

***Forcipomyia altaica* REMM, 1972, a boreo-montane biting midge in the
Western Palaearctic (Diptera: Ceratopogonidae)***

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ABSTRACT. *Forcipomyia altaica*, a boreo-montane species known previously only from the Altai
Mts (Russian Central Asia), Czech Republic and Germany, is reported from the Italian Alps and
Poland for the first time. Illustrated descriptions of both sexes are provided.

KEY WORDS: Forcipomyiinae, montane species, redescription, new records, Italy, Poland.

INTRODUCTION

Biting midges are a relatively well-studied large family of the nematoceros Diptera, and
the recent World fauna comprises 6224 extant species grouped in 111 genera and
4 subfamilies (BORKENT 2015). The genus *Forcipomyia* MEIGEN, 1818 (subfamily
Forcipomyiinae), including 1153 extant species grouped in 35 subgenera is distributed
worldwide (BORKENT 2015). Immature stages are common in terrestrial, semiaquatic or

* The paper is dedicated to Prof. Waclaw WOJCIECHOWSKI in recognition of his great contribution to the
taxonomy and faunistics of Hemiptera.

fully aquatic habitats (SZADZIEWSKI et al. 1997). Females with functional piercing mouthparts take protein meals and feed on the blood of vertebrates (subg. *Lasiohelea* KIEFFER, 1921) or the haemolymph of other insects (subgenera *Trichohelea* GOETGHEBUER, 1920, *Lepidohelea* KIEFFER, 1917, *Microhelea* KIEFFER, 1917). However, the females of many species have reduced piercing mouthparts, and like the males, feed on nectar and can act as pollinators of various plants, e.g. the cocoa tree (SORIA & WIRTH 1979). In the subgenus *Forcipomyia* s. str. the immature stages live mostly under the bark of trees, and adult females, which usually have reduced teeth on the mandibles and laciniae, probably feed only on nectar or honeydew. In Europe *Forcipomyia* is represented by 87 species, most of them in the subgenus *Forcipomyia* s. str. (55 spp.) (SZADZIEWSKI et al. 2013). In the relatively well-studied Polish fauna, there are known 36 *Forcipomyia* species with 16 in the subgenus *Forcipomyia* s. str. among the 220 biting midges reported to date (ALWIN & SZADZIEWSKI 2013).

The purpose of this paper is to redescribe *F. altaica* REMM, 1972, a species reported for the first time from Italy and Poland, to compare it with similar congeners and to analyse its geographical distribution. The species was originally described from two males and seven females collected in the Altai mountains.

MATERIALS AND METHODS

All the specimens examined were slide mounted in Canada balsam following the method of WIRTH & MARSTON (1968). The materials are housed in the collections of the Department of Invertebrate Zoology and Parasitology, University of Gdańsk, Poland (CEI UG) and the Museum für Naturkunde Berlin, Germany (ZMHB). The photographs were taken using a LAS Montage multifocus and a Leica DM6000.

One female and ten males were measured. The special terms and their abbreviations used in the descriptions are as follows:

- wing length – measured from the basal *arculus* to the wing tip;
- CR (costal ratio) – length of the costal vein measured from the basal *arculus* to the tip of the second radial cell divided by the wing length;
- AR (antennal ratio) – male: the combined length of the distal four flagellomeres divided by the combined length of the proximal nine flagellomeres; female: the combined length of the distal five flagellomeres divided by the combined length of the proximal eight flagellomeres;
- PR(III) (palpal ratio) – the length of the palpal segment 3 divided by its greatest breadth;

- TR(I, II, III) (tarsal ratio) – the length of tarsomere 1 (basitarsus) divided by the length of tarsomere 2; I – fore leg, II – mid leg, III – hind leg; tarsomeres measured with the head (ball) lodged in the joint cavity.

SYSTEMATICS

Forcipomyia (Forcipomyia) altaica REMM, 1972
(Figures 1-4)

Forcipomyia altaica REMM, 1972: 62 (descriptions, figures – male, female, Russia: Altai); HAVELKA & CASPERS 1981: 18 (description, figures – male, Germany); KNOZ 1997: 84 (Czech Republic: Moravia).

