

AN UPDATE OF THE FORCIPOMYIINAE FAUNA OF THE NETHERLANDS

(DIPTERA: CERATOPOGONIDAE)

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Comparing the private collection of the first author with that of the University of Gdansk led to the discovery of three new species of biting midges of the subfamily Forcipomyiinae for the Netherlands: *Atrichopogon infuscus*, *Atrichopogon meloesugans* and *Forcipomyia crassipes*. In addition some nomenclatural corrections to the Dutch checklist are proposed, which brings the total number of Forcipomyiinae in the Netherlands to 36. The distribution and biology of the new species are briefly discussed.

INTRODUCTION

Biting midges (family Ceratopogonidae) form a diverse and intriguing group of nematoceran Diptera. Females of this family can be ectoparasites (on both arthropods and vertebrates), phytophagous, nectarivorous, carnivorous and hematophagous. Males feed on nectar or plant sap. The haematophagous habit can be of veterinary importance or cause nuisance to people. Beside the medically important genus *Culicoides* Latreille, 1809, the Ceratopogonidae are poorly studied in the Netherlands. The scarce interest is caused by the small size of these midges and the

fact that they are difficult to identify. Furthermore a comprehensive identification key is lacking.

In a series of monitoring studies in the Basque Country, the genus *Culicoides* (subfamily Ceratopogoninae) were the most abundant ceratopogonids, followed by representatives of the Forcipomyiinae and the Dasyheleinae (Gonzalez et al. 2014). Probably the situation is similar in the Netherlands. Most of the biting midges collected by Dutch Malaise traps belong to *Culicoides*, the Forcipomyiinae and the Dasyheleinae.



Figure 1. Female of *Atrichopogon meloesugans* approaching *Meloe proscarabeus*. Photo Linde Slikboer.
Figuur 1. Vrouwtje van *Atrichopogon meloesugans* dat afkomt op *Meloe proscarabeus*. Foto Linde Slikboer.



Figure 2. Empodium of *Forcipomyia palustris*. Specimen of the collection of University of Gdansk. Photos in this paper by Pasquale Ciliberti, unless noted otherwise. **Figuur 2.** Empodium van *Forcipomyia palustris*. Exemplaar uit de collectie van de Universiteit van Gdansk. Foto's in dit artikel door Pasquale Ciliberti, tenzij anders vermeld.

Within the ceratopogonids the Forcipomyiinae can be distinguished by the empodium between the tarsal claws (fig. 2), although the empodium is greatly reduced in the *Forcipomyia* subgenus *Trichobelea* Goetghebuer, 1920. Until recently 32 species of the Forcipomyiinae were known in the Netherlands (Knoz & Beuk 2016). Within this subfamily two genera are recognised: *Atrichopogon* Kieffer, 1906 and *Forcipomyia* Meigen, 1818 (Alwin-Kownacka et al. 2016). The bulk of the Forcipomyiinae are nectar feeders but some are ectoparasites. Females of *Forcipomyia* (*Pterobosca*) *paludis* Macfie, 1936, feed on haemolymph from the wings of dragonflies (Manger & Martens 2013), while females of *Forcipomyia* (*Trichobelea*) *equus* Johannsen, 1908 feed on Neuroptera. The latter species is present in Belgium (Szadziewski et al. 2013), but not officially in the Netherlands, how-



Figure 3. Head of male *Atrichopogon infuscus*. Specimen collected at Geldermalsen. **Figuur 3.** Kop van mannetje *Atrichopogon infuscus*. Exemplaar verzameld bij Geldermalsen.

