

Further records and DNA barcodes of Norwegian moth flies (Diptera, Psychodidae)

GUNNAR MIKALSEN KVIFTE & LOUIS BOUMANS

Kvifte, G.M. & Boumans, L. 2014. Further records and DNA barcodes of Norwegian moth flies (Diptera, Psychodidae). *Norwegian Journal of Entomology* 61, 11–14.

New records and barcodes are given for three species of Psychodidae not previously recorded from Norway; *Telmatoscopus advena* (Eaton, 1893), *Parajungiella pseudolongicornis* (Wagner, 1975) and *Psychoda erminea* Eaton, 1898. New distributional data are given for eleven species of Psychodidae. *Pericoma blandula* Eaton, 1893 is confirmed as a cryptic species complex using DNA barcodes, and nine additional species are listed with DNA barcodes. The Norwegian fauna of Psychodidae now stands at 43 species.

Key words: Psychodidae, *Telmatoscopus advena*, *Parajungiella pseudolongicornis*, *Psychoda erminea*, *Pericoma blandula*, faunistics, Norway, distribution, DNA barcodes.

Gunnar Mikalsen Kvifte, Department of Natural History, The University Museum of Bergen, University of Bergen, P.O. Box 7800, NO-5400 Bergen, Norway, and Department of Biology, University of Kassel, Heinrich-Plett-Strasse 40, 34132 Kassel, Germany. E-mail: gunnar.kvifte@um.uib.no

Louis Boumans, Natural History Museum, University of Oslo, P.O. Box 1172 Blindern, NO-0318 Oslo, Norway. E-mail: louis.boumans@nhm.uio.no

Introduction

The Norwegian fauna of Psychodidae was until recently very poorly known, but has been the object of considerable study in recent years. The checklist by Kvifte *et al.* (2011) listed 36 species based on material in Norwegian museums, and four additional species were collected during the National Taxonomy Initiative's expedition to Finnmark (Salmela *et al.* 2012, Kvifte & Andersen 2012). However, very little material has been identified from other parts of Norway and it is likely that further species remain to be discovered. Furthermore, the distributional patterns of Norwegian moth flies are almost completely unknown, as many species are known from very few localities.

The present paper provides new national and regional records of Norwegian moth-flies, based mostly on freshly collected material. With the

records presented herein, 43 species of moth-flies are presently known to occur in Norway.

Material and Methods

Specimens were collected in Malaise traps or manually, by the authors or by collaborators. All reported material has been dissected and mounted on slides in euparal or Canada balsam. The specimens are mostly deposited in the Natural History collections at the University of Bergen, except for some specimens, which are in the private collection of L. Boumans. The latter specimens are labelled LB.

DNA barcodes were obtained in cooperation with Barcode of Life Datasystems as described in Ekrem *et al.* (2012). Sequences were compared in R version 3.0.1 (www.r-project.org) and in the BOLD online user interface (www.boldsystems.org).

org). Genetic distances are given as uncorrected percentual distances. GenBank accession numbers are given in parentheses for each sequenced specimen. Nomenclature is according to Kvifte *et al.* (2011).

PSYCHODIDAE
Pericomaini

***Berdeniella freyi* (Berdén, 1954)**

New regional record. OPPLAND northern, [ON], Dovre: Rondane Nasjonalpark, Skranglehaugen. 23.–30.VI.2008, 1♂, leg. T. Hoffstad (KF549508)

***Pericoma blandula* Eaton, 1893 complex**

New regional records. HORDALAND interior [HOI], Voss: Vossevangen near Voss bibliotek, 3.VII.2011, 2♂♂1♀, leg. G. Kvifte (KF549503, KF549496, KF549514)

Remarks. The DNA barcodes from the present specimens are very different from those recorded as *Pericoma blandula* from Finnmark by Kvifte & Andersen (2012). Pairwise distances between the Finnmark and Voss populations range from 8.9 to 9.3%, whereas intra-population distances are 0% and 0–0.76% – a difference exceeding the “barcoding gap” proposed by Hebert *et al.* (2003) to distinguish between species. There are at least three possible explanations for this: mitochondrial introgression, phylogeographic artefacts resulting from different dispersal lines, or cryptic speciation.

Of these explanations, we deem cryptic speciation as the most probable as other evidence for *P. blandula* as a morphologically cryptic species complex exists. *Pericoma neoblandula* Duckhouse, 1962 is distinct as a larva, but cannot reliably be separated from *P. blandula* in the adult stage according to Vaillant (1978, 1979) and Withers (1989). The former species is only known from its original description, but may be overlooked since virtually all records of *P. blandula* are based on adult males. It is likely that *P. blandula* encompasses several cryptic species like these, as its inter-population morphological variability can be very high (Vaillant 1979). Further DNA sequences, as well as study of larvae and of adult morphometrics, will undoubtedly

prove useful to resolve this situation.