Material examined (n = 29)

Italy. South Tirol, the Stülfser Joch National Park. Suldental near Gomagoi, 1220 m amsl, 46°34'33.8 N 10°32'51.2 E, 11 June 2005, Malaise trap, 1 male; Suldental near Gomagoi, 1220 m amsl, 46°34'33.8 N 10°32'51.2 E, 27 June 2005, Malaise trap, 1 male. Tartscher valley near Trafoi (Kehre 44), 1630 m amsl, 46°32'33.9 N 10°30'17.2 E, 27 June 2005, Malaise trap, 2 males. [ZMHB]

Poland. Beskidy Mts., Babia Góra. Akademicka Perć, mountain pine, 1300 m amsl, 1 July 1989, leg. R. SZADZIEWSKI, 2 males; Akademicka Perć, mountain pine, 1350 m amsl, 1 July 1989, leg. R. SZADZIEWSKI, 6 males. Markowe Szczawiny, Przełęcz Brona, 1200-1400 m amsl, 30 June 1989, leg. R. SZADZIEWSKI, 1 male; Markowe Szczawiny, Przełęcz Brona, pond, 30 June 1989, leg. R. SZADZIEWSKI, 2 males. Sokolica, 1300-1367 m amsl, 30 June 1989, leg. R. SZADZIEWSKI, 3 males. Szumiąca Woda, 1300 m amsl, 1 July 1989, leg. R. SZADZIEWSKI, 1 female, 1 male; Szumiąca Woda, stream, 1300 m amsl, 1 July 1989, leg. R. SZADZIEWSKI, 7 males. **Pieniny Mts.** Krościenko, about 600 m amsl, 22 June 1988, at light, leg. R. SZADZIEWSKI, 1 male. **Gdańsk.** Gdańsk Oliwa, Dolina Radości, valley in moraine, 17 May 1979, net, leg. R. SZADZIEWSKI, 1 male. [CEI UG]

Distribution. *Forcipomyia altaica* is a boreo-montane species known from Russia (Altai), the Czech Republic (Moravia) and Germany (Bonn area). It is now reported for the first time from Italy (the Alps) and Poland (the Carpathians, Gdańsk).

The species occurs in Asian and European montane and lowland boreal habitats. It was reported from the Altai mountains of Central Asia at altitudes up to 2500 m amsl (REMM 1972), in the Italian Alps, 1200-1600 m amsl (present records) and the Polish Carpathians, 600-1400 m amsl (present records). It has also been noted in lowland regions: Lednice in Moravia (KNOZ 1997) at 160 m amsl, Annaberger Bach (128 m amsl) near Bonn

(HAVELKA & CASPERS 1981), and a boreal valley in moraine in Gdańsk (present record) (Fig. 1). The distribution pattern is typical of boreo-montane zoogeographic elements.

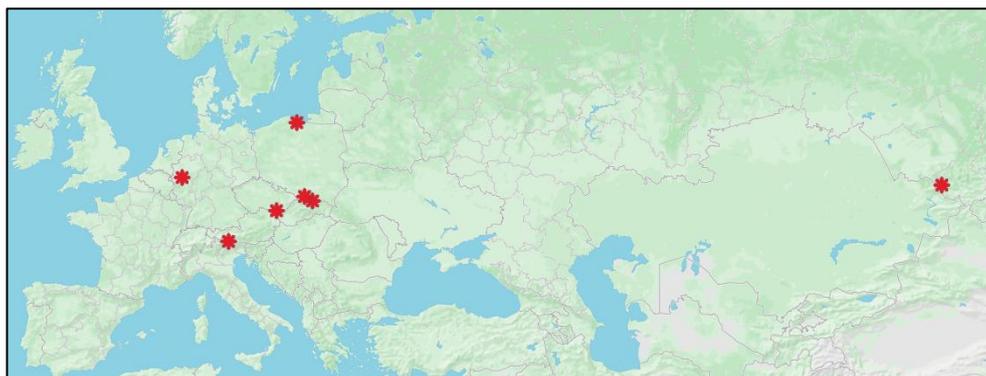


Fig. 1. *Forcipomyia altaica* REMM, 1972, distribution map.