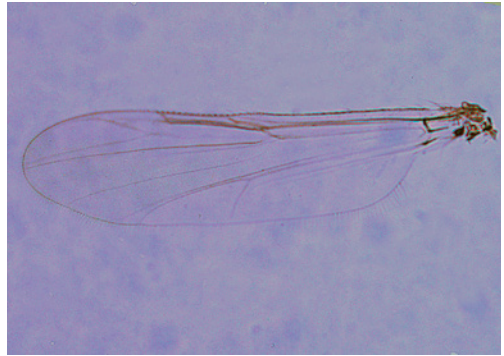


Figure 4. Wing of male *Atrichopogon infuscus*. Specimen collected at Geldermalsen. **Figuur 4.** Vleugel van mannetje *Atrichopogon infuscus*. Exemplaar verzameld bij Geldermalsen.

ever pictures uploaded on Waarneming.nl show Neuroptera being parasitized by small midge-like insects, which probably belong to *F. equus*. *Forcipomyia* (*Lasiohelea*) *velox* Winnertz, 1852 is another ectoparasite which feeds on amphibians (Navai et al. 2017). The subgenus *Melohelea* Wirth, 1956 of *Atrichopogon* includes species that are specialized ectoparasites of Coleoptera, mainly members of the related families Meloidae and Oedemeridae.

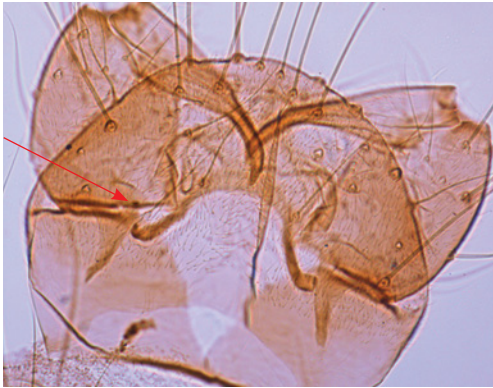


Figure 5. Male genitalia of *Atrichopogon infuscus*. Specimen collected at Weert. The arrow indicates the position of the long seta.

Figuur 5. Mannelijke genitalia van *Atrichopogon infuscus*. Exemplaar verzameld bij Weert. De pijl geeft de positie van de lange seta aan.

During a visit to Gdansk, Poland, the first author compared his material with the outstanding collection of the University of Gdansk. This trip was financed by the Uyttenboogaart-Eliassen foundation. Work in the collection revealed the presence of three new species for the Dutch fauna which we report in this paper: *Atrichopogon infuscus* Goetghebuer, 1929, *Atrichopogon meloesugans* Kieffer, 1922 and *Forcipomyia crassipes* (Winnertz, 1852). Moreover some rectifications to the Dutch Diptera checklist of Knoz & Beuk (2016) are proposed. We noted that this checklist contains junior synonyms. The presence of *Forcipomyia* (*Panbelea*) *aristolochiae* (Rondani, 1860) is confirmed.

MATERIALS AND METHODS

The material was collected using different methods. The specimens were stored in 70 % ethanol and subsequently mounted in Euparal using the method described in Ciliberti (2019), except that the insect parts cleared in 10 % KOH were not heated but left in cold 10 % KOH for a night. All specimens mentioned in this paper are stored in the collection of the first author.



Figure 6. Records of *Atrichopogon infuscus* in the Netherlands.

Figuur 6. Vindplaatsen van *Atrichopogon infuscus* in Nederland.

NEW RECORDS TO THE DUTCH FAUNA

Atrichopogon (*Atrichopogon*) *infuscus*

Gelderland Geldermalsen, AC 149.80-433.35, 8.VII-14.VII.2014, 1 ♂, L. Sijstermans. **Limburg** Weert, Kettingdijk, AC 172.4-357.2, 15.V.2015, 1 ♂, Sijstermans (col. Ciliberti).

The first specimen of *A. infuscus* was collected in a white pan trap (with tap water and a few drops of dishwashing soap) which operated from 8-14 July 2014 in a fruit orchard near Geldermalsen. In 2015 a male specimen was collected with an insect net at the natural area of Kettingdijk (fig. 6).

