

Ceratopogonidae

Ryszard Szadziewski (1998 Checklist: Ryszard Szadziewski)

Last update: Jul 2024

Diagnosis: Small nematocerous midges (wing length 0.6-4.8 mm) common in moist habitats. Flagellum longer than head, composed of 13 flagellomeres in both sexes, in males plumose with decumbent plume hairs. Proboscis usually slightly elongate, in females adapted for piercing with well-developed biting mouthparts. Postnotum without median groove. Wing veins M_1 and M_2 usually well developed. Fore legs relatively short. Legs unarmed or greatly modified and armed with spines in predatory species. In similar Chironomidae: first medial veins are fused, plume erect in male, mouthparts greatly reduced, legs unarmed, fore legs usually long. Eggs of most Ceratopogonidae are more or less oval, in the genus *Dasyhelea* horse-shoe shaped. Larvae apneustic (without functional spiracles) with unique heavily sclerotised pharyngeal apparatus well visible through the head capsule. Pupae have respiratory horns with spiracular openings which contact the atmosphere.

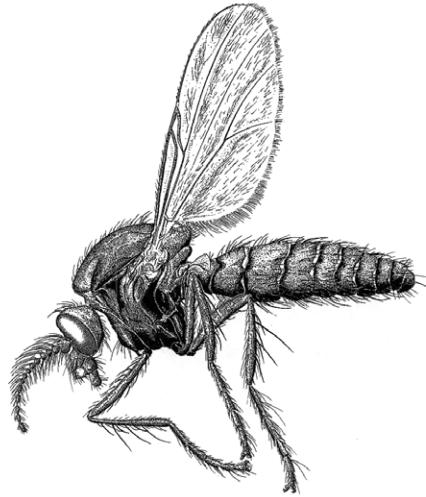
Biology: The bloodsucking adult females of biting midges are important vectors of pathogenic organisms (arboviruses, filarial parasites, protozoan blood parasites) in frogs, birds and mammals. *Culicoides* are vectors of dangerous bluetongue viral disease affecting cattle, sheep, goats, camelids and wild ruminants. Larvae are common inhabitants of shallow water bodies and semiaquatic habitats. Some species in the genera *Dasyhelea*, *Forcipomyia*, *Atrichopogon* and *Culicoides* live in typical terrestrial habitats like rotting wood, horse or cow dung or even ant nests, tree holes and sap flows. Feeding habits of adults are diverse. Fully functional biting mouthparts are restricted to the females. Males only take meals of sugar and water from flower nectar and honeydew. In all *Dasyhelea* and some *Forcipomyia*, both sexes feed exclusively on nectar. Females of other genera usually only supplement their protein rich diet with nectar. A protein rich meal is necessary for ovarian development in most species. The females of *Culicoides* suck blood from mammals and birds, while *Forcipomyia* (*Lasiohelea*) *velox* feed on frogs. Some species of *Forcipomyia* and *Atrichopogon* are ectoparasites on caterpillars and adults of Lepidoptera, Odonata, Coleoptera and Neuroptera from which they suck the hemolymph. The females of the subfamily Ceratopogoninae, except *Culicoides*, are predators on small insects. They inject proteolytic enzymes into their prey, which dissolve tissues. The digested fluid is then sucked out.

Nomenclature and classification: According to World catalogue (Borkent & Dominiak 2020) and Fauna Europaea (Szadziewski et al. 2013), with some changes.

Number of species: CH: 104 (1998 Checklist: 55), CZ: 175, DE: 256, EE: 184, FR: 243, GB: 169, PL 220, SL: 137, Europe: ~600, World: ~6300.

Level of faunistic knowledge in Switzerland: Poor.

General references: Boorman (1997) [keys, Palaearctic genera], Borkent (2014) [keys, pupae of the world], Glukhova (2005) [keys to species of *Culicoides*, Russia and adjacent



Forcipomyia brevipennis,
male (CMPD2, p.351).

countries], Goetghebuer (1934) [keys to Palaearctic species], González & Goldarazena (2011) [keys to *Culicoides* of north Spain], Szadziewski et al. (1997) [keys to genera, north Europe], Remm (1988) [catalogue, Palaearctic species], Szadziewski et al. (2013) [Fauna Europaea], Wirth & Grogan (1988) [predatory genera of the world].

References to the Swiss fauna: Cagienard et al. (2006), Casati et al. (2009), Delécolle & Schiegg (1998, 1999a, 1999b), Schiegg et al. (1999), Szadziewski (1998), Wenk et al. (2012).

