaearctic region. It has a disjunct distribution: mountainous areas in the East Palaearctic and in the boreal coniferous zone in Finland. *Tipula freyana* Lackschewitz, 1936, is a widely distributed species in the Palaearctic region, which occurs in the northern boreal Finland in the coniferous zone. Female cerci and vaginal apodemes of *T. moesta* and of *T. chonsaniana* are illustrated for the first time.

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### **1. Introduction**

The dipteran family Tipulidae, long-palped crane flies, is a species rich group of nematoceran flies living in all geographic areas and in a diverse array of biotopes. According to Oosterbroek (2007), 1629 species and subspecies of the family are known from the Palaearctic region. The ecology and distribution of the majority of these are poorly known. The subgenus *Tipula (Yamatotipula)* comprises 87 taxa in the Palaearctic (Oosterbroek 2007), and most of them are associated with aquatic or semiaquatic habitats (Theowald 1957, Brindle 1960). Three species of the subgenus: *T. moesta* Riedel, 1919; *T. chonsaniana* Alexander, 1945 *stat.rev.*; and *T. freyana* Lackschewitz, 1936 (subspecies of *T. freyana* excluded in this context, see Savchenko 1961), are

morphologically similar species, having wide distributions in the Palaearctic, reaching their limits of distribution in Fennoscandia and being absent from Central Europe (Oosterbroek 2007). Lackschewitz (1936), in his description of *T. freyana*, was the first to recognize similarity of *T. moesta* and *T. freyana*, and Alexander (1954), in his paper describing crane flies from the mountains of North Korea, discussed the similarity of *T. moesta*, *T. freyana* and *T. chonsaniana*.

Further, Mannheims (1952) recognized a *moesta* group consisting of *T. moesta* and *T. freyana* and Savchenko (1961) used the name “*moesta* group” to combine *T. moesta moesta*, *T. moesta chonsaniana*, *T. freyana freyana*, *T. freyana monochroa* Savchenko, 1961 (= *freyana abscondita* Savchenko, 1964) and *T. trifida* Alexander, 1921 (*T. trifida* is probably a synonym of *T.*

*latemarginata* Alexander, 1921 Oosterbroek 2007, not close to the *moesta* group). The species of the *moesta* group are characterized by the prominent central lobe of the 9<sup>th</sup> tergite, covered by small, dark spines and two lateral lobes, which are bare.

The discovery of *Tipula* (*Y.*) *chonsaniana* in a recent survey of nematoceran Diptera of the headwater brooks of the river Iijoki basin (J. Salmela, unpubl.) allowed the study of its morphology and reconsideration of its status. In the present paper we illustrate the species of the *moesta* group noted from Finland, and include a review of their distribution and ecology.

## 2. Material and methods

The studied material is mainly from the collection of Jukka Salmela (PCJS), Jyväskylä. Individuals were collected using Malaise-traps or sweep-netting, and all are stored in 70% ethanol. Other specimens of the *moesta* group deposited in the collection of the Helsinki Zoological Museum (ZMH) were examined by JS in 2006. These specimens were dry and pinned. In order to draw the illustrations, both male and female hypopygia were treated with 10% KOH solution, placed in small drops of glycerol and observed under a microscope. Morphological terminology follows Alexander and Byers (1981) and Merz and Haenni (2000). The following abbreviations of the Finnish biogeographical provinces are used in the text: Oa=*Ostrobotnia australis*, Oba=*Ostrobotnia ouluensis*, Ks=*Regio kuusamoensis*, Lkoc=*Lapponia kemensis occidentalis*, Le=*Lapponia enontekiensis*, Li=*Lapponia inarensis*.

## 3. Taxonomy of the *moesta* group in Finland

Medium-sized craneflies, wing length circa 13–14 mm. Male 9<sup>th</sup> tergite with a prominent central lobe, covered by dark bristles; lateral lobes obtuse or slightly pointed, bare. Three species are known from Finland: *T. moesta*, *T. chonsaniana* and *T. freyana*.