Diagnosis. A large species, with wing length 1.6-2.0 mm, whole body blackish-brown, 3rd palpal segment elongate, sensory pit small, located in basal part. Male: gonostyle nearly straight, slender; parameres fused basally, apices long, slender, wavy; aedeagus shield-shaped, posterior margin with one median and two lateral triangular projections. Female with two ovoid seminal capsules with short neck; all tibiae armed with lanceolate scales.

Description

Male (Figs 2-3). Body, including legs, uniformly blackish brown.

Head. Eyes bare, confluent. Antenna with plume well-developed (Fig. 2A); total flagellum length 1.0-1.3 mm, AR 0.98-1.28; flagellomeres 5, 6, 7 (8) fused, flagellomere 10 about twice as long as flagellomere 11. Proboscis well developed. Mandibles and laciniae long, pale, without teeth. Palpal segment 3 slender (Fig. 2B), 130-152 µm long, with small and shallow sensory pit located in basal 1/3 of its length; PR(III) 4.0-5.4. **Thorax.** Scutellum (Fig. 2C) bearing numerous setae. Wing (Fig. 2D) without pattern; first radial cell reduced, slit-like, second one short; wing length 1.6-2.0 mm; CR 0.41-0.47. Haltere dark. Legs slender (Figs 2E-G), with well-developed empodium and claws with bifid apices; hind tibia with comb composed of 8-9 large setae and with strong, moderately long apical spur; fore, mid and hind tarsal ratios: TR(I) 1.0-1.4, TR(II) 0.9-1.1, TR(III) 1.0-1.2. **Genitalia** (Fig. 3). Tergite 9 rounded, with a pair of well-defined apicolateral processes, each bearing few long setae. Sternite 9 more than 2.3 times broader than long, posterior