Checklist

Atrichopogon Kieffer, 1906

(*Atrichopogon* s.str.)

- *brunnipes* (Meigen, 1804) !
- *fuscus* (Meigen, 1804) !
- *minutus* (Meigen, 1830) !
- *pavidus* (Winnertz, 1852) !

(*Lophomyidium* Cordero, 1929)

- *fuscus* (Coquillett, 1901) !
- = *polydactylus* Nielsen, 1951

(*Meloehalea* Wirth, 1956)

- *lucorum* (Meigen, 1818) !
- = *setosipennis* (Kieffer, 1911)
- *oedemerarum* Stora, 1939 !
- *winnertzi* Goetghebuer, 1922 !

- (*Psammopogon* Remm, 1979)
 - *flaveolus* Zilahi-Sebess, 1936 L
- (*Psilokempia* Enderlein, 1936)
 - *appendiculatus* (Goetghebuer, 1920) !
 - *forcipatus* (Winnertz, 1852) L
 - *maculatus* (Lundström, 1910) !
 = *avastensis* Remm, 1959
- Bezzia* Kieffer, 1899
 (*Bezzia* s.str.)
 - *winnertziana* Kieffer, 1919 !
- (*Pygobezzia* Remm, 1974)
 - *albicornis* (Meigen, 1818) !
 - *fuliginata* Clastrier, 1962 !
- Brachypogon* Kieffer, 1899
 (*Brachypogon* s.str.)
 - *fagicola* Delécolle & Schiegg, 1999 !
- (*Isohelea* Kieffer, 1917)
 - *alpinus* (Clastrier, 1961) L
 - *babiogorensis* Szadziewski, 1994 !
 - *hudjakovi* (Remm, 1974) !
 - *nitidulus* (Edwards, 1921) !
- Ceratoculicoides* Wirth & Ratanaworabhan, 1971
 - *moravicus* Knoz, 1987 !
 = *havelkai* Wirth & Grogan, 1988
 - *tontoeguri* (Havelka, 1980) !
- Ceratopogon* Meigen, 1803
 - *grandiforceps* (Kieffer, 1913) !
- Culicoides* Latreille, 1809
 (*Avaritia* Fox, 1955)
 - *chiopterus* (Meigen, 1830) !
 - *dewulfi* Goetghebuer, 1936 !
 - *imicola* Kieffer, 1913 !
 - *obsoletus* (Meigen, 1818) !
 - *scoticus* Downes & Kettle, 1952 !
- (*Beltranmyia* Vargas, 1953)
 - *circumscriptus* Kieffer, 1918 !
- (*Culicoides* s.str.)
 - *deltus* Edwards, 1939 !
 - *fagineus* Edwards, 1939 !
 - *flavipulicaris* (Dzafarov, 1964) !
 - *grisescens* Edwards, 1939 !
 - *impunctatus* Goetghebuer, 1920 !
 - *newsteadi* Austen, 1921 !
 - *pulicaris* (Linnaeus, 1758) !
 - *punctatus* (Meigen, 1804) !
- (*Groganomyia* Szadziewski & Dominiak, 2019)

- *cameroni* Campbell & Pelham-Clinton, 1960 !
- (*Monoculicoides* Khalaf, 1954)
 - *helveticus* Callot, Kremer & Déduit, 1962 L
 - *nubeculosus* (Meigen, 1830) !
- (*Oecacta* Poey, 1853)
 - *albicans* (Winnertz, 1852) !
 - *brunnicans* Edwards, 1939 !
 - *vexans* (Staeger, 1839) !
- (*Sensiculicoides* Shevchenko, 1977)
 - *cataneii* (Clastrier, 1957) !
 - *comosioculatus* Tokunaga, 1956 !
 - *duddingstoni* Kettle & Lawson, 1955 !
 - *festivipennis* Kieffer, 1914 !
 - *furcillatus* Callot, Kremer & Paradis, 1962 !
 - *indistinctus* (Khalaf, 1961) !
 - *jurensis* Callot, Kremer & Paradis, 1962 !
 - *kibunensis* Tokunaga, 1937 !
 - *pictipennis* (Staeger, 1839) !
 - *pseudoheliophilus* Callot & Kremer, 1961 !
- (*Silvaticulicoides* Glukhova, 1977)
 - *achrayi* Kettle & Lawson, 1955 !
 - *fascipennis* Staeger, 1839 !
 - *pallidicornis* Kieffer, 1919 L
- (*Wirthomyia* Vargas, 1973)
 - *reconditus* Campbell & Pelham-Clinton, 1960 !
 - *segnis* Campbell & Pelham-Clinton, 1960 !
- Dasyhelea* Kieffer, 1911
 - (*Dasyhelea* s.str.)
 - *bilineata* Goetghebuer, 1920 !
 - = *saxicola* (Edwards, 1929)
 - *flavifrons* (Guérin-Méneville, 1833) !
 - = *dufouri* (Laboulbène, 1869)
 - = *paludicola* Kieffer, 1925
 - *malleola* Remm, 1962 !
 - *pallidiventris* (Goetghebuer, 1931) !
 - (*Dicryptoscena* Enderlein, 1936)
 - *modesta* (Winnertz, 1852) !
 - *notata* Goetghebuer, 1920 !
 - (*Prokempia* Kieffer, 1913)
 - *flaviventris* (Goetghebuer, 1910) !
 - (*Pseudoculicoides* Malloch, 1915)
 - *arenivaga* Macfie, 1943 !
- Forcipomyia* Meigen, 1818
 - (*Calofoforcipomyia* Saunders, 1956)
 - *glauca* Macfie, 1934 !
 - (*Euprojoannisia* Bréthes, 1914)

