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Front cover: *Syngrapha interrogationis* (L., 1758) (Lepidoptera, Noctuidae). Artist: Hallvard Elven.

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A small jubilee

With the present issue of Norwegian Journal of Entomology we have reached Volume 50. This figure, however, does not correspond to the age of the journal, which is actually 82 years. The journal was founded by The Norwegian Entomological Society in 1921 under the name of Norsk Entomologisk Tidsskrift. Initially, each volume included issues from several years. Many papers were written in Norwegian. From 1967 with Volume 13, the volumes corresponds to the calendar years.

Over the years more and more papers were written in English. In order to give the journal a more international appearance, the name was changed to Norwegian Journal of Entomology with Volume 22 in 1975.

In 1979, support to the journal from The Norwegian Research Council was discontinued. The council expected taxonomic and ecological papers to be published in international Nordic journals, like *Oikos*, *Holarctic Ecology* and *Entomologica Scandinavica*, which they supported. One problem remained. There was no journal for publishing local, faunistic papers.

The situation changed later in the same year, when The Norwegian Research Council decided to support a series of faunistic journals. Our journal was continued as *Fauna Norvegica Series B*, with subtitle *Norwegian Journal of Entomology*. Up to 1993, Series B was published by Norsk zoologisk tidsskriftsentral at The Zoological Museum in Oslo, but from 1994 publication was taken over by Norsk institutt for naturforskning (NINA) in Trondheim.

Due to financial problems, however, NINA decided to discontinue publication of the journal from 1998. For this reason, since 1999 the journal has again been published by The Norwegian Entomological Society. The name was changed back to *Norwegian Journal of Entomology*, and the journal receives support from The Norwegian Ministry of Environment.

Since the Norwegian Entomological Society took over, submissions of manuscripts have been regular and satisfactory. Two issues have appeared yearly, including a large report from the 25th Nordic Baltic Congress of Entomology in 2001. We hope to continue publication of the journal at an international level with papers on all topics of entomology. The Nordic international journals have become quite specialised, and have high levels of refusals. For this reason national entomological journals are still very important.

The Editor

«Catalogus Lepidopterorum Norvegiae»

Dette er tittelen på den trykte katalogen over Norges sommerfugler. Her vil du finne alle norske arter listet opp med opplysninger om i hvilke fylker og regioner de er påvist. I tillegg gis det kommentarer til nesten 500 av de i alt 2123 artene. Samtidig er katalogen en sjekklister over samtlige sommerfuglarter i de nordiske land. Artenes forekomst i hvert av disse landene er angitt ved hjelp av bokstavkoder.

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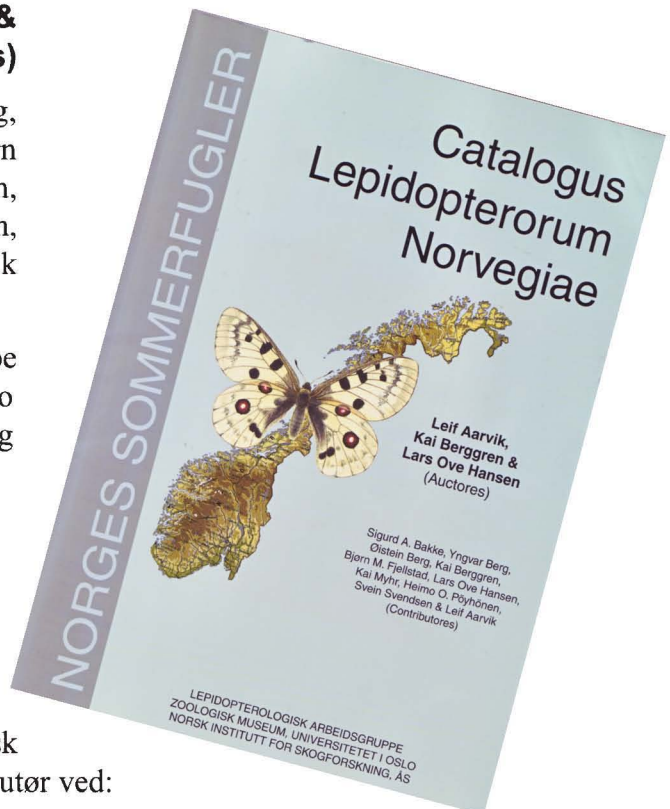
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On the validity of the species *Exechiopsis aemula* Plassmann and *Exechiopsis pulchella* (Winnertz) (Diptera, Mycetophilidae)

Olavi Kurina

Kurina, O. 2003. On the validity of the species *Exechiopsis aemula* Plassmann and *Exechiopsis pulchella* (Winnertz) (Diptera, Mycetophilidae). Norw. J. Entomol. 50, 3–10.

The morphological differences between the species *Exechiopsis pulchella* (Winnertz, 1863) and *E. aemula* Plassmann, 1984 are discussed, based on an analysis of the taxonomic literature and the study of type material. The validity of the second species is established. Detailed illustrations of male genitalia for both species are given.

Key words: Diptera, Mycetophilidae, *Exechiopsis*, taxonomy, Europe.

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INTRODUCTION

When studying European material of the subgenus *Exechiopsis* s. str. Tuomikoski, 1966 a problem occurred in the identification of the species *E. (s. str.) pulchella* (Winnertz, 1863) which brought about an analysis of the literature and review of available type material.

In the Palaearctic region another two species were described, close in morphological characteristics to *E. pulchella*. Both of them have been reported subsequently as junior synonyms: *E. forciposa* (Tollet, 1955) – synonymised by Hackman (1988) with remark «questionable»; *E. aemula* Plassmann, 1984 – synonymised by Ševčák (2001). During the original study two groups of specimens could clearly be distinguished and the validity of the species *E. aemula* was established by study of type material. The difference between the species appears primarily in the structure of male genitalia, which is discussed below.

METHODS AND ABBREVIATIONS

The studied material includes specimens preserved on pins and of specimens preserved in 70%

alcohol. For each dry preserved specimens the genitalia were separated from the abdomen and heated in 15% KOH for maceration. The remaining chitinous parts were washed with acetic acid and distilled water for neutralisation and inserted into glycerine. The genitalia were preserved as glycerine preparations. For material preserved in alcohol there was no need for maceration of the genitalia, as the observation of their structure was possible directly.

Abbreviations of museums in which material are deposited:

IZBE – Institute of Zoology and Botany, Estonian Agriculture University, Estonia;

JŠPC – Jan Ševčák Personal Collection, Ostrava, Czech Republic;

MNHN – Muséum National d'Histoire Naturelle, Paris, France;

ZMAN – Zoölogisch Museum Amsterdam, Nederland;

ZSM – Zoologische Staatssammlung in München, Germany.

THE SPECIES

Exechiopsis (Exechiopsis) aemula Plassmann

Figures 2, 4, 6, 8.

Exechiopsis (Exechiopsis) aemula Plassmann, 1984
Exechiopsis (Exechiopsis) pulchella (Winnertz, 1863): Krivosheina et al. (1986); Kurina (1998); Ševčík (2001).

Diagnostic characters. Mesonotum entirely yellow or light brown with yellow shoulders. Pleural parts yellow to brownish. Head brown. Scape and pedicel and basal half of first flagellomere yellow, other segments of flagellum brown. Legs yellow, tarsi brown. Abdomen entirely brownish or with yellowish bands on hind margins of tergites. Wings clear, apical part of R_5 distinctly convergent with M_1 . Proepisternum with one bristle.

Male genitalia: depth of ventral cavity of gonocoxite forms one third of the height of the gonocoxites; medial appendage of gonocoxite apically somewhat angled; ventral appendage of gonostylus without distinct medially directed lobe, existing only as a bump; medial appendage of gonostylus curved on apical third, with two combs of spines, the apical consisting of two spines, one of them longer, the subapical comb located on upper third of appendage (sometimes two combs almost coalesce) and consist of 10–13 spines.

Type material. Holotype (studied): 1 ♂, Sweden, Ångerån, 20–30 Sept. 1977, K. Müller leg. [ZSM]. Paratypes (studied): 2 ♂♂, Sweden, Ångerån, 10–20 Sept. 1977, K. Müller leg. [ZSM].

Material. **Nederland.** 2 ♂♂, Hilversum, 10 May 1908 and 1 Oct. 1916, de Meijere leg. [ZMAN]. **France.** 1 ♂, Forêt d'Orléans (45), Massif de Loris, 23 Aug. 1978, J. Clastrier leg. [MNHN]. **Czech Republic.** 1 ♂, Bohemia, Sumava, Nová Hůrka beat-bog, 20 Aug.–24 Sept. 1999, M. Barták & S. Kubik leg. [JŠPC]. **Germany.** 42 ♂♂, Rastorf b. Kiel, 4–14 March 1974 and 8 Oct.–1 Nov. 1974, F. Sick leg. [ZSM]. **Norway.** 1 ♂, Akershus, Østmarka, Tappenberg, reared by eclector from spruce root, 9 May–29 Aug. 1996, B. Økland leg. [IZBE]. **Sweden.** 13 ♂♂, Ångerån, 21–30 Sept. 1977, K. Müller leg. [ZSM]; 11 ♂♂, Abisko,

28 July – 18 Aug. 1975, 11 – 25 Aug. 1975, 15 – 22 Sep. 1975, 18–26 Aug. 1976 and 13–20 Sept. 1976, K. Müller leg. [ZSM]; 4 ♂♂, Norrbyn, S. Umea, 20 Sep.–31 Oct. 1985 and 1–10 Aug. 1986, K. Müller leg. [ZSM]. **Estonia.** 1 ♂, Järvelja, sweep netting, 25 Aug. 1989, O. Kurina leg.; 4 ♂♂, Nigula Nature Reserve, sweep netting, 1 July, 24 Sept. and 25 Sept. 1999, O. Kurina leg.; 1 ♂, Oonga, sweep netting, 3 Oct. 1995, O. Kurina leg.; 3 ♂♂, Endla Nature Reserve, light trap, 8–15 Oct. 1995, K. Kimmel leg. [all in IZBE].

Exechiopsis (Exechiopsis) pulchella (Winnertz)

Figures 1, 3, 5, 7.

Exechia pulchella Winnertz, 1863

Exechia intersecta (Meigen, 1818): Lundström, 1909

Exechia pulchella Winnertz, 1863: Lundström, 1912

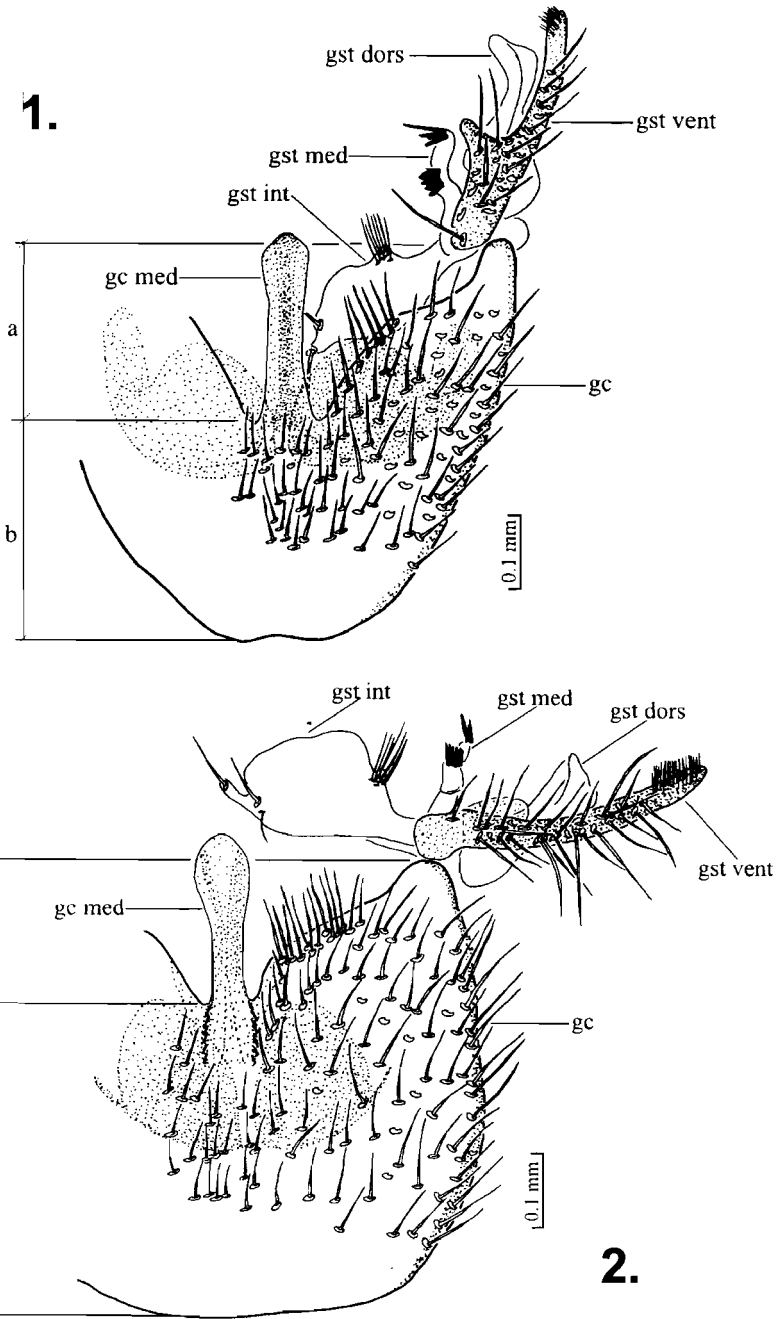
Exechia forciposa Tolle, 1955

Exechiopsis (Exechiopsis) pulchella (Winnertz, 1863): Kurina (1998).

