Fungus gnats from Jostedalen, West Norway (Diptera; Diadocidiidae and Mycetophilidae)

GEIR E. E. SØLI

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During a study of terrestrial invertebrates in Jostedalen in 1988, more than 3.000 specimens of fungus gnats were caught. 214 species were recognized, belonging to the families Diadocidiidae and Mycetophilidae. The number of species in Jostedalen is exceptionally high when compared to number of species recorded from other local areas in Europe. The genus *Drepanocercus* (Vockeroth, 1980) is recorded for the first time from the Palaearctic region. Other rare species are *Mycomya simulans* Väisänen, 1984, *Acnemia falcata* Zaitzev, 1982, *Zygomyia pseudohumeralis* Caspers, 1980, *Anatella aquila Zaitsev, 1989, A. fungina* Plassmann, 1984, *Exechia subfrigida* Lastovka & Matila, 1974. *Exechiopsis dryaspagensis* Chandler, 1977 and *E. pseudopulchella* (Lundström, 1909). Twenty species could not be identified, half of which undoubtly represent undescribed species. The fauna of Norwegian fungus gnats is poorly documented, and most species recorded here are new to Norway. According to the present knowledge on the distribution of fungus gnats, the fauna in Jostedalen seems to have an affinity to the central/eastern Palaearctic fauna, and has more species in common with the Finnish fauna than with the British.

Geir E. E. Søli, Museum of Zoology, University of Bergen, Muséplass 3, N-5007 Bergen, Norway.

INTRODUCTION

The river Jostedøla has its origin in the glacier Jostedalsbreen, the largest ice cap on the European mainland, and runs through the valley Jostedalen. Since the late 1970's the river and its tributaries have been used for production of hydroelectric power, and a reservoir has been built at the lake Styggevatn. As a consequence of these rather pronounced human impacts on the watercourse and parts of the precipitation area, a series of documentation programs on the flora and fauna has been accomplished. In early 1988 a project dealing with the distribution of invertebrates was initiated. The field work was carried out the same year. Three groups of invertebrates were selected: soil mites, caddis flies and fungus gnats, with emphasize on the former. The caddis fly fauna is outlined by Andersen et al. (1990), and the present work deals with the fungus gnat families Diadocidiidae and Mycetophilidae.

Diadocidiidae and Mycetophilidae make up two of seven families in the superfamily Sciaroidea, viz. Ditomyiidae, Diadocidiidae, Keroplatidae, Bolitophilidae, Lygistorrhinidae, Sciardae and Mycetophilidae. Fungus gnats are distributed all over the world, but their taxonomy, biology and biogeography are only superficially known. In Europe, the fauna of fungus gnats has been well documented from England, France, Germany, Finland and from some regions in the former USSR. However, only a restricted number of faunal lists from definite locations has been published, most of them from The British Isles and Germany.

The first and only survey dealing with Norwegian fungus gnats in details is that by Siebke (1877). Siebke listed 67 species which can be referred to Mycetophilidae, but the validity of these records can only be stated by a thoroughly examination of Siebke's material. In the period from 1877 to 1940 only a few scattered records were published (for references, see Soot-Ryen 1943). More recently some Norwegian records have been published in systematical revisions (Hackman 1970, 1971; Gagné 1981; Väisänen 1984).

STUDY AREA

The valley Jostedalen, is situated in West Norway (between 61°15' and 61°45'NF, and between 7°10' and 7°20'E), and stretches from Gaupnefjorden, a branch of Lustrafjorden in the inner Sognefjorden, to about 60 km northwards along the eastern part of the huge glacier Jostedalsbreen (Fig. 1). The ice cap of this glacier and its satellites covers an area of about 800 sq.km. The river Jostedøla runs through the valley, and wide flood plains are forming terraces, separated by rather steep slopes. The valley, thus covers altitudes from sea level up to 1150 meters. For further details concerning the study area, see Andersen et al. (1990).

Øyastrondi constitutes the main sampling area, and is situated at the eastern rim of a huge flood plain, Fåbergstølsgrandane. A rather undisturbed birch forest *(Betula pubescens)* is stretching from the flood plain and about 200 meters up the valley side. The forest has a rich and diverse undergrowth, mainly ferns and perennial herbs.

Additional samples were obtained from locatities at different altitudes along the valley, and from one side valley, Geisdalen (Tab. 1). In addition to Øyastrondi, Sprongdalen-Loc. 1 was situated in birch forest. Three other localities, Sprongdalen-Loc. 2 & 3 and Geisdalen-Loc. 2, were situated above the timber line, in oligotrophic alpine heaths. The remaining localities were all situated in mixed forests.

