Online ISSN: 2299-9884
Polish Journal of Entomology 90(4): 236–244 (2021) DOI: 10.5604/01.3001.0015.6647

Biting midges of the genus *Forcipomyia* Meigen, 1818 (Diptera: Ceratopogonidae) from Afghanistan, with description of a new species

Shahin Navai

Museum of Natural History, Leibniz-Institute for Evolution and Biodiversity Science, Berlin, Germany.

* Corresponding author: Shahin.nawai@mfn.berlin

Abstract: Examination of an old collection of adult biting midges of the genus *Forcipomyia* Meigen, 1818 from Afghanistan revealed six species, placed within four subgenera: *Forcipomyia* (3 species)*, Microhelea* (1 species), *Synthridomyia* (1 species) and *Thyridomyia* (1 species). Five species are new records, *Forcipomyia* (*Forcipomyia*) *szadziewskii* n. sp. is described as a new member of this genus from this country.

Key words: New species, *szadziewskii,* South West Asia, Bamian, Helmand, Heart, Kunduz

Introduction

The genus *Forcipomyia* Meigen, 1818 of the subfamily Forcipomiinae Lenz, 1934 is a widely distributed and relatively well-studied group of nematocerous flies with about 1174 extant species worldwide (Borkent & Dominiak 2020). The genus has been poorly studied in S.W. Asia. Alwin-Kownacka *et al.* (2016) reported 25 species in 10 subgenera from the Middle East region. From Afghanistan at the high elevation of Mt. Noshaq, only *Forcipomyia* (*F.*) *monticolonia* Tokunaga, 1966 has been reported (Tokunaga 1966).

Afghanistan (Fig. 1) lies in South West Asia on the borders of the Palaearctic region. Geologically the country is divided into three main blocks: the Afghan-Tajikistan block in the north, the Iran-Central Afghan block in west, and in the east and southeast the Afghan-Pakistan block (With *et al.* 2018). The zoogeographical realm of Afghanistan is complex due to an overlap of elements of the Indian fauna and five major ecological life zones. The country includes a vast area of land divided by the Hindu Kush mountain range with a considerable diversity (Wagner *et al.* 2016, Habibi 1982, Kullmann 1970). Regarding various genera of the family Ceratopogonidae, Afghanistan can be mainly recognized as part of the Palearctic region (Tokunaga 1966, Buck *et al.* 1972, Navai 1977, 1994, 1997, UNDP 2019) and shows more affinities with a Central Asian fauna.

Material and methods

The materials studied in this article are part of the family Ceratopogonidae collected by D.P. Wojcik in 1968 for the United States National Entomological Collection, U.S. National Museum of Natural History, Washington D.C., USA (USNM). The materials were collected from four different provinces: Kunduz in the Northeast, Bamian (Bamihan on labels) in Central East, Heart in Central West, and Helmand in Central South (Fig. 1). The majority of the specimens are from Helmand and two specimens of one species are from Heart. The specimens are slide-mounted, examined, measured and drawn using a Zeiss Axioskop compound transmitted light microscope with an attached camera Lucida. Photographs were taken by Zeiss Axiocam MRc5.

Flagellum length, wing length and width are expressed in millimeter (mm) and dimensions of spermathecae are measured in micrometer (µm). Mean value of the measurements and ratios are provided followed by ranges and number of specimens studied (“n”) in a parentheses.

Fig. 1. Map of Afghanistan, source: https://geology.com/world/1200/afghanistan-road-map.jpg (accessed 31.05.2021). Red dots show the collection areas.

Abbreviations of different morphological terminologies used in the text and/or Figures are: PR – palpal ratio, AR – antennal ratio, WL – wing length, WW – Wing width, CR – costal ratio, TR – tarsal ratio, MfN-Berlin – Museum of Natural History. Berlin, Germany.

Systematics

Diptera: Ceratopogonidae
Subfamily: Forcipomyiinae Lenz, 1934
Genus: *Forcipomyia* Meigen, 1818
Type species: *Tipula bipunctata* Linnaeus, designated by Westwood, 1840: 126.