### 3.1. *Tipula* (*Yamatotipula*) *moesta* Riedel (Figs 1a, 2a, 3a, 4b, d)

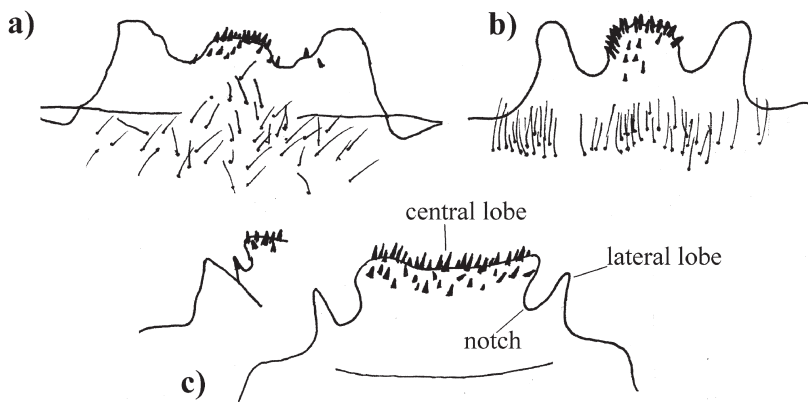
Riedel 1919: 8 (description), Fig. 8 (hypopygium); Lackschewitz 1936: 291, Fig. 29 (a. hypopygium lateral, b. hypopygium dorsal, c. hypopygium ventral, d. 9<sup>th</sup> tergite, e. inner gonostylus inside, f. inner gonostylus outside, g. adminiculum, h. antenna); Savchenko 1961: 249, Fig. 141 (hypopygium), Fig. 142 (1a. 9<sup>th</sup> tergite, 1b. inner gonostylus) (as *T. (Y.) moesta moesta*); Mannheims 1952: 94–95 (discussion on the taxonomy of *T. moesta* and *T. freyana*).

*Tipula simplicicornis* Lundström; Lundström (1912): 44 (description), Fig. 43 (9<sup>th</sup> tergite), Fig. 44 (hypopygium) (Preoccupied by the senior primary homonym *Tipula simplicicornis* Zetterstedt, 1838; replaced by the next available name, *moesta* Riedel, [Oosterbroek 2007]).

*Tipula haplocera* Bergroth; Bergroth (1922): 22 (new name for *T. simplicicornis*).

*Material examined.* Finland, Le: Karesuando, R. Frey leg, 1♂ (ZMH) (type material of *simplicicornis*); Le: Enontekiö, Jietanasvuoma 7602509:3319103, 5.VI.–10.VII. 2007 J. Salmela leg, 3♂♂ (PCJS); Le: Enontekiö, Kilpisjärvi Gihcegorzi SE 7677900:3248500, 19.VI.–17.VII. 2007 J. Salmela leg, 1♀ (PCJS); Le: Enontekiö, Kilpisjärvi, Iso Jehkas W 7677303:3255866, 19.VI.–17.VII. 2007 J. Salmela leg, 1♂ (PCJS); Lkoc: Muonio, R. Frey leg, 1♂ (ZMH) (type material of *simplicicornis*); Lkoc: Kittilä, Kielisenpalo 7549573:3419292, 26.VI.–25.VII. 2007 J. Salmela leg, 1♂ (PCJS); Lkoc: Kittilä, Vielmakoskenpalo NW 7548460:3418563, 26.VI.–25.VII. 2007 J. Salmela leg, 3♀♀ 1♂ (PCJS); Li: Utsjoki, J. Sahlberg leg, 2♂♂ (ZMH) (type material of *simplicicornis*); Li: Utsjoki, Kaldoaivi wilderness area 77445:35336, 8.VII. 2003 J. Salmela leg, 1♂ (PCJS); Li: Utsjoki, Kaldoaivi wilderness area, Vuobbe Kalddojavri 77476:35332, 8.VII. 2003 J. Salmela leg, 1♂ (PCJS); Li: Utsjoki, Kaamasmukka 18.VI. 2003 L. Paasivirta leg, 1♂ (PCJS); Li: Utsjoki, Teno, Ruostepuro 7763644:3487967, 26.VI.–3.VII. 2006 P. Bage leg, 13♂♂ 4♀♀ (PCJS); Li: Utsjoki, Galddasjohka 7755514:3531820, 15.VI.–19.VII. 2007 J. Salmela leg 1♂ 1♀ (PCJS); Li: Utsjoki, Galddasduolbbas 7753741:3529780, 15.VI.–19.VII. 2007 J. Sal-

