

New records of biting midges of the genus *Dasyhelea* from Israel, with notes on synonymy in the genera *Culicoides* and *Forcipomyia* (Diptera: Ceratopogonidae)

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ABSTRACT. Six species of *Dasyhelea* KIEFFER, 1911 from Israel are recorded for the first time and detailed drawings of their male genitalia are presented. These species represent the following faunal elements: Afrotropical (*Dasyhelea flava* CARTER, INGRAM et MACFIE, 1921), meridional (eremial) Palaearctic (*D. alboverrucosa* REMM, 1967, *D. punctiventris* GOETGHEBUER, 1940), west Palaearctic (*D. arenivaga* MACFIE, 1943), arboreal Holarctic (*D. bifida* ZILAHY-SEBESS, 1936) and arboreal Palaearctic (*D. turficola* KIEFFER, 1925). *D. flava* is reported for the first time in the Palaearctic Region. *Culicoides subneglectus* VIMMER, 1932 and *C. bulbostylus* KHALAF, 1961 are recognized as new junior synonyms of *Culicoides trivittatus* VIMMER, 1932. *Dasyhelea dasyptera* GOETGHEBUER, 1934 is recognized as a new junior synonym of *Forcipomyia frutetorum* (WINTERNERTZ, 1852).

KEY WORDS: Diptera, Ceratopogonidae, *Dasyhelea*, *Culicoides*, *Forcipomyia*, new synonymy, Israel.

INTRODUCTION

Of the Ceratopogonidae family, only the genus *Culicoides* was extensively studied in Israel, while other genera were studied only occasionally. Faunistic and taxonomic studies yielded

70 species from the following genera *Leptoconops* SKUSE, 1889, *Forcipomyia* MEIGEN, 1818, *Atrichopogon* KIEFFER, 1906 and *Culicoides* LATREILLE, 1809.

The reported species in the genus *Leptoconops* SKUSE, 1889 are *L. kerteszi* KIEFFER, 1908 (AUSTEN 1921), *L. bezzii* NOE, 1905 (BODENHEIMER 1937), *L. golanensis* CLASTRIER, 1981 and *L. montigena* CLASTRIER, 1981 (CLASTRIER 1981a,b).

VIMMER (1928) described the following four new species in the genus *Forcipomyia* MEIGEN, 1818 from Tel-Aviv: *F. brachypetiolata*, *F. imaculata*, *F. ochracea*, and *F. flavomaculata* which are doubtful species of unclear taxonomic position. GOETGHEBUER (1934) reported *F. murina* (WINNERTZ, 1852) from unidentified localities of Palestine. We do not include in the list *F. asticta* KIEFFER, 1913 known from India which was noted with a question mark from Jerusalem by GOETGHEBUER (1934). Some uncertainly determined and questioned species of *Forcipomyia* mentioned by AUSTEN (1921) and BODENHEIMER (1937) are also not included.

Dasyhelea dasyptera GOETGHEBUER, 1934 actually belongs to *Forcipomyia*. This species was described from Rehoboth (now Rehovot) near Jaffa (now Tel-Aviv) (10.XII.1931, coll. Aharoni). Detailed studies of the holotype preserved in the Staatliches Museum für Naturkunde in Stuttgart showed that it is the female of *Forcipomyia* (*Thyridomyia*) *frutetorum* (WINNERTZ, 1852) as interpreted by DOW & WIRTH (1972). **New synonymy.** The holotype is characterized as follows: eyes pubescent, proximal flagellomeres of antenna spherical, the distal more elongate and the last segment with rounded apical papilla, AR = 0.86; third palpal segment 55 µm long, swollen on proximal half, sensory pit distinct, PR = 2.4; mandible with small teeth. Wing membrane with macrotrichia, pale spot at tip of costa present, wing length 0.77 mm, CR = 0.56. Both radial cells present. Tarsal ratio of foreleg TR(I) 2.4, middleleg TR(II) 2.4 and hindleg TR(III) 2.5. Spermatheca single, globular with long neck.