Results

1. *Forcipomyia* (*Forcipomyia*) *alatauensis* Remm, 1980 (Fig. 2)

Forcipomyia (s. str.) *alatauensis* Remm, 1980: 123. Kazakhstan. ♀♂

Material examined. 4♀♀, 2♂♂. Afghanistan, Bamian Prov., Saydabad, 8000 ft. (=2 438.4 m), 4 km. N. Bamian, 34°49'30"N 67°50'00"E, 18.08.1968, black light trap, leg. D. P. Wojcik, 1♀; 19.08.1968, 1♀, 1♂; 20.8.1968, 1♀; 21.8.1968, 1♀, 1♂.

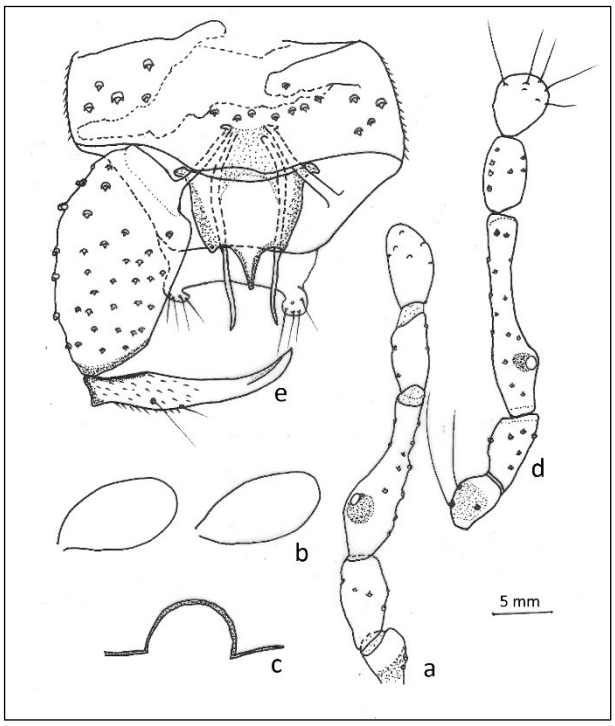

Fig. 2. *Forcipomyia* (*Forcipomyia*) *alatauensis* Remm, 1980: a) maxillary palpus, female; b) spermathecae, female; c) subgenital plate, female; d) maxillary palpus, male; e) genitalia, male.

Diagnosis. Large-sized blackish brown species, body covered with long blackish hairs. Eyes bare; male flagellomeres 5–7 fused; palpi slender; costal and radial area darker and covered with strong macrotrichia, first radial cell fused in both sexes; tarsi in all legs light brown; female tibiae with lanceolate scales, two ovoid spermathecae.

Description. Female (Fig. 2a–c)**:** Body blackish brown color. Eyes bare. Antennae short, AR 0.77 (0.70–0.84, n=2). Maxillary palpus (Fig. 2a) slender, dark brown, third segment robust, weakly swollen in the basal part with well sclerotized relatively deep sensory pit, opening narrow. PR 2.8 (n=2). Wings without pattern, covered with long blackish-brown macrotrichia, costa and radial veins darker with strong macrotrichia; WL 1.82 (1.71–1.93, n=2) mm, WW 0.75 (0.71–0.80, n=2) mm, CR 0.49 (0.48–0.51, n=2). Legs brown, tibiae with lanceolate scales; tarsi in all legs light brown; TR(I) 1.43 (1.34–1.53, n=2), TR(II) 1.46 (1.39–1.53, n=2), TR(III) 1.39 (1.31–1.48, n=2); hind tibial comb with 7 long spines. Abdomen dark brown; two oval, well sclerotized spermathecae (Fig. 2b); subgenital plate as in Figure 2c.

Male (Fig. 2d, e)**:** Same color as female. Eyes bare. Flagellomeres 5-7 fused. Maxillary palpus (Fig. 2d) slender, third segment weakly swollen in the basal part with small, well sclerotized sensory pit; PR 4.1 (4.0–4.3, n=2). Wing covered with long macrotrichia, costa and radial veins darker; WL 1.92 (1.84–2.00, n=2) mm, WW (0.72 (0.61–0.84, n=2) mm, CR 0.43 (0.43, n=2). Legs dark, tarsi in all legs light brown; TR(I) 1.23 (1.08–1.38, n=2), TR(II) 1.09 (1.08–1.11, n=2), TR(III) 1.19 (1.18–1.2, n=2); hind tibial comb with 10 long spines. Genitalia as in Figure 2, parameres are broadly fused a fourth their length at the base and slightly bent.