Atrichopogon infuscus (fig. 3-5) has a wide distribution in Europe (Szadziwski et al. 2013). The biology of *A. infuscus* is poorly known. Species of



Figure 7. Mandible teeth of female *Atrichopogon meloesugans*. Specimen collected at Goeree.

Figuur 7. Tandem op de mandibel van vrouwtje *Atrichopogon meloesugans*. Exemplaar verzameld bij Goeree.



Figure 9. Wing of female *Atrichopogon meloesugans*. Specimen collected at Goeree.

Figuur 9. Vleugel van vrouwtje *Atrichopogon meloesugans*. Exemplaar verzameld bij Goeree.



Figure 8. Head of female *Atrichopogon meloesugans*. Note that the right flagellomere is broken off. Specimen collected at Goeree.

Figuur 8. Kop van vrouwtje *Atrichopogon meloesugans*. De rechter flagellomeer is afgebroken. Exemplaar verzameld bij Goeree.

the subgenus *Atrichopogon* are most likely nectar feeders. It is a difficult species to identify, as it is very similar to *A. fuscus* (Meigen, 1804) and *A. griseolus* (Zetterstedt, 1855). In *A. infuscus* the eyes are completely pubescent and one long seta is present at each side of the caudomedian excavation of sternite IX (fig. 5). In *A. fuscus* the hairs on the eyes are restricted to the middle and there are several long setae at the caudomedian excavation. In *A. griseolus* the eyes are completely

pubescent and there are two long setae at each side of the caudomedian excavation. Szadziewski (1986) reports that some specimens of *A. infuscus* collected in Poland had two long setae on one side of the caudomedian excavation.

Atrichopogon (Meloebelea) meloesugans

Zuid-Holland Goeree, Stellendam, dike slope by Scharrezeeweg, AC 87.390-424.051, 5.IV.2019, 1 ♀, L. Slikboer (col. Ciliberti).

Atrichopogon meloesugans (fig. 7-10) was collected during bee monitoring, on a dike near Stellendam (fig. 11). A female specimen of the oil beetle *Meloe proscarabeus* Linnaeus, 1758 was caught on the slope of the dike. Several midges flew toward the beetle and attacked it (fig. 1). One of the midges was caught using an insect net.

This is the first European record of *A. meloesugans* outside of Poland. Until now this species was only known from the type locality in Algeria (Kieffer 1922) and from Poland (Szadziewski et al. 2013). Species of the subgenus *Meloebelea* feed on beetles of the families Meloidae and Oedemeridae (Wirth 1956) and are collected mainly in moist terrestrial habitats (Szadziewski et al. 2007). According to



Figure 10. Female spermathecae of *Atrichopogon meleosugans*. Specimen collected at Goeree.
 Figuur 10. Vrouwelijke spermathecae van *Atrichopogon meleosugans*. Exemplaar verzameld bij Goeree.



Figure 11. Record of *Atrichopogon meleosugans* in the Netherlands.
 Figuur 11. Vindplaats van *Atrichopogon meleosugans* in Nederland.

Szadziewski et al. (2007) six species of *Melochelea* are present in Europe. Female identification is based mainly on the number and the shape of the mandible teeth (fig. 7), the shape of the proximal flagellomeres, the shape of the third palpal segment and the shape of the proboscis (fig. 8). Separation of the species in this subgenus is extremely challenging and a molecular approach could greatly improve the identifications.

Forcipomyia (Forcipomyia) crassipes

Zeeland Rilland, Bathpolder, AC 72.446-382.603, I.VIII.2016, 1 ♂, N.J. Dek (col. Ciliberti).

A male specimen of *F. crassipes* was collected at Rilland with an insect net (fig. 13). *Forcipomyia crassipes* is distributed in Central, Eastern Europe and North Africa. There are no records from

Southern Europe (Szadziewski et al. 2013). On Gbif.org there are records from Canada. The biology of *F. crassipes* is poorly known. Species of the subgenus *Forcipomyia* are most likely nectar feeders. This species is distinguished by the gonostyli which are constricted apically (fig. 12).