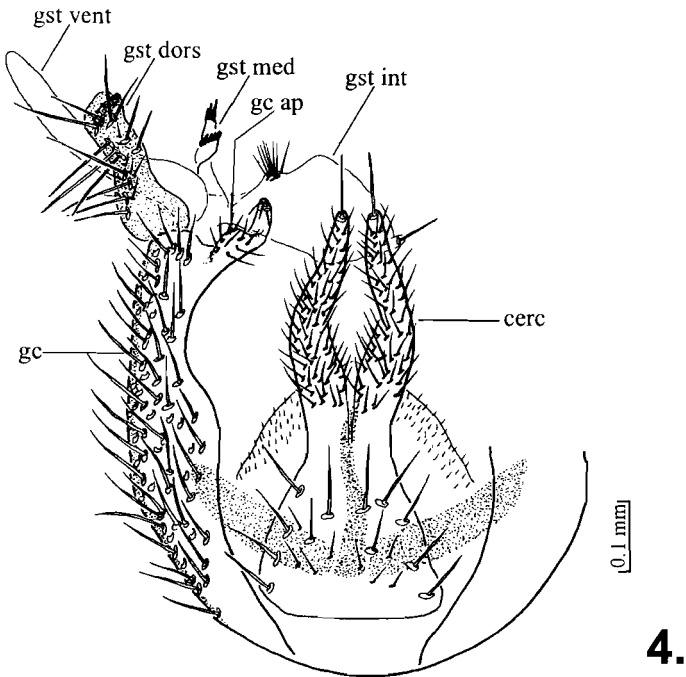
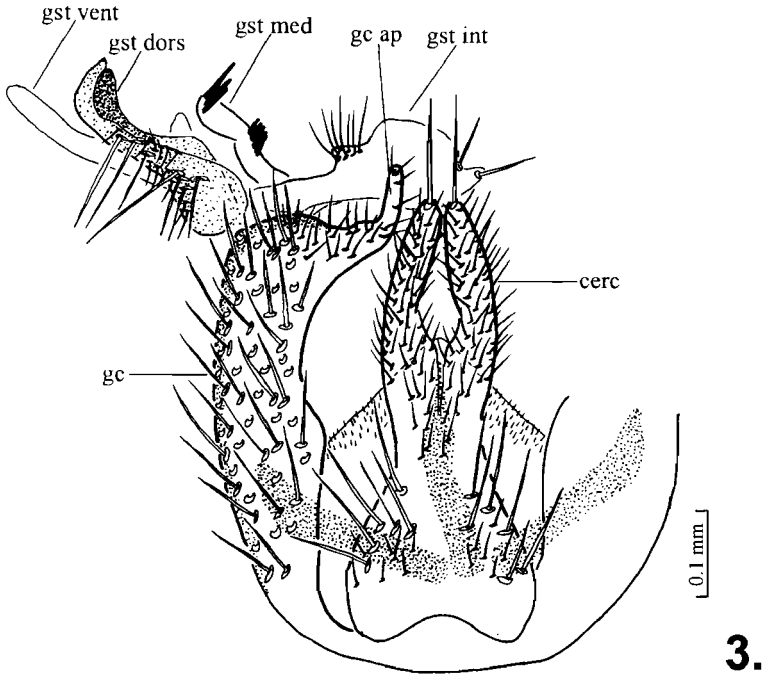
Diagnostic characters. Mesonotum light brown with yellow shoulders. Pleural parts yellow to brownish. Head brown. Scape and pedicel and basal half of first flagellomere yellow, other flagellomeres brown. Legs yellow to brownish, tarsi brown. Abdomen entirely brownish or with dispersed yellowish bands on hind margins of tergites. Wings clear, apical part of R_5 distinctly convergent with M_1 . Proepisternum with one bristle.

Male genitalia: depth of ventral cavity of gonocoxite equals half of the height of the gonocoxites; medial appendage of gonocoxite apically rounded; ventral appendage of gonostylus with distinct medially directed lobe; medial appendage of gonostylus curved, with two combs of spines, the apical consisting of 3–4 spines, one of them usually longer, the subapical comb located on middle of appendage and consisting of 3–6 spines. Male genitalia are represented on Figures 1, 3, 5 and 7.

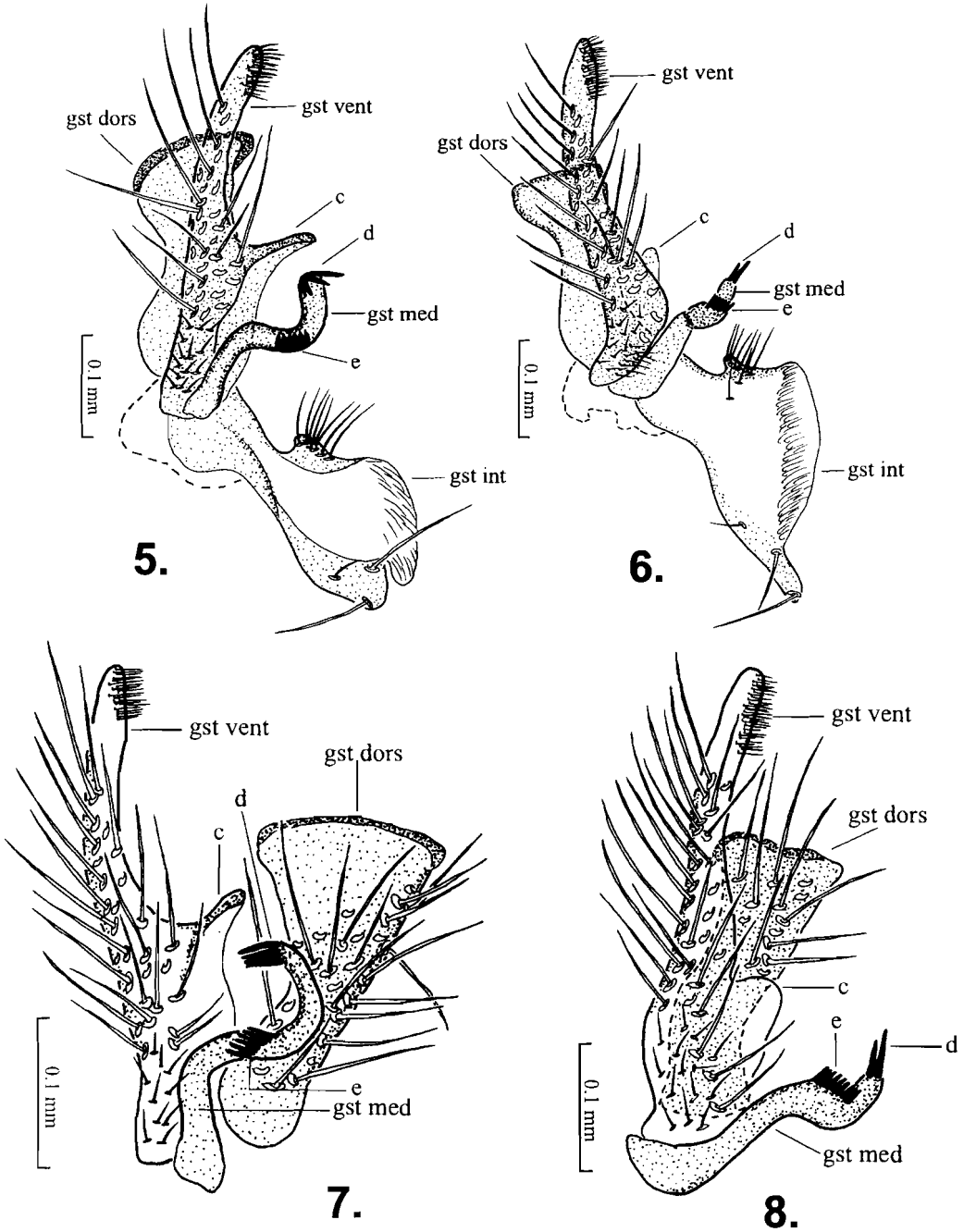
Material: Italy. 1 ♂, Aosta, Valgrisanche, Chamencon, alt. 1280 m, 12 Sept. 1974, L. Matile leg. [MNHN]. **Germany.** 1 ♂, Freiburg, Bechtaler Wald, 20 March 1985, FVA-Abt. Ws. leg. (= Forstliche Versuchs und Forschungsanstalt Baden-



Figures 1–2. Ventral view of male genitalia. **1.** *Exechiopsis pulchella* (Winnertz, 1863); **2.** *Exechiopsis aemula* Plassmann, 1984. Abbreviations: gc = gonocoxite; gc med = medial appendage of gonocoxite; gst dors = dorsal appendage of gonostylus; gst vent = ventral appendage of gonostylus; gst med = medial appendage of gonostylus; gst int = internal appendage of gonostylus; a = depth of ventral cavity of gonocoxite; b = height of gonocoxite.



Figures 3–4. Dorsal view of male genitalia. 3. *Exechiopsis pulchella* (Winnertz, 1863); 4. *Exechiopsis aemula* Plassmann, 1984. Abbreviations: cer = cerci; gc ap = apical appendage of gonocoxite; other abbreviations see Figures 1, 2.



Figures 5–8. Ventral (Figures 5, 6) and internal (Figures 7, 8) views of gonostylus. **5, 7.** *Exechiopsis pulchella* (Winnertz, 1863); **6, 8.** *Exechiopsis aemula* Plassmann, 1984. Abbreviations: c = medial lobe of ventral appendage of gonostylus; d = apical comb of spines on medial appendage of gonostylus; e = subapical comb of spines on medial appendage of gonostylus; other abbreviations see Figures 1, 2.

Württemberg, Abt. Waldschutz, Freiburg) [ZSM]. **Norway.** 2 ♂♂, Akershus, Østmarka, Tappenberg, reared by eclector from spruce root, 9 May–29 Aug. 1996, B. Økland leg. [IZBE]. **Sweden.** 18 ♂♂, Abisko, 10–20 June 1975, 27 July–4 Aug. 1975, 11–25 Aug. 1975, 1–8 Sept. 1975, 7–14 June 1976 and 23–30 Aug. 1976, K. Müller leg. [ZSM]. **Estonia.** 1 ♂, Endla Nature Reserve, light trap, 8–15 Oct. 1995, K. Kimmel leg. [IZBE].

DISCUSSION

There are no illustrations of genitalia included in Winnertz's description (Winnertz 1863) of *E. pulchella*, which is usual for a taxonomic study in the middle of the 19th century. According to Evenhuis (1997) most of Winnertz's material was originally deposited in Zoologisches Forschungsinstitut und Museum «Alexander Koenig», Bonn, Germany but moved to Poppelsdorf Castle during World War II and was probably destroyed during bombing of the castle. Consequently, it was unfortunately not possible to study the type material. However, in the beginning of the 20th century C. Lundström published a paper on mycetophiloids of Finland (Lundström 1909) with several sufficiently detailed illustrations including the figures of *Exechiopsis intersecta* (Meigen, 1818) and *E. pulchella*. These two species were both equipped with a question-mark. In the supplement of his monograph, Lundström (1912) noted that H. Dziedzicki had compared his figures with Winnertz's type material. From this Lundström concluded that his *E. intersecta* (Lundström 1909: p. 44, Figs. 153, 154) was conspecific with true *E. pulchella* and his *pulchella* (Lundström 1909: p. 45, Figs. 83, 84, 150) was a new species – *Exechiopsis pseudopulchella* (Lundström, 1912). Subsequently, Dziedzicki (1915: Plate XVII, Figs. 262, 263) figured the male genitalia of the *E. pulchella* type material by himself and they correspond with Lundström's figures.

The present discussion is based on the statement that Lundström and Dziedzicki actually figured the true *E. pulchella*. Later, several authors have used Lundström's figures for this species (e.g. Landrock 1927, 1940, Ostroverkhova & Stackelberg 1969).

While studying the material collected by R. Leruth from caves in Romania, R. Tollet (1955) described a new species – *Exechiopsis forciposa* (Tollet, 1955) and gave detailed figures of the male genitalia (pl. III, Figs. 10–12); however, it is apparent from his figures that it is the same species figured by Lundström (1909). According to Tollet (1955) the type material of *E. forciposa* is deposited in the Royal Museum of Natural History in Belgium but it could not be located by P. Limbourg (pers. comm.). Despite the unavailability of the types, the present study support the synonymy proposed by Hackman (1988), i. e. *E. forciposa* as a junior synonym of *E. pulchella*.

A. Zaitzev figured *E. pulchella* (Krivosheina et al. 1986) but his figure does not represent the species figured by Lundström; however, it is apparently conspecific with *E. aemula*. Ševčík (2001) had studied the holotype of *E. aemula* but he followed Zaitzev's identification of *E. pulchella* and synonymised the species. The situation that Zaitzev's figure does not represent the true *E. pulchella* had already been detected by L. Matile. In the Museum of Natural History in Paris I found material of *E. pulchella* determined by L. Matile and separated into two groups with handwritten labels: «*Exechiopsis. (E.) pulchella* Winnertz» and «*Exechiopsis (E.) pulchella* Zaitzev non Winnertz».

Study of the type material of *E. aemula* reveals that the two species differ mainly on the basis of male genitalia, which is discussed in Table 1 with reference to the respective figures.

Acknowledgements. I am much obliged to Dr. M. Baylac (Muséum National d'Histoire Naturelle Paris, France), Dr. H. de Jong (Zoölogisch Museum Amsterdam, Nederland) and Dr. W. Schacht (Zoologische Staatssammlung in München, Germany) for an opportunity to work with the collections. My very special thanks are due to Dr. J. Ševčík (Ostrava, Czech Republic) for the loan of material, to Dr. B. Økland (Ås, Norway) for the permission to use his unpublished data and to Dr. A. Polevoi (Petrozavodsk, Russia) for the valuable comments. I am very grateful to Dr. P. Chandler (Melksham, United Kingdom) for his help and critical perusal of the manuscript. The study was financially supported by grant 4990 of Estonian Science Foundation.

Table 1. Morphological differences of male genitalia between *Exechiopsis aemula* Plassmann, 1984 and *Exechiopsis pulchella* (Winnertz, 1863).

<i>Exechiopsis aemula</i> Plassmann, 1984	<i>Exechiopsis pulchella</i> (Winnertz, 1863)
<u>dorsal apical appendage of gonocoxite (gc ap)</u>	
with distinct hump (Figure 4)	without such a hump (Figure 3)
<u>cerci</u>	
slender, without cavity on basal margin (Figure 4)	bold, with cavity on basal margin (Figure 3)
<u>ventral cavity of gonocoxite</u>	
relatively deep, half height of gonocoxites (Figure 1: a)	relatively shallow, about one third height of gonocoxites (Figure 2: a)
<u>ventral medial appendage of gonocoxite (gc med)</u>	
rounded at apex (Figure 2)	somewhat angled at apex (Figure 1)
<u>ventral appendage of gonostylus</u>	
without distinct medially directed lobe, existing only as a bump (Figures 6, 8: c)	with distinct medially directed lobe (Figures 5, 7: c)
<u>dorsal appendage of gonostylus (gst dors)</u>	
basal width about half of its apical width (Figures 6, 8)	basal width about three-quarters of its apical width (Figures 5, 7)
<u>medial appendage of gonostylus</u>	
curved only on apical third; apical comb consisting of two spines; subapical comb consisting of 10–13 spines and located on upper third of appendage (Figures 6, 8: d, e)	curved; apical comb consisting of 3–4 spines; subapical comb consisting of 3–6 spines and located on middle of appendage (Figures 5, 7: d, e)
<u>internal appendage of gonostylus (gst int)</u>	
apex tapering (Figure 6)	apex blunt (Figure 5)

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Distribution and ecology of the water spider, *Argyroneta aquatica* (Clerck) (Araneae, Cybaeidae), in Norway

Kjetil Aakra & Dag Dolmen

Aakra, K. & Dolmen, D. 2003. Distribution and ecology of the water spider, *Argyroneta aquatica* (Clerck) (Araneae, Cybaeidae), in Norway. Norw. J. Entomol. 50, 11–16.

The distribution of the water spider *Argyroneta aquatica* in Norway is presented with a list of all known localities. The species is common in eastern parts of South Norway but absent from Western Norway. This absence may be due to topological constraints to dispersal and is unlikely to be caused by climate. The species is also known from Finnmark while it has not been found in most parts of Nordland and is apparently absent from Troms. Barriers formed by the mountains chains along the Norgweian/Swedish/Finnish border may be the cause of this. Notes on the ecology of the species are provided. *A. aquatica* may be found in both oligotrophic/dystrophic and eutrophic ponds and small lakes. It has also been observed in running water. The most important prerequisite appears to be vegetation such as *Sphagnum* where it can spin its egg sacs.

Key words: *Argyroneta aquatica*, Araneae, distribution, ecology, Norway.