Fig. 1. 9<sup>th</sup> tergite of the male hypopygium, dorsal view. – a. *Tipula moesta* Riedel, 1919. – b. *T. chonsaniana* Alexander, 1945. – c. *T. freyana* Lackschewitz, 1936 (insert represents the notch between central and lateral lobes from a posterodorsal view).



mela leg 1♀ (PCJS); Li: Utsjoki: Buolbmatgeasjavri SE 7736725:3535800, 16.VI.–20.VII. 2007 J. Salmela leg 2♂♂ (PCJS); Li: Utsjoki, Davrraluobbal 7755370:3535500, 6.VII. 2007 J. Salmela leg, 1♂ (PCJS); Li: Utsjoki, Guovdajavri N 7752:3532, 5.VII. 2007 J. Salmela leg, 1♂ 1♀ (PCJS); Li: Utsjoki, Guovdajavri 7751750:3532900, 5.VII. 2007 J. Salmela leg, 2♂♂ (PCJS); Li: Utsjoki, Buolbmatgeasjavri S 7736750:3535300, 3.VII. 2007 J. Salmela leg, 1♂ 1♀ (PCJS); Li: Utsjoki, Askkasjohka 7748700:3534200, 5.VII. 2007 J. Salmela leg, 1♂ (PCJS); Li: Utsjoki, Skalvejavri NW 7742:3534, 4.VII. 2007 J. Salmela leg, 1♂ (PCJS); Li: Utsjoki, Aksonjuni S 7740100:3531550, 2.VII. 2007 J. Salmela leg, 1♀ (PCJS); Li: Inari, Pierkivaaranjäkä 7681322:3509370, 6.VI.–7.VII. 2007 J. Salmela leg, 1♂ (PCJS).

**Taxonomic remarks.** Male. Head dark brown, sparsely covered with light hairs. Antennae dark brown, the proximal half of the first flagellomere somewhat lighter than distal half. Thorax dark brown, including halteres. Wings brown tinged, unpatterned, stigma faint, brownish. Legs brown, proximal half lighter than distal part, coxae and trochanters densely covered with light hairs. Abdominal segments dark brown, sternites and tergites with a narrow light caudal margin. Dorsal side of 9<sup>th</sup> tergite (Fig. 1c) with an obtuse central lobe, covered by numerous dark spines, neighbouring lateral lobes relatively wide, bare. Notch between central and lateral lobes moderate, not very deep. Outer gonostylus (Fig. 2b) oval, tip weakly pointed. Inner gonostylus (Fig. 3b) dark, sclerotized, bearing dark setae. Dorsal crest low in relation to the beak.

Female. In general, similar to male. Antennae shorter. Cerci (Fig. 4b) brown, relatively thick, apex truncate. Vaginal apodeme (Fig. 4d).

**Discussion.** The species is readily distinguished from *T. chonsaniana* due to clear and consistent differences in coloration of the antennae (scape and pedicel dark; yellow in *T. chonsaniana*), thorax (e.g. halteres dark; yellow in *T. chonsaniana*), abdominal segments (all dark; segment 1–5 yellow to yellow brown in *T. chonsaniana*) and structure of the male hypopygium. Whereas the 9<sup>th</sup> tergite of *T. moesta* is characterized by a low notch between the central and lateral lobes, the notches of *T. chonsaniana* are much deeper and lateral lobes are narrower caudally. Further, differences between the species are present in the structure of inner and outer gonostylus.

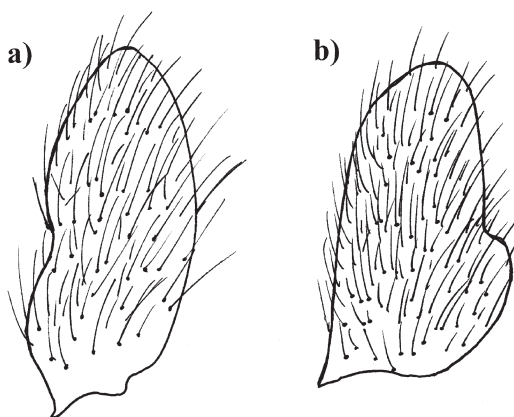


Fig. 2. Male outer gonostylus, lateral view, from outside. – a. *Tipula moesta* Riedel, 1919. – b. *T. chonsaniana* Alexander, 1945.