***Pericoma rivularis* Berdén, 1954**

New regional records. HORDALAND coastal [HOY], Bergen: Milde, Mørkevatnet, 19.VI.2012, 1♂, leg. G. Kvifte (KF549497)

Paramormiini

****Telmatoscopus advena* (Eaton, 1893)**

First records for Norway. ROGALAND coastal [RY], Finnøy: Helgøy, 5.VI–5.VII.2011. 1♂, leg. T. Jonassen (KF549511); HORDALAND coastal [HOY], Bergen: Milde, Hatlehaugen. 25.V.2011, 1♂, leg. B. Røttingen & A. Schrøder-Nielsen (KF549504); SOGN & FJORDANE interior [SFI], Aurland: Fretheim, 12.VI.1939, 1♂, leg. Knaben

Remarks. *Telmatoscopus advena* is a widespread European species whose larvae develop in water-filled tree holes in deciduous trees (Salmela 2005). Some authors wrongly place this species in the genus *Sciria* Enderlein, 1935. *Sciria* is an objective synonym of *Telmatoscopus* Eaton, 1904 because the two genera share the same type species (Kvifte 2012).

****Parajungiella pseudolongicornis* (Wagner, 1975)**

First records for Norway. AKERSHUS [AK], Oslo: Klemetsrud, Gjersrudtjern, 2.VI.2011, 2♂♂, leg. L. Boumans; ROGALAND coastal [RY], Finnøy: Kyrkjøy, 13.VI–11.VII.2010, 1♂1♀, leg. T. Jonassen (♂ KF549505)

Remarks. *Parajungiella pseudolongicornis* is a widespread European species. It is very similar to *P. longicornis* (Tonnoir, 1919), which also occurs in Norway; these two species can only reliably be distinguished based on details of the male genitalia. The habitat of the immature stages of the species is unknown, but it is likely to develop in mud in swamps and on riverbanks like *P. longicornis*.

Psychodini

***Psychoda alternata* Say, 1824**

New regional records. AKERSHUS [AK],

Oslo: Akershus slott, toilet, 2.VIII.2011, 1♀, leg. L. Boumans (det. L. Boumans, specimen lost); HORDALAND coastal [HOY], Bergen, Fantoft Studentby, 3.VII.2011, 1♀, leg. G. Kvifte (KF549499)

Psychoda alticola Vaillant, 1973

New regional record. OPPLAND northern [ON], Dovre: Rondane National Park, Skranglehaugen, 16.–23.VI.2008, 1♂, leg. E. Stur (KF549500)

Psychoda cinerea Banks, 1894

New regional records. AKERSHUS [AK], Oslo: Bjørnås, Elgtråkket 82 indoors, XI.2010, 1♂, leg. L. Boumans ; 23.XII.2010, 2♀♀.; 28.XII.2010, 1♀; 5.I.2011, 1♂; 22.I.2011, 1♀; 11.II.2011, 1♂; 13.II.2011, 1♀; 27.IV.2011, 1♀ (all det. and coll. LB).

**Psychoda erminea* Eaton, 1898

First records for Norway. AKERSHUS [AK], Oslo: Bjørnås, Elgtråkket 82, 10.IX.2012, 1♀, leg. L. Boumans; HORDALAND interior [HOI], Kvam: Nes. 22.IX–3.X.2010, 1♂, leg. T. Solhøy; 3.X–20.X.2010, 1♂1♀ (♂ KF549506); 20.X–4.XI.2010, 1♂ (KF549501).

Remarks. *Psychoda erminea* is a widespread European species, which appears to have its main activity period in late autumn and winter (Withers 1988, Salmela 2005). The biology of this species is not very well known, but it has been reared from such diverse substrates as truffles (Tonnoir 1922), the dung of otters *Lutra lutra* (Linnaeus, 1758) (Withers 1988) and household compost (Boumans 2011).

Psychoda grisescens Tonnoir, 1922

New regional record. OPPLAND northern [ON], Dovre: Rondane Nasjonalpark, Skranglehaugen. 23.–30.VI.2008. 1♂, leg. T. Hoffstad (KF549510).

Psychoda lobata Tonnoir, 1940

New regional record. AUST-AGDER coastal [AAY], Vegårshei: Lauvøya, 22.VII.2012, 2♂♂, leg. I. Kvifte (KF549507, KF549494).

Psychoda setigera Tonnoir, 1922

New regional records. HEDMARK southern [HES], Stange: Jønsberg Videregående Skole, 13.VIII.2011, 1♂[dead], leg. L. Boumans (coll. LB); ROGALAND coastal [RY], Finnøy, Helgøy, 5.VI–5.VII.2011, 1♂, leg. T. Jonassen (KF549512); 8.VII–10.IX.2011, 1♂ (KF549502).