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INTRODUCTION

The water spider *Argyroneta aquatica* (Clerck, 1757) is unique among the spiders in that it lives a wholly aquatic life. Its distribution is Palaearctic (Platnick 2002). In Norway the species was first reported from Ringerike, Buskerud, by Strand (1899), and other early records were published from various localities in the vicinity of Oslo (Strand 1900, 1904). It took more than 60 years before the next records were published, this time from the vicinity of Oslo (Brun et al. 1965) and from Finnmark (Cooke 1967, Waaler 1970). Dolmen (1977) provided an extensive review of all known and previously unpublished records from the Trøndelag counties as well as several unpublished records from southeastern and southern Norway. This information was not fully included in the Norwegian checklist (Hauge 1989) which indicated that the water spider could be found throughout Norway with the possible exception of western Norway. Only two records have subsequently been published, from Nordland

(Arnekleiv 1982) and from Tjøme (Andersen & Hauge 1995), but the species has been briefly dealt with in several semi-official reports (Dolmen 1990, 1991, 1996) as well as in *Limnofauna Norvegica* (Aagaard & Dolmen 1996). A comparatively large number of unpublished records from Trøndelag and southeastern parts of Norway have subsequently been made by the second author and others (see Acknowledgements) and a few previously undetermined specimens were found in the collections of the Museum of Natural History and Archaeology by the first author. The aim of this paper is to present all known Norwegian records of *A. aquatica* and provide some comments on the ecology and distribution of the species in Norway.

MATERIAL & METHODS

Material present in the Museum of Natural History and Archaeology (abbreviated MNHA in the list below) has been examined. Older material has

proved untraceable, e.g. Strand's records, but has nevertheless been included in the locality list as the species is easily identified. These older records have not been included in the map, however, because the locality information provided is not accurate enough. In our overview, dates, legator and other information are only provided for records not previously published. All new records are leg. D. Dolmen unless otherwise stated.

Grothendieck & Kraus (1994) transferred *A. aquatica* to the subfamily Cybaeinae within the Agelenidae based on comparison of genital characters. Cybaeinae is given familial rank by Platnick (2002). Abbreviations of faunal provinces follow Økland (1981).

RESULTS

Published localities

Ø Marker: loc N of Fløvik, Øymarksjøen (EIS 21) (Dolmen 1977). **AK** Oslo: Østensjøvannet (EIS 28) (Brun et al. 1965). Vicinity of Oslo («Kristiania») (Strand 1900, 1904). **BV** Flå: Lille Damtjern (EIS 44) (Dolmen 1977). **BØ** Lier: Småvatna, Kjenner (17 June 1977) (Dolmen 1977). Ringerike (Strand 1899). **VE** Tjøme: Moutmarka (EIS 11) (Andersen & Hauge 1995). **AAY** Birkenes: Møretrå (EIS 62) (Dolmen 1977). Risør: Tjerdalstjernet (9 July 1977) (Dolmen 1977). **AAI** Åmli/**AAY** Vegårdshei: Selåsvatnet (14 July 1977) (mentioned by Dolmen 1977, but no date provided). **MRY** Aure: pond S of Skardvatnet, Gjelavassdraget (EIS 90) (Dolmen 1996). **NSY** Brønnøy: 5 localities at Lomtjerna and pond 233, Lomsdalvassdraget (EIS 114) (Arnekleiv 1982). **MRI** Rindal: Gåstjøna (EIS 85) (Dolmen 1977). Surnadal: 2 locs at Høglivatnet and ponds on Fagermyran, Nordmarka (EIS 85) (Dolmen 1977). **STY** Ørland: pond at Vardeheia (EIS 96) (Dolmen 1977). **STI** Meldal: pond NE of Raudåsen, Svor-kavassdraget (EIS 86) (Dolmen 1990). Oppdal: loc E of Oppdal centre (EIS 79) (Dolmen 1977). Orkdal: Smørbergtjernet at Søvatnet (EIS 91) (8 Sept. 1952, leg. R. Dahlby, MNHA) (Dolmen 1977), ponds by Svorka south of Gagnåst. (13 Sept. 1977) (EIS 91) (Dolmen 1977). Rennebu: 2 locs SW of Lånkesetra, Nerskogen. (EIS 86)

(Dolmen 1977). Selbu: Bårsettjøna and 2 locs at Uglan (EIS 92) (Dolmen 1977), pond N of Røssetvolden, Rotlavassdraget (EIS 93) (Dolmen 1990). Skaun: 12 locs N of Elgshøgda (EIS 91) (Dolmen 1977). Tydal: loc. W of Nedalshytta, (now submerged by Nesjøen) (EIS 89) (Dolmen 1977). **NTY** Namsos: 2 locs in Aunemarka, Bangdalen (EIS 106) (Dolmen 1977). **NTI** Inderøy: Skålpundtjøna, Verstad (EIS 98) (Dolmen 1977). Levanger: loc. W of Sillermoen, Frol (EIS 98) (Moen & Moksnes 1970, Moksnes 1970, 1975, Waaler 1970, 1971). Meråker: 5 locs. near Tevla at Skurdalsvollen (EIS 93) (Dolmen 1977), pond at Tevla in Øvre Teveldalen (Dolmen 1996), Villrasstjøna and Mikkeltjerna, Stordalen (EIS 93) (Dolmen 1977). Namsskogan: Kjelmoseetra (EIS 107) (Dolmen 1977). Snåsa: pond at Eggetjern, Grønningen (EIS 103) (Dolmen 1977). Steinkjer: 6 locs at Øyingen, Valøy and 8 locs at Larsheimen (EIS 101) (Dolmen 1977), Lomtjøna, Skillegrind in Ogdalen (EIS 101) (Dolmen 1977). Stjørdal: 5 locs at Grønlivatna, Leksdal (EIS 93) (Dolmen 1977). **FN** Porsanger: Kolvik (EIS 174) (Cooke 1967). **FØ** Sør-Varanger: Ivargammevatn (EIS 160) (Waaler 1970).

New localities

Ø Halden: Grefserødtjernet, S. Enningdalen (EIS 12) (28 May 1990), Lille Svantjern, Skogskroken (EIS 12) (29 May 1990), Nedre Elgvatnet (EIS 12) (30 May 1990). Marker: Nordre Brutjern (EIS 21) (EIS 21) (6 July 1987, leg. Hans A. Olsvik), Gjølsjø (EIS 21) (24 May 1989, leg. Hans A. Olsvik), pond NE of Bergtjern (EIS 21) (20 May 1989), pond SE of Breidmosetjern (EIS 21) (21 May 1989), Breidmosetjern (EIS 21) (7 July 1989), Gjølsjøen, Ørje (EIS 21) (24 May 1989). **AK** Aurskog-Høland: Langebruslora (EIS 29) (12 May 1999, leg. Hans A. Olsvik). Ski: Lommetjern, Bru (EIS 28) (12 May 1983 leg. Hans A. Olsvik), Snipptjøna, Langhus (EIS 28) (27 May 1986, leg. Hans A. Olsvik). Ullensaker: Svenskestutjern, NE of Jessheim (EIS 37) (observation 1975, G. Halvorsen). **HES** Stange: Brynitjernet E of Stange (EIS 46) (26 Oct. 1986, Jan Seland), pond at Verva Gård (EIS 46) (observation ca. 2000, Hilde Åseth). **HEN** Engerdal: pond at Storkjøltjern, Kvisleflået (EIS 74) (8 Aug. 1980), pond S of Lortsetra,



Figure 1. Distribution of the water spider *Argyroneta aquatica* (Clerck) in Norway. The thick line indicates the probable limit of distribution in Norway. The question marks indicate uncertainties with regard to occurrence.

Kvisleflået (EIS 74) (28 Aug. 1983). Åmot: Venbergjtjørna (EIS 55) (26 July 1991, leg. Hans A. Olsvik). **VE** Andebu: Grøntjern W of Høyjord (EIS 19) (12 June 1994), pond WSW of Stranda (EIS 19) (16 June 1996). Hof: Bikjetjern, Haslestad (EIS 19) (3 July 1993), Teigstjern, Eidsfoss (EIS 19) (11 July 1996). Holmestrand: pond W of Kaldåkeråsen, pond SE of Auerød (EIS 19) (5 July 1993). Lardal: pond W of Måråsen at Svartangen (EIS 18) (9 June 1994), Brånatjern E of Kopa (EIS 18) (10 June 1994), pond S of Kringlemyråsen, Stormyrjtjern (EIS 18) (14 June 1994). Larvik: Asketjern, Aske (EIS 19) (26 July 1983), Solumtjern, Solum (EIS 19) (30 May 1993), pond at Vardeåsen (EIS 19) (31 May 1994), Vittersentjernet (EIS 19) (17 June 1994), pond WNW of Haga (EIS 19) (EIS 19) (1 June 1994), pond SW of Steinsvoll, Ulverødtjernet, Liljetjernet, pond N of Seierstad (EIS 19) (13 July 1994). Sandefjord: Prestvatnet (EIS 19) (19 June 1996). Tjøme: pond at Moutmarka (EIS 19) (8 Aug. 1990). **TEY** Bamble: Kiletjern (EIS 10) (9 July 2000, leg. Hans A. Olsvik). **TEI** Kvitseid: Østre Løkslitjern, Tjørnåsen (EIS 17) (30 May 1989). **AAV** Arendal: pond E of Bjornes (EIS 6) (12 July 1997), Gjerstadvatnet, Tromøya (EIS 6) (6 Aug. 1999), pond E of Kroktjern, Mofjellet, 2 ponds on Viveråsen (EIS 6) (6 June 1988), Ubergstjern S of Øynesvatn (EIS 6) (21 July 1988). Birkenes: pond SE of St. Olavsheia, Herefoss (EIS 6) (13 June 1996). Froland: Mårvatn (EIS 5) (5 June 1990). Gjerstad: pond NE of Øygaardstjern, Solhomfjell, pond on Maurmyrane, pond 1 km E of Karitjern, Lille Karitjern (EIS 10) (3 June 1988), pond on bog E of Karitjern, Solhomfjell (EIS 10) (7 June 1995), Lindtjern, Brokelandsheia (EIS 11) (17 May 2001). Risør: Åkvågvatnet (EIS 11) (3 July 1990). Vegårshei: Ufsdaltjern and Nedre Niptjern at Sørfjorden (EIS 10) (22 July 1988). **AAI** Åmli: pond NW of Kilåsen (EIS 10) (14 June 1996). **VAY** Lindesnes: pond ENE of Røyseland (EIS 1) (4 June 1990), Njervetjern, Spangereid (EIS 1) (28 May 1993). Marnardal: Hilleråstjern, Fidje (EIS 5) (2 June 1990). **MRI** Rindal: pond N of Urddalen (EIS 86) (31 July 1991), pond at Igletjønn, Rindal (EIS 86) (observation June 1975, Hans A. Olsvik). **STY** Hemne: pond WSW of Borstadsetra (EIS 91) (26 Aug. 1980). **STI** Klæbu: pond at Byatjørna

(EIS 92) (21 June 1989). Orkdal: pond at Søvasskjølen (EIS 91) (observation ca. 1980, Noralf Frengen). **NTI** Høylandet: pond NE of Vikafjellet, 3 ponds on Vikafjellet, 3 ponds on Flasnesfjellet (EIS 107) (16 June 1988), 2 ponds W of Røyrtjørna (EIS 107) (19 June 1988). Meråker: Gressevann, Stordalen (EIS 93) (leg. R. Dahlby, 13 Aug. 1944, MNHA), pond S of Tevla (EIS 93) (20 Aug. 1992, leg. Jon-K. Skei), pond E of Tevla (EIS 93) (15 Sept. 1992, leg. Jon-K. Skei). Namskogan: pond E of Kjelmosetra (EIS 108) (20 June 1988) (locality previously published in Dolmen 1977). **FØ** Sør-Varanger: pond E of Magesekkvatn (EIS 160) (27 July 1992, leg. Hans A. Olsvik), pond W of Sametimyra (EIS 169) (29 July 1992, leg. Hans A. Olsvik.).

DISCUSSION

Distribution

A. aquatica has a trans-Palaeartic boreo-nemoral range (Marusik et al. 2000). It ranges east to the Sakhalin Islands and Japan and as far south as Korea (Marusik et al. 2000). *A. aquatica* is known from all parts of Sweden (Hanström 1965), including the Abisko region close to the Troms border (Holm 1945), and Finland (Palmgren 1977), right up to the Barents Sea coast. According to the map in Marusik et al. (2000), the records from northern Fennoscandia represent the northernmost outpost of the water spider throughout its range.

The distribution pattern in Norway (Figure 1) is peculiar. The water spider is almost certainly absent from western parts of the country (i.e. the counties of Rogaland, Hordaland and Sogn og Fjordane). The sampling intensity, both for spiders in general and for limnic invertebrates, has been considerable in this region, yet not a single specimen of the water spider has ever been reported. Besides, a great number of localities over large areas of this part of the country seem to have close to optimum habitats for the species, when compared with the Trøndelag area. We therefore believe the apparent paucity of *A. aquatica* from Western Norway to be real. The exact western limit of distribution to the north and south of this

region (indicated by question marks in Figure 1) is not known with certainty, but appears to be abrupt, especially in the north.

The explanation for the absence of *A. aquatica* from western Norway may in part be a matter of time, i.e. the species has not had enough time since the retreat of the ice sheet to colonize this region of the country. In view of the extensive distribution of the species in the rest of Europe and the presence of suitable habitats in Western Norway (see above and below), however, the existence of serious barriers must have prevented its distribution further west in Norway. Such barriers could be the topography itself, whereby the steep mountainsides, extensive fjord systems and large tracts of alpine mountain plateaus make effective dispersal difficult. Climatic factors such as heavy precipitation levels, relatively warm winters and cool summers prevailing in the oceanic west, probably do not affect the distribution of *A. aquatica*.

We also believe that saltwater represent a serious barrier to the species and it is thus unlikely to appear on coastal islands, including larger islands like Hitra and those in the Lofoten archipelago in the North. *A. aquatica* was not found during a recent survey of the invertebrate fauna on Hitra and other coastal island in Trøndelag (Grenstad et al. 2000).

Unlike many other spiders, which use «ballooning» during the dispersal phase, *A. aquatica* has not been reported to use this kind of anemochore dispersal. Accordingly, it cannot cross fjords and mountains or large dry areas of land as easily as other species.

As Figure 1 shows, there is a very large gap between the locality in Nordland (Arnekleiv 1982) and the record by Cooke (1967) from Porsangerfjord. The water spider may actually be absent from most of this region, as the mountains and alpine plateaus between Norway and Sweden/Finland probably constitute significant barriers to the species. Palmgren (1977) for instance, noted the absence of *A. aquatica* from the Kilpisjärvi-area. If this is the case, the species may be absent from the majority of Troms county and northern-

most parts of Nordland, although the record from Abisko (Holm 1945) must be noted. The species seems to be more widespread in Finnmark, however.

All in all, the distribution of the water spider in Norway is distinctly eastern, (cf. Aagaard & Dolmen 1996: p. 24, map D). Only future records can reveal the true distribution of the water spider in Norway, but present knowledge hints at some interesting patterns.

Ecology and habitat preferences

In Norway the water spider has been found in a wide range of limnic habitats. In Trøndelag a typical *Argyroneta*-locality is represented by oligotrophic/dystrophic bog ponds and small lakes dominated by *Sphagnum* and surrounded by pine and spruce forest (Dolmen 1977). Most of these ponds are small, and their altitude ranges between 150 to 750 m.a.s.l.

The species has a very wide ecological amplitude in Norway, however. In eastern parts of south-eastern-Norway it has been reported from eutrophic lakes and ponds and it has even been sighted in running water (Hans A. Olsvik pers. comm.). It thus seems able to utilize almost any kind of standing water bodies, as long as there is some vegetation present.