*T. moesta* is an arctic species occurring in the northern parts of Russia and Fennoscandia (Oosterbroek 2007). The species is known from the northern parts of Finland (Fig. 5a) from a total of 23 localities (see above Material examined). The species has been collected from rich fens in the coniferous zone but most of its records originate from alpine wetlands around lakes and fens in a treeless fell-area and from headwater brooks surrounded by *Betula pubescens* ssp. *czerepanovii* and *Salix myrsinifolia* ssp. *borealis*. Other tipulids encountered in the same localities are, for example, *Prionocera ringdahli* Tjeder, 1948, *P. subserricornis* (Zetterstedt, 1851), *Tipula* (*Savtshenkia*) *gimmerthali* Lackschewitz, 1925, *T. (Savtshenkia) subnodicornis* Zetterstedt, 1838 and *T. (Vestiplex) excisa* Schummel, 1833.

### 3.2. *Tipula (Yamatotipula) chonsaniana* Alexander stat.rev. (Figs 1b, 2b, 3b, 4a, c)

Alexander 1945: 234 (description); Savchenko 1961: 250, Fig. 142 (2a 9<sup>th</sup> tergite, 2b inner gonostylus) (as subspecies of *T. moesta*).

*Material examined.* Finland, Oa: Kauhajoki, Pääntäneenjoki 6923480:3246550, 5.–19.VI.2000 J. Salmela & T. Tuovinen leg, 1♂ (PCJS); Ks: Taivalkoski, Hevosniitynoja 7268921:3555642, 1.VI.–3.VII.2006 J. Salmela leg, 1♂ (PCJS); Ks: Taivalkoski, Loukonoja 7253258:3573972, 1.VI.–3.VII.2006 J. Salmela leg, 2♂♂ (PCJS); Ks: Taivalkoski, Pikku-Partasenoja 7247884:3554703, 1.VI.–3.VII.2006 J. Salmela leg, 6♂♂ 2♀♀ (PCJS); Oba: Pudasjärvi, Ruoto-oja 7253173:3534899, 1.VI.–3.VII.2006 J. Salmela leg, 1♂ (PCJS); Oba: Pudasjärvi, Hanhioja 7255863:3504372, 25.V.–23.VI. 2007 J. Salmela leg, 1♂ (PCJS).

*Taxonomic remarks.* Male. Head dark brown, segments 4–13 of the antennae dark brown, scape and pedicel yellow, the proximal half of the 1<sup>st</sup> flagellomere yellow, distal half infuscated. General coloration of the thorax dark brown. Yellow stripes in post sutural scutum, katatergite and anepimeron. Caudal half of scutellum yellow, anterior corners of mediotergite yellow. Fore coxae proximally dark brown, distally yellow, mid coxae light brown with vertical, light bands and hind coxae mainly yellow with a vertical light

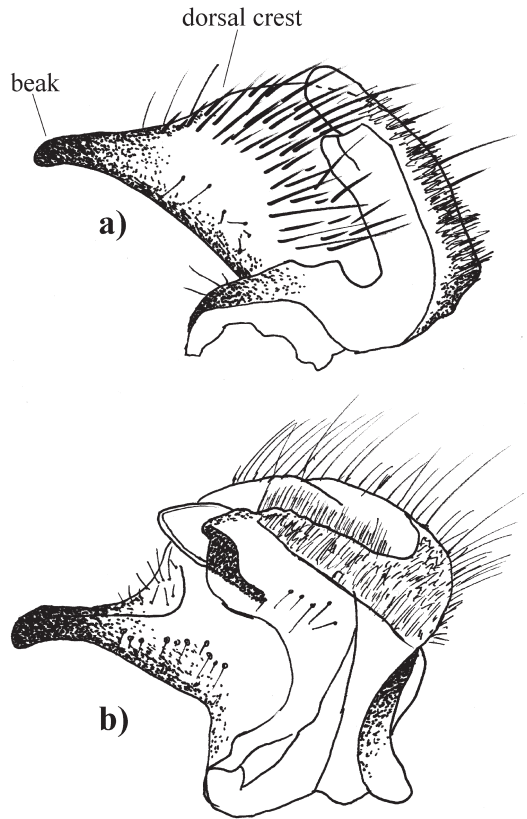


Fig. 3. Male inner gonostylus, lateral view, from outside. – a. *Tipula moesta* Riedel, 1919. – b. *T. chonsaniana* Alexander, 1945.

