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Paramormia ustulata (Walker, 1856) on Shetland, with biogeographical notes on the Psychodidae (Diptera) of North Atlantic islands

GUNNAR MIKALSEN KVIFTE & ROGER THOMASON

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Paramormia ustulata (Walker, 1856) is recorded from Shetland for the first time and a revised checklist of the Shetland Psychodidae is given. The Psychodidae fauna of Shetland is briefly compared with that of mainland Britain, Norway and the Faroe Islands.

Key words: Diptera, Psychodidae, *Paramormia*, Moth flies, owl midges, moth midges, faunistics, biogeography.

Gunnar Mikalsen Kvifte, Faculty of Biosciences and Aquaculture, P.O. Box 2501, NO-7729 Steinkjer. Norway. E-mail: gunnar.mikalsen-kvifte@nord.no

Roger Thomason, 24 Hamarsgarth, Mossbank, Shetland Isles ZE2 9TH United Kingdom. E-mail: thomasonre@gmail.com

Introduction

Moth flies (Diptera, Psychodidae) are a family of small nematocerous flies characterised by specialised antennal sensory organs, wing venation with many veins but hardly any crossveins and in general a hirsute, hunchbacked appearance. They are easily recognized in the field by their short, erratic flight, described by Erica McAlister as reminiscent of someone who has had too much coffee (McAlister 2016). Around 3000 species have been described worldwide, of which approximately 500 have been found in Europe (Wagner 1997, Kvifte & Wagner 2017).

The Psychodidae of the British Isles are probably the most thoroughly studied psychodid fauna of any country of the world, in large part due to the availability of a comprehensive identification key (Withers 1989). As evident from the many species that have been found in Britain since then (Withers 1990, 1997, 2002, 2003a, 2003b, 2006, Sivell & Irwin 2016), however, noteworthy discoveries can be made also in the British fauna, and the regional distributions and ecological requirements of many species remain elusive.

The Psychodidae fauna of Shetland was last reviewed by Laurence (1997), and since then one further species has been recorded: *Psychoda sigma* Kincaid, 1899 was recorded as *Psychoda surcoufi* Tonnoir, 1922 by Riddiford & Laurence (2000) (see Prpic 2015 for a discussion of the taxonomy of the species). In the present paper we present records of yet another species new to Shetland, namely *Paramormia ustulata* (Walker, 1856). We also present a revised checklist of the Shetland Psychodidae.

Material and methods

Moth flies were photographed and collected by Roger Thomason on Shetland in 2020 and sent to Gunnar Mikalsen Kvifte for identification. Prior to identification specimens were dissected, macerated in 10% KOH, treated with acetic acid and mounted on permanent slides in Euparal. Specimens were identified according to Withers (1989) and the reference collection in the University Museum of Bergen (relevant specimens are mostly listed in Kvifte *et al*. 2011, Kvifte & Andersen 2012, Kvifte & Boumans 2014 and Kvifte 2019). Specimens are currently with the lead author, to be deposited in the University Museum of Bergen, Norway (ZMUB).

Classification and nomenclature are according to Kvifte (2018).

The record

***Paramormia ustulata* (Walker, 1856)**

Material examined: SHETLAND, Mainland, near Scatsta airport. (60.44161 N, 1.267599 W). 27.V.2020. 3 ♂♂ on slides (ZMUB), 2 additional ♂♂ in ethanol.

Remarks: First record from Shetland. Chandler (2002) gives one previous Scottish record. Prior to capture some adults were photographed to document their live appearance (Figure 1).

Discussion

As Shetland is an isolated archipelago, its fauna is of special interest from a biogeographical point of view, particularly in comparison with the well-studied faunas of continental Britain, Scandinavia and the Faroe Islands. A list of moth fly species recorded on Shetland and their presence/absence in these areas is given in Table 1.

The oceanic moth flies of the North Atlantic belong to six genera in the tribes Psychodini and Pericomaini, according to the classification used by Kvifte (2018); both tribes are represented by an approximately equal number of species. The Azores, Canary Islands, Madeira and Cabo Verde archipelagos further South in the Atlantic are similarly balanced (Jaume-Schinkel et al. 2021, Ježek & van Harten 1996, Wagner 1988, Wagner

FIGURE 1. *Paramormia ustulata* (Walker, 1856) adults, live appearance. Photo: Roger Thomason

TABLE 1. List of Psychodidae species recorded from Shetland, and their distribution in neighbouring areas. Distributional data from Britain are according to Withers (1989), from Norway according to Kvifte et al. (2011) and from the Faroe Islands according to Pedersen (1971), Andersen (1999) and Kvifte (unpubl.). Records new to this study are given with an asterisk (*).

List of Psychodidae species recorded from Shetland	Mainland Britain	Norway	Faroe Islands
Psychoda albipennis Zetterstedt, 1850	X	X	X
Psychoda grisescens Tonnoir, 1922	X	X	X
Psychoda phalaenoides (L., 1758)	X	X	x (unpubl.)
Psychoda trinodulosa Tonnoir, 1922	X	X	
Psychoda sigma Kincaid, 1899	X	X	
Pericoma pseudexquisita Tonnoir, 1940	X		X
Pneumia nubila (Meigen, 1818)	X		
* *Pneumia trivialis* (Eaton, 1893)	X	X	
Panimerus maynei (Tonnoir, 1920)	X		
Seoda labeculosa (Eaton, 1893)	X		
* *Paramormia ustulata* (Walker, 1856)	X	?	

& Baez 1993).

This is in contrast to the Pacific Psychodinae fauna, which save for a few species of Pericomaini is overwhelmingly dominated by the genus *Psychoda* (Quate 1959, 1961). The Indian Ocean Psychodidae fauna is still poorly investigated but appears approximately as rich in genera as the Atlantic fauna (Eaton 1913, Ježek et al. 2025, Kvifte *in prep.*).

It is puzzling how many species appear on the isles that have not been recorded from Norway, as the climates of Shetland and Western Norway are very similar and any species with sufficient dispersal ability to colonize Shetland should also be able to reach Scandinavia. We speculate that the apparent Norwegian absence of *Pericoma pseudexquisita*, *Pneumia nubila, Panimerus maynei, Seoda labeculosa* and possibly *Paramormia ustulata* is due to the bedrock of Western Norway being comparatively poor in calcium carbonate, which appears important for many aquatic Psychodidae. The non-aquatic species recorded from Shetland (*Psychoda spp*) are all also common and widespread in Scandinavia.

Acknowledgements. We dedicate this paper to the memory of Phil Withers, who has done more to advance our understanding of British Psychodidae than any other dipterist, paralleled only by the reverend A.E. Eaton. We are grateful to the editor and an anonymous reviewer for constructive comments on an earlier version of the manuscript.

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