- *alacris* (Winnertz, 1852) !
- *borealis* Remm, 1966 !
- *palustris* (Meigen, 1804) !
- *phlebotomoides* Bangertner, 1933 L
- *titillans* (Winnertz, 1852) !
- (*Forcipomyia* s.str.)
- *bipunctata* (Linnaeus, 1767) !
 - = *tenuisquama* Kieffer, 1924
- *braueri* (Wasman, 1893) L
- *brevipennis* (Macquart, 1826) !
- *ciliata* (Winnertz, 1852) !
- *costata* (Zetterstedt, 1838) !
 - = *picea* (Winnertz, 1852)
- *longisetosa* Krivosheina & Remm, 1974 !
 - = *helvetica* Delécolle & Schiegg, 1999
- *nigra* (Winnertz, 1852) !
- *pallida* (Winnertz, 1852) !
- *pseudonigra* Delécolle & Schiegg, 1999 !
- *pulchrithorax* Edwards, 1924 !
- *sahariensis* Kieffer, 1923 !
 - = *acanthophora* Remm, 1976
- *sihlwaldensis* Delécolle & Schiegg, 1999 !
- *tenuis* (Winnertz, 1852) !
- (*Lasiohelea* Kieffer, 1921)
- *velox* (Winnertz, 1852) !
- (*Lepidohelea* Kieffer, 1917)
- *tibialis* Remm, 1961 !
- (*Microhelea* Kieffer, 1917)
- *fuliginosa* (Meigen, 1818) !
- (*Pterobosca* Macfie, 1940)
- *paludis* (Macfie, 1936) !
- (*Thyridomyia* Saunders, 1925)
- *monilicornis* (Coquillett, 1905) !
- (*Trichohelea* Goetghebuer, 1920)
- *eques* (Johannsen, 1908) !
- *tonnoiri* (Goetghebuer, 1920) !
- Kolenohoelea* de Meillon & Wirth, 1981
- *calcarata* (Goetghebuer, 1920) !
- Mallochohelea* Wirth, 1962
- *alpina* (Clastrier, 1962) L
- Palpomyia* Meigen, 1818
- *brachialis* (Hailday, 1833) !
- *distincta* (Haliday, 1833) !
- *flavicornis* (Staeger, 1839) !
- *lineata* (Meigen, 1818) !
- *serripes* (Meigen, 1818) !

- *spinipes* (Panzer, 1806) !

Schizohelea Kieffer, 1917

- *leucopeza* (Meigen, 1804) !

Serromyia Meigen, 1818

- *femorata* (Meigen, 1804) !

- *ledicola* Kieffer, 1925 !

- *subinermis* Kieffer, 1919 !

Excluded species

Dasyhelea turficola Kieffer, 1925 N1

Dasyhelea flavoscutellata (Zetterstedt, 1850) N2

Notes

N1 *Dasyhelea turficola* Kieffer, 1925 was mentioned without locality from Switzerland by mistake by Dominiak & Szadziewski (2010).

N2 Specimens from Switzerland determined as *Dasyhelea flavoscutellata* actually concern *D. arenivaga*.