band on the anterior edge. Trochanters yellow. Femorae yellow, only distal ends dark brown, tibiae and tarsi dark brown. Halteres yellow. Wings brownish-yellow, stigma brownish. Main coloration of abdominal segments 1–5 yellow to yellow brown, segments 6–9 brown. Sternites and tergites of segments 6–8 with a narrow light caudal margin. Abdominal segments covered by light hairs, on segments 1–5 their alveoli contrast well with the light ground coloration of the segments. The central lobe of the 9<sup>th</sup> tergite (Fig. 1b) rounded, covered by numerous dark spines. Lateral lobes are bare, apically rounded and slightly narrowed. Notch between the central and lateral lobes is pronounced. Outer gonostylus (Fig. 2a) widest basally, narrowed outwardly, tip rounded. Inner gonostylus (Fig. 3a) well sclerotized, bearing light hairs. Dorsal crest is high in relation to the beak.



Female. Similar to male, antennae shorter. Abdominal segments light brown to brown, segments 1–5 with a yellow stripe on the dorsal side. Cerci (Fig. 4a) yellowish brown, relatively thin, apex rounded. Vaginal apodeme (Fig. 4c).

*Discussion.* The species is here reported for the first time from Finland and from the West Palearctic region. The species was described from North Korea (Alexander 1945) as a distinct species, but later Savchenko (1961, p. 250) classified *T. chonsaniana* as a subspecies of *T. moesta*, based on “colouration and minor peculiarities in the structure of the hypopygium”. As already noted by Alexander (1945), however, the morphological differences between *T. chonsaniana* and the related species *T. moesta* and *T. freyana* are striking and support its status as a distinct species. *T. chonsaniana* has a wide but apparently disjunct distribution in the Palearctic region. Since it is not a species confined to the East Palearctic, it is not considered as a subspecies of *T. moesta*. In Finland, there is no documentation of sympatric occurrence of *T. moesta* and *T. chonsaniana*, but this is probably due to non-overlapping distribution areas. It is likely, that *T. moesta* has its main distribution in the subalpine subzone and becoming rare in the northern parts of the coniferous zone. *T. chonsaniana* seems to occur in the middle and northern boreal Finland, being confined to the coniferous zone (Fig. 5b). Further, differences in body coloration and morphological differences in male hypopygium and female cerci and vaginal apodeme support the status of *T. chonsaniana* as a distinct species.

*T. chonsaniana* is known from North Korea, Russia (Far-East, Tuva, Altai) and Finland (Oosterbroek 2007). According to Savchenko (1961) and Pilipenko (1999), *T. chonsaniana* is a summer species with flying season in early June–July, occurring in mountainous areas. Alexander (1945) states that type material from North Korea was collected from Mt. Chonsani, above altitudes of 1,000 m a.s.l. around mid July. Most of the Finnish records (see above Material examined) are from small, about 1 m wide headwater brooks of the River Iijoki catchment area, at the border of middle and northern boreal Finland (around 65°30'N 28°00'E, Fig. 5b). The brooks have summer water temperature ranging from 9,6 to 16,4 °C (measured in early August 2006, J. Sal-