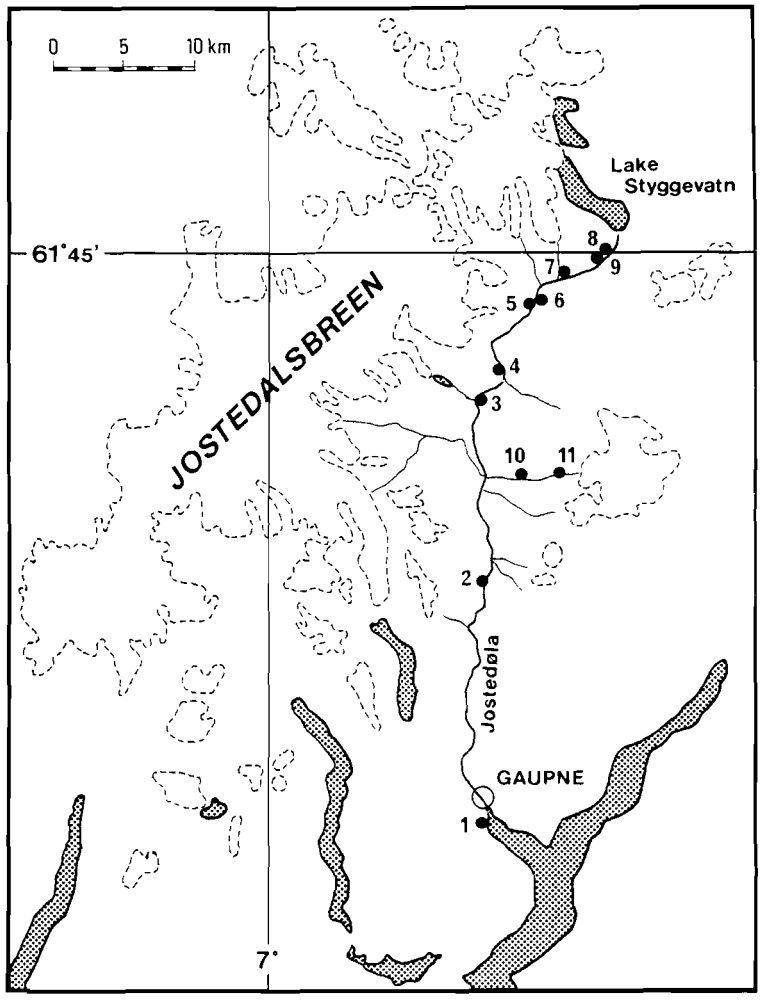

Fig. 1. The glacier Jostedalsbreen and the valley Jostedalen in Luster, West Norway, showing the position of the localities. The localities are 1) Marheimgilet, 2) Fossen, 3) Nigard, 4) Buhaug, 5) Fåbergstølen, 6) Øyastrondi, 7—9 Sprongdalen and 10—11) Geistdalen. (See also Tab. 1.)

Table 1. Localities in Jostedalen, West Norway, visited during the survey. All localities are situated in the municipality of Luster, EIS-square no. 60.

Locality			UTM-ref.	M.a.s.l.	Method
1	Marheimgilet, Gaupne		32VMP092063	30	Net
2	Fossen		32VMP0824	100	Net
3	Nigard		32VMP0837	250	Ligth trap
4	Buhaug		32VMP106401	360	Net
5	Fåbergstølen		32VMP1343	520	Net
6	Øyastrondi		32VMP139448	560	Malaise/net
	Sprongdalen				
7		Loc.1	32VMP1545	660	Net
8		Loc.2	32VMP1847/1948	1000	Net
9		Loc.3	32VMP180470	870	Ligth trap
	Geisdalen				
10		Loc.1	32VMP1132	700	Net
11		Loc.2	32VMP1331	900	Net

MATERIAL AND METHODS

The material comprises about 3.000 specimen, collected in malaise traps, light traps and with sweep nets. The malaisetrap at Øyastrondi was operated from June 24 to September 13 1988. The trap was filled with a mixture of 50% alcohol and 50% ethylenglycol, and emptied at irregular intervals. The samples have been united to cover three collecting periods: June 24 to July 12, July 12 to August 17 and August 17 to September 13. Light traps were used at two locatiies (Nigard and Sprongdalen-Loc. 3), during a short period in September. Sweep nets were used extensively at Øyastrondi and at most other localities (See Tab. 1). Except for some slide mounted specimens, the material is stored in 70% alcohol. All specimens are kept in the collection of the Museum of Zoology, Bergen.

Where nothing else is stated, information on distribution is taken from Soós & Papp (1988).

RESULTS

The material comprises 214 species belonging to the families Diadocidiidae and Mycetophilidae. Emphasize has been put on the identification of males, as very few females have been satisfactorily described. Twenty species were not identified, and more thoroughly examinations are needed to clearify their taxonomical position. However, more than half of them do probably represent undescribed species.

Table 2. Number of species of fungus gnats from different countries and locations in Europe. No refers to number of species in Sciaroidea, excl. Sciaridae; No* refers to number of species in Mycetophilidae.

Country, location	No	No*	References
FINLAND:			
TOTAL	491	434	Hackman 1980; Väisänen 1984
ENGLAND:			
Cambridgeshire, Monks Wood	153	124	Cole & Chandler 1979
Kent, Blean Woods	107	104	Russel-Smith 1979
TOTAL:	505	-	Chandler, pers.com.
GERMANY:			
Allgäu	282	245	Plassmann 1978b, 1980b
Bayern	349	299	Plassmann & Plachter 1986
Breitenbach	193	-	Caspers 1987
Mornauer Mooses	38	34	Plassmann 1982
Mellum and Memmert	78	67	Plassmann 1988
Thüringens	103	85	Plassmann & Joost 1986
AUSTRIA:			
Lunz	134	129	Caspers 1984
RUSSIA:			
Moscow Province	-	175	Sakharova 1977
SWEDEN:			
Messaure	326	296	Plassmann 1978a, 1979, 1980a
POLEN:			
Nida-valley	175	153	Mikolajczyk 1967

SPECIES LIST

The species are listed according to Soós & Papp (1988). As all specimens were collected during 1988 only dates are listed.

Family DIADOCIDIIDAE

Diadocidia (D.) ferruginosa (Meigen, 1830)
Fossen 24 June 1♂; Øyastrondi 24 June-12 July 5♂♂ 5♀♀, 17 Aug. -13 Sept. 5♂♂ 3♀♀.

D. (D.) spinosula Tollet, 1948
Øyastrondi 24 June-12 July 1♂, 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 1♂.

D. (Adidocidia) valida Mik, 1874
Øyastrondi 24 June -12 July 1♂, 17 Aug. -13 Sept. 2♂♂ 2♀♀.

Family MYCETOPHILIDAE
Subfamily SCIOPHILINAE

Mycomya annulata (Meigen, 1818)
Øyastrondi 12 July-17 Aug. 3♂♂, 17 Aug. -13 Sept. 52♂♂ 2♀♀.

M. bicolor (Dziedzicki, 1885)
Øyastrondi 12 July-17 Aug. 1♂.

M. cinerascens (Macquart, 1826)
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 1♂.

M. denmax Väisänen, 1979
Øyastrondi 17 Aug. -13 Sept. 5♂♂.

M. disa Väisänen, 1984
Øyastrondi 24 June-12 July 3♂♂.

M. egregia (Dziedzicki, 1885)
Øyastrondi 24 June-12 July 1♂, 17 Aug. -13 Sept. 1♂.

M. fasciata (Zetterstedt, 1838)
Marheimgilet 22 June 1♂; Fåbergstølen 23 June 1♂; Øyastrondi 24 June-12 July 7♂♂ 2♀♀, 12 July-17 Aug. 1♂.