Psychoda trinodulosa Tonnoir, 1922

New regional records. HEDMARK southern [HES], Stange: Jønsberg Videregående Skole, 13.VIII.2011, 3♂♂2♀♀ [all dead], leg. L. Boumans (coll. LB); ROGALAND coastal [RY], Finnøy: Kyrkjøy, 4.VII.2011, 1♂, leg. T. Jonassen (KF549495); Finnøy: Helgøy, 10.IX.2011, 1♂, leg. T. Jonassen (KF549498).

Trichopsychoda hirtella (Tonnoir, 1919)

New regional records. AKERSHUS [AK], Bærum: Fornebu, Lilløyplassen, 25.VIII.2011, 2♂♂6♀♀, leg. L. Boumans (coll. LB); HORDALAND coastal [HOY], Lindås: Lyngheiseret, 20.VIII.2012, 2♂♂, leg. G. Kvifte.

Remarks. These are the first Norwegian records of this characteristic European species since Andersen & Håland (1995).

Acknowledgements. We dedicate this paper to the late Torstein Solhøy, in appreciation of the useful material from Nes he donated and for his valuable advice and support of GMK's taxonomic and faunistic research. Torbjørn Ekrem, Trond Hoffstad, Terje Jonassen, Inger Kvifte, Steffen Roth, Bodil Røttingen, Audun Schrøder-Nielsen and Elisabeth Stur supplied further material. DNA barcoding of Norwegian Psychodidae was funded by the Norwegian Taxonomy Initiative / Artsdatabanken.

References

- Andersen, T. & Håland, Ø. 1995. Norwegian moth flies (Diptera: Psychodidae). *Fauna Norvegica, Serie B* 42, 125–130.
- Boumans, L. 2011. Bijdrage aan de kennis van urbane motmuggen (Diptera: Psychodidae). *Nederlandse Faunistische Mededelingen*, 36, 49–68.
- Duckhouse, D. A. 1962. Some British Psychodidae (Diptera, Nematocera): Descriptions of species and a discussion on the problem of species pairs.

- Transactions of the Royal Entomological Society of London* 114, 403–436.
- Ekrem, T., Roth, S., Andersen, T., Stur, E., Søli, G. & Halvorsen, G.A. 2012. Insects inhabiting freshwater and humid habitats in Finnmark, northern Norway. *Norwegian Journal of Entomology* 59, 91–107.
- Hebert, P.D.N., Cywinska, A., Ball, S.L. & DeWaard, J.R. (2003). Biological identifications through DNA barcodes. *Proceedings of the Royal Society B-Biological Sciences* 270, 313–321.
- Kvifte, G.M. 2012. Catalogue and bibliography of Afrotropical Psychodidae: Bruchomyiinae, Psychodinae, Sycoracinae and Trichomyiinae. *Zootaxa* 3231, 29–52.
- Kvifte, G.M. & Andersen, T. 2012. Moth flies (Diptera, Psychodidae) from Finnmark, northern Norway. *Norwegian Journal of Entomology* 59, 108–119.
- Kvifte, G.M., Håland, Ø. & Andersen, T. 2011. A revised checklist of Norwegian moth flies (Diptera, Psychodidae). *Norwegian Journal of Entomology* 58, 180–188.
- Salmela, J. 2005. New moth flies for eastern Fennoscandia (Diptera: Psychodidae). *Sahlbergia* 10, 1–3.
- Salmela, J.E., Kvifte, G.M. & More, A. 2012. Description of a new *Psychoda* Latreille species from Fennoscandia (Diptera: Psychodidae). *Zootaxa* 3313, 34–43.
- Tonnoir, A.L. 1922. Synopsis des espèces européennes du genre *Psychoda* (Diptères). *Annales de la Société Entomologique de Belgique* 62, 49–88.
- Vaillant, F. 1978. *Psychodidae-Psychodinae. Lieferung 317*. Pp. 207–238 in Lindner, E. (Ed.), *Die Fliegen der Paläarktischen Region*. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart.
- Vaillant, F. 1979. *Psychodidae-Psychodinae. Lieferung 320*. Pp. 239–270 in Lindner, E. (Ed.), *Die Fliegen der Paläarktischen Region*. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart.
- Withers, P. 1988. Revisionary notes on British species of *Psychoda* Latreille (Diptera, Psychodidae) including new synonyms and a species new to science. *British Journal of Entomology and Natural History* 1, 69–76.
- Withers, P. 1989. Moth flies. Diptera: Psychodidae. *Dipterists Digest*, 4, 1–83.

Received: 26 August 2013
Accepted: 14 February 2014