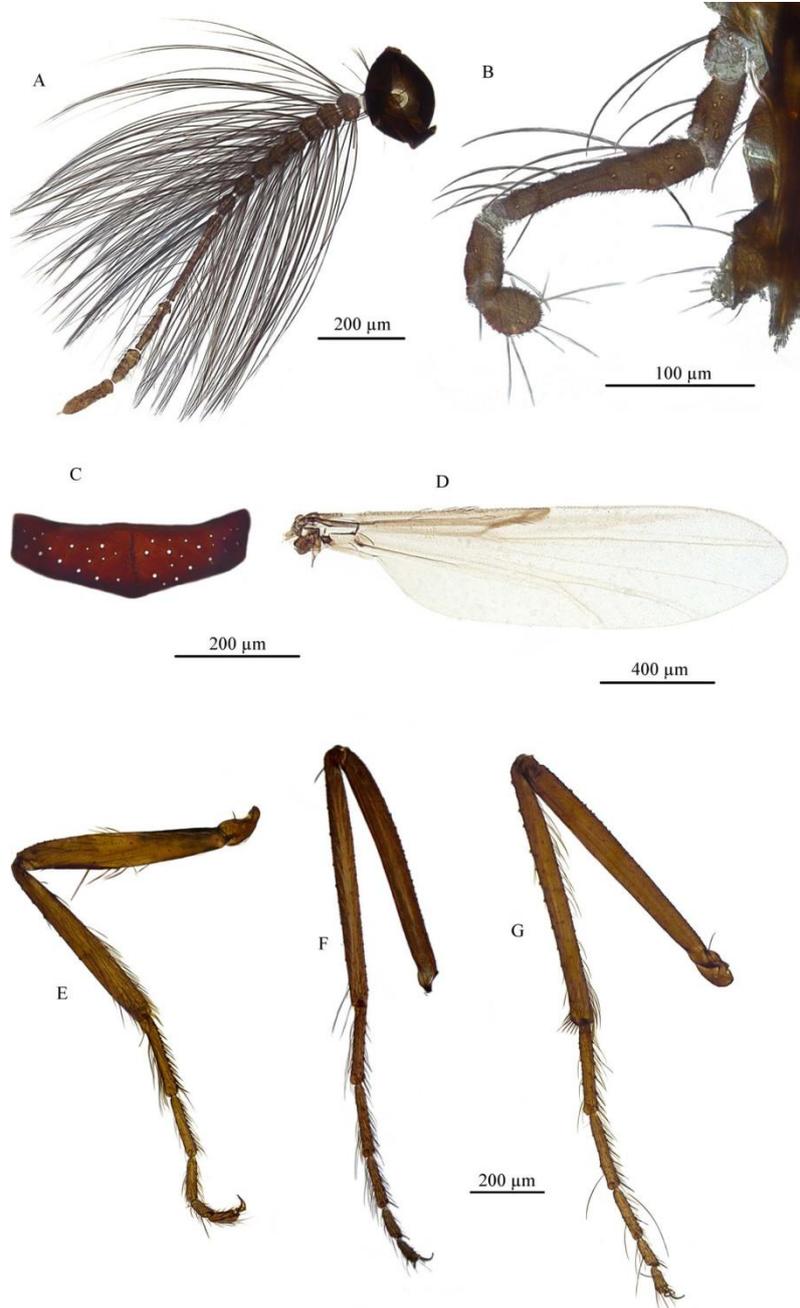


Fig. 2. *Forcipomyia altaica* REMM, 1972, male: A – antenna; B – maxillary palp; C – scutellum; D – wing; E-G – legs (the same scale bar for all images) – fore leg (E), mid leg (F), hind leg (G).

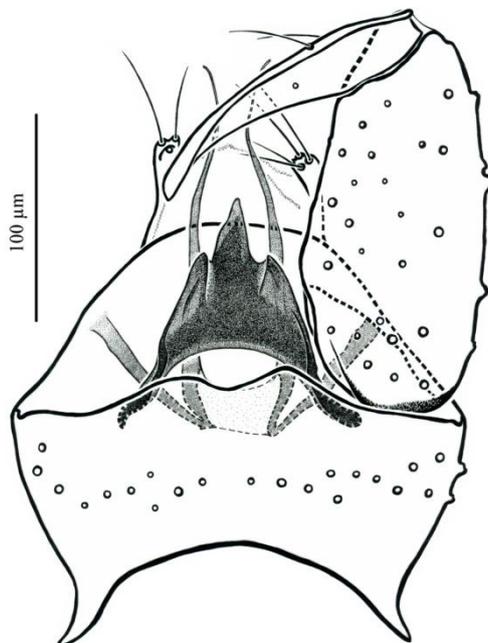


Fig. 3. *Forcipomyia altaica* REMM, 1972, male genitalia, ventral view.

margin with shallow median excavation, irregular row of long setae present. Gonocoxite more than twice as long as broad. Gonostylus nearly straight, slender, tapering slightly towards tip. Parameres U-shaped, moderately separated but their basal portions connected by poorly sclerotized hyaline bridge; each paramere elongate, slender, thin in apical portion. Aedeagus heavily sclerotized in the middle, with one well-defined posteromedial triangular projection and two shorter lateral ones.

Female (Fig. 4). Similar to male **with the usual sexual differences.**

Head. Eyes bare, confluent. Antennal flagellomeres subcylindrical, five distal ones slightly longer and slenderer than proximal ones; total flagellum length 0.8 mm, AR 0.76. Mandibles and laciniae without teeth. Palpal segment 3 more robust than in male (Fig. 4B), 117 μm long, PR(III) 3.0; sensory pit small and shallow, located in basal half. *Thorax.* Scutellum as in male with numerous setae. Wing (Fig. 4A) without pattern; first radial cell reduced, slit-like, second radial cell short, as in male; wing length 1.7 mm; CR 0.49. Haltere dark. Legs (Figs 4C-E) with all tibiae bearing lanceolate scales; hind tibial comb composed of 9 spines; empodium well-developed; hind tibial spur strong, moderately long; tarsal ratios TR(I) 1.3, TR(II) 1.1, TR(III) 1.1. *Genitalia.* Subgenital plate ovoid, with large lumen (Fig. 4F). Two ovoid seminal capsules present (Fig. 4G), with short neck, similar in size, dimensions 116x66 μm and 110x72 μm .