M. hackmani Väisänen, 1984
Geisdalen (Loc. 1) 24 June 1♂ 1♀.

M. lambi Edwards, 1941
Fåbergstølene 17 Aug. 1♂; Øyastrondi 12 July-17 Aug. 4♂♂.

M. maculata (Meigen, 1804)
Sprongdalen (Loc. 1) 17 Aug. 1♂ 1♀.

M. neohyalinata Väisänen, 1984
Øyastrondi 24 June-12 July 2♂♂; Geisdalen (Loc. 1) 24 June 1♂.

M. nigricornis (Zetterstedt, 1852)
Sprongdalen (Loc. 3) 8.-12 Sept. 1♂.

M. nitida (Zetterstedt, 1852)
Buhaug 23 June 1♂ 2♀♀; Fåbergstølen 23 June 1♂ 2♀♀; Øyastrondi 24 June-12 July 3♂♂ 4♀♀; Sprongdalen (Loc. 1) 23 June 12 ♂♂ 6♀♀; Geisdalen (Loc. 1) 24 June 2♂♂ 2♀♀.

M. shermani Garrett, 1924
Fåbergstølene 17 Aug. 1♂ 4♀♀; Øyastrondi 12 July-17 Aug. 24♂♂ 1♀, 17 Aug. -13 Sept. 102♂♂ 6♀♀; Sprongdalen (Loc. 1) 17 Aug. 7♂♂ 1♀; Sprongdalen (Loc. 3) 8.-12 Sept. 1♂.

M. simulans Väisänen, 1984
Øyastrondi 17 Aug. -13 Sept. 1♂.

M. trivittata (Zetterstedt, 1838)
Øyastrondi 12 July-17 Aug. 3♂♂, 17 Aug. -13 Sept. 2♂♂; Sprongdalen (Loc. 1) 17 Aug. 1♂.

M. tumida (Winnertz, 1863)
Marheimgilet 22 June 2♂♂; Buhaug 23 June 1♂ 2♀♀; Fåbergstølen 23 June 2♂♂; Øyastrondi 24 June-12 July 11♂♂ 3♀♀, 17 Aug. -13 Sept. 3♂♂; Sprongdalen (Loc. 1) 23 June 2♂♂; Geisdalen (Loc. 1) 24 June 1♂ 1♀.

M. vittiventris (Zetterstedt, 1852)
Fåbergstølene 17 Aug. 1♂ 1♀; Øyastrondi 12 July-17 Aug. 22♂♂, 17 Aug. -13 Sept. 181♂♂.

M. wankowiczii (Dziedzicki, 1885)
Nigard 8.-13 Sept. 1♂; Øyastrondi 12 July-17 Aug. 3♂♂, 17 Aug. -13 Sept. 7♂♂.

M. winnertzi (Dziedzicki, 1885)
Øyastrondi 17 Aug. -13 Sept. 1♂;

M. sp. (cf. *tamerlani* Väisänen, 1984)
Øyastrondi 17 Aug. -13 Sept. 1♂.

Neoempheria pictipennis (Haliday, 1833)
Øyastrondi 17 Aug. -13 Sept. 1♂.

Acnemia nitidicollis (Meigen, 1818)
Øyastrondi 24 June-12 July 5♂♂, 12 July-17 Aug. 26♂♂, 17 Aug. -13 Sept. 60♂♂.

A. falcata Zaitzev, 1982
Øyastrondi 12 July-17 Aug. 20 ♂♂, 17 Aug. -13 Sept. 26♂♂.

Allocotocera pulchella (Curtis, 1837)
Øyastrondi 12 July-17 Aug. 1♂.

Monoclona rufilatera (Walker, 1837)
Øyastrondi 24 June-12 July 7♂♂, 12 July-17 Aug. 1♀, 17 Aug. -13 Sept. 1♂ 2♀♀.

Neuratelia nemoralis (Meigen, 1818)
Fossen 24 June 1♂.

N. sp.
Marheimgilet 22 June 1♂ 2♀♀.

Paratinia sciarina Mik, 1874
Øyastrondi 17 Aug. -13 Sept. 2♂♂ 1♀.

Phthinia humilis Winnertz, 1863
Øyastrondi 24 June-12 July 7♂♂, 17 Aug. -13 Sept. 3♂♂.

Polylepta borealis Lundström, 1912

Fossen 24 June 1♂; Øyastrondi 24 June-12 July 3♂♂; Sprongdalen (Loc. 1) 23 June 1♂; Geisdalen (Loc. 1) 24 June 2♂♂.

P. guttiventris (Zetterstedt, 1852)
Øyastrondi 24 June-12 July 1♂; Geisdalen (Loc. 1) 24 June 1♂.

Sciophila fenestella Curtis, 1837
Øyastrondi 24 June-12 July 1♂, 12 July-17 Aug. 4♂♂, 17 Aug. -13 Sept. 3♂♂.

S. nigronitida Landrock, 1925
Fåbergstølene 17.08, 1♂.

Syntemna hungarica (Lundström, 1912)
Øyastrondi 12 July-17 Aug. 4♂♂ 1♀, 17 Aug. -13 Sept. 1♀.

S. relicta (Lundström, 1912)
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 2♂♂.

S. sp. (cf. *nitidula* Edwards, 1925)
Øyastrondi 17 Aug. -13 Sept. 2♂♂.

Apolephthisa subincana (Curtis, 1837)
Øyastrondi 24 June-12 July 4♂♂ 2♀♀, 12 July-17 Aug. 1♀.

Boletina basalis (Meigen, 1818)
Marheimgilet 22 June 6♂♂; Fossen 24 June 2♂♂; Buhaug 23 June 3♂♂ 9♀♀; Øyastrondi 24 June-12 July 82♂♂ 9♀♀; 12 July-17 Aug. 1♂ 3♀♀; 17 Aug. -13 Sept. 7♂♂; Sprongdalen (Loc. 1) 23 June 1♀; Sprongdalen (Loc. 2) 23 June 2♂♂; Geisdalen (Loc. 1) 24 June 1♂ 1♀.

B. borealis Zetterstedt, 1852
Øyastrondi 24 June-12 July 1♂.

B. brevicornis Zetterstedt, 1852
Øyastrondi 17 Aug. -13 Sept. 2♂♂; Geisdalen (Loc. 2) 24 June 1♂

B. cincticornis (Walker, 1848)
Fåbergstølen 23 June 1♂; Øyastrondi 24 June-12 July 3♂♂ 5♀♀; Sprongdalen (Loc. 1) 23 June 7♂♂; Sprongdalen (Loc. 2) 23 June 20♂♂ 3♀♀; Geisdalen (Loc. 1) 24 June 1♂; Geisdalen (Loc. 2) 24 June 7♂♂ 3♀♀.