A. aquatica prefers the shallow parts of the ponds, where it spins its characteristic and shiny white egg sacs which may be located just below the water surface within the *Sphagnum*. The other silk constructs of the water spider are harder to discover and are usually placed in somewhat deeper water (Bristowe 1971).

The species is active throughout the ice-free season. The earliest observations are from early May whereas it is active until at least October in southern Norway.

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On the Norwegian thrips fauna (Thysanoptera)

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The number of thrips species presently known to Norway is 125 of which 11 are imported or intercepted greenhouse species. A reference collection at The Norwegian Crop Research Institute, Plant Protection Centre, contains 109 of these species of which 22 are not reported from Norway previously.

Key words: Thrips, new species, reference collection, Norway.

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INTRODUCTION

As thrips (Thysanoptera) are very small and easily overlooked insects, they have not gained much attention. The first extensive work on thrips in Norway was made by Herstad (1960) who reported 24 species. Olsen & Solem (1982) performed a more comprehensive study. Based on data collected from other entomologists and from several museums in northern Europe, in addition to their own collecting effort, they listed 88 species from Norway. Later papers (Olsen 1987, Selnes 1988, Olsen & Midtgaard 1996) increased the number of species to 96. Based on these data and on records from nearby countries the expected total number of thrips species in Norway was estimated to 120 (Ottesen 1993).

MATERIAL AND METHODS

An investigation on thrips was initiated in 1995 at The Norwegian Crop Research Institute, Plant Protection Centre, where a reference collection is compiled. Thrips were collected mostly by one of two methods:

- 1) Green plant material, in some cases with flowers, was collected and washed (Kobre 1996).
- 2) Bark or debris from beaten branches of dead trees was collected and incubated in Berlese funnels (Kobre 2001).

Collecting of live plant material took place from April to September, but bark and branches from dead trees could be sampled throughout the year. All specimens, except some larvae, were macerated with alkali and mounted in Canada balsam.

Collecting has only been carried out systematically in the vicinity of the author's residence at Nesodden, Fagerstrand (EIS 28). Otherwise the sampling has been more random in connection with duty travels and vacations.

The specimens presented below are deposited at The Norwegian Crop Research Institute, Plant Protection Centre, and they were collected and identified by me unless otherwise stated. fortyfour of the identifications were verified by zur Strassen. Four of the species mentioned have been presented recently as new to Norway: *Stenothrips graminum* (Kobre et al. 2000), *Hoplothrips polysticti* and *H. unicolor* (Kobre 2001) and *H. carpathicus* (Kobre & Solheim 2002). Species not reported previously from Norway are marked with an asterisk.

Records for each biogeographic region (K.A. Økland 1981), municipality and EIS square (J. Økland 1976) are given. As the sampling methods used were not standardised to give quantitative results, the number of collected specimens is not given. Because the reproduction of thrips is arrhenotok or thelytok parthenogenetic (Lewis 1973), and the sex ratio varies a lot between species

(Olsen 1984), the sex of the recorded specimens is therefore given.

The nomenclature follows Schliephake & Klimt (1979), with some recent corrections (zur Strassen pers. com.). Information of ecological interest is also noted (Ahlberg 1926, Maltbæk 1932, Mound et al. 1976, Qvick 1977, Schliephake & Klimt 1979 and own notes). Presence in the Nordic countries is shown in brackets (N = Norway, S = Sweden, F = Finland, D = Denmark, I = Iceland).

LIST OF SPECIES

Aeolothripidae

Aeolothrips albicinctus Haliday, 1836

Ø Fredrikstad (Borge): Torsnes (EIS 20) ♀. **AK** Frogn: Langåra (EIS 28) ♀, Nesodden: Fagerstrand (EIS 28) ♀, Nannestad: Gardermoen (EIS 37) ♀.

At the base of grass tussocks, probably predacious. Not common. (NSFD).

Aeolothrips ericae Bagnall, 1920

Ø Råde: Saltnes (EIS 19) ♀, Fredrikstad (Borge): Torsnes (EIS 20) ♀, Fredrikstad (Onsøy): Slevik (EIS 20) ♀. **AK** Frogn: Håøya (EIS 28) ♂, Hurum: Tofte (EIS 28) ♀, Nesodden: Fagerstrand (EIS 28) ♀. **HEN** Tynset: Tynset (EIS 80) ♀♂. **OS** Lillehammer: Lillehammer (EIS 54) ♀. **BØ** Kongsberg: Hvitvingfoss (EIS 19) ♂, Ringerike: Hvalsmoen (EIS 36) ♀. **BV** Rollag: Rollag (EIS 35) ♀, Gol: Gol (EIS 43) ♀♂, Nes: Svenkerud (EIS 44) ♀. **VE** Borre: Horten (EIS 19) ♂, Tjøme: Mostrand (EIS 19) ♀. **TEY** Kragerø: Bråtøy (EIS 11) ♂. **TEI** Tinn: Austbygda (EIS 34) ♀. **AAY** Tvedestrand: Borøy (EIS 6) ♀. **AAI** Valle: Nomeland (EIS 16) ♀. **HOI** Eidfjord: Eidfjord (EIS 41) ♀♂. **SFI** Aurland: Vassbygdi (EIS 42) ♀, Sogndal: Lerheim (EIS 50) ♀♂. **MRY** Molde: Skaret (EIS 84) ♀. **STY** Hitra: Kvenvær (EIS 90) ♀. **STI** Oppdal: Oppdal (EIS 79) ♀♂. **NSY** Bodø: Saltstraumen (EIS 130) ♀♂. **NNØ** Steigen: Mjelde (EIS 134) ♀, Leinesfjord (EIS 134) ♂, Hamarøy: Ulsvåg (EIS 138) ♀. **TRY** Harstad: Trondenes (EIS 145) ♀.

On Ericaceae, Leguminosae and others. Common. (NSF).

Aeolothrips fasciatus (Linnaeus, 1758)

Ø Råde: Saltnes (EIS 19) ♀. **AK** Nesodden: Fagerstrand (EIS 28) ♀♂. **OS** Gran: Gran (EIS 36) ♀. **ON** Nord-Fron: Vinstra (EIS 62) ♀♂. **BØ** Kongsberg: Hvitvingfoss (EIS 19) ♂, Øvre Eiker: Fiskum (EIS 27) ♀, Sande: Svelvik (EIS 28) ♀, Krødsherad: Hamremoene (EIS 35) ♂, Ringerike: Hvalsmoen (EIS 36) ♀. **BV** Gol: Gol (EIS 43) ♀, Nes: Svenkerud (EIS 44) ♀. **VE** Horten: Horten (EIS 19) ♀♂. **TEY** Kragerø: Bråtøy (EIS 11) ♀♂, Drangedal: Oseid (EIS 17) ♀. **AAI** Valle: Rosskreppfjorden (EIS 8) ♀. **VAY** Kristiansand: Hamresand (EIS 5) ♀.

In flowers of many plant species, both imagoes and larvae are predators. Common. (NSFD).

**Aeolothrips manteli* Titschack, 1962

VE Tjøme: Mostrand (EIS 19) ♀.

On *Anchusa officinalis*. Previously recorded only a few times in Dutch marine areas on the same plant. (N).

Aeolothrips melaleucus Haliday, 1852

AK Asker: Sem (EIS 28) ♀ leg. & det G. Taksdal, Nesodden: Fagerstrand (EIS 28) ♀, Ås: Norderås (EIS 28) ♀, Enebakk: Børter (EIS 29) ♀.

On deciduous trees, predatory on thrips, mites and probably other small arthropods. (NS).

Aeolothrips versicolor Uzel, 1895

AK Frogn: Lågøy (EIS 28) ♀, Nesodden: Fagerstrand (EIS 28) ♀. **TEY** Kragerø: Bråtøy (EIS 11) ♀.

On deciduous trees, predatory on thrips and other small arthropods. (NSFD).

Aeolothrips vittatus Haliday, 1836

Ø Halden: Kråkgullåsen (EIS 20) ♀. **BV** Sigdal: Heimseteråsen (EIS 35) ♀ leg. J. Skartveit & K. H. Thunes.

On *Pinus* and *Picea*, probably predacious. (NSFD).

**Rhipidothrips niveipennis* Reuter, 1899

AK Nesodden: Fagerstrand (EIS 28) ♀. **VE** Larvik (Brunlanes): Hummerbakken (EIS 19) ♀. **AAI** Evje & Hornes: Evje (EIS 5) ♀.

On grasses. (NSF).

Thripidae*Anaphothrips badius* (Williams, 1913)

Ø Fredrikstad (Borge): Torsnes (EIS 20) ♀. **VE** Tjøme: Mostrand (EIS 19) ♀.

On *Carex* or *Phragmites*, on marshy ground, probably rare. (NSD).

Anaphothrips obscurus (Müller, 1776)

AK Ås: Ås (EIS 28) ♀. **HES** Kongsvinger: Roverud (EIS 38) ♀ leg. S. H. Jonsen. **OS** Lillehammer: Lillehammer (EIS 54) ♀. **ON** Nord-Fron: Vinstra (EIS 62) ♀. **BØ** Flesberg: Belgen (EIS 27) ♀. **VE** Tjøme: Mostrand (EIS 19) ♀. **BV** Flå: Flå (EIS 35) ♀. **TEY** Kragerø: Skåtøy (EIS 11) ♀. **VAY** Kristiansand: Hamresand (EIS 5) ♀. **MRY** Smøla: Moldstad (EIS 90) ♀.

On grasses and cereals, common. (NSFD).

Apterothrips secticornis (Trybom, 1896)

BV Nore og Uvdal: Geitvann (EIS 33) ♀. **AAI** Valle: Rosskreppfjorden (EIS 8) ♀. **HOI** Odda: Valldal (EIS 24) ♀. **FN** Nesseby: Nesseby (EIS 177) ♀ leg. O. Elen.

On grasses and in flowers in the mountains up to the snowline, ♂♂ rare (Kjellsen 1973). (NSFI).

Aptinothrips elegans Priesner, 1924

ØRåde: Saltnes (EIS 19) ♀. **AK** Nesodden: Fagerstrand (EIS 28) ♀. **TEY** Kragerø: Bråtøy (EIS 11) ♀.

On grasses, rare. (NSD).

Aptinothrips rufus Haliday, 1836

Ø Fredrikstad (Onsøy): Slevik (EIS 20) ♀. **AK** Nesodden: Fagerstrand (EIS 28) ♀. **BV** Hol: Dagali (EIS 34) ♀, Nore og Uvdal: Uvdal (EIS 34) ♀. **VE** Borre: Løvøya (EIS 19) ♀. **TEY** Kragerø: Bråtøy (EIS 11) ♀. **AAI** Evje & Hornes: Evje (EIS 5) ♀. **RY** Klepp: Orresand (EIS 7) ♀. **HOY** Sund: Klokkekarvik (EIS 30) ♀. **HOI** Etne: Frette (EIS 23) ♀, Eidfjord: Eidfjord (EIS 41) ♀. **MRY** Skodje: Brusdal (EIS 76) ♀ leg. E. Nordhus, Fræna: Bud (EIS 83) ♀, Smøla: Veidholmen (EIS 90) ♀. **STY** Hitra: Kvenvær (EIS 90) ♀, Frøya: Flatval (EIS 95) ♀. **NNØ** Steigen: Leinesfjord (EIS 134) ♀.

On many grass species, common, often together with *A. stylifer*, ♂ very rare. (NSFDI)

Aptinothrips stylifer Trybom, 1894

Ø Halden: Kråkgullåsen (EIS 20) ♀, Fredrikstad (Onsøy): Slevik (EIS 20) ♀. **AK** Ås: Ås (EIS 28) ♀, Lørenskog: Losby (EIS 29) ♀, Nes: Vormsund (EIS 37) ♀. **HES** Kongsvinger: Roverud (EIS 38) ♀ leg. S. H. Jonsen. **HEN** Tynset: Kvikne (EIS 80) ♀. **OS** Gausdal: Skeikampen (EIS 63) ♀. **BØ** Ringerike: Skarrud (EIS 45) ♀. **BV** Hol: Dagali (EIS 34) ♀, Sigdal: Heimseteråsen (EIS 35) ♀ leg. J. Skartveit & K. H. Thunes. **VE** Tjøme: Mostrand (EIS 19) ♀. **TEY** Kragerø: Bråtøy (EIS 11) ♀. **RY** Klepp: Orresand (EIS 7) ♀. **HOI** Etne: Frette (EIS 23) ♀, Odda: Valldal (EIS 24) ♀. **SFI** Lærdal: Tønjum (EIS 51) ♀, Balestrand: Fjærland (EIS 59) ♀. **MRY** Skodje: Brusdal (EIS 76) ♀ leg. E. Nordhus, Fræna: Bud (EIS 83) ♀. **STY** Smøla: Moldstad (EIS 90) ♀, Frøya: Flatval (EIS 95) ♀. **NNØ** Steigen: Leinesfjord (EIS 134) ♀, Hamarøy: Ulvsvåg (EIS 138) ♀. **FN** Nesseby: Nesseby (EIS 177) ♀ leg. O. Elen.

On several grass species, particularly *Deschampsia* and *Dactylis*, common, often together with *A. rufus*, ♂ very rare. (NSFDI)

Baliothrips dispar (Haliday, 1836)

AK Nesodden: Fagerstrand (EIS 28) ♀♂. **BØ** Ringerike: Skarrud (EIS 45) ♀. **AAI** Evje & Hornes: Hornes (EIS 5) ♂. **HOY** Lindås: Storavatn (EIS 39) ♀ leg. L.G. Jensen. **NNØ** Steigen: Leinesfjord (EIS 134) ♀. **FN** Nesseby: Nesseby (EIS 177) ♀♂ leg. O. Elen.

On Gramineae in wet areas. (NSFD).

Belothrips acuminatus Haliday, 1836

AK Nesodden: Fagerstrand (EIS 28) ♀. **BV** Flå: Stavn (EIS 35) ♀. **VE** Larvik (Brunlanes): Hummerbakken (EIS 19) ♀.

On *Galium verum*, not common. (NSFD).

Ceratothrips ericae (Haliday, 1836)

Ø Fredrikstad (Onsøy): Slevik (EIS 29) ♀. **AK** Frogn: Håøya (EIS 28) ♀, Nesodden: Fagerstrand (EIS 28) ♀. **BØ** Øvre Eiker: Fiskum (EIS 27) ♀.

BV Nore og Uvdal: Uvdal (EIS 34) ♀, Sigdal: Heimseteråsen (EIS 35) ♀♂ leg. J. Skartveit & K. H. Thunes. **VE** Tjøme: Mostranda (EIS 19) ♀. **AAV** Tvedestrand: Risøya (EIS 11) ♀. **AAI** Valle: Nomeland (EIS 16) ♀. **SFY** Jølster: Lunde (EIS 59) ♀. **SFI** Balestrand: Målsnes (EIS 50) ♀. **MRY** Ålesund: Sævoll (EIS 76) ♀. **STY** Hitra: Kvenvær (EIS 90) ♀, Frøya: Flatval (EIS 95) ♀.

On *Calluna vulgaris*, specialist pollinator (Hagerup 1950). (NSFDI)

Chaetanaphothrips orchidii (Moulton, 1907)

VE Tønsberg (EIS 11) ♀ leg. H. M. Lien.