CORRECTIONS DUTCH CHECKLIST

Forcipomyia (Panhelea) aristolochiae (Rondani, 1860)

Dominiak & Szadziewski (2010) studied the types of *Ceratopogon aristolochiae* and concluded that this species should be placed in the genus *Forcipomyia*. In addition they established that, based on the long neck of the female spermathecae, *Forcipomyia brevicubita* (Goetghebuer, 1920) is a junior



Figure 12. Male genitalia of *Forcipomyia crassipes*. Specimen collected at Rilland.
 Figuur 12. Mannelijke genitalia van *Forcipomyia crassipes*. Exemplaar verzameld bij Rilland.



Figure 13. Record of *Forcipomyia crassipes* in the Netherlands.
 Figuur 13. Vindplaats van *Forcipomyia crassipes* in Nederland.

synonym of *F. aristolochiae*. *Forcipomyia brevicubita* is on the Dutch list as 'to be added' (Knoz & Beuk 2016). *Forcipomyia aristolochiae* (fig. 14) was caught in a flight interception trap (with mostly acetic acid and smaller parts of ethanol and glycerol, mimicking rotting wood), placed in a small woodland in the dunes near Bergen. The woodland mainly consists of dying exotic pine *Pinus nigra* and spruce *Picea sitchensis*, but also some native broad-leaved trees. The species is therefore confirmed as present in the Netherlands.

Forcipomyia (Forcipomyia) costata
 (Zetterstedt, 1838)

Szadziewski (1986) studied the type material of *Ceratopogon costatus* and concluded that the specimens belong to the genus *Forcipomyia*. Moreover, it was concluded that *Forcipomyia picea* (Winnertz, 1852) is a junior synonym of *F. costata*.

Forcipomyia (Euprojoannisia) palustris
 (Meigen, 1804)

Goetghebuer (1922) placed *Ceratopogon palustris* in the genus *Dasyhelea* Kieffer, 1911. Szadziewski (1986) studied the types and concluded that the species belongs in *Forcipomyia*.

CONCLUDING REMARKS

The present paper brings the total number of biting midges in the Netherlands to 115, of which 36 belong to the Forcipomyiinae. Comparing the Dutch checklist of Forcipomyiinae with Belgium and Germany several differences are found. At least for some species this is an artefact, representing a lack of knowledge and interest rather than a true distribution dissimilarity. For example, *Atrichopogon winnertzi* Goetghebuer, 1922 has a wide distribution in Europe and has been collected by the first author around the Belgian city of



Figure 14. Male genitalia of *Forcipomyia aristolochiae*. Specimen collected at Bergen.

Figuur 14. Mannelijke genitalia van *Forcipomyia aristolochiae*. Exemplaar verzameld bij Bergen.

Lanaken just about two kilometers from the Dutch border. It seems quite certain that this species is also present in the Netherlands. Clearly more species of Forcipomyiinae are expected to be found in the Netherlands in the future.

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SAMENVATTING

Een update van de lijst van Nederlandse Forcipomyiinae (Diptera: Ceratopogonidae)

De privécollectie van de eerste auteur is vergeleken met de collectie van de Universiteit van Gdansk. Het voornaamste doel was het bevestigen of corrigeren van determinaties van een aantal knutten (Ceratopogonidae) gevangen in de periode van 2014-2019. Er werden drie nieuwe soorten uit de subfamilie Forcipomyiinae voor de Nederlandse fauna vastgesteld, namelijk *Atrichopogon infuscus*, *A. meloesugans* en *Forcipomyia crassipes*. Tevens wordt *Forcipomyia aristolochiae* bevestigd voor de Nederlandse fauna en worden enkele nomenclatorische wijzigingen doorgevoerd in de Nederlandse lijst. Hiermee komt het aantal soorten Forcipomyiinae in Nederland op 36. De verspreiding en de biologie van de soorten wordt kort behandeld.

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