B. dubia (Meigen, 1804)
Øyastrondi 17 Aug. -13 Sept. 1♂ 2♀♀_; Sprongdalen (Loc. 2) 23 June 2♂♂.

B. edwardsi Chandler, 1992 (New name for *B. brevicornis* sensu Edwards; nec Zetterstedt.)
Øyastrondi 17 Aug. -13 Sept. 1♂.

B. gripha Dziedzicki, 1885
Øyastrondi 17 Aug. -13 Sept. 10♂♂; Sprongdalen (Loc. 2) 23 June 27♂♂ 7♀♀; Sprongdalen (Loc. 3) 8.-12 Sept. 2♂♂; Geis-dalen (Loc. 1) 24 June 1♂ 2♀♀; Geisdalen (Loc. 2) 24 June 13♂♂ 110♀♀.

B. groenlandica Staeger, 1845
Øyastrondi 24 June-12 July 3♂♂.

B. lundstroemi Landrock, 1912
Øyastrondi 17 Aug. -13 Sept. 1♂.

B. moravica Landrock, 1912
Øyastrondi 24 June-12 July 1♂.

B. nasuta (Haliday, 1839)
Øyastrondi 24 June-12 July 2♂♂.

B. nigricans Dziedzicki, 1885
Øyastrondi 12 July-17 Aug. 1♂.

B. nigrofusca Dziedzicki, 1885
Øyastrondi 24 June-12 July 1♂; Sprongdalen (Loc. 1) 17 Aug. 1♂.

B. pectinunguis Edwards, 1932
Sprongdalen (Loc. 3) 8.-12 Sept. 1♂.

B. plana (Walker, 1856)
Marheimgilet 22 June 1♂; Øyastrondi 24 June-12 July 2♂♂; 12 July-17 Aug. 22♂♂ 3♀♀; 17 Aug. -13 Sept. 21♂♂ 17♀♀; Geisdalen (Loc. 2) 24. 06. 1♂.

B. sciarina Staeger, 1840
Nigard 08.-13 Sept. 1♂.

B. trivittata (Meigen, 1818)
Buhaug 23 June 2♂♂; Fåbergstølen 23 June 4♂♂ 1♀; Øyastrondi 24 June-12 July 8♂♂ 2♀♀; 17 Aug. -13 Sept. 2♂♂; Sprongdalen (Loc. 2) 23 June 3♂♂ 2♀♀.

B. sp. (cf. *maculata* Holmgren, 1870)
Sprongdalen (Loc. 2) 23 June 1♂.

Coelosia tenella (Zetterstedt, 1852)
Sprongdalen (Loc. 3) 8.-12 Sept. 5♂♂.

Drepanocercus spinistylus Söli, 1993
Øyastrondi 24 June-12 July 1♂.

Dziedzickia marginata (Dziedzicki, 1885)
Øyastrondi 12 July-17 Aug. 5♂♂, 17 Aug. -13 Sept. 4♂♂.

Gnoriste bilineata Zetterstedt, 1852
Øyastrondi 24 June-12 July 2♂♂.

G. harcyniae von Röder, 1887
Marheimgilet 22 June 1♂.

Grzegorzekia collaris (Meigen, 1818)
Øyastrondi 24 June-12 July 2♂♂, 12 July-17 Aug. 1♂.

Palaeodocosia janickii (Dziedzicki, 1923)
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 2♂♂.

Synapha vitripennis (Meigen, 1818)
Øyastrondi 24 June-12 July 2♂♂.

Ectrepesthoneura hirta (Winnertz, 1846)
Øyastrondi 24 June-12 July 1♂ 1♀, 12 July -17 Aug. 1♀.

Leia subfasciata (Meigen, 1818)
Øyastrondi 24 June-12 July 5♂♂; Buhaug 23 June 2♂♂ 1♀.

Subfamily MYCETOPHILINAE

Dynatosoma fuscicorne (Meigen, 1818)
Øyastrondi 24 June-12 July 2♂♂.

D. reciprocum (Walker, 1848)
Buhaug 23 June 1♂; Øyastrondi 12 July-17 Aug. 2♂♂ 1♀, 17 Aug. -13 Sept. 1♀.

D. thoracicum (Zetterstedt, 1838)
Øyastrondi 24 June-12 July 1♂.

Epicypta aterrima (Zetterstedt, 1852)
Øyastrondi 12 July-17 Aug. 1♂.

Mycetophila abbreviata Landrock, 1914
Øyastrondi 12 July-17 Aug. 2♂♂, 17 Aug. -13 Sept. 3♂♂.

M. bialorussica Dziedzicki, 1884
Øyastrondi 17 Aug. -13 Sept. 1♂.

M. confluens Dziedzicki, 1884
Fossen 24 June 3♂♂.

M. czizeki Landrock, 1911
Øyastrondi 24 June-12 July 2♂♂.

M. evanida Lastovka, 1972
Fossen 24 June 20♂♂; Nigard 8.-13 Sept. 8♂♂; Øyastrondi 24 June-12 July 2♂♂, 12 July-17 Aug. 23♂♂, 17 Aug. -13 Sept. 6♂♂; Sprongdalen (Loc. 1) 17 Aug. 1♂; Sprongdalen (Loc. 2) 23 June 2♂♂; Sprong-dalen (Loc. 3) 8.-12 Sept. 2♂♂.

M. fungorum (De Geer, 1776)
Nigard 8.-13 Sept. 34♂♂ 71♀♀; Buhaug 23 June 1♀; Øyastrondi 24 June-12 July 9♂♂ 8♀♀, 12 July-17 Aug. 18♂♂, 17 Aug. -13 Sept. 56♂♂ 79♀♀; Sprongdalen (Loc. 3) 8.-12 Sept. 14♂♂ 19♀♀.

M. ichneumonea Say, 1823
Nigard 8.-13 Sept. 1♂; Øyastrondi 12 July-17 Aug. 1♂.

M. marginata Winnertz, 1863
Sprongdalen (Loc. 1) 23 June 3♂♂; Geisdalen (Loc. 1) 24 June 1♂.

M. mohilivensis Dziedzicki, 1884
Fossen 24 June 2♂♂; Øyastrondi 17 Aug. -13 Sept. 1♂; Sprongdalen (Loc. 3) 8.-12 Sept. 1♂.