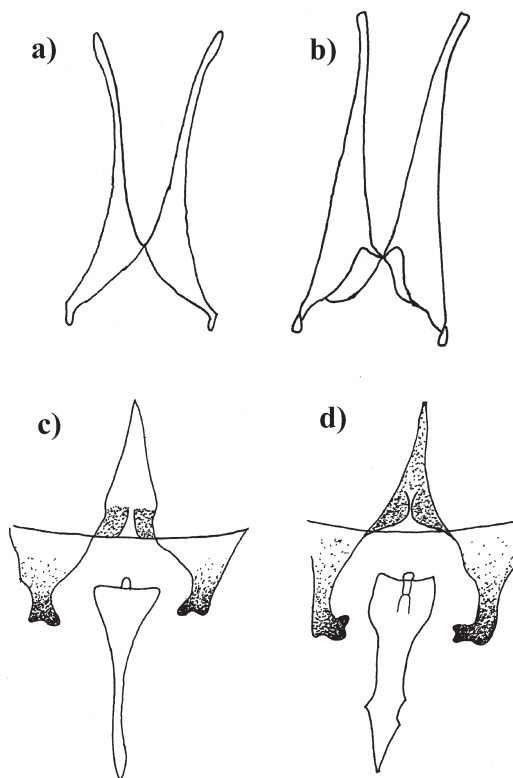


Fig. 4. Female cerci (a, b), ventral view, and vaginal apodeme (c, d), ventral view. – a, c. *Tipula chonsaniana* Alexander, 1945. – b, d. *T. moesta* Riedel, 1919.

mela unpublished) and water chemistry mirroring the non-calcareous bedrock of the area (pH 5,8–6,8). The brooks have minerogenous bottom and the surrounding vegetation is dominated by deciduous trees (*Alnus incana*, *Betula* spp.). Interestingly, four out of five sites where *T. chonsaniana* was found have intensive forest management history, including timber harvesting, ditching and dredging of the brook, and thus, sites could not be assessed as natural state biotopes. The studied Malaise trap material from the headwater brooks of the Iijoki river basin consisted of a total 50 sites, with a varying degrees of human modification (from pristine to strongly managed sites, J. Salmela unpublished). *T. chonsaniana* was found in tipulid communities together with species viz. *Tipula* (*Lunatipula*) *trispinosa* Lundström, 1907, *T. (Schummelia) variicornis* Schummel, 1833 and *T. (Yamatotipula) coeruleascens* Lackschewitz, 1923.

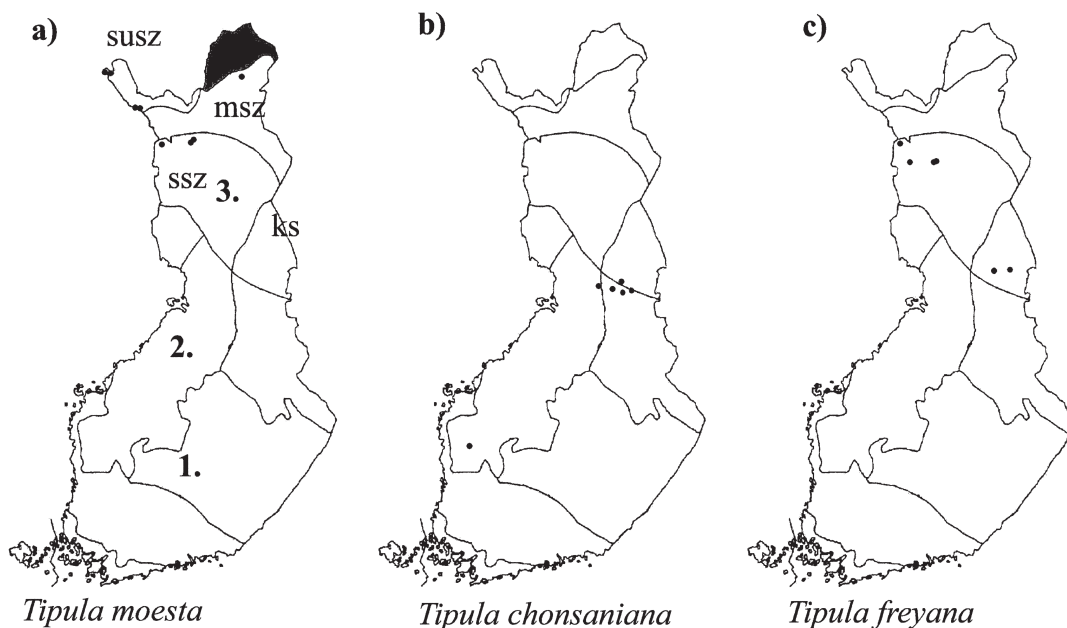


Fig. 5. Distribution maps, Finland. – a. *Tipula moesta* Riedel, 1919. – b. *T. chonsaniana* Alexander, 1945. – c. *T. freyana* Lackschewitz, 1936. Dots represents collecting localities, black coloration of a subzone indicates rather continuous distribution within the area. 1=hemiboreal and southern boreal, 2=middle boreal and 3=northern boreal ecoregion; ks=subzone of Koillismaa, ssz=southern subzone, msz=middle subzone, susz=subalpine subzone. Modified after Ulvinen *et al.* (2002).