Intercepted (NSFD).

Chirothrips hamatus Trybom, 1895

Ø Fredrikstad (Borge): Torsnes (EIS 20) ♀. **AK** Nesodden: Fagerstrand (EIS 28) ♀♂, Lørenskog: Losby (EIS 29) ♀♂.

On grasses, not common. (NSFD).

Chirothrips manicatus Haliday, 1836

Ø Fredrikstad (Onsøy): Slevik (EIS 20) ♀♂. **AK** Frogn: Aspond (EIS 28) ♀, Nesodden: Fagerstrand (EIS 28) ♂, Lørenskog: Losby (EIS 29) ♀, Nes: Vormsund (EIS 37) ♀. **HEN** Åmot: Deset (EIS 64) ♀, Alvdal: Alvdal (EIS 72) ♀. **OS** Lillehammer: Lillehammer (EIS 54) ♀♂, Sør-Fron: Gålå (EIS 62) ♀, Gausdal: Skei (EIS 63) ♀. **BØ** Kongsberg: Hvitvingfoss (EIS 19) ♀, Ringerike: Steinsletta (EIS 36) ♀. **BV** Hol: Dagali (EIS 34) ♀♂. **VE** Tjøme: Mostranda (EIS 19) ♂. **TEY** Drangedal: Oseid (EIS 17) ♀. **TEI** Sauherad: Sauherad (EIS 18) ♀, Vinje: Vinje (EIS 25) ♀. **AAV** Tvedestrand: Risøya (EIS 11) ♀♂. **AAI** Evje & Hornes: Evje (EIS 5) ♀♂, Valle: Nomeland (EIS 16) ♀. **HOY** Sund: Klokkekarvik (EIS 30) ♀. **HOI** Eidfjord: Eidfjord (EIS 41) ♀. **SFI** Aurland: Vassbygdi (EIS 42) ♀, Sogndal: Lerheim (EIS 50) ♀, Lærdal: Lærdalsøyri (EIS 51) ♀♂, Stryn: Loen (EIS 68) ♀. **SFY** Gløppen: Eidfoss (EIS 59) ♀. **STY** Hitra: Forsnes (EIS 90) ♀. **NSI** Rana: Mo i Rana (EIS 123) ♀♂ leg. A. Folkedal.

On grasses, very common. (NSFD).

**Ctenothrips distinctus* (Uzel, 1895)

AK Nesodden: Fagerstrand (EIS 28) ♀♂. **VE** Borre: Løvøya (EIS 19) ♀.

On leaves of *Convallaria majalis*. (NSF).

Dendrothrips degeeri Uzel, 1895

Ø Fredrikstad (Borge): Torsnes (EIS 20) ♀. **AK** Vestby: Son (EIS 19) ♀, Asker: Sem (EIS 28) ♀ leg. & det G. Taksdal, Frogn: Langåra (EIS 28) ♀. **BØ** Kongsberg: Kongsberg (EIS 27) ♀. **AAV** Risør: Torskeberg (EIS 11) ♀. **HOY** Bergen: Sandviken (EIS 39) ♀.

On leaves of deciduous trees (NS).

Dendrothrips ornatus (Jablonovski, 1894)

AK Frogn: Låtgøy (EIS 28) ♀. **VE** Tjøme: Vasser (EIS 19) ♀.

On leaves of *Tilia cordata*. (N).

**Dendrothrips saltatrix* Uzel, 1895

Ø Fredrikstad (Borge): Torsnes (EIS 20) ♀. **AK** Vestby: Son (EIS 19) ♂, Frogn: Håøya (EIS 28) ♀, Ås: Ås (EIS 28) ♂. **VE** Tjøme: Mostranda (EIS 19) ♀. **AAV** Risør: Torskeberg (EIS 11) ♀♂.

On deciduous trees. Noted as rare in Britain (Mound & al 1976), Sweden and Finland (Qvick 1977). However, the species is rarely collected, probably because of its habit of jumping when disturbed (Lewis 1973). It has been collected several times in numbers during hibernation in moss at the base of large *Fraxinus*, and once in *Anthriscus sylvestris*. (NSF).

Drepanothrips reuteri Uzel, 1895

Ø Halden: Kråkegullåsen (EIS 20) ♀. **AK** Nesodden: Fagerstrand (EIS 28) ♀.

Locally abundant in the catkins of *Corylus avellana*. Pest on *Vitis vinifera* in warmer regions. (NSFD).

**Echinothrips americanus* Morgan, 1913

VE Stokke: Gjennestad (EIS 19) ♀♂.

In greenhouses. (NS).

Frankliniella intonsa (Trybom, 1895)

Ø Moss: Jeløy (EIS 19) ♀, Råde: Saltnes (EIS 19) ♀, Fredrikstad (Borge): Torsnes (EIS 20) ♀, Fredrikstad (Onsøy): Kjenntjern (EIS 20) ♀♂. **AK** Nesodden: Fagerstrand (EIS 28) ♀♂, Sørum: Fetsund (EIS 29) ♀, Nes: Vormsund (EIS 37) ♀. **HEN** Åmot: Deset (EIS 64) ♀. **OS** Østre Toten: Kapp (EIS 46) ♀, Lillehammer: Lillehammer (EIS 54) ♀. **BØ** Kongsberg: Kongsberg (EIS 27) ♀, Øvre Eiker: Fiskum (EIS 27) ♀, Ringerike: Hvalsmoen (EIS 36) ♀♂. **BV** Gol: Gol (EIS 43) ♀, Hol: Dagali (EIS 34) ♀. **VE** Larvik (Brunlanes): Hummerbakken (EIS 11) ♀. **TEY** Kragerø: Bråtøy (EIS 11) ♀, Helle (EIS 11) ♂. **TEI** Sauherad: Gvarv (EIS 18) ♀, Vinje: Vinje (EIS 25) ♀. **VAY** Kristiansand: Hamresand (EIS 5) ♀, Arendal: Nedenes (EIS 6) ♀. **HOY** Fjell: Skålvik (EIS 30) ♀. **SFI** Aurland: Vassbygdi (EIS 42) ♀.

In many flowers, very common. (NSFD).

**Frankliniella occidentalis* (Pergande, 1895)

Ø Moss: Jeløy (EIS 20) ♂. **AK** Nesodden: Fagerstrand (EIS 28) ♀. **TEI** Gvarv: Gvarv (EIS 18) ♀. **RY** Ombo (EIS 14) ♀, Stavanger: Stavanger (EIS 8) ♂.

Serious pest in greenhouses, also collected on free land. (NSFD).

Frankliniella tenuicornis (Uzel, 1895)

Ø Fredrikstad (Borge): Torsnes (EIS 20) ♀. **AK** Nesodden: Agnormåsan (EIS 28) ♀, Ås: Ås (EIS 28) ♂, Nes: Vormsund (EIS 37) ♀. **HES** Kongsvinger: Roverud (EIS 38) ♀ leg. S. H. Jonsen, Ringsaker: Kise (EIS 45) ♀. **OS** Lillehammer: Lillehammer (EIS 54) ♀. **ON** Nord-Fron: Kvam (EIS 62) ♀♂. **BØ** Flesberg: Belgen (EIS 27) ♀, Ringerike: Ringen (EIS 36) ♀. **VE** Sem: Oseberg (EIS 19) ♀.

On grasses and cereals, potential as pest, common. (NSFD).

**Hemianaphothrips articulatus* Priesner, 1925

Ø Fredrikstad (Borge): Torsnes (EIS 20) ♀. **VE** Larvik (Brunlanes): Hummerbakken (EIS 19) ♀.

Probably on *Carex* and grasses in moist areas. (ND).

**Hercinothrips femoralis* (Reuter, 1891)

AK Ås: Ås (EIS 28) ♀. **ON** Nord-Fron: Vinstra (EIS 62) ♀ leg. B. Lilleeng.

Long known as a greenhouse species (Ahlberg 1922), also collected outdoors. (NSFD).

Iridothrips iridis (Watson, 1924)

AAV Arendal: Nedenes (EIS 6) ♀♂.

On *Iris pseudacorus*. (NSFD).

Kakothrips robustus (Uzel, 1895)

Ø Fredrikstad (Onsøy): Slevik (EIS 20) ♀. **HEN** Tynset: Tynset (EIS 80) ♀. **TEI** Tinn: Austbygda (EIS 34) ♀♂. **HOI** Etne: Frette (EIS 23) ♀.

Was previously a pest in *Pisum*, *Lathyrus* and *Viciae*, but apparently less common at present. Collected on *Vicia cracca*. (NSFD).

Limothrips cerealium Haliday, 1836

Ø Fredrikstad (Borge): Torsnes (EIS 20) ♀. **AK** Frogn: Saxebøl (EIS 28) ♀. **VE** Borre: Langgrunn (EIS 19) ♀. Sem: Oseberg (EIS 19) ♂.

On grasses and cereals, not common. (NSFD).

Limothrips denticornis Haliday, 1836

Ø Hvaler: Kirkøy (EIS 12) ♀, Fredrikstad (Borge): Torsnes (EIS 20) ♀. **AK** Oslo: Nordstrand (EIS 28) ♀♂ leg. W. M. Schøyen, Lørenskog: Losby (EIS 29) ♀, Nes: Vormsund (EIS 37) ♀. **HES** Kongsvinger: Roverud (EIS 38) ♀ leg. S. H. Jonsen, Ringsaker: Kise (EIS 45) ♀. **HEN** Storelvdal: Messelt (EIS 64) ♀, Tynset: Brydalen (EIS 73) ♀. **OS** Ringeby: Glomstad (EIS 63) ♀. **ON** Nord-Fron: Kvam (EIS 62) ♂ leg. B. Lilleeng, Vinstra (EIS 62) ♀ leg. B. Lilleeng. **BØ** Flesberg: Belgen (EIS 27) ♀, Hurum: Holmsbu (EIS 28) ♀, Ringerike: Skarrud (EIS 46) ♀. **BV** Flå: Flå (EIS 35) ♀♂, Nes: Nesbyen (EIS 44) ♀. **VE** Sem: Oseberg (EIS 19) ♀. **AAV** Froland: Svenes (EIS 6) ♀. **AAI** Evje & Hornnes: (EIS 5) ♀♂. **RY** Klepp: Orresand (EIS 7) ♀. **SFI** Lærdal: Tønjum (EIS 51) ♀♂. **STI** Rennebu:

Halland (EIS 87) ♀, Trondheim: Gaulosen (EIS 92) ♀. **NTI** Stjørdal: Hell (EIS 92) ♀.

On grasses, common. Regarded as pest in cereals. (NSFD).

Mycterothrips latus (Bagnall, 1912)

AK Nesodden: Svestadtjern (EIS 28) ♀♂. **BØ** Ringerike: Skarrud (EIS 45) ♀. **BV** Hol: Dagali (EIS 34) ♀. **VE** Horten: Horten (EIS 19) ♀. **TEY** Kragerø: Bråtøy (EIS 11) ♀. **NNØ** Steigen: Fure (EIS 134) ♀♂.

On *Betula* leaves. (NSFD).

Mycterothrips salicis (Reuter, 1879)

AK Frogn: Langåra (EIS 28) ♀, Nannestad: Gardermoen (EIS 37) ♀. **VE** Tjøme: Mostranda (EIS 19) ♀.

On *Salix* leaves. (NSFD).

Neohydatothrips abnormis (Karny, 1910)

TEI Tinn: Austbygda (EIS 34) ♀.

In flowers of Fabacea. (N).

Neohydatothrips gracilicornis (Williams, 1916)

Ø Fredrikstad (Borge): Torsnes (EIS 20) ♀♂, Fredrikstad (Onsøy): Slevik (EIS 20) ♀. **AK** Frogn: Håøya (EIS 28) ♂, Nesodden: Fagerstrand (EIS 28) ♀, Lørenskog: Losby (EIS 29) ♀. **BØ** Øvre Eiker: Fiskum (EIS 27) ♀. **VE** Tjøme: Mostranda (EIS 19) ♂. **TEY** Kragerø: Bråtøy (EIS 11) ♂. **AAV** Risør: Torskeberg (EIS 11) ♀. **HOI** Eidfjord: Eidfjord (EIS 41) ♀. **TRY** Harstad: Trondenes (EIS 145) ♀.

In flowers of Fabacea, particularly in *Vicia cracca*, common. (NSF).

Odontothrips biuncus John, 1921

Ø Fredrikstad (Onsøy): Slevik (EIS 20) ♀, Råde: Saltnes (EIS 19) ♀♂. **AK** Frogn: Håøya (EIS 28) ♀, Nesodden: Fagerstrand (EIS 28) ♂. **HEN** Alvdal: Alvdal (EIS 72) ♀♂, Tynset: Kvikne (EIS 80) ♀, Tynset (EIS 80) ♂. **OS** Lillehammer: Lillehammer (EIS 54) ♀. **ON** Nord-Fron: Kvam (EIS 62) ♀. **BØ** Kongsberg: Hvittingfoss (EIS 19) ♀, Ringe-

rike: Hvalsmoen (EIS 36) ♀. **BV** Gol: Gol (EIS 43) ♀. **VE** Horten: Horten (EIS 19) ♂. **AAI** Evje & Hornes: Evje (EIS 5) ♀. **AAV** Arendal: Nedenes (EIS 6) ♀. **TEY** Drangedal: Oseid (EIS 17) ♀. **HOI** Etne: Frette (EIS 23) ♀, Eidfjord: Eidfjord (EIS 41) ♀♂. **SFI** Aurland: Vassbygdi (EIS 42) ♀, Sogndal: Lerheim (EIS 50) ♀, Lærdal: Læredalsøyri (EIS 51) ♀, Stryn: Loen (EIS 68) ♀♂. **MRY** Smøla: Hopen (EIS 90) ♀. **STI** Oppdal: Oppdal (EIS 79) ♀, Meldal: Løkken (EIS 91) ♀. **NNØ** Steigen: Leinesfjord (EIS 134) ♀. **TRY** Harstad: Trondenes (EIS 145) ♀.

On *Vicia* and *Lathyrus*. Common. (NSFD).

Odontothrips intermedius (Uzel, 1895)

AK Nesodden: Fagerstrand (EIS 28) ♀ det A. Olsen, Lørenskog: Losby (EIS 29) ♀♂.

On *Lathyrus montanus*. (NSFD).

Odontothrips loti (Haliday, 1852)

Ø Fredrikstad (Borge): Torsnes (EIS 20) ♀♂, Fredrikstad (Onsøy): Slevik (EIS 20) ♀. **AK** Frogn: Håøya (EIS 28) ♀, Nesodden: Fagerstrand (EIS 28) ♂. **HEN** Tynset: Kvikne (EIS 80) ♀♂. **OS** Østre Toten: Kapp (EIS 46) ♀, Lillehammer: Lillehammer (EIS 54) ♀♂. **ON** Nord-Fron: Vinstra (EIS 62) ♀♂. **BØ** Øvre Eiker: Fiskum (EIS 27) ♀. **BV** Nore og Uvdal: Hvåle (EIS 35) ♀♂, Ringerike: Hvalsmoen (EIS 36) ♀♂, Gol: Gol (EIS 43) ♀♂. **VE** Horten: Horten (EIS 19) ♀♂. **TEY** Kragerø: Bråtøy (EIS 11) ♂. **TEI** Sauherad: Sauherad (EIS 18) ♀. **AAV** Tvedestrand: Laget (EIS 11) ♀. **AAI** Evje & Hornes: Evje (EIS 5) ♂. **VAY** Kristiansand: Hamresand (EIS 5) ♀. **HOY** Fjell: Skålvik (EIS 30) ♀♂. **HOI** Etne: Frette (EIS 23) ♂, Eidfjord: Eidfjord (EIS 41) ♀, Brimnes (EIS 41) ♂. **SFI** Sogndal: Lerheim (EIS 50) ♀♂, Balestrand: Fjærland (EIS 59) ♂, Stryn: Loen (EIS 68) ♀♂. **SFY** Gloppen: Byrkjelo (EIS 59) ♀. **MRY** Skodje: Solnørvika (EIS 76) ♀. **STY** Hitra: Kvenvær (EIS 90) ♀. **STI** Oppdal: Oppdal (EIS 79) ♀, Meldal: Løkken (EIS 91) ♀. **NSV** Bodø: Saltstraumen (EIS 130) ♀♂. **NNØ** Steigen: Nordskot (EIS 134) ♀, Steigen: Fure (EIS 134) ♂. **NNV** Hadsel: Stokmarknes (EIS 143) ♀.