M. ocellus Walker, 1848
Øyastrondi 17 Aug. -13 Sept. 3♂♂.

M. ornata Stephens, 1829
Øyastrondi 17 Aug. -13 Sept. 1♂ 4♀♀.

M. pumila Winnertz, 1863
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 1♂.

M. schnablii (Dziedzicki, 1884)
Øyastrondi 12 July-17 Aug. 1♂.

M. semifusca Meigen, 1818
Øyastrondi 12 July-17 Aug. 2♂♂, 17 Aug. -13 Sept. 2♂♂.

M. signatoides Dziedzicki, 1884
Øyastrondi 17 Aug. -13 Sept. 1♂.

M. strigatoides (Landrock, 1927)
Øyastrondi 12 July-17 Aug. 2♂♂.

M. sumavica (Lastovka, 1963)
Øyastrondi 17 Aug. -13 Sept. 5♂♂.

M. vittipes Zetterstedt, 1852
Buhaug 23 June 1♂; Øyastrondi 17 Aug. -13 Sept. 1♂; Geisdalen (Loc. 1) 24 June 1♂.

Phronia austriaca Winnertz, 1863
Øyastrondi 17 Aug. -13 Sept. 3♂♂.

P. aviculata Lundström, 1914
Øyastrondi 17 Aug. -13 Sept. 5♂♂.

P. biarcuata (Becker, 1908)
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 4♂♂.

P. braueri Dziedzicki, 1889
Øyastrondi 17 Aug. -13 Sept. 1♂.

P. caliginosa Dziedzicki, 1889
Øyastrondi 17 Aug. -13 Sept. 2♂♂.

P. cinerascens Winnertz, 1863
Fåbergstølene 17 Aug. 1♂; Øyastrondi 12 July-17 Aug. 1♂.

P. egregia Dziedzicki, 1889
Øyastrondi 17 Aug. -13 Sept. 2♂♂.

P. exigua (Zetterstedt, 1852)
Sprongdalen (Loc. 3) 8.-12 Sept. 1♂.

P. flavicollis Winnertz, 1863
Marheimgilet 22 June 1♂; Øyastrondi 12 July-17 Aug.3♂♂,17 Aug. -13 Sept. 3 ♂♂.

P. flavipes Winnertz, 1863
Øyastrondi 17 Aug. -13 Sept. 13♂♂; Sprongdalen (Loc. 1) 23 June 1♂; Sprongdalen (Loc. 3) 8.-12 Sept. 2♂♂.

P. forcipata Winnertz, 1863
Øyastrondi 12 July-17 Aug. 2♂♂, 17 Aug. -13 Sept. 3♂♂.

P. humeralis Winnertz, 1863
Marheimgilet 22 June 13♂♂; Øyastrondi 17 Aug. -13 Sept. 1♂; Sprongdalen (Loc. 3) 8.-12 Sept. 1♂.

P. interstincta Dziedzicki, 1889
Øyastrondi 24 June-12 July 2♂♂, 17 Aug. -13 Sept. 1♂.

P. longaelamellata Strobl, 1898
Øyastrondi 24 June-12 July 1♂.

P. lutescens Hackman, 1970
Øyastrondi 24 June-12 July 1♂, 12 July-17 Aug. 3♂♂, 17 Aug. -13 Sept. 6♂♂.

P. nigricornis (Zetterstedt, 1852)
Fossen 24 June 2♂♂.

P. notata Dziedzicki, 1889
Marheimgilet 22 June 1♂.

P. obscura Dziedzicki, 1889
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 1♂.

P. sp. (cf. *mutabilis* Dziedzicki, 1889)
Øyastrondi 24 June-12 July 3♂♂.

Sceptonia fumipes Edwards, 1925
Øyastrondi 17 Aug. -13 Sept. 3♂♂ 2♀♀.

S. fuscipalpis Edwards, 1925
Øyastrondi 17 Aug. -13 Sept. 2♂♂ 2♀♀.

S. nigra (Meigen, 1804)
Øyastrondi 17 Aug. -13 Sept. 2♂♂ 2♀♀.

Trichonta atricauda (Zetterstedt, 1852)
Buhaug 23 June 2♂♂; Fåbergstølene 17 Aug. 1♂.

T. bicolor Landrock, 1912
Øyastrondi 12 July-17.08 1♂.

T. facilis Gagné, 1981
Marheimgilet 22 June 1♂; Øyastrondi 24 June-12 July 3♂♂, 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 1♂.

T. fissicauda (Zetterstedt, 1852)
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 1♂; Sprongdalen (Loc. 1) 23 June 1♂.

T. hamata Mik, 1880
Marheimgilet 22 June 6♂♂; Fossen 24 June 1♂; Øyastrondi 24 June-12 July 1♂, 12 July-17 Aug. 5♂♂, 17 Aug. -13 Sept. 4♂♂.

T. melanura (Staeger, 1840)
Øyastrondi 24 June-12 July 1♂.

T. submaculata (Staeger, 1840)
Marheimgilet 22 June 1♂; Fossen 24 June 1♂; Øyastrondi 17 Aug. -13 Sept. 6♂♂; Sprongdalen (Loc. 3) 8.-12 Sept. 1♂.

T. terminalis (Walker, 1856)
Buhaug 23 June 1♂; Fåbergstølen 23 June 1♂.

T. trivittata Lundström, 1916
Øyastrondi 17 Aug. -13 Sept. 1♂.

T. vulcani (Dziedzicki, 1889)
Øyastrondi 12 July-17 Aug. 6♂♂, 17 Aug. -13 Sept. 11♂♂.

T. sp. A (cf. *comis* Gagné, 1981)
Øyastrondi 12 July-17 Aug. 1♂.

T. sp. B (cf. *generosa* Gagné, 1981)
Øyastrondi 17 Aug. -13 Sept. 3♂♂.

T. sp. C
Øyastrondi 17 Aug. -13 Sept. 11♂♂.

Zygomyia pseudohumeralis Caspers, 1980
Øyastrondi 12 July-17 Aug. 1♂.

Z. notata (Stannius, 1831)
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 1♂.

Allodiopsis (A.) domestica (Meigen, 1830)
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 1♂.

A. (Notolopha) cristata (Staeger, 1840)
Fossen 24 June 1♀; Øyastrondi 24 June-12 July 2♂♂ 1♀, 12 July-17 Aug. 5♂♂, 17 Aug. -13 Sept. 15♂♂ 3♀♀.

Allodia (A.) anglofennica Edwards, 1921
Øyastrondi 17 Aug. -13 Sept. 7♂♂.