### 3.3. *Tipula (Yamatotipula) freyana* Lackschewitz (Fig. 1c)

Lackschewitz 1936: 292 (description), Fig. 30 (a hypopygium lateral, b hypopygium dorsal, c hypopygium ventral, d 9<sup>th</sup> tergite, e dististylus inside, f dististylus outside, g adminiculum, h antenna); Savchenko 1961: 251, Fig. 143 (1 9<sup>th</sup> tergite) (as *T. (Y.) freyana freyana*).

*Material examined.* Russia, Kantalaks, R. Frey leg, 1♂ (ZMH) (holotype); Finland, Lkoc: Muonio, R. Frey leg, 1♂ (ZMH) (paratype); Lkoc: Kolari, Ylläs 7503827:3381388, 1.VII.2006 J. Jakovlev & J. Penttinen leg, 1♂ (PCJS); Lkoc: Kittilä, Kutuoja 7502000:3443750, 11.VII.2007 J. Salmela leg, 3♂♂ (PCJS); Lkoc: Kittilä, Kutuoja 7501800:3445300, 11.VII.2007 J. Salmela leg, 1♂; Ks: Taivalkoski, Portinjoki 7283471:3574786, 1.VI.–3.VII.2006, J. Salmela leg, 1♂ (PCJS); Ks: Taivalkoski, Poikaloukusanjoja 7280951:3541405, 1.VI.–3.VII.2006, J. Salmela leg, 1♂ (PCJS).

*Taxonomic remarks.* Male. Head dark brown.

Scape brownish, pedicel and 1<sup>st</sup> flagellomere yellowish brown, other flagellomeres brown. Thorax mainly dark brown, but anepimeron, anatergite and katatergite light brown. Halterella yellowish. Base of coxae brown, distal part and trochanters yellowish. Femorae yellowish brown, tips infuscated, tibiae and tarsi dark brown. Wings brown tinged, pterostigma dark brown. Abdominal segments 1–4 yellowish brown, segments 5–8 darker, hypopygium dark brown. 9<sup>th</sup> tergite (Fig. 1c) with a very wide central lobe, covered by dark spines. Lateral lobes relatively thin, tapering caudally, notches between central and lateral lobes deep, U-shaped. A conspicuous spine present in the notch, detectable from a posterodorsal view (Fig. 1c). Outer and inner gonostylus are not illustrated. Female unknown to the authors.

*Discussion.* The species is quite easily distinguished from *T. moesta* and *T. chonsaniana* by the structure of 9<sup>th</sup> tergite. *T. freyana* is characterized by a wide central lobe, over twice as wide as in *T. moesta* and *T. chonsaniana*. In addition,

*T. freyana* has a distinct, dark spine in the notch between the lobes, a character absent from the other discussed species.

The distribution of *T. freyana* covers Finland, Sweden, Russian Karelia, East Siberia and North Korea (Oosterbroek 2007). *T. freyana* is apparently a rare species in Finland, being distributed in the coniferous northern boreal zone, not occurring in the subalpine subzone. The species is known only from six sites, including nearly 100 years-old record by R. Frey from Lkoc: Muonio. This paratype from Muonio was collected from Muonionkoski (koski=rapid) 9.7.1911 (Frey 1934) and the other records are sites around forest brooks with minerogenous bottom, surrounded by boreal deciduous trees (*Betula* spp., *Alnus incana*) and Norway spruce (*Picea abies*). *T. freyana* has been collected together with *Tipula (Acutipula) fulvipennis* De Geer, 1776, *T. (Savtshenkia) grisescens* Zetterstedt, 1851, *T. (Vestiplex) laccata* Lundström & Frey, 1916 and *T. coeruleascens*.

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