Of the genus *Atrichopogon* KIEFFER, 1906 the only known species from Israel is *A. taizi* BOORMAN et HARTEN, 2002 (= *A. wirthorum* DELECOLLE et BRAVERMAN, 1996, = *A. shaubensis* BOORMAN et HARTEN, 2002) (SZADZIEWSKI & BORKENT 2003), which is widely distributed in the Arab Peninsula.

The extensively studied genus *Culicoides* LATREILLE, 1809 includes in Israel 59 species reported by: AUSTEN (1921), VIMMER (1932), MACFIE (1933), GOETGHEBUER (1934), BODENHEIMER (1937), CALLOT et al. (1969), BOORMAN et al. (1974), BRAVERMAN et al. (1976), BRAVERMAN et al. (1981), KREMER et al. (1981), BRAVERMAN et al. (1983), BRAVERMAN et al. (1996) and GLUKHOVA & BRAVERMAN (1999). Most of the *Culicoides* species described by VIMMER (1932) were subsequently recognized as junior synonyms (EDWARDS 1939, KREMER et al. 1981, SZADZIEWSKI 1984). We found that male genitalia of *Culicoides trivittatus* from Israel (VIMMER 1932: 136, fig.) with uniquely shaped gonostyli (enlarged bulbous base covered with strong bristles) are identical to those described in *C. subneglectus* VIMMER, 1932 (redescribed by KREMER et al. 1981) and *C. bulbostylus* KHALAF, 1961 (p. 463, male, fig. male genitalia) (redescribed by GUTSEVICH 1973 and GLUKHOVA 1989, 2005). We propose to consider *C. subneglectus* VIMMER, 1932 and *C. bul-*

bostylus KHALAF, 1961 as junior synonyms of *C. trivittatus* VIMMER, 1932. **New synonyms.**

MATERIALS AND METHODS

Dasyhelea specimens were collected by Y. Braverman in 1995 from Bet Dagan (32°0'N, 34°49'E) and Nahshonim (32°3'N, 34°56'E). The insects were preserved in 70% ethanol, transferred to a mixture of phenol - alcohol and subsequently mounted in Canada balsam as described by WIRTH & MARSTON (1968). Determined species are kept in the Department of Invertebrate Zoology, University of Gdańsk.

The holotype female *Dasyhelea dasyptera* GOETGHEBUER, 1934 was borrowed from Staatliches Museum für Naturkunde in Stuttgart (Germany). The pinned holotype was mounted on a microscope slide. Both wings were removed from the specimen and put into Canada balsam and the remaining part of the ceratopogonid was immersed in 10% KOH for clearing. Following that step, the specimen was transferred into a succession of 50%, 75% and 96% ethanol solutions and then into a mixture of phenol and alcohol.

RESULTS AND DISCUSSION

Dasyhelea (Prokempia) flava CARTER, INGRAM et MACFIE, 1921

(Fig. 1a)

Dasyhelea flava CARTER, INGRAM et MACFIE, 1921: 196 (larva, pupa, male, female, key, breeding site, Gold Coast - Ghana); CLASTRIER 1959: 413 (male, female, Réunion Island); CLASTRIER & WIRTH 1961: 321 (breeding site, Gambia); DE MEILLON & WIRTH 1981: 532 (breeding sites, distribution, South Africa); BOORMAN & VAN HARTEN 2002: 442 (male, female, breeding site, distribution, Oman, Yemen).

Material examined

Bet Dagan, Kimron Veterinary Institute, horse stable, 07.08.1995, 4 males; 6-31.08.1995, 43 males; 31.10.1995, 18 males; 5-10.11.1995, 25 males. Nahshonim, 21.08.1995, 1 male.

Distribution, ecology

Afrotropical species widely distributed in Subsaharan Africa (Ghana, Gambia, Réunion Island, South Africa) and in Arabian Peninsula (Oman, Yemen). Reported for the first time from Israel and the Palearctic Region. *D. flava* was erroneously noted from Ethiopia by

DE MEILLON & WIRTH (1981) without defined localities and materials. Collected by light and Malaise traps. Several time reared from rotting banana stems.

***Dasyhelea (Pseudoculicoides) alboverrucosa* REMM, 1967**

(Fig. 1b)

Dasyhelea alboverrucosa REMM, 1967: 17 (male, female, Azerbaijan); SZADZIEWSKI 1985: 96 (comments); REMM 1988: 80 (in catalogue, without defined localities, Azerbaijan, Kazakhstan, Tadjik Republic, Turkmen Republic, Uzbekistan, Moldova); NAVAI 1994: 361 (male, Afghanistan).