A. (A.) lugens (Wiedemann, 1817)
Fåbergstølene 17 Aug. 6♂♂; Øyastrondi 12 July-17 Aug. 8♂♂, 17 Aug. -13 Sept. 150♂♂; Sprongdalen (Loc. 1) 23 June 1♂; Sprongdalen (Loc. 3) 8.-12 Sept. 2♂♂.

A. (A.) lundstroemi Edwards, 1921
Øyastrondi 24 June-12 July 1♂, 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 15♂♂; Sprongdalen (Loc. 2) 17 Aug. 1♂.

A. (A.) pyxidiiformis Zaitzev, 1983
Øyastrondi 17 Aug. -13 Sept. 14♂♂; Sprong-dalen (Loc. 3) 8.-12 Sept. 1♂.

A. (A.) septentrionalis Hackman, 1971
Øyastrondi 24 June-12 July 2♂♂, 17 Aug. -13 Sept. 17♂♂; Sprongdalen (Loc. 1) 23 June 1♂.

A. (A.) truncata Edwards, 1921
Øyastrondi 12 July-17 Aug. 7♂♂, 17 Aug. -13 Sept. 29♂♂.

A. (A.) sp. (cf. *pyxidiiformis* Zaitzev, 1983)
Øyastrondi 17 Aug. -13 Sept. 2♂♂.

A. (Brachycampta) barbata (Lundström, 1909)
Øyastrondi 24 June-12 July 1♂.

Anatella aquila Zaitzev, 1989
Øyastrondi 17 Aug. -13 Sept. 11♂♂.

A. ciliata Winnertz, 1863
Øyastrondi 24 June-12 July 1♂, 12 July-17 Aug. 3♂♂, 17 Aug. -13 Sept. 3♂♂.

A. flavomaculata Edwards, 1925
Øyastrondi 24 June-12 July 1♂, 17 Aug. -13 Sept. 16♂♂.

A. fungina Plassmann, 1984
Øyastrondi 24 June-12 July 2♂♂, 12 July-17 Aug. 2♂♂ 1♀, 17 Aug. -13 Sept. 3♂♂ 4♀♀.

A. laffooni Plassmann, 1977
Øyastrondi 12 July-17 Aug. 3♂♂, 17 Aug. -13 Sept. 95♂♂.

A. lenis Dziedzicki, 1923
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 3♂♂.

A. longisetosa Dziedzicki, 1923
Øyastrondi 12 July-17 Aug. 2♂♂, 17 Aug. -13 Sept. 31♂♂.

A. minuta (Staeger, 1840)
Øyastrondi 12 July-17 Aug. 2♂♂, 17 Aug. -13 Sept. 28♂♂.

A. setigera Edwards, 1921
Nigard 8.-13 Sept. 1♂.

A. simpatica Dziedzicki, 1923
Øyastrondi 24 June-12 July 1♂, 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 3♂♂.

A. turi Dziedzicki, 1923
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 1♂.

A. unguigera Edwards, 1921
Øyastrondi 12 July-17 Aug. 1♂.

A. sp. A
Øyastrondi 17 Aug. -13 Sept. 1♂.

A. sp. B
Øyastrondi 17 Aug. -13 Sept. 61♂♂.

A. sp. C
Øyastrondi 17 Aug. -13 Sept. 1♂.

Brevicornu (B.) bipartitum Lastovka & Matile, 1974
Øyastrondi 12 July-17 Aug. 1♂.

B. (B.) boreale (Lundström, 1914)
Fåbergstølen 23 June 1♂; Øyastrondi 12 July-17 Aug. 3♂♂, 17 Aug. -13 Sept. 3♂♂.

B. (B.) foliatum (Edwards, 1925)
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 3♂♂.

B. (B.) griseicolle (Staeger, 1840)
Øyastrondi 17 Aug. -13 Sept. 2♂♂.

B. (B.) griseolum (Zetterstedt, 1852)
Fåbergstølen 23 June 1♂, 17 Aug. 3♂♂; Øyastrondi 24 June-12 July 2♂♂, 12 July-17 Aug. 14♂♂.

B. (B.) kingi (Edwards, 1925)
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 1♂.

B. (B.) ruficorne (Meigen, 1838)
Fåbergstølene 17 Aug. 1♂; Øyastrondi 24 June-12 July 1♂, 12 July-17 Aug. 4♂♂, 17 Aug. -13 Sept. 14♂♂.

B. (B.) sericoma (Meigen, 1830)
Fåbergstølene 17 Aug. 1♂; Øyastrondi 12 July-17 Aug. 12♂♂, 17 Aug. -13 Sept. 48♂♂; Sprongdalen (Loc. 1) 17 Aug. 1♂; Sprongdalen (Loc. 3) 8.-12 Sept. 9♂♂.

B. (B.) sp. A (cf. *bellum* (Johannsen, 1911))
Øyastrondi 12 July-17 Aug. 4♂♂.

B. (B.) sp. B (cf. *melanderi* Zaitzev, 1988)
Øyastrondi 17 Aug. -13 Sept. 1♂.

B. (B.) sp. C
Marheimgilet 22 June 2♂♂.

Cordyla brevicornis (Staeger, 1840)
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 4♂♂.

C. fissa Edwards, 1925
Øyastrondi 17 Aug. -13 Sept. 1♂.

C. fusca Meigen, 1804
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 2♂♂.

C. pusilla Edwards, 1925
Øyastrondi 12 July-17 Aug. 2♂♂, 17 Aug. -13 Sept. 3♂♂.

C. semiflava (Staeger, 1840)
Øyastrondi 24 June-12 July 1♂, 17 Aug. -13 Sept. 1♂.

Exechia cincta Winnertz, 1863
Øyastrondi 17 Aug. -13 Sept. 1♂.

E. confinis Winnertz, 1863
Øyastrondi 17 Aug. -13 Sept. 2♂♂.

E. contaminata Winnertz, 1863
Øyastrondi 17 Aug. -13 Sept. 5♂♂.

E. cornuta Lundström, 1914
Øyastrondi 24 June-12 July 1♂.

E. exigua Lundström, 1909
Øyastrondi 12 July-17 Aug. 8♂♂, 17 Aug. -13 Sept. 9♂♂.

E. festiva Winnertz, 1863
Øyastrondi 12 July-17 Aug. 3♂♂.

E. frigida (Boheman, 1865)
Øyastrondi 17 Aug. -13 Sept. 30♂♂; Sprongdalen (Loc. 3) 8.-12 Sept. 2♂♂.

E. fusca (Meigen, 1804)
Fossen 24 June 1♂; Nigard 8.-13 Sept. 1♂; Øyastrondi 17 Aug. -13 Sept. 245♂♂; Sprongdalen (Loc. 1) 23 June 1♂; Sprongdalen (Loc. 3) 8.-12 Sept. 1♂.