Comments. The male genitalia of the specimen examined differs slightly from the original drawing of *F. alatauensis*, as the parameres are not strait and broadly fused a fourth their length at the base. Costa and radial area darker and covered with strong long machrotrichia.

Distribution. East Palaearctic boreo montane species, known from Kazakhstan, Kyrgyzstan & Tajikistan (Remm 1980). This is the first record from Afghanistan and SW Asia.

2. Forcipomyia (*Forcipomyia*) *dichromata* Remm, 1968 (Figs 3, 4)

Forcipomyia dichromata Remm. In: Remm H, Zhogolev DT, 1968: 826. Crimea, Gurzuf.

Material examined. 12♀♀. Afghanistan, Helmand Province, Gawargin 2200 ft (= 670.5 m), 20 Km. S. Lashkar Gah, 31°34’59”N 64°22’9”E, 1.10.1968, Black light trap, leg. D.P. Wojcik, 12 ♀♀.

Diagnosis. Medium-sized light brown species. Eyes bare; first radial cell fused, pale spot in front of costa; legs straw colored. Two significantly unequal, ovoid spermathecae; subgenital plate semi-circular with large lumen.

Description. Female (Figs 3, 4)**:** Eyes bare, frontal sclerite as in Figure 3a. Antennal flagellomeres sub cylindrical, last five distal

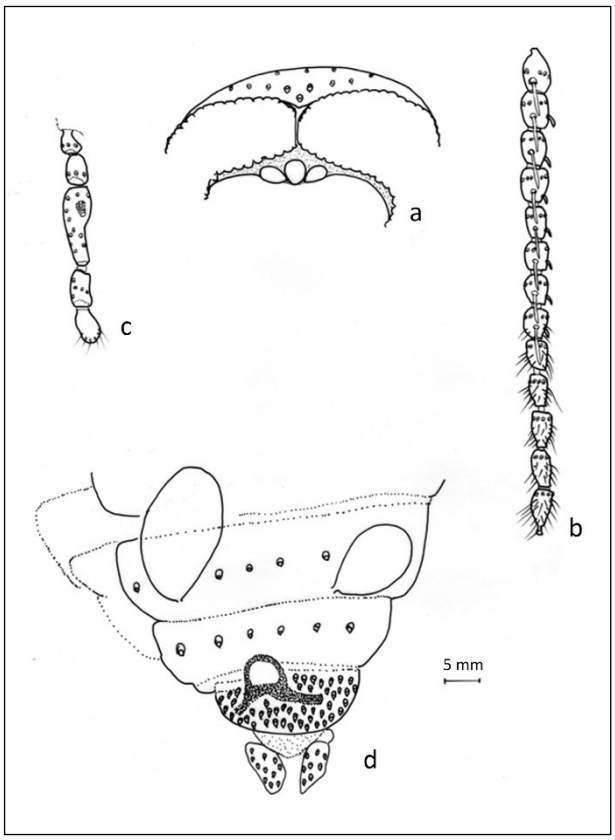

Fig 3. *Forcipomyia* (*Forcipomyia*) *dichromata* Remm, 1968, female: a) frontal sclerite; b) flagellum; c) maxillary palpus; d) last segments of abdomen.

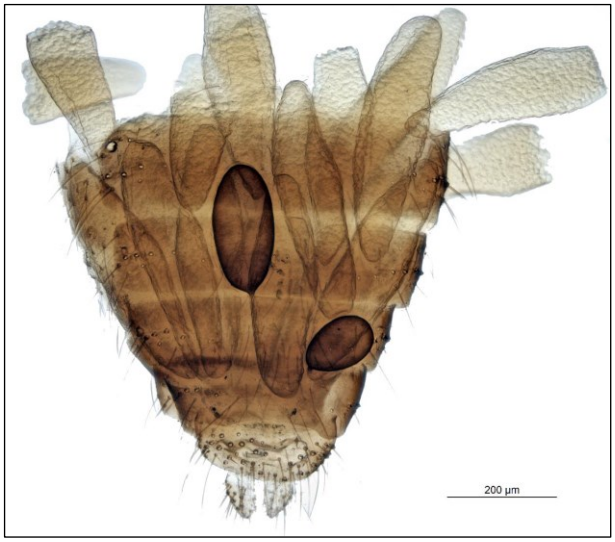

Fig. 4. *Forcipomyia* (*Forcipomyia*) *dichromata* Remm, 1968, female, last segments of abdomen.