On Papilionaceae, particularly in *Lotus corniculatus*. Common. (NSFD).

**Odontothrips phaleratus* (Haliday, 1836)

Ø Fredrikstad (Borge): Torsnes (EIS 20) ♀. **BØ** Hurum: Holmsbu (EIS 28) ♀. **VE** Horten: Horten (EIS 19) ♀.

On *Lathyrus montanus* and *L. pratensis*. (NSFD).

Oxythrips ajugae Uzel, 1895

AK Frogn: Langåra (EIS 28) ♀, Lørenskog: Losby (EIS 29) ♀, Nes: Vormsund (EIS 37) ♀. **HEN** Tynset: Kvikne (EIS 80) ♀. **OS** Sør-Fron: Gålå (EIS 62) ♀. **BØ** Ringerike: Skarrud (EIS 45) ♀♂. **BV** Nore og Uvdal: Lågliberget (EIS 33) ♀, Sigdal: Heimseteråsen (EIS 35) ♀ leg. J. Skartveit & K. H. Thunes. **TEI** Tinn: Austbygdi (EIS 34) ♀. **HOI** Kvam: Svevatn (EIS 31) ♀ leg. J. Skartveit & K. H. Thunes. **STI** Oppdal: Oppdal (EIS 79) ♀.

On ♂ cones of *Pinus*, often together with *O. bicolor*, very common. (NSFD).

Oxythrips bicolor (Reuter, 1879)

Ø Hvaler: Kirkøy (EIS 12) ♀, Moss: Jeløya (EIS 19) ♂, Råde: Vannsjø (EIS 20) ♀. **AK** Nesodden: Fagerstrand (EIS 28) ♀♂, Enebakk: Børter (EIS 29) ♀. **HEN** Åmot: Deset (EIS 64) ♀. **BØ** Ringerike: Steinsletta (EIS 36) ♀. **BV** Sigdal: Heimseteråsen (EIS 35) ♀ leg. J. Skartveit & K. H. Thunes, Gol: Gol (EIS 43) ♀. **VE** Sandefjord: Engø (EIS 19) ♀. **AAV** Tromøy: Færvik (EIS 6) ♂, Risør: Torskeberg (EIS 11) ♀. **HOI** Kvam: Svevatn (EIS 31) ♀ leg. J. Skartveit & K. H. Thunes, Eidfjord: Eidfjord (EIS 41) ♀. **SFI** Sogndal: Sogndal (EIS 51) ♂. **MRY** Ålesund: Ålesund (EIS 76) ♀ leg. E. Nordhus.

On ♂ cones of *Pinus*, often together with *O. ajugae*; very common. (NSFD).

Parthenothrips dracaenae (Heeger, 1854)

AK Nesodden: Agnor (EIS 28) ♀, Oslo (EIS 28) ♀♀ leg. & det W. M. Schøyen, Ås: Ås (EIS 28) ♀. **BØ** Lier: Eriksrud (EIS 28) ♀.

Long known as a pest on ornamental plants in greenhouses (Ahlberg 1922). Collected once outdoors and once hibernating in bark of *Picea*. (NSFDI).

**Rubiiothrips silvarum* (Priesner, 1920)

Ø Fredrikstad (Onsøy): Slevik (EIS 20) ♀. **AK** Nesodden: Fagerstrand (EIS 28) ♀. **BV** Gol: Rotheim (EIS 43) ♀. **VE** Borre: Løvøya (EIS 19) ♀.

On *Galium verum*, locally abundant. (NSFD).

Scirtothrips longipennis (Bagnall, 1909)

AK Oslo (EIS 20) larvae leg. & det T. H. Schøyen. In greenhouses. Has been a pest (Fjelddalen 1953), but the pest status is more doubtful at present (Mound, in litt.). (NSFD).

**Selenothrips rubrocinctus* (Giard, 1901)

RY Sola (EIS 7) larvae leg. B. Eidhammer. Intercepted. (N).

Stenothrips graminum Uzel, 1895

AK Nesodden: Fagerstrand (EIS 28) ♀♂.

On grasses and *Avena sativa*, not common. (NSFD).

Taeniothrips inconsequens (Uzel, 1895)

AK Nesodden: Fagerstrand (EIS 28) ♀. **VE** Tjøme: Mostrand (EIS 19) ♀. **HOI** Ullensvang: Lofthus (EIS 32) ♀♀ leg. & det T. H. Schøyen. **HOY** Bergen: Sandviken (EIS 39) ♀. **MRY** Ålesund: Ålesund (EIS 76) ♀.

Previously well known as a serious pest on pear, but at present collected mainly from *Sorbus aucuparia*. A similar change of host plant has probably occurred on the American continent (Kobro 1999). (NSDI).

Taeniothrips picipes (Zetterstedt, 1828)

Ø Hvaler: Kirkøy (EIS 12) ♀, Halden: Femsjøen (EIS 20) ♀♂. **AK** Frogn: Hallangspollen (EIS 28) ♀♂, Lørenskog: Losby (EIS 29) ♀, Nes: Vormsund (EIS 37) ♀. **HEN** Tynset: Kvikne (EIS 80) ♀. **OS** Gausdal: Bonsjøen (EIS 62) ♂, Sør-Fron: Gålå (EIS 62) ♀, Gausdal: Skei (EIS 63) ♀. **BØ** Kongsvik: Hvitvingfoss (EIS 19) ♀, Øvre Eiker: Fiskum (EIS 27) ♀, Ringerike: Skarrud (EIS 45) ♀. **BV** Hol: Dagali (EIS 34) ♀, Sigdal: Heimseteråsen (EIS 35) ♀ leg. J. Skartveit & K. H. Thunes. **TEY** Kragerø: Bråtøy (EIS 11) ♀♂. **HOI** Eidfjord: Sima (EIS 41) ♀. **SFI** Aurland: Østerbø (EIS 42) ♀, Bale-

strand: Lindane (EIS 50) ♀. **MRY** Skodje: Brusdal (EIS 76) ♀ leg. E. Nordhus. **STY** Hitra: Forsnes (EIS 90) ♀. **NSY** Bodø: Saltstraumen (EIS 130) ♀. **NNØ** Steigen: Leinesfjord (EIS 134) ♀. **TRY** Harstad: Trondenes (EIS 145) ♀.

In flowers of many herbs, very common, particularly in spring. (NSFD).

Thrips atratus Haliday, 1836

Ø Fredrikstad (Onsøy): Kjennetjern (EIS 20) ♀, Spydberg: Askim (EIS 29) ♀. **AK** Nesodden: Fagerstrand (EIS 28) ♂, Rælingen: Tappenbergvann (EIS 29) ♂, Nes: Vormsund (EIS 37) ♀. **HEN** Åmot: Deset (EIS 64) ♀. **OS** Gjøvik: Gjøvik (EIS 45) ♀ leg. K. I. Aarnes, Lillehammer: Lillehammer (EIS 54) ♀. **BØ** Svelvik: Svelvik (EIS 28) ♀, Øvre Eiker: Fiskum (EIS 27) ♂, Ringerike: Hvalsmoen (EIS 36) ♀. **VE** Horten: Horten (EIS 19) ♀. **TEY** Kragerø: Helle (EIS 11) ♀. **AAV** Tvedestrand: Borøy (EIS 6) ♀, Laget (EIS 11) ♂. **AAI** Evje & Hornes: Evje (EIS 5) ♀. **HOI** Etne: Frette (EIS 23) ♀. **SFI** Balestrand: Balestrand (EIS 50) ♀, Vik: Viksøyri (EIS 50) ♀, Lærdal: Lærdalsøyri (EIS 51) ♀. **STY** Frøya: Titran (EIS 95) ♀. **STI** Oppdal: Oppdal (EIS 79) ♀. **NTI** Stjørdal: Hell (EIS 92) ♀, Verran: Verrastrand (EIS 97) ♀ leg. R. Langnes.

In flowers of many plant species, very common. (NSFD).

Thrips brevicornis Priesner, 1920

Ø Råde: Saltnes (EIS 19) ♀, Fredrikstad (Onsøy): Slevik (EIS 20) ♀. **AK** Frogn: Hallangspollen (EIS 28) ♀. **BØ** Kongsvinger: Hvitvingfoss (EIS 19) ♀, Øvre Eiker: Fiskum (EIS 27) ♀, Ringerike: Hvalsmoen (EIS 36) ♀. **BV** Rollag: Rollag (EIS 35) ♀. **AAV** Tvedestrand: Laget (EIS 11) ♀. **VAY** Kristiansand: Hamresand (EIS 5) ♀. **HOI** Kvam: Steinste (EIS 32) ♀, Eidfjord: Eidfjord (EIS 41) ♀. **SFI** Vik: Viksøyri (EIS 50) ♀.

In flowers. (NF).

Thrips calcaratus Uzel, 1895

AK Nesodden: Fagerstrand (EIS 28) ♀.

On *Tilia* at bud burst. (NFD).

Thrips dilatatus Uzel, 1895

BV Hol: Dagali (EIS 34) ♀. **HEN** Tynset: Kvikne (EIS 80) ♀. **STY** Hitra: Kvenvær (EIS 90) ♀.

On *Rhinanthus*, not common. (NSFD).

Thrips flavus Schrank, 1776

AK Nesodden: Fagerstrand (EIS 28) ♀, Svestadtjern (EIS 28) ♂, Lørenskog: Losby (EIS 29) ♀. **OS** Østre Toten: Kapp (EIS 46) ♀, Lillehammer: Lillehammer (EIS 54) ♀. **ON** Nord-Fron: Vinstra (EIS 62) ♀. **BØ** Hurum: Tofte (EIS 19) ♀, Ringerike: Hvalsmoen (EIS 36) ♀, Ringerike: Skarrud (EIS 45) ♀. **BV** Rollag: Rollag (EIS 35) ♀, Gol: Gol (EIS 43) ♀. **VE** Horten: Horten (EIS 19) ♀. **TEY** Kragerø: Bråtøy (EIS 11) ♀, Drangedal: Osleid (EIS 17) ♀. **AAV** Arendal: Nedenes (EIS 6) ♀. **AAI** Evje & Hornes: Evje (EIS 5) ♀. **RI** Suldal: Erfjord (EIS 14) ♀. **HOI** Etne: Skånevik (EIS 23) ♀. **SFI** Aurland: Vassbygdi (EIS 42) ♀, Leikanger: Hermansverk (EIS 50) ♀, Vik: Viksøyri (EIS 50) ♀, Lærdal: Lærdalsøyri (EIS 51) ♀, Tønjum (EIS 51) ♂. **SFY** Jølster: Lunde (EIS 59) ♀. **MRY** Skodje: Brusdal (EIS 76) ♀ leg. E. Nordhus. **NTI** Verran: Verrastrand (EIS 97) ♀ leg. R. Langnes.

In flowers of many plant species, very common, particularly along the west coast. (NSFD).

Thrips fuscipennis Haliday, 1836

Ø Råde: Saltnes (EIS 19) ♀, Fredrikstad (Borge): Torsnes (EIS 20) ♀, Fredrikstad (Onsøy): Slevik (EIS 20) ♀. **AK** Vestby: Son (EIS 19) ♀, Asker: Sem (EIS 28) ♀ leg. & det G. Taksdal, Nesodden: Fagerstrand (EIS 28) ♀, Toppen (EIS 28) ♂, Lørenskog: Losby (EIS 29) ♀, Nes: Vormsund (EIS 37) ♀. **HES** Kongsvinger: Roverud (EIS 38) ♀ leg. S. H. Moen, Stange: Malungen (EIS 46) ♀. **OS** Nordre Land: Synnfjord (EIS 53) ♂, Lillehammer: Lillehammer (EIS 54) ♀. **BØ** Øvre Eiker: Fiskum (EIS 27) ♀. **BV** Rollag: Rollag (EIS 35) ♀, Ringerike: Ringen (EIS 36) ♀, Katnosa (EIS 36) ♂, Skarrud (EIS 45). **TEY** Kragerø: Bråtøy (EIS 11) ♀. **TEI** Sauherad: Gvarv (EIS 18) ♀. **AAV** Arendal: Nedenes (EIS 6) ♀. **VAY** Kristiansand: Hamresand (EIS 5) ♀. **RY** Finnøy: Fogn (EIS 14) ♀. **HOI** Eidfjord: Eidfjord (EIS 41) ♀. **MRY** Ålesund: Sævoll (EIS 76) ♀. **SFI** Lærdal: Tønjum (EIS 51) ♂. **STY** Frøya: Flatval (EIS 95) ♀.

On leaves and in flowers of many plant species, very common. Regarded as a pest in apple and strawberries. Often together with *T. major*. (NSFD).

Thrips juniperinus Linnaeus, 1758

BV Hol: Dagali (EIS 34) ♀♂.

On *Juniperus communis*. (NS).

Thrips linariae (Priesner, 1928)

BV Gol: Gol (EIS 43) ♀ det R. z. Strassen. **VE** Borre: Løvøya (EIS 19) ♀. **VAY** Kristiansand: Hamresand (EIS 5) ♀.

On *Linaria vulgaris*. (NS).