E. maculipennis (Stannius, 1831)
Sprongdalen (Loc. 3) 8.-12 Sept. 1♀.

E. nigra Edwards, 1925
Øyastrondi 24 June-12 July 1♂, 12 July-17 Aug. 10♂♂, 17 Aug. -13 Sept. 32♂♂.

E. parvula (Zetterstedt, 1852)
Øyastrondi 17 Aug. -13 Sept. 1♂.

E. pseudocincta Strobl, 1910
Øyastrondi 12 July-17 Aug. 1♂.

E. spinuligera Lundström, 1912
Øyastrondi 17 Aug. -13 Sept. 4♂♂.

E. subfrigida Lastovka & Matile, 1974
Øyastrondi 17 Aug. -13 Sept. 2♂♂; Sprongdalen (Loc. 3) 8.-12 Sept. 1♂.

E. unimaculata (Zetterstedt, 1860)
Fåbergstølene 17 Aug. 1♂; Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 4♂♂.

Exechiopsis (E.) clypeata (Lundström, 1911)
Nigard 8.-13 Sept. 1♂; Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 3♂♂.

E. (E.) distendens (Lackschewitz, 1937)
Øyastrondi 12 July-17 Aug. 2♂♂, 17 Aug. -13 Sept. 32♂♂ 3♀♀.

E. (E.) dryaspagensis Chandler, 1977
Øyastrondi 12 July-17 Aug. 2♂♂.

E. (E.) fimbriata (Lundström, 1909)
Øyastrondi 24 June-12 July 1♂, 12 July-17 Aug. 4♂♂, 17 Aug. -13 Sept. 1♂ 2♀♀.

E. (E.) furcata (Lundström, 1911)
Øyastrondi 17 Aug. -13 Sept. 3♂♂; Sprongdalen (Loc. 3) 8.-12 Sept. 3♂♂.

E. (E.) grassatura (Plassmann, 1978)
Øyastrondi 12 July-17 Aug. 2♂♂ 2♀♀, 17 Aug. -13 Sept. 10♂♂ 6♀♀.
E. (E.) indecisa (Walker, 1856)
Nigard 8.-13 Sept. 5♂♂; Øyastrondi 12 July-17 Aug. 1♀, 17 Aug. -13 Sept. 2♂♂.
E. (E.) intersecta (Meigen, 1818)
Nigard 8.-13 Sept. 1♂; Øyastrondi 17 Aug. -13 Sept. 5♂♂ 1♀.
E. (E.) ligulata (Lundström, 1913)
Øyastrondi 12 July-17 Aug. 1♂ 1♀, 17 Aug. -13 Sept. 3♂♂ 1♀, 17 Aug. -13 Sept. 7♂♂ 3♀♀.
E. (E.) magnicauda (Lundström, 1911)
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 2♂♂.
E. (E.) pseudindecisa Lastovka & Matile, 1974
Øyastrondi 12 July-17 Aug. 1♂, 17 Aug. -13 Sept. 2♀♀.
E. (E.) pseudopulchella (Lundström, 1912)
Øyastrondi 24 June-12 July 1♂, 12 July-17 Aug. 8♂♂ 5♀, 17 Aug. -13 Sept. 45♂♂ 13♀♀.
E. (E.) pulchella (Winnertz, 1863)
Nigard 8.-13 Sept. 2♂♂; Øyastrondi 24 June-12 July 1♀, 12 July-17 Aug. 1♀, 17 Aug. -13 Sept. 10♂♂ 1♀; Sprongdalen (Loc. 3) 8-13 Sept. 1♂.
E. (E.) subulata (Winnertz, 1863)
Øyastrondi 12 July-17 Aug. 5♂♂, 17 Aug. -13 Sept. 2♂♂ 1♀.
E. (E.) sp. (cf. *forciposa* (Tollett, 1955))
Øyastrondi 17 Aug. - 13 Sept. 3♂♂, Nigard 8-13 Sept. 2♂♂.
E. (Xenexechia) crucigera (Lundström, 1909)
Øyastrondi 12 July-17 Aug. 2♂♂.
E. (X.) membranacea (Lundström, 1912)
Øyastrondi 17 Aug. -13 Sept. 1♂.
E. (X.) pollicata (Edwards, 1925)
Øyastrondi 17 Aug. -13 Sept. 1♂.
E. (X.) sp. (cf. *crucigera* (Lundström, 1909))
Øyastrondi 24 June-12 July 1♀.
Pseudobrachypeza helvetica (Walker, 1856)
Øyastrondi 17 Aug. -13 Sept. 2♂♂ 1♀.
Pseudoexechia trisignata (Edwards, 1913)
Øyastrondi 17 Aug. -13 Sept. 1♂.
Pseudorymosia foeva (Dziedzicki, 1910)
Øyastrondi 12 July-17 Aug. 1♀, 17 Aug. -13 Sept. 8♂♂.
Rymosia bifida Edwards, 1925
Øyastrondi 17 Aug. -13 Sept. 1♂.
R. fasciata (Meigen, 1804)
Øyastrondi 12 July-17 Aug. 1♂ 1♀.
R. guttata Lundström, 1912
Øyastrondi 24 June-12 July 1♂, 17 Aug. -13 Sept. 2♂♂.
R. placida Winnertz, 1863
Øyastrondi 12 July-17 Aug. 4♂♂, 17 Aug. -13 Sept. 1♂.
R. signatipes (van der Wulp, 1859)
Øyastrondi 12 July-17 Aug. 1♂.
R. sp. (cf. *acta* Dziedzicki, 1910
Øyastrondi 24 June-12 July 1♂, 12 July -17 Aug. 1♂, 17 Aug. -13 Sept. 2♂♂.
Tarnania fenestralis (Meigen, 1818)
Nigard 8.-13 Sept. 1♀; Øyastrondi 17 Aug. -13 Sept. 8♂♂ 1♀; Sprongdalen (Loc. 3) 8.-12 Sept. 1♂ 4♀♀.
T. tarnanii (Dziedzicki, 1910)
Øyastrondi 17 Aug. -13 Sept. 5♂♂ 1♀.