Material examined

Nahshonim, 21.08.1995, 1 male.

Distribution

The species represents meridional or eremial faunal element in the Palaearctic region. Recorded in arid regions of southern Palaearctic: Azerbaijan, Afghanistan, Kazakhstan, Tadjik Republic, Turkmen Republic, Uzbekistan and Republic of Moldova.

***Dasyhelea (Pseudoculicoides) arenivaga* MACFIE, 1943**

(Fig. 1c)

Dasyhelea inconspicua var. *arenivaga* MACFIE, 1943: 151 (male, female, Egypt).

Dasyhelea arenivaga SZADZIEWSKI 1986: 55 (male, distribution, Algeria, Poland).

Material examined

Bet Dagan, Kimron Veterinary Institute, horse stable, 6-31.08.1995, 2 males; 31.10.1995, 1 male; 5-10.11.1995, 1 male. Nahshonim, 21.08.1995, 4 males.

Distribution

Egypt, Algeria, Poland. It probably represents west Palaearctic faunal element.

***Dasyhelea (Pseudoculicoides) bifida* ZILAHİ-SEBESS, 1936**

(Fig. 1d)

Dasyhelea fasciigera var. *bifida* ZILAHİ-SEBESS, 1936: 44 (male, Hungary).

Dasyhelea bifida ZILAHİ-SEBESS: BORKENT & FORSTER 1986: 1283 (syn. *Dasyhelea furva*, distr. Holarctic: Canada, Algeria, Romania); REMM 1988: 80 (in catalogue, Spain, Hungary, Romania, Moldova, Azerbaijan, Armenia, Kazakhstan, Siberia, central Asia, no defined localities); SZADZIEWSKI 1991: 106 (Poland); NAVAI 1994: 364 (male, Afghanistan).

Dasyhelea furva REMM, 1967: 21 (male, female, Caucasus); REMM 1979: 51 (Estonia); REMM 1988: 82 (in catalogue, Estonia, southern part of European Russia, Siberia, Canada, no defined localities).

Material examined

Nahshonim, 21.08.1995, 1 male.

Distribution

Holarctic arboreal faunal element reported from Algeria, Spain, Hungary, Poland, Estonia, Afghanistan, Caucasus, Uzbekistan, Tadjik Republic, Turkmen Republic, Republic of Moldova, Azerbaijan, Armenia, Kazakhstan, Kirghiz, Siberia and Canada.

***Dasyhelea (Pseudoculicoides) punctiventris* GOETGHEBUER, 1940**

(Fig. 1e)

Dasyhelea punctiventris GOETGHEBUER, 1940: 71 (male, Holstein); SZADZIEWSKI 1985: 86 (male, female, syns.: *D. sericatiodes* ZILAHİ-SEBESS, 1940; *D. siccicola* REMM, 1968;

D. sericatiodes sensu REMM 1981, distribution: Algeria, Turkey, Hungary, German, Crimea in Ukraine, Caucasus, Kazakhstan, NW China, Siberia, Mongolia).

Dasyhelea siccicola REMM, 1968: in REMM & ZHOGOLEV 1968: 832 (male, female, Crimea, Caucasus, Kazakhstan, China).

Dasyhelea sericatiodes ZILAHİ-SEBESS, 1940: 53 (male, Hungary); REMM, 1988: 83 (in catalogue, Germany, Hungary, Caucasus, Ukraine, European part of Russia, Azerbaijan, Kazakhstan, Kirghiz, Uzbekistan, Siberia, China).

Material examined

Bet Dagan, Kimron Veterinary Institute, horse stable, 6-31.08.1995, 2 males.

Distribution

Widely distributed meridional or eremial (arid) Palaearctic species common in steppean and semidesert regions.