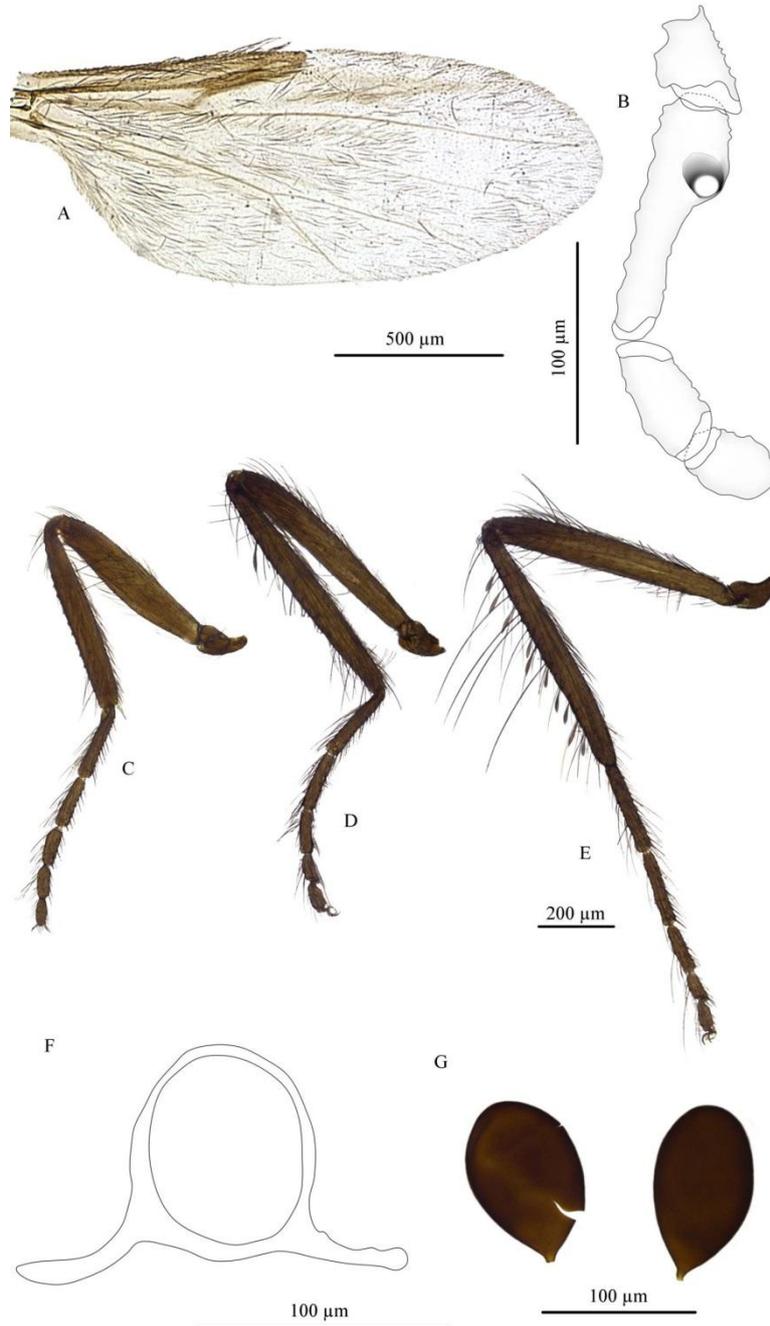


Fig. 4. *Forcipomyia altaica* REMM, 1972, female: A – wing; B – maxillary palp; C-E – legs (the same scale bar for all images) – fore leg (C), mid leg (D), hind leg (E); F – subgenital plate; G – seminal capsules.