flagellomeres slightly longer (Fig. 3b), flagellum length 0.71 (0.63–0.77, n=5) mm, AR 0.73 (0.67–0.75, n=3). Maxillary palpus light brown, third segment robust, swollen in the basal half with well sclerotized relatively deep sensory pit, opening narrow, segment four slightly longer than last segment (Fig. 3c); PR 2.5 (2.5, n=5). Thorax light brown, anepisternum and katepisternum yellowish brown; scutellum yellowish bearing 18 long bristles in two rows; the bristles on second row are stronger. Wing without pattern, covered with macrotrichia, a pale spot in front of costa; first radial cell slit-like, second radial cell moderately long and narrow; WL 1.44 (1.28–1.56, n=5) mm, WW 0.58 (0.55–0.61, n=5) mm, CR 0.45 (0.44–0-47, n=5); halters pale and transparent. Legs straw colored without lanceolate scales, hind femora with brown band at the apex; tarsi slightly darker; hind tibial comb with 10–11 spines, spur moderately long and bipectinate; TR(I) 1.09 (1.06–1.14, n=5), TR(II) 0.98 (0.95–1.00, n=5), TR(III) 0.94 (0.92–1.02, n=5); empodium well developed. Abdominal terga brown, base and apex of each tergum pale; last tergum covered with dense strong long setae (Figs. 3d, 4); sterna pale yellowish; subgenital plate semi-circular with large lumen (Fig. 3d); spermathecae (Figs 3d, 4) two, ovoid and significantly unequal, measuring 130x79 µm and 96x57 µm (n=5).

Comments. *Forcipomyia* (*Forcipomyia*) *dichromata* is close to *F*. (*F*.) *monticolonia* Tokunaga, 1966 from the highlands of Afghanistan in having two unequal spermathecae. In *F*. (*F*.) *monticolonia* the spermathecae are pyriform, with a significant neck, and the smaller spermatheca has clear punctuations, also the AR of *F. monticolonia* is greater than *F. dichromata*.

Distribution. Palaearctic species, recorded from Crimea, main land France, Tajikistan, Uzbekistan (Remm 1988), Israel, Turkey, Yemen (Alwin-Kownacka *et al.* 2016). This is the first record from Afghanistan.

3. Forcipomyia (*Microhelea*) *fuliginosa* (Meigen, 1818)

Ceratopogon fuliginosa Meigen, 1818: 86. Germany.

Material examined. 3♀♀. Afghanistan, Helmand Province, Gawargin 2200 ft

(=670.56 m), 20 Km. S. Lashkar Gah, 31°34’59”N 64°22’9”E, 1.10.1968, black light trap, leg. D. P. Wojcik, 3 ♀♀.

Diagnosis. Medium-sized dark brown species. Wing and body covered with long, dark hairs and narrow lanceolate scales; a pale spot at the tip of costa.

Description. Female: Eyes bare. Mandibles straight with many minute teeth, maxillae slender, long and blade-like with 30–40 fine teeth, tapered to a point. Antennal last five flagellomeres slightly darker than previous flagellomeres. AR 1.21 (1.15–1.29, n=3). Palpi light brown, segment three broadly inflated nearly to the tip, sensory pit deep, opens near distal end by a small round pore; few minute sensory pores near sensory pit opening. PR 2.18 (2.00–2.25, n=3). WL 1.63 (1.60–1.68, n=3) mm, WW 0.69 (0.68–0.73, n=3) mm, CR 0.50 (0.50, n=3); halters straw colored. Empodium well developed; TR(I) 0.71 (0.68–0.73, n=3), TR(II) 0.51 (0.51, n=3), TR(III) 0.55 (0.51–0.59, n=3); hind tibial comb with 9 (n=3) long spines. Two ovoid slightly unequal well sclerotized spermathecae present, neck not visible; subgenital plate arch-shaped with lateral lumen.

Distribution. Holarctic species. Recorded from Egypt, Oman and Yemen (Alwin-Kownacka *et al.* 2016). This is the first record from Afghanistan.

4. *Forcipomyia* (*Thyridomyia*) *monilicornis* (Coquillett, 1905)

Ceratopogon monilicornis Coquillett, 1905: 63. Canada (British Columbia).

