On the occurrence of *Stratiomys validicornis* (Loew, 1854) (Diptera, Stratiomyidae) in Fennoscandia

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The soldier fly *Stratiomys validicornis* (Loew, 1854) is reported from the Dovre mountains in southern Norway, and confirmed for the first time from Fennoscandia. *S. validicornis* is the only species of soldier fly having a northern European-Siberian distribution pattern. The new record expands the geographical range of this species substantially towards the west. A new synonym is proposed: *Stratiomys paludosa* Siebke, 1863 = *S. validicornis* (Loew, 1854).

Key words: Diptera, Stratiomyidae, *Stratiomys*, Soldier flies, Norway, Fennoscandia, Palaearctic, new record.

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Introduction

The genus *Stratiomys* Geoffroy, 1762 is a large genus of soldier flies with 93 species recorded worldwide (Woodley 2011). Most species occur in tropical and subtropical areas, and 11 of them are recorded from Europe (Rozkošný 1982, Nyström & Kahanpää 2016). Many of these species have a wide distribution in the Palaearctic zone, but most of them are rare and local in their occurrences. The larvae of *Stratiomys* are associated with lake shores, marshes and pools of stagnant waters, where they live coprophagous, saprophagous or feeding on microorganisms (Rozkošný 1973). The adults are living in the same areas as the larvae and may visit flowers. The species of *Stratiomys* are among the largest soldier flies, characterized by long antennae, and yellow markings of head, scutellum and metasoma.

Stratiomys validicornis (Loew, 1854) has been categorized as the only Stratiomyidae with a northern European-Siberian distribution pattern (Nartshuk 2009), and this species has a main distribution in Mongolia, northern China and eastern Siberia, in addition to an isolated occurrence in the Arkhangelsk-region of Russia as the only reported European record. However, Siebke (1863) described *Stratiomys paludosa* from the Dovrefjell area (Hjerkinn) in Norway based on a male specimen collected in 1861. This species was later identified as *S. validicornis*, but unfortunately the type was probably lost. Rozkošný (1973) found that the occurrence of *S. validicornis* in Scandinavia was "scarcely likely, at any rate" and proposed that *S. paludosa* might be an aberrant specimen of *S. singularior* (Harris, 1776).

Stratiomys validicornis can be distinguished from other species of *Stratiomys* by the combination of short and black antennae, hairless eyes, completely yellow tibiae, and the mainly black sternites with a yellow hind margin. From the closely related *S. equestris* Meigen, 1835 the females can be distinguished by the shorter

antennae, and the well separated yellow frontal spots close to the inner eye margin. The males can be separated from *S. equestris* by study of genital characters (Rozkošný 1982).

Material and methods

The specimen was collected by the author using yellow pan traps put out in a sandpit close to a small river in the lower alpine zone in the Dovre mountain area of Norway. The morphological study of the specimen was conducted with Wild M10 stereomicroscope. The images were created using the photography technique of focus stacking. Several partially focused images were taken with a Nikon D850 mounted on a Nikon PB-4 Bellow with microscope objectives of different magnifications. The separate images were combined using Zerene Stacker 1.04© (2009–2017) software. The specimen has been deposited in the NTNU, University Museum in Trondheim, Norway.

A part of the front leg was submitted for COI DNA barcoding. All data are available through the public project "Norwegian Diptera, larger Brachycera" (NOBRA) in the Barcode of Life Data Systems 4.0 (BOLD, Ratnasingham & Hebert 2007). Comparisons of COI-sequences from this study with data present in other public BOLD-projects were performed using a selection of tools provided by BOLD, including Neighbor Joining clustering using the Kimura 2-parameter substitution model (Kimura 1980).

Results

One female of *Stratiomys validicornis* was recorded with the following data: Norway, HEDMARK [**HEN**], Folldal municipality: Borkhus, Liamælan [62.18218°N–9.71994°E], 820 m asl., 29 July 2010, 1♀, Barcode ID: NOBRA 158, leg. Frode Ødegaard (Figures 1, 2 and 3). The yellow pan traps were situated in a sand pit with a small river and marshy habitats within immediate vicinity.

FIGURE 1. Female of *Stratiomys validicornis* (Loew, 1854), dorsal view. Photo: Arnstein Staverløkk/NINA.

FIGURE 2. Female of *Stratiomys validicornis* (Loew, 1854), ventral view. Photo: Arnstein Staverløkk/NINA.

FIGURE 3. Female head in frontal view of *Stratiomys validicornis* (Loew, 1854). Photo: Arnstein Staverløkk/NINA.

It is likely that the larvae may develop in these surroundings. DNA barcoding of the specimen gave a full COI-sequence (658 bp) which made up a unique clade (BIN: ACT7867) in the BOLD database (Ratnasingham & Hebert 2007). However, very few specimens of *Stratiomys* are currently DNA barcoded, which prevents useful comparison with closely related species.

With this new record of *S. validicornis* it became applicable to assess Siebke's record of "*Stratiomys paludosa*" in a new light. Siebke (1863) points out that *S. paludosa* is closely related to *S. singularior* (=*furcata*), and he states that his new species can be distinguished from *S. singularior* by having naked eyes, shorter antennae, and completely yellow tibiae. His specimen, a male, was recorded at Hjerkinn (the farm), 16 July 1861. This description of *S. paludosa* fits very well with *S. validicornis*. Taking also in consideration that no other species of *Stratiomys* has been found in the mountains of Scandinavia, and that his type locality is situated less than 10 km away from the new locality at Liamælan, there is hardly any doubt that Siebke got the same species, and hence, the first record of *S. validicornis* from Fennoscandia. Accordingly, *Stratiomys paludosa* (Siebke, 1863) is here proposed as a new synonym for *Stratiomys validicornis* (Loew, 1854).

Discussion

The present finding of *Stratiomys validicornis* represents the first confirmed record of the species from Fennoscandia. With the substantiation that also Siebke collected this species from the same area, nearly 150 years before the present record, it is reasonable to believe that the species has had stable populations at this site for a long time. The main distribution area of the species is restricted to the northern East Palaearctic, except for an isolated record in the Arkhangelsk region of Russia. With this new information, the distributional range of the species has increased substantially towards the west in the northern Palaearctic zone. As *Stratiomys* species in general are very rare and local in their occurrences, there is reason to believe that the species is overlooked in similar north boreal and lower alpine areas in the northwestern parts of Palearctic zone.

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