Comments. *Forcipomyia altaica* belongs to the *Squamigera* species group, which is characteristic in having the aedeagus with three apical triangular processes: one median and two submedian, and all the tibiae in females armed with lanceolate scales. In the Western Palaearctic the group includes three closely related species: *F. squamigera* KIEFFER, 1916 (present examination), *F. altaica* and *F. alatauensis* REMM, 1980. The latter species with wing length 1.8-2.2 mm described from males and females from the mountains of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) differs mostly in that the apices of the parameres are straight and stout (REMM 1980). *Forcipomyia squamigera* is a smaller and paler species with wing length 1.0-1.3 mm. It differs mostly in having broadly separated paramere bases, gonostyli with a blunt slightly curved apex, and a short and stout third palpal segment. In SZADZIEWSKI et al. (2007) it was incorrectly stated that the aedeagus in the male genitalia of this species is triangular with a barely visible apical portion.

REFERENCES

- ALWIN A., SZADZIEWSKI R. 2013. Biting midges of the subgenus *Trichohoelea* of *Forcipomyia* in Poland with keys for the determination of Polish subgenera (Diptera: Ceratopogonidae). Polish Journal of Entomology **82**(2): 113–126.
- BORKENT A. 2015. World species of biting midges (Diptera: Ceratopogonidae). Available online <http://www.inhs.illinois.edu/research/FLYTREE/Borkent.html>. (Last updated: February 11, 2015).
- HAVELKA P., CASPERS N. 1981. Die Gnitzen (Diptera, Nematocera, Ceratopogonidae) eines kleinen Waldbaches bei Bonn. Emergenz 1976/1977. Selbstverlag des Naturhistorischen Vereins, Bonn, 1–100.
- KNOZ J. 1997. Ceratopogonidae (Diptera, Nematocera) recorded firstly in the Czech and Slovak Republics. [in:] J. VAŇHARA, R. ROZKOŠNÝ (eds). Dipterologica Bohemoslovaca 8. Folia Facultatis Scientiarum Naturalium Universitatis Masarykianae Brunensis, Biologia **95**: 77–87.
- REMM H. 1972. New species of Ceratopogonidae (Diptera) from the south Siberia. Tartu Riikliku Ulikooli Toimetised **293**: 62–90. (in Russian)
- REMM H. 1980. New species of the family Ceratopogonidae (Diptera) from the Middle Asia. Tartu Riikliku Ulikooli Toimetised **516**: 85–128. (in Russian)
- SORIA S. DE J., WIRTH W.W. 1979. Ceratopogonid midges (Diptera: Nematocera) collected from cacao flowers in Palmira, Colombia: an account of their pollinating abilities. Revista Theobroma **9**: 77–84.
- SZADZIEWSKI R., BORKENT A., DOMINIAK P. 2013. Fauna Europaea: Ceratopogonidae. [in:] P. BEUK, T. PAPE (eds). Fauna Europaea: Diptera, Nematocera. Fauna Europaea version 2.6. Available online from <http://www.faunaeur.org>. (Retrieved: June 25, 2015).
- SZADZIEWSKI R., GILKA W., DOMINIAK P. 2007. A redescription of *Forcipomyia squamigera* KIEFFER, 1916 in all stages (Diptera: Ceratopogonidae). [in:] T. ANDERSEN (ed.). Contributions to the Systematics and Ecology of Aquatic Diptera. The Caddis Press, Columbus (Ohio), 275–280.

SZADZIEWSKI R., KRZYWIŃSKI J., GILKA W. 1997. Diptera Ceratopogonidae, Biting Midges. [in:] A.N. NILSSON (ed.). Aquatic Insects of North Europe – A Taxonomic Handbook. Volume 2. Apollo Books, Stenstrup, 243–263.

WIRTH W., MARSTON N. 1968. A method for mounting small insects on microscope slides in Canada balsam. *Annals of the Entomological Society of America* **61**(3): 783–784.

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