Material examined. 3♂♂. Afghanistan, Bamian Province, Saydabad, 8000 ft. (=2438.4 m), 4 km. N. Bamian, 34°49’30”N 67°50’00”E, 20.08.1968, black light trap, leg. D. P. Wojcik. 3♂♂.

Diagnosis. Medium-sized brown species; eyes bare; thorax brown, scutellum light brown; third palpal segment slightly swollen in the middle with a large shallow pit.

Description. Male: Brown to dark brown species. Eyes bare. Mesonotum and postscutellum darker. Empodium well developed. First radial cell reduced. Third palpal segment slightly swollen in the middle.

PR 3.46 (3.30–3.70, n=3). WL 1.2 (1.2, n=3) mm, WW 0.40 (0.40, n=3) mm, CR 0.43 (0.42–0.44, n=3). TR(I) 2.1 (2.1–2.3, n=3), TR(II) 1.9 (1.8–2, n=3), TR(III) 2.2 (2.1–2.3, n=3). Hind tibial comb with 7–8 (n=3) long spines.

Distribution. Holarctic species. This is the first record from Afghanistan and S.W. Asia.

5. *Forcipomyia* (*Synthridomyia*) *murina* (Winnertz, 1852)

Ceratopogon murina Winnertz, 1852: 26. Europe.

Material examined. 2♀♀, 1 ♂. Afghanistan, Kunduz Province, Bolla Quchi, 36°48’N 68°48’E/ 36.8°N 68.8°E 10.09.1968. Black light trap, leg. D. P. Wojcik, 2 ♀♀, 1 ♂.

Diagnosis. Medium-sized brown species; eyes in the middle pubescent in both sexes. Palpus third segment slightly swollen in lower half with lightly sclerotized sensory pit. Mesonotum, and postscutellum brown, scutellum and pleura light brown. Wing covered with macrotrichia.

Female: Eyes pubescent in the middle. One spermatheca present with distinct neck. Mandible and maxilla with many fine teeth. AR 0.77 (0.70–0.85, n=2). PR 3 (3, n=2). WL 0.86 (0.82–0.91, n=2) mm, WW 0.33 (0.32–0.35, n=2) mm, CR 0.33 (0.31–0.36, n=2). TR(I) 2.09 (1.90–2.28, n=2), TR(II) 2.45 (2.40–2.50, n=2), TR(III) 2.16 (2.10–2.20, n=2). Hind tibial comb with 6 long spines.

Male: Eyes pubescent in the middle. Palpus light brown, PR 5.8 (n=1). WL 1.05 (n=1) mm, WW 0.32 (n=1) mm, CR 0.37 (n=1). TR(I) 2.46 (n=1), TR(II) 2.43 (n=1), TR(III) 2.45 (n=1); Hind tibial comb with 6 long spines.

Distribution. Holarctic species. Recorded from Bahrain, Oman, UAE and Yemen

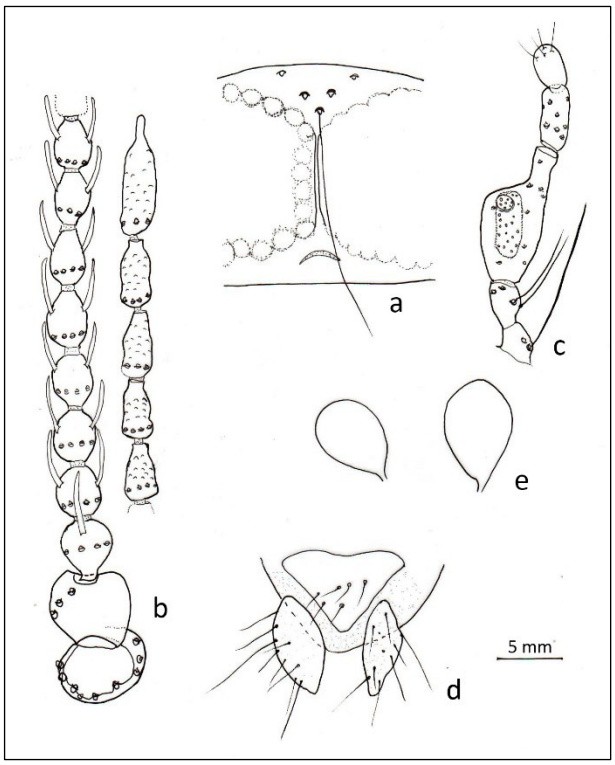

Fig. 5. *Forcipomyia* (*Forcipomyia*) *szadziewskii* Navai, n. sp., female: a) frontal sclerite; b) flagellum; c) maxillary palpus; d) last abdominal segment; e) spermathecae.