***Dasyhelea (Pseudoculicoides) turficola* KIEFFER, 1925**

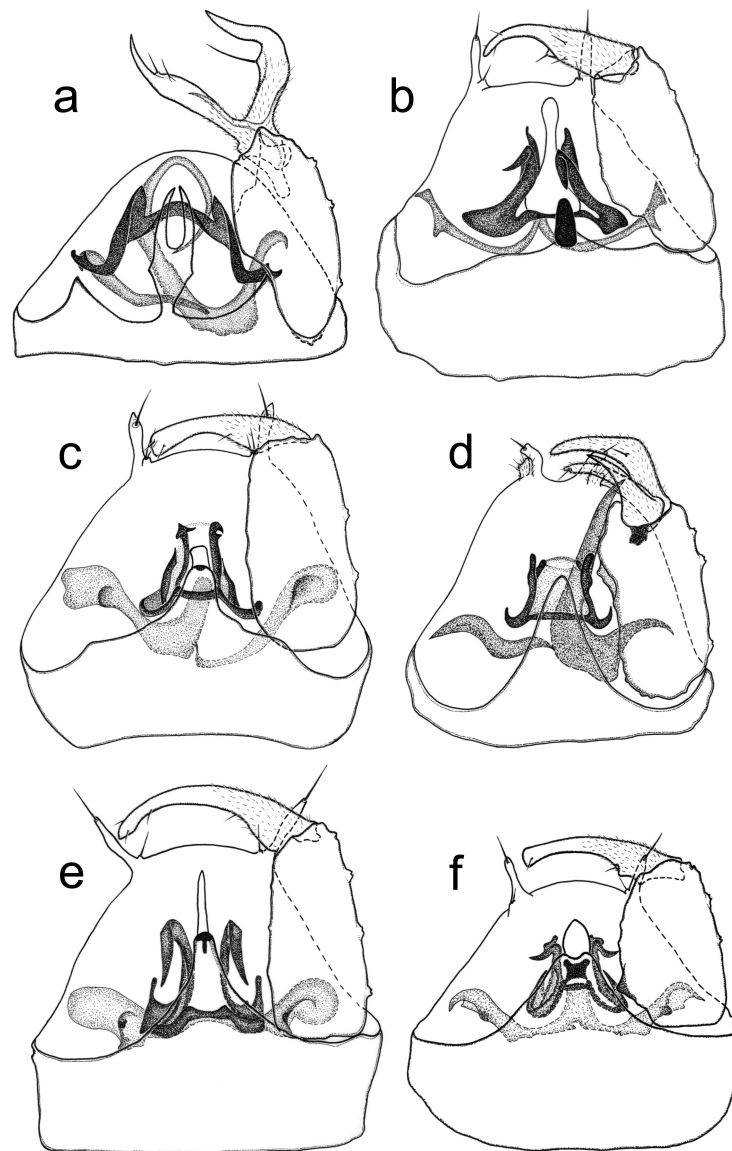
(Fig. 1f)

Dasyhelea turficola KIEFFER, 1925: 152 (male, key, Estonia); SZADZIEWSKI 1985: 80 (male, female, breeding sites, syns.: *D. grenieri* CLASTRIER, 1966, Algeria, Belgium, Poland, whole Palaearctic); REMM 1988: 84 (in catalogue, Far East of Russia, Estonia, Lithuania, European part of Russia, Georgia, Siberia, Great Britain, Germany).

Dasyhelea grenieri CLASTRIER, 1966: 703 (male, female, Canary Islands).

Material examined

Bet Dagan, Kimron Veterinary Institute, horse stable, 07.08.1995, 42 males; 6-31.08.1995, 55 males; 5-10.11.1995, 1 male. Bet Dagan, Volcani Institute, 1-30.08.1995, 13 males; 10.09.1995, 9 males. Nahshonim, 21.08.1995, 24 males.



Figs 1a-f. Male genitalia of *Dasyhelea* from Israel, ventral aspect: a - *D. flava* CARTER, INGRAM et MACFIE, 1921, b - *D. alboverrucosa* REMM, 1967, c - *D. arenivaga* MACFIE, 1943, d - *D. bifida* ZILAHY-SEBESS, 1936, e - *D. punctiventris* GOETGHEBUER, 1940, f - *D. turficola* KIEFFER, 1925.

Distribution, ecology

Common arboreal Palaerctic species broadly distributed from Algeria and Canary Islands to Far East of Russia. Sampled and reared from wet soil.

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