References

- Boorman J. 1997. 2.21. Family Ceratopogonidae. In: Papp L. & Darvas B. (eds). Contributions to a Manual of Palaearctic Diptera (with special reference to flies of economic importance). Vol. 2, Nematocera and Lower Brachycera: 349-368. Science Herald, Budapest.
- Borkent A. 2014. The pupae of the biting midges of the World (Diptera: Ceratopogonidae), with a generic key and analysis of the phylogenetic relationships between genera. *Zootaxa* 3879: 1-327.
- Borkent A. & Dominiak P. 2020. Catalog of the biting midges of the World (Diptera: Ceratopogonidae). *Zootaxa* 4787: 1-377.
- Cagienard A., Griot C., Mellor P.S., Denison E. & Stärk K.D.C. 2006. Bluetongue vector species of *Culicoides* in Switzerland. *Medical and Veterinary Entomology* 20: 239-247.
- Casati S., Racho V., Delécolle J.C., Kuhn M., Mathis A., Griot C. & Stärk K.D.C. 2009. An investigation on the *Culicoides* species composition at seven sites in southern Switzerland. *Medical and Veterinary Entomology* 23: 93-98.
- Delécolle J.-C. & Schiegg K. 1998. Contribution à l'étude des Cératopogonidés de Suisse. I. Révision et redescription des espèces paléarctiques du genre *Ceratoculicoides* Wirth & Ratanaworabhan, 1971 (Diptera, Nematocera). *Bulletin de la Société Entomologique de France* 103: 273-286.
- Delécolle J.-C. & Schiegg K. 1999a. Contribution à l'étude des Cératopogonidés de Suisse. II. Description de *Brachypogon* (s. str.) *facicola* n. sp. (Diptera, Nematocera). *Bulletin de la Société Entomologique de France* 104: 31-34.
- Delécolle J.-C. & Schiegg K. 1999b. Contribution à l'étude des Cératopogonidés de Suisse. III. Description de trois espèces nouvelles appartenant au genre *Forcipomyia* (Meigen) (Diptera, Nematocera). *Bulletin de la Société Entomologique de France* 104: 381-392.
- Dominiak P. & Szadziewski R. 2010. Distribution and new synonymy in European biting midges of the genus *Dasyhelea* Kieffer (Diptera: Ceratopogonidae). *Zootaxa* 2437: 1-37.
- Glukhova V.M. 2005. *Culicoides* (Diptera, Ceratopogonidae) of Russia and adjacent lands. *International Journal of Dipterological Research* 16: 1-75.
- Goetghebuer M. 1934. 13.a. Heleidae (Ceratopogonidae). In: Lindner E. (ed). *Die Fliegen der palaearktischen Region*. Vol. 3(2): 49-94. (Lief. 78), Schweizerbart, Stuttgart.
- González González de Heredia M. & Golarazena Lafuente A. 2011. El género *Culicoides* en el País Vasco: guía práctica para su identificación y control. Eusko Jaurlaritzaren Argitalpen Zerbitzu Nagusia. Servicio Central de Publicaciones del Gobierno Vasco, Donostia-San Sebastián. Vitoria-Gasteiz, 247 pp.
- Remm H. 1988. Family Ceratopogonidae. In: Soós Á. & Papp L. (eds). *Catalogue of Palaearctic Diptera*. Vol. 3: 11-114. Akadémiai Kiadó, Budapest.

- Schiegg K., Obrist M., Duelli P., Merz B. & Ewald K.C. 1999. Diptera and Coleoptera collected in the forest reserve Sihlwald ZH. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 72: 289-302.
- Szadziewski R. 1998. 13. Ceratopogonidae. In: Merz B., Bächli G., Haenni J.-P. & Gonthier Y. (eds). *Diptera - Checklist. Fauna Helvetica 1*: 102-104. CSCF / SEG, Neuchâtel, 369 pp.
- Szadziewski R., Borkent A. & Dominiak P. 2013. Fauna Europaea: Ceratopogonidae. In: de Jong H. (ed). *Fauna Europaea: Diptera Nematocera. Fauna Europaea version 1.10*. <http://www.faunaeur.org/>.
- Szadziewski R., Krzywiński J., & Giłka W. 1997. Diptera Ceratopogonidae, biting midges. In: Nilsson A.N. (ed). *Aquatic Insects of North Europe - A Taxonomic Handbook. Vol. 2*: 243-263. Apollo Books, Stenstrup, Denmark.
- Wenk C.E., Kaufman C., Schaffner F. & Mathis A. 2012. Molecular characterization of Swiss Ceratopogonidae (Diptera) and evaluation of real-time PCR assays for the identification of *Culicoides* biting midges. *Veterinary Parasitology* 184: 258-266.
- Wirth W.W. & Grogan W.L. 1988. The predaceous midges of the world. *Flora and Fauna Handbook. Vol. 4*. E. J. Brill, New York.