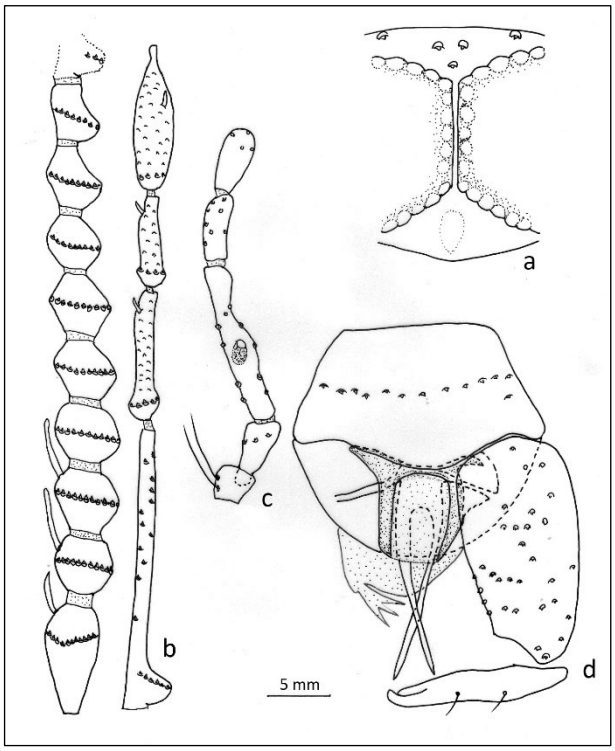

Fig. 6. *Forcipomyia* (*Forcipomyia*) *szadziewskii* Navai, n. sp., male: a) frontal sclerite; b) flagellum; c) maxillary palpus; d) genitalia.

(Szadziewski *et al.* 2011). Israel (Alwin-Kownacka *et al.* 2016). This is the first record from Afghanistan.

6. Forcipomyia (*Forcipomyia*) *szadziewskii* Navai, n. sp. (Figs 5–8)

Type material. Holotype ♂, labeled AFGHANISTAN Herat Prov. Karukh, 4200 ft [=1280 m], 43 km E Heart, [34°29'24"N 62°35'24"E] 15.X.1968 [15.10.1968] D. P. Wojcik black light trap. Paratype ♀, labeled same data as male. The holotype deposited in the Diptera collection (USNM), while the paratype in the Diptera collection (MfN-Berlin).

Diagnosis. Medium-sized species, body light brown to brown, wings covered with long macrotrichiae without pattern. Radial area slightly darker, a pale spot in front of costa. Third palpal segment in both sexes sensory pit in the middle of third palpal segment. Hind femur with brown band at the apex in both sexes. Female with two ovoid and subequal spermathecae. Male genitalia light brown; gonostylus rather broad with sinuate fold; aedeagus poorly sclerotized laterally, main part not visible; parameres stout, fused at base.

Description. **Female** (Figs 5a–e)**:** Eyes bare; frontal sclerite as in Figure 5a. Antennae light brown, flagellum 0.66 mm, all flagellomeres with sensilla chaetica, and sensilla trichodia (Fig. 5b), flagellomeres 5–8 subcylindrical, distal five flagellomeres longer (Fig. 5b). AR 0.73. Maxillary palpi light brown, third segment swollen in the middle with well sclerotized deep sensory pit, opening narrowly, fourth segment slightly longer than fifth (Fig. 5c). PR 2.25 (n=1). Thorax, mesonotum, scutellum and katepisternum brown, anepisternum yellowish light brown; scutellum with about 10 strong, long bristles and 8 smaller setae in the middle. Wing without pattern, covered with long macrotrichia; a pale spot in front of the costa present. WL 1.13 (n=1) mm, WW 0.49 (n=1) mm, CR 0.44 (n=1). Halters transparent. Legs

Fig. 7. *Forcipomyia* (*Forcipomyia*) *szadziewskii* Navai, n. sp., male, maxillary palpus.