Thrips major Uzel, 1895

Ø Råde: Saltnes (EIS 19) ♀♂, Halden: Kråkegullåsen (EIS 20) ♀, Fredrikstad (Onsøy): Slevik (EIS 20) ♀. **AK** Nesodden: Toppen (EIS 28) ♀, Enebakk: Børter (EIS 29) ♀, Lørenskog: Losby (EIS 29) ♀, Nes: Vormsund (EIS 37) ♀. **HES** Ringsaker: Kise (EIS 45) ♀, Åsnes: Gjesåsen (EIS 46) ♀, Grue: Skasenden (EIS 47) ♀. **HEN** Åmot: Deset (EIS 64) ♀, Alvdal: Alvdal (EIS 72) ♀. Tynset: Tynset (EIS 80) ♀♂. **OS** Lillehammer: Lillehammer (EIS 54) ♀, Sør-Fron: Gålå (EIS 62) ♀. **ON** Nord-Fron: Storhøliseter (EIS 62) ♀♂. **BØ** Hurum: Tofte (EIS 19) ♀, Holmsbu (EIS 28) ♂, Øvre Eiker: Fiskum (EIS 27) ♀♂, Ringerike: Hvalsmoen (EIS 36) ♀♂. **BV** Hol: Dagali (EIS 34) ♀, Rollag: Rollag (EIS 35) ♀, Gol: Gol (EIS 43) ♀. **VE** Horten: Horten (EIS 19) ♀. **TEY** Drangedal: Oseid (EIS 17) ♀, Vinje: Vinje (EIS 25) ♀. **TEI** Sauherad: Sauherad (EIS 18) ♀. **AAY** Tvedestrand: Laget (EIS 11) ♀. **AAI** Valle: Nomeland (EIS 16) ♀♂. **VAY** Kristiansand: Hamresand (EIS 5) ♀. **HOI** Etne: Kyrving (EIS 23) ♀, Indre Hurdanger (EIS 32) ♀, Kvam: Ytre Ålvik (EIS 41) ♀. **MRY** Skodje: Brusdal (EIS 76) ♀ leg. E. Nordhus, Solnørsvika (EIS 76) ♂, Fræna: Bud (EIS 83) ♀. **STI** Oppdal: Oppdal (EIS 79) ♀, Rennebu: Halland (EIS 87) ♀, Meldal: Løkken (EIS 91) ♀, Trondheim: Leinøra (EIS 92) ♀. **NSI** Rana: Mo i Rana (EIS 123) ♀♂ leg. A. Folkedal. **NSY** Bodø: Saltstraumen (EIS 130) ♂. **NNØ** Steigen: Leinesfjord (EIS 134) ♀. **TRY** Harstad: Trondenes (EIS 145) ♀♂. **FN** Nesseby: Nesseby (EIS 177) ♀♂ leg. O. Elen.

Often found together with *Thrips fuscipennis*, very common. (NSFD).

Thrips menyanthidis Bagnall, 1923

AK Nesodden: Fagerstrand (EIS 28) ♀. **VE** Tjøme: Mostranda (EIS 19) ♀.

On *Menyanthes trifoliata*. (NF)

Thrips minutissimus Linnaeus, 1758

Ø Moss: Jeløy (EIS 19) ♀, Hvaler: Vesterøy (EIS 20) ♀. **AK** Asker: Sem (EIS 28) ♀ leg. & det G. Taksdal, Nesodden: Fagerstrand (EIS 28) ♀♂, Enebakk: Børter (EIS 29) ♀.

On woody Rosaceae. Not common. (NSFD).

Thrips nigropilosus Uzel, 1895

AK Oslo larvae leg. & det T. H. Schøyen.

In greenhouses. (NSFD).

**Thrips palmi* Karny, 1925

♀ leg. C. Stenseth, det BM. (N).

Intercepted.

Thrips physapus Linnaeus, 1758

Ø Fredrikstad (Onsøy): Slevik (EIS 20) ♀. **AK** Nesodden: Agnormåsan (EIS 28) ♂, Fagerstrand (EIS 28) ♀. **ON** Nord-Fron: Storhøliseter (EIS 62) ♀. **BØ** Kongsberg: Hvittingfoss (EIS 19) ♀. **VE** Tjøme: Mostranda (EIS 19) ♂. **TEY** Drangedal: Oseid (EIS 17) ♀♂, Tinn: Austbygdi (EIS 34) ♂. **TEI** Sauherad: Gvarv (EIS 18) ♀. **AAY** Risør: Torskeberg (EIS 11) ♀. **VAY** Kristiansand: Hamresand (EIS 5) ♀. **HOI** Etne: Skånevik (EIS 23) ♀. **NTI** Verran: Verrastrand (EIS 97) ♀ leg. R. Langnes.

In flowers of Compositae, common. (NSFD).

Thrips pini (Uzel, 1895)

AK Nesodden: Fagerstrand (EIS 28) ♀. **BV** Sigdal: Heimseteråsen (EIS 35) ♀ leg. J. Skartveit & K. H. Thunes. **TEI** Notodden: Tinnfoss (EIS 27) ♀.

On leaves of *Picea abies*, not common. (NSFDI)

**Thrips robustus* Priesner, 1920

NSY Bodø: Saltstraumen (EIS 130) ♀♂.

Collected once on *Lotus corniculatus*. (N).

Thrips tabaci Lindeman, 1889

Ø Råde: Saltnes (EIS 19) ♀, Fredrikstad (Onsøy): Slevik (EIS 20) ♀. **AK** Nesodden: Agnormåsan (EIS 28) ♀. **ON** Nord-Fron: Vinstra (EIS 62) ♀. **BØ** Kongsberg: Hvittingfoss (EIS 19) ♀, Øvre Eiker: Fiskum (EIS 27) ♀. **BV** Hol: Dagali (EIS 34) ♀, Rollag: Rollag (EIS 35) ♀, Ringerike: Hvalsmoen (EIS 36) ♀. **TEY** Kragerø: Bråtøy (EIS 11) ♀, Drangedal: Oseid (EIS 17) ♀. **TEI** Sauherad: Sauherad (EIS 18) ♀, Tinn: Alset (EIS 34) ♀. **AAI** Valle: Nomenland (EIS 16) ♀. **VAY** Kristiansand: Hamresand (EIS 5) ♀. **HOI** Etne: Frette (EIS 23) ♀, Kvam: Svevatn (EIS 31) ♀♀ leg. J. Skartveit & K. H. Thunes, Eidfjord: Eidfjord (EIS 41) ♀. **SFI** Aurland: Vassbygdi (EIS 42) ♀, Vik: Viksøyri (EIS 50) ♀, Lærdal: Lærdalsøyri (EIS 51) ♀. **MRY** Fræna: Bud (EIS 83) ♀. **STY** Hitra: Kvenvær (EIS 90) ♀, Frøya: Titran (EIS 95) ♀. **NTI** Verran: Verrastrand (EIS 97) ♀.

Polyfagous in greenhouses and outdoors. (NSFDI)

Thrips trehernei Priesner, 1927

Ø Fredrikstad (Onsøy): Kjenntjern (EIS 20) ♀. **AK** Nesodden: Fagerstrand (EIS 28) ♀, Svestadtjern (EIS 28) ♂, Sørums: Fetsund (EIS 29) ♀, Nes: Vormsund (EIS 37) ♀. **HEN** Åmot: Deset (EIS 64) ♀, Alvdal: Alvdal (EIS 72) ♀♂. **OS** Østre Toten: Kapp (EIS 46) ♀, Lillehammer: Lillehammer (EIS 54) ♀♂, Sør-Fron: Fjellhøi (EIS 62) ♀. **BØ** Kongsberg: Hvittingfoss (EIS 19) ♂, Øvre Eiker: Fiskum (EIS 27) ♀, Krødsherad: Hamremoen (EIS 35) ♀, Ringerike: Steinsletta (EIS 36) ♀, Skarrud (EIS 45) ♀. **BV** Hol: Dagali (EIS 34) ♀♂, Gol: Gol (EIS 43) ♂, Nes: Svenkerud (EIS 44) ♀. **VE** Tjøme: Mostrand (EIS 19) ♀, Borre: Horten (EIS 19) ♂. **TEI** Kragerø: Bråtøy (EIS 11) ♀♂, Sauherad: Sauherad (EIS 18) ♂, Vinje: Vinje (EIS 25) ♀♂. **AAI** Evje & Hornes: Evje (EIS 5) ♂. **HOI** Eidfjord: Sima (EIS 41) ♀, Aurland: Vassbygdi (EIS 42) ♀. **SFI** Vik: Viksøyri (EIS 50) ♀♂, Lærdal: Lærdalsøyri (EIS 51) ♀♂. **MRY** Smøla: Veidholmen (EIS 90) ♂. **STI** Oppdal: Oppdal (EIS 79) ♀. **STY** Hitra: Kvenvær (EIS 90) ♀. **TRY** Harstad: Trondenes (EIS 145) ♀♂.

In flowers of Compositae, very common. (NSFDI)

Thrips validus Uzel, 1895

Ø Hvaler: Kirkøy (EIS 12) ♀, Råde: Saltnes (EIS 19) ♀♂, Halden: Femsjøen (EIS 20) ♀. **AK** Frogn: Håøya (EIS 28) ♀, Oppegård: Kolbotn (EIS 28) ♂, Lørenskog: Losby (EIS 29) ♀, Sørums: Fetsund (EIS 29) ♂, Nes: Vormsund (EIS 37) ♂. **OS** Øyer: Øyer (EIS 54) ♀♂. **ON** Nord-Fron: Storhøliseter (EIS 62) ♀. **BØ** Kongsberg: Hvittingfoss (EIS 19) ♀, Øvre Eiker: Fiskum (EIS 27) ♀♂, Krødsherad: Hamremoen (EIS 35) ♂, Ringerike: Hvalsmoen (EIS 36) ♂. **BV** Nore og Uvdal: Uvdal (EIS 34) ♀, Flå: Roppemoen (EIS 35) ♀, Gol: Gol (EIS 43) ♂, Nes: Svenkerud (EIS 44) ♀. **VE** Horten: Horten (EIS 19) ♂. **TEI** Sauherad: Gvarv (EIS 18) ♀. **AAI** Risør: Torskeberg (EIS 11) ♀. **AAI** Evje & Hornes: Evje (EIS 5) ♀, Valle: Nomenland (EIS 16) ♀. **VAI** Hægebostad: Eiken (EIS 4) ♀♂. **HOI** Etne: Skånevik (EIS 23) ♀♂, Kvam: Steinstå (EIS 32) ♀, Eidfjord: Eidfjord (EIS 41) ♀♂. **STI** Oppdal: Oppdal (EIS 79) ♀. **TRY** Harstad: Trondenes (EIS 145) ♀.

In flowers of Compositae, very common. (NSFD).

Thrips viminalis Uzel, 1895

BV Hol: Dagali (EIS 34) ♀.

In catkins and leaf buds of *Salix*. (NSF).

Thrips vulgatissimus Haliday, 1836

Ø Råde: Saltnes (EIS 19) ♀, Fredrikstad (Onsøy): Kjenntjern (EIS 20) ♀. **AK** Frogn: Håøya (EIS 28) ♀, Lørenskog: Losby (EIS 29) ♀. **HEN** Åmot: Deset (EIS 64) ♀, Alvdal: Alvdal (EIS 72) ♀, Tynset: Tynset (EIS 80) ♀. **OS** Østre Toten: Kapp (EIS 46) ♀, Nord Aurdal: Svarthammer (EIS 53) ♀, Lillehammer: Lillehammer (EIS 54) ♀, Sør-Fron: Gålå (EIS 62) ♀, Gausdal: Skei (EIS 63) ♀. **ON** Nord-Fron: Storhøliseter (EIS 62) ♀. **BØ** Øvre Eiker: Fiskum (EIS 27) ♀, Ringerike: Hvalsmoen (EIS 36) ♀. **BV** Nore og Uvdal: Geitvann (EIS 33) ♀, Hol: Dagali (EIS 34) ♀, Hvåle (EIS 35) ♀, Gol: Gol (EIS 43) ♀, Nes: Bromma (EIS 44) ♀. **VE** Horten: Horten (EIS 19) ♀. **TEY** Kragerø: Bråtøy (EIS 11) ♀, Drangedal: Oseid (EIS 17) ♀. **AAI** Valle: Rosskreppfjorden (EIS 8) ♀, Nomenland (EIS 16) ♀. **AAI** Arendal: Nedenes (EIS 6) ♀. **HOI** Etne: Frette (EIS 23) ♀, Eidfjord: Eidfjord (EIS 41) ♀. **SFY** Jølster: Lunde (EIS 59) ♀♂. **SFI**

Aurland: Østerbø (EIS 42) ♀, Vassbygdi (EIS 42) ♂, Balestrand: Balestrand (EIS 50) ♀, Vik: Viksøyri (EIS 50) ♀, Lærdal: Lærdalsøyri (EIS 51) ♀♂. **MRY** Skodje: Brusdal (EIS 76) ♀ leg. E. Nordhus, Fræna: Bud (EIS 83) ♀. **STI** Oppdal: Oppdal (EIS 79) ♀, Meldal: Løkken (EIS 91) ♀. **STY** Hitra: Forsnes (EIS 90) ♀, Kvenvær (EIS 90) ♂, Frøya: Titran (EIS 95) ♀. **NTI** Stjørdal: Hell (EIS 92) ♀, Verran: Verrastrand (EIS 97) ♀ leg. R. Langnes. **NSI** Rana: Mo i Rana (EIS 123) ♀ leg. A. Folkedal. **NSY** Bodø: Saltstraumen (EIS 130) ♀♂. **NNØ** Steigen: Nordskot (EIS 134) ♀♂, Hamarøy: Ulsvåg (EIS 138) ♀. **NNV** Hadsel: Stokmarknes (EIS 143) ♀. **TRY** Harstad: Trondenes (EIS 145) ♀♂ leg. E. Kobro, Tromsø: Holt (EIS 162) ♀ leg. T. J. Johansen. **FN** Vadsø: Vadsø (EIS 177) ♀ leg. N. M. Nilsen.

In flowers of many plant species, very common, even in the mountains and farthest to the north. ♂ rare. (NSFDI).

Phlaeothripidae

**Acanthothrips nodicornis* (Reuter, 1880)

AK Nesodden: Fagerstrand (EIS 28) ♀♂. **HES** Grue: Skasenden (EIS 47) ♀. **BV** Sigdal: Heimseteråsen (EIS 35) ♀ leg. J. Skartveit & K. H. Thunes.

Found on dead branches of *Betula*, in the bark of a dead *Betula* and from the canopy of *Pinus*, not common. (NSFD).

Bolothrips dentipes (Reuter, 1880)

VE Tjøme: Mostrand (EIS 19) ♂.

In grass tussocks in wet areas. (NSFD).

**Bolothrips icarus* (Uzel, 1895)

AK Frogn: Nettet (EIS 28) ♂.

Grass. (NSFD).

**Bolothrips bicolor* (Heeger, 1852)

TEY Kragerø: Bråtøy (EIS 11) ♂.

Grass. (N).

Cephalothrips monilicornis (Reuter, 1880)

BØ Sande: Svelvik (EIS 28) ♀. **BV** Rollag: Øytjern (EIS 35) ♀. **RY** Klepp: Orresand (EIS 7) ♀ leg. T. Edland.

On grass leaves, locally common. (NSFD).

Cryptothrips nigripes (Reuter, 1880)

AK Nesodden: Fagerstrand (EIS 28) larva det R. z. Strassen, Ås: Ås (EIS 28) larva det R. z. Strassen. **HEN** Tynset: Tunna (EIS 80) ♀.

On dead branches of *Betula*. (NSFD).

**Haplothrips acanthoscelis* (Karny, 1910)

VE Tjøme: Mostrand (EIS 19) ♀♂.

In flowers in dry meadows, rare. (NSD)

Haplothrips aculeatus (Fabricius, 1803)

Ø Fredrikstad (Borge): Torsnes (EIS 20) ♀♂. **AK** Frogn: Håøya (EIS 28) ♀♂. **BV** Sigdal: Heimseteråsen (EIS 35) ♀ leg. J. Skartveit & K. H. Thunes. **SFI** Sogndal: Lerheim (EIS 50) ♀.

In grasses. (NSFDI).

Haplothrips alpester Priesner, 1914

AK Frogn: Håøya (EIS 28) ♂. **OS** Øyer: Øyer (EIS 54) ♂, Ringebu: Glomstad (EIS 63) ♂. **ON** Nord-Fron: Vinstra (EIS 62) ♂. **BV** Nore og Uvdal: Hvalø (EIS 35) ♀♂. **TEI** Vinje: Vinje (EIS 25) ♀♂, Tinn: Austbygdi (EIS 34) ♀♂. **AAI** Evje & Hornes: Evje (EIS 5) ♂. **SFI** Lærdal: Lærdalsøyri (EIS 51) ♂. **STI** Oppdal: Oppdal (EIS 79) ♀♂.