DISCUSSION

The species

The world distribution of most species of Mycetophilidae are only superficially known. However, several of the species reported must be considered rare, as they have previously only been recorded from one or a few localities. This holds for *Mycomya simulans,* recorded from Eastern Siberia (Väisänen 1984), *Acnemia falcata* from the Kola peninsula in Russia (Zaitzev 1982), *Zygomyia pseudohumeralis* from two locations in Germany (Caspers 1980, Plassmann 1988), *Anatella aquila* from Altai and Sakhalin in the former USSR (Zaitzev 1989), *A. fungina* from Lunz in Austria (Plassmann 1984), *Exechiopsis dryaspagensis* from Wales in England and *E. pseudopulchella* from southern Finland and Bavaria in Germany (Plassmann & Plachter 1986).

Three species have previously not been recorded outside the eastern parts of the Palaearctic Region, viz. *Mycomya simulans, Anatella aquila* and *Exechia subfrigida.* The latter is recorded from Mongolia and the central parts of the former USSR. The record of *M. simulans* is remarkable, and the specimen may cover an undescribed species. Nevertheless, more thoroughly examinitions have revealed several Eastern Palaearctic species to be more widespread than previously supposed. One such species recorded here is *Brevicornu bipartitum,* described from Mongolia, and not recorded outside this area untill two males were published from the St. Petersburg region (Zaitzev 1988).

The record of *Drepanocercus spinistylus* is noteworthy as it represent the first Palaearctic record of the genus, previously known

by the Nearctic *P. ensiler* Vockeroth, 1980 only (see Vockeroth 1980 and Søli 1993).

Most species recorded from Jostedalen must be considered new to the Norwegian fauna. Exceptions from this are most species within the genus *Mycomya,* well treated by Väisänen (1984). Of these only *M. denmax, M. egregia, M. lambi, M. maculata* and *M. simulans* are new to Norway.

The fauna

Most species recorded from Jostedalen are widespread and common in Europe. Notwithstanding, several species tend to have their main distribution in the central/eastern parts of Europe, that means, they have not been recorded west of Germany, Switzerland and Italy. Such species are *Mycomya denmax, M. egregia, M. hackmani, M. simulans, Acnemia falcata, Polylepta borealis, Syntemna relicta, Boletine borealis, Dynatosoma thoracicum, Mycetophila abbreviata, M. sumavica, Phronia aviculata, P. caliginosa, P. longaelamellata, Trichonta facilis, T. fissicauda, T. trivittata, Zygomyia pseudohumeralis, Allodia pyxidiiformis, A septentrionalis, Anatella aquila, Brevicornu bipartitum, Exechia cornuta, E. maculipennis, E. subfrigida, E. unimaculata, Exechiopsis distendens, E. pseudopulchella, E. membranacea* and *Rymosia guttata. Exechiopsis dryaspagensis* is the only species recorded in western Europe only. This points to an affinity between the fauna in Jostedalen and the fauna in Central and Eastern Europe. Such an affinity is also emphasized when comparing the species list with other lists from England and Finland (for references see Tab. 2). Thus, 19% of the species here recorded have not been recorded from the British Isles, while only 9% have not been recorded from Finland.

As fungus gnats seem to have their optimal habitats at northern latitudes, one should except a rather rich and diverse fauna in Norway. Nevertheless, the very high number of species in this submontans area is noteworthy. Results obtained from other parts of Europe can be used to evaluate the diversity found in Jostedalen (Table 2). In doing this, only Allgäu in South Germany and Messaure in Northern Sweden reveals a species richness which outnumbers the one presented here. Still, the numbers are not fully comparable. The species list presented from Allgäu is the result of more than three years collecting. From Messaure the material originated from an extensive collecting programme, including various methods such as suction traps, light traps and pitfall traps. This contrasts the present survey, where, in addition to sweep nets, only one malaisetrap was operated at one location for less than 3 months. Hence, a more thoroughly study of fungus gnats in the Jostedalen area would undoubtly add several more species to the list.

In England and Finland the total numbers of species in Sciaroidea (excl. Sciaridae) are more than 510 (Chandler, pers. com) and 492 (Hackman 1980; Väisänen 1984). respectively. Given these numbers, one must suppose the Norwegian fauna of fungus gnats to comprise more than 500 species. If so, the fauna of Jostedalen includes at least 40% of the Norwegian species of fungus gnats.

Based on the present survey, Jostedalen seems to have an extremely rich and diverse fauna of fungus gnats, with several undescribed and rare species. This fits well with the results obtained from a study of a small sample of chironomids (Chironomidae) from the same area. Based on this single sample one new genera and two new species were described (Sæther & Schnell 1988, Schnell & Sæther 1988). Hence, more comprehensive studies of the invertebrate fauna in the Jostedalen area should be initiated. If the river is not allowed to dry out completely for longer periods, the terrestrial fauna will most probably not be seriously affected by the construction of the reservoir at lake Styggevatn.

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SAMMENDRAG

I forbindelse med en undersøkelse av evertebrater i Jostedalen sommeren 1988, ble det samlet inn mer enn 3000 individer av soppmygg. 214 arter ble identifisert innen familiene Diadocidiidae og Mycetophilidae. Tyve arter er ikke artsbestemt, og minst halvparten av disse er ubeskrevne. Funnet av *Drepano-*

cercus spinistylus er bemerkelsesverdig da slekten tidligere bare er representert med én art i Nord Amerika. Andre sjeldne arter er *Mycomya simulans* Väisänen 1984, *Acnemia falcata* Zaitzev, 1982, *Zygomyia pseudohumeralis* Caspers, 1980, *Anatella aquila* Zaitzev, 1989, *A. fungina* Plassmann, 1984, *Exechia subfrigida* Lastovka & Matile, 1974, *Exechiopsis dryaspagensis* Chandler, 1977 og *E. pseudopulchella* (Lundström, 1909). Disse artene er tidligere bare kjent fra et fåtall lokaliteter i verden.

Forekomsten av soppmygg er svært dårlig undersøkt i Norge, og de fleste artene er nye for vår fauna. Antall arter i materialet er meget høyt sammenlignet med resultater fra andre deler av Europa, og det totale artsantallet i Norge må anslås til minst 500. En vurdering av faunaen i Jostedalen viser affinitet til den sentrale/østlige palearktiske faunaen av soppmygg. Dette understrekes også ved at den har flere arter til felles med den finske faunaen enn med den engelske.

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