Fig. 8. *Forcipomyia* (*Forcipomyia*) *szadziewskii* Navai, n. sp., male, genitalia.

light brown, without lanceolate scales; hind femur with brown apical band; TR(I) 0.84 (n=1), TR(II) 0.77 (n=1), TR(III) 0.75 (n=1); Hind tibial comb with 9 long spines; empodium narrow. Abdomen with pale tergum 1, terga 2–9 brown, base and apex of terga 2–4 pale, last tergum covered with dense strong long setae; sterna 1–2 pale, 3–9 brown; pleura 3–6 covered with long blackish hairs. Subgenital plate not sclerotized. Cerci well developed (Fig. 5d). Two spermathecae, slightly unequal, ovoid, with short necks (Fig. 5e), measuring 85x37 µm and 72x25 µm.

Male (Figs 6–8)**:** Eyes bare, frontal sclerite as in Fig. 6a. Flagellum light brown, plum brown, flagellomere 10 two times longer than flagellomere 11 (Fig. 6b); flagellum 1.09 mm. AR 1.05. Maxillary palpi light brown, third segment swollen in the middle with well sclerotized relatively deep sensory pit, opening narrow (Figs 6c, 7), segment four slightly longer than last segment. PR 5.4 (n=1). Thorax, mesonotum, scutellum and katepisternum brown, anepisternum yellowish light brown; scutellum bearing about 10 strong long bristles and 8 smaller setae in the middle. Wing without pattern, covered with long macrotrichia, a pale spot in front of the costa present. WL 1.57 (n=1) mm, WW 0.48 (n=1) mm, CR 0.44 (n=1). Halters transparent. Legs without lanceolate scales, light brown, hind femur with brown band at the apex. TR(I) 0.75 (n=1), TR(II) 0.70 (n=1), TR(III) 0.74 (n=1); hind tibial comb with 10 spines; empodium narrow. Abdominal terga brown, base and apex of the first four terga pale. Genitalia (Figs 6d, 8) pale brown, covered with dense strong dark hairs, ninth sternum with round caudal margin and ninth tergum with abundant brown long hairs. Gonocoxite light brown, nearly twice as long as broad. Gonostylus pale, shorter than gonocoxite, rather broad with sinuate fold, apex brown. Aedeagus poorly sclerotized laterally, medial part not visible (Figs 6d, 8). Parameres (Figs 6d, 8) long, almost as long as gonocoxite, broadly fused a sixth of the length at base, free distal portion rather stout and gradually pointed.

Discussion. *Forcipomyia szadziewskii* is allied to the *F. brevipennis* group of the subgenus *Forcipomyia* and close to *F. cirrhosa* Clastrier, 1961 and *F. suberis* Clastrier, 1956. The sensory pit on the middle of the third palpal segment in both sexes of the new species are rather unusual for the subgenus *Forcipomyia*. This character is unique in this

species and separate it from other species in this group. The female shows strong differences with two unequal spermathecae and the genital plate. The male differs from both species by its color, shape of the aedeagus and the round caudal margin of the sternum IX.

Etymology. The species is named in honor of Prof. Ryszard Szadziewski of Gdansk, Poland in recognition of his immense contribution to the systematics and phylogeny of the family Ceratopogonidae.

Distribution. Afghanistan.

Acknowledgments

I gratefully acknowledge Dr. Patrycja Dominiak, Tromsø University Museum, Norway for her critical reviews and helpful suggestions. I am grateful to Prof. Ryszard Szadziewski, Gdańsk, Poland for reviewing of earlier drafts of the manuscript with valuable comments. I extend my thanks to Dr. Jason Dunlop, MfN Berlin who kindly checked the English of the manuscript. Many thanks to Bernhard Schurian and Birger Neuhaus, MfN-Berlin for helping to prepare the photos. Thanks are due to Dr. James Pecor, USNM for loan of the specimens for this study.

References

Alwin-Kownacka A, Szadziewski R, Szwedo J. 2016. Biting midges of the subfamily Forcipomiinae (Diptera: Ceratopogonidae) from the Middle East, with keys and descriptions of new species. *Zootaxa*, 4173 (4): 351–378.

Borkent A, Dominiak P. 2020. Catalog of the Biting Midges of the World (Diptera: Ceratopogonidae), *Zootaxa*, 4787(1): 1–377.
DOI: 10.11646/zootaxa.4787.1.1.

Buck AA, Anderson RI, Kawata K, Abrahams IW, Ward RA, Sasaki T. 1972. Chapter 3: 80. *Health and disease in rural Afghanistan*. York Press, Baltimore, U.S.A. 231 pp.

Clastrier J, 1956. Notes sur les Cératopogonidés. I.-Quatre espèces du groupe *Forcipomyia* d'Algérie et de Tunisie. *Archives de l'Institut Pasteur Algérie*, 34: 496–512.

Clastrier J, Rioux JA, Desscous S. 1961. Notes sur les Cératopogonidés. XII. – Cératopogonidés du Nord Tchad. *Archives de l'Institut Pasteur d'Algérie*, 39(1): 49–98.

Coquillett DW. 1905. New nematocerus Diptera from North America. *New York Entomological Society*, 13: 56–69.

Habibi K. 1982. AFGHANISTAN iii. Fauna, *Encyclopedia Iranica*, Online Edition, 1982. Available online at: http://www.iranica online.org

Kullmann E. 1970. Die Tierwelt Ostafghanistans in ihren geographischen Beziehungen. *Freunde des Kölner Zoo*, 13(1): 3–25.

Lenz F. 1934. 13a Heleidae (Ceratopogonidae). In: Lindner E. (Ed.). *Die Fliegen der palaearktischen Region* 3: 95–133 (Lfg. 78). Stuttgart.

Meigen JG. 1818. *Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten*. Vol. 1. xxxvi + 333 pp. Pls. 1–11. Aachen.

Navai S. 1977. Biting midges of the genus *Culicoides* (Diptera: Ceratopogonidae) from Southwest Asia. *Ph.D. Thesis*. University of Maryland, College Park, USA, 201 pp.

Navai S. 1994. Biting midges of the genus *Dasyhelea* from Afghanistan, with description of new species. *Deutsche entomologische Zeitschrift*, 41: 357–399.

Navai S. 1997. A new species of *Brachyopogon* Kieffer from Afghanistan (Diptera: Ceratopogonidae). *Memoirs of the Entomological Society of Washington*, 18: 184–188.

Newmann E. 1834. Attempted division of British insects into natural orders. *Entomological Magazine,* 2: 379–431.

Remm H, Zhogolev DT. 1968. To the fauna of biting midges (Diptera: Ceratopogonidae) of the Crimea (in Russian, English summary).

Entomologicheskoe Obozrenie, 47: 826–842.

Remm H. 1980. New species of the family Ceratopogonidae (Diptera) from the Middle Asia (in Russian, English summary). *Tartu Riikliku Ulikooli Toimetised*, 516: 85–128.

Remm H. 1988. Ceratopogonidae. In A. Soos (Ed.). *Catalogue of Palaearctic Diptera*, Vol. 3. Budapest, Akadémiai Kiadó, 448 pp.

Szadziewski R, Gwizdalska-Kentzer M, Gilka W. 2011. Order Diptera, family Ceratopogonidae. *Arthropod fauna of the UAE*, 4: 636–653.

Tokunaga M. 1966. Some Nematocerous Diptera of the North East of Afghanistan. *Report of the Kyoto University Scientific Expedition to Karakoram and Hindukush*, 8: 273–286.

UNDP. 2019. *Preserving biodiversity in Afghanistan*, Duration 01/2014 to 12/2018. Available online at: https://www.undp.org

Wagner P, Bauer AM, Leviton AE, Wilms TM, Böhme W. 2016. A Checklist of the Amphibians and Reptiles of Afghanistan Exploring Herpetodiversity using Biodiversity Archives. *Proceeding of the California Academy of the Sciences*, 4(63): 457–565.

Westwood JO. 1840. Order XIII. Diptera Aristotle (Antliata Fabricius. Halteriptera Clairv.). In his: *An introduction to the modern classification of insects, founded on the natural habits and corresponding organization of the different families*. *Synopsis of the genera of British insects*, London. 125 – 154.
DOI: 10.5962/bhl.title.12455

With SW, Breckle IC, Hedge M, Rafiqpoor D. 2018. Chapter 2: 54. in Pullaiah T. (Ed.). *Global Biodiversity*. New York, Apple Academic Press, 548 pp.
DOI: 10.1201/9780429487743

Winnertz J. 1852. Beitrag zur Kenntnis der Gatung *Ceratopogon* Meigen. *Linnaea Entomologica*, 6: 1–80.

Received: 16.06.2021
Accepted: 30.08.2021
Published online: 28.12.2021