In Compositeae and other flowers. (NSF).

**Haplothrips alpicola* Priesner, 1950

HEN Tynset: Kvikne (EIS 80) ♀♂. **OS** Nord Aurdal: Svarthammer (EIS 53) ♂, Øyer: Øyer (EIS 54) ♂, Nord-Fron: Vinstra (EIS 62) ♀♂. **BV** Nore og Uvdal (EIS 35) ♀♂. **TEI** Sauherand: Sauherad (EIS 18) ♂. **HOI** Etne: Frette (EIS 23) ♀♂, Eidfjord: Eidfjord (EIS 41) ♀♂. **SFI** Lærdal: Lærdalsøyri (EIS 51) ♀. **STY** Hitra: Kvenvær (EIS 90) ♂. **NSI** Rana: Mo i Rana (EIS 123) ♀♂ leg. A. Folkedal. **NNØ** Steigen: Naustvik (EIS 134) ♂.

In flowers. (N).

**Haplothrips distinguendus* (Uzel, 1895)

Ø Fredrikstad (Onsøy): Kjennejern (EIS 20) ♀♂.
AK Nesodden: Fagerstrand (EIS 28) ♀. OS Lillehammer: Lillehammer (EIS 54) ♀. ON Nord-Fron: Vinstra (EIS 62) ♀. BØ Øvre Eiker (EIS 27) ♀, Ringerike: Hvalsmoen (EIS 36) ♀. VE Horten: Horten (EIS 19) ♀. TEY Kragerø: Skåtøy (EIS 11) ♀. AAY Tvedestrand: Laget (EIS 11) ♀.

In flowers of thistles, probably common. (NSFD).

Haplothrips leucanthemi (Schrank, 1781)

AK Nesodden: Fagerstrand (EIS 28) ♀. HEN Alvdal: Alvdal (EIS 72) ♀. OS Østre Toten: Kapp (EIS 46) ♀, Øyer: Øyer (EIS 54) ♀. VE Horten: Horten (EIS 19) ♀. TEY Kragerø: Bråtøy (EIS 11) ♀. TEI Sauherad: Sauherad (EIS 18) ♀, Vinje: Vinje (EIS 25) ♀. HOI Etne: Frette (EIS 23) ♀, Odda: Valldal (EIS 24) ♀. MRY Fræna: Bud (EIS 83) ♀, Smøla: Veidholmen (EIS 90) ♀♂. STI Oppdal: Oppdal (EIS 79) ♀. NSY Bodø: Saltstraumen (EIS 130) ♀. NNØ Steigen: Nordskot (EIS 134) ♀.

In flowers of *Chrysanthemum leucanthemum*, very common. (NSFD).

Haplothrips minutus (Uzel, 1895)

Ø Fredrikstad (Borge): Torsnes (EIS 20) ♂. AK Nesodden: Fagerstrand (EIS 28) ♀♂. OS Lillehammer: Lillehammer (EIS 54) ♀.

On dead trees, on branches and in the bark. (ND).

Haplothrips niger (Osborn, 1883)

Ø Spydberg: Askim (EIS 29) ♀. AK Frog: Lågøy (EIS 28) ♀. HEN Alvdal: Alvdal (EIS 72) ♀, Tynset: Kvikne (EIS 80) ♀. OS Østre Toten: Kapp (EIS 46) ♀, Øyer: Øyer (EIS 54) ♀. ON Nord-Fron: Vinstra (EIS 62) ♀. VE Horten: Horten (EIS 19) ♀. TEI Sauherad: Sauherad (EIS 18) ♀, Vinje: Vinje (EIS 25) ♀. AAY Tvedestrand: Laget (EIS 11) ♀. AAI Valle: Nomeland (EIS 16) ♀, Evje og Hornes: Evje (EIS 23) ♀. HOI Eidfjord: Eidfjord (EIS 41) ♀. HOY Sund: Klokkevik (EIS 30) ♀. SFI Vik: Viksøyri (EIS 50) ♀. MRY Skodje: Brusdal (EIS 76) ♀ leg. E. Nordhus. STI Oppdal: Oppdal (EIS 79) ♀. STY Hitra: Kvenvær (EIS 90) ♀. NSI Rana: Mo i Rana (EIS 123) ♀ leg. A. Folke-

dal. NSY Bodø: Saltstraumen (EIS 130) ♀. NNØ Steigen: Leinesfjord (EIS 134) ♀, Hamarøy: Ulsvåg (EIS 138) ♀. NNV Hadsel: Stokmarknes (EIS 143) ♀. TRY Harstad: Trondenes (EIS 145) ♀.

In flowers of *Trifolium pratense*, very common. (NSFD).

Haplothrips propinquus Bagnall, 1933

Ø Fredrikstad (Onsøy): Slevik (EIS 20) ♀. AK Nesodden: Fagerstrand (EIS 28) ♀♂, Rælingen: Tappenbergvann (EIS 29) ♂. HEN Tynset: Tynset (EIS 80) ♀. OS Nord Aurdal: Svarthammer (EIS 53) ♀♂, Øyer: Øyer (EIS 54) ♀. ON Nord-Fron: Vinstra (EIS 62) ♀♂. BV Hol. Dagali (EIS 34) ♀, Nore og Uvdal: Uvdal (EIS 34) ♀♂ det R. z. Strassen. VE Horten: Horten (EIS 19) ♀. TEY Kragerø: Bråtøy (EIS 11) ♀♂. TEI Sauherad: Sauherad (EIS 18) ♀♂, Vinje: Vinje (EIS 25) ♀♂. AAI Evje & Hornes: Evje (EIS 5) ♀♂. HOI Etne: Frette (EIS 23) ♀♂, Eidfjord: Sima (EIS 41) ♀. SFI Balestrand: Balestrand (EIS 50) ♀, Lærdal: Lærdalsøyri (EIS 51) ♀♂. STI Oppdal: Oppdal (EIS 79) ♀♂, Meldal: Løkken (EIS 91) ♀. STY Hitra: Kvenvær (EIS 90) ♀, Forsnes (EIS 90) ♂. NNØ Steigen: Fure (EIS 134) ♀, Leinesfjord (EIS 134) ♂, Hamarøy: Ulsvåg (EIS 138) ♀♂. NNV Hadsel: Stokmarknes (EIS 143) ♀. TRY Harstad: Trondenes (EIS 145) ♀.

In flowers of *Achillea millefolium*, very common. (NSF).

**Haplothrips senecionis* Bagnall, 1932

HOI Etne: Frette (EIS 23) ♀.

In flowers of *Senecio jacobaea*, not common. (N).

Haplothrips setiger Priesner, 1921

Ø Fredrikstad (Onsøy): Slevik (EIS 20) ♀♂. VE Larvik (Brunlanes): Hummerbakken (EIS 11) ♂, Tjøme: Mostranda (EIS 19) ♀♂. TEY Kragerø: Bråtøy (EIS 11) ♂. AAY Tvedestrand: Lyngør (EIS 6) ♂.

In flowers on dry places. (NSD).

Haplothrips stacies (Haliday, 1835)

Ø Hvaler: Kirkøy (EIS 12) ♀♂. VE Tjøme: Mostranda (EIS 19) ♀♂.

In *Armeria maritima*. (NSD).

Haplothrips subtilissimus (Haliday, 1852)

TEY Kragerø: Skåtøy (EIS 11) larva det R. z. Strassen.

On leaves of trees. (NSFD).

**Haplothrips tritici* (Kurdjumov, 1912)

VE Larvik (Brunlanes): Hummerbakken (EIS 11) ♀ det R. z. Strassen.

In cereals. (NS).

**Haplothrips utae* Klimt, 1969

VE Tjøme: Mostrand (EIS 19) ♀. **BV** Hol: Dagali (EIS 34) ♀ det R. z. Strassen.

In *Aster tripolium* and *Juncus*. (N).

Hoplandrothrips bidens (Bagnall, 1910)

AK Vestby: Tannum (EIS 28) larva det R. z. Strassen.

On dead branches of *Betula*. (N).

Hoplandrothrips williamsianus Priesner, 1923

BV Sigdal: Heimseteråsen (EIS 35) ♀ leg. J. Skarveit & K. H. Thunes, det R. z. Strassen.

From *Pinus* canopy, and twigs of *Betula*. (NS).

Hoplothrips carpathicus Pelikán, 1961

AK Frogn: Håøya (EIS 28) ♀♂, Nesodden: Fagerstrand (EIS 28) ♀♂. **HEN** Stor Elvdal: Messelt (EIS 64) ♂. **BØ** Kongsberg: Kongsberg (EIS 27) ♀. **VE** Borre: Horten (EIS 19) ♀, Stokke: Melsomvik (EIS 19) ♀♂. **TEI** Notodden: Tinnfoss (EIS 27) ♀♂. **AAV** Birkenes: Senumstad (EIS 6) ♀, Grimstad: Grimstad (EIS 6) ♀.

Forage on fungus in bark of dead *Betula*, probably common (Kobro & Solheim 2002). (NSF).

Hoplothrips corticis (De Geer, 1773)

Ø Eidsberg: Slitu (EIS 29) ♀♂. **AK** Frogn: Lågøy (EIS 28) ♀, Nesodden: Fagerstrand (EIS 28) ♂. **BØ** Ringerike: Skarrud (EIS 46) ♀♂. **VE** Stokke: Melsomvik (EIS 19) ♀, Tjøme: Mostrand (EIS

19) ♂. **AAV** Grimstad: Grimstad (EIS 6) ♀♂. **HOI** Kvam: Tørvik (EIS 31) ♀♂, Eidfjord: Sima (EIS 41) ♀. **NTI** Stjørdal: Hell (EIS 92) ♂.

On dead wood infested with *Hymenochaete tabacina*, probably common. (NSFD).

Hoplothrips fungi (Zetterstedt, 1828)

AK Frogn: Havsjødalen (EIS 28) ♀, Nesodden: Agnor (EIS 28) ♀. **TEY** Kragerø: Bråtøy (EIS 11) ♂. **AAV** Grimstad: Grimstad (EIS 6) ♂. **STI** Trondheim: Gaulosen (EIS 92) ♂.

On dead wood of Angiosperms. (NSD)

Hoplothrips pedicularius (Haliday, 1836)

Ø Rakkestad: Rakkestad (EIS 20) ♀♂, Eidsberg: Slitu (EIS 29) ♀. **AK** Nesodden: Fagerstrand (EIS 28) ♀♂. **HES** Kongsvinger: Speismark (EIS 37) ♀, Stange: Malungen (EIS 46) ♀, Grue: Skasenden (EIS 47) ♀♂. **HEN** Åmot: Deset-Østseter (EIS 64) ♀♂, Tynset: Brydalen (EIS 73) ♀♂. **OS** Gausdal: Skeikampen (EIS 63) ♀. **ON** Nord-Fron: Tigestad (EIS 62) ♀♂. **BØ** Kongsberg: Hvitvingfoss (EIS 19) ♀, Ringerike: Skarrud (EIS 36) ♀♂. **BV** Hol: Dagali (EIS 34) ♀, Rollag: Trillemarka (EIS 35) ♀, Hol: Storefjell (EIS 43) ♀. **VE** Larvik (Brunlanes): Hummerbakken (EIS 11) ♀, Sandefjord: Haukerød (EIS 19) ♀, Stokke: Melsomvik (EIS 19) ♂. **TEI** Notodden: Elgsjø (EIS 27) ♀. **TEY** Bamble: Stathelle (EIS 11) ♂, Skien: Høgli (EIS 18) ♀, Frogner (EIS 18) ♂. **AAV** Grimstad: Grimstad (EIS 6) ♀♂. **RY** Strand: Tau (EIS 14) ♀♂. **RI** Suldal: Erfjord (EIS 15) ♀♂. **HOY** Bergen: Sandviken (EIS 39) ♀♂. **HOI** Odda: Lono (EIS 24) ♀, Kvam: Tørvik (EIS 31) ♀♂, Ullensvang: Lofthus (EIS 32) ♂, Eidfjord: Sima (EIS 41) ♀♂. **SFI** Sogndal: Lerheim (EIS 50) ♀. **STI** Rennebu: Merk bru (EIS 86) ♀♂, Halland (EIS 87) ♀, Orkdal: Vormstad (EIS 91) ♀♂, Trondheim: Gaulosen (EIS 92) ♀♂. **NTI** Stjørdal: Hell (EIS 92) ♀♂.

On dead wood infested with several *Stereum* species, very common. (NSFD).

Hoplothrips polysticti (Morison, 1949)

Ø Rakkestad: Rakkestad (EIS 20) ♂. **AK** Nesodden: Fagerstrand (EIS 28) ♀♂, Rælingen: Tappenbergvann (EIS 29) ♀♂. **HES** Kongsvinger: Lier

(EIS 37) ♀♂, Stange: Malungen (EIS 46) ♀♂, Åsnes: Basknappen (EIS 46) ♂. **HEN** Åmot: Deset-Østseter (EIS 64) ♀♂, Tynset: Brydalen (EIS 73) ♀♂. **OS** Øyer: Øyer (EIS 54) ♀. **ON** Nord-Fron: Tagestad (EIS 62) ♀♂. **BØ** Kongsberg: Hvittingfoss (EIS 19) ♀♂, Flesland: Lampeland (EIS 27) ♀♂, Ringerike: Katnosa (EIS 36) ♀♂. **BV** Hol: Dagali (EIS 34) ♀♂. **AAV** Birkenes: Senumstad (EIS 6) ♀, Grimstad: Grimstad (EIS 6) ♂. **AAI** Bygland: Moi (EIS 9) ♀. **HOI** Ullensvang: Lofthus (EIS 32) ♀♂, Eidfjord: Sima (EIS 41) ♀♂. **MRY** Frei: Rensvik (EIS 84) ♀. **STI** Oppdal: Oppdal (EIS 79) ♀♂, Rennebu: Merk bru (EIS 86) ♀♂, Halland (EIS 87) ♂, Orkdal: Vormstad (EIS 91) ♀, Lefstad (EIS 91) ♂.

On lying dead *Picea abies* infested with *Trichaptum abietinum*, very common. (Kobro 2001). (NS).

Hoplothrips ulmi (Fabricius, 1781)

Ø Halden: Kråkegullåsen (EIS 20) ♀♂. **AK** Nesodden: Agnor (EIS 28) ♀, Toppen (EIS 28) ♂, Rælingen: Tappenbergvann (EIS 29) ♂. **HEN** Stor Elvdal: Messelt (EIS 64) ♀. **OS** Øyer: Øyer (EIS 54) ♀♂. **BV** Sigdal: Heimseteråsen (EIS 35) ♀ leg. J. Skartveit & K. H. Thunes. **VE** Sandefjord: Haukerød (EIS 19) ♀.

On dead wood of Angiosperms. (NSFD).

Hoplothrips unicolor (Vuillet, 1914)

AK Frogn: Holt (EIS 28) ♀♂, Nesodden: Fagerstrand (EIS 28) ♂. **HEN** Åmot: Deset-Østseter (EIS 64) ♂. **VE** Tjøme: Mostrand (EIS 19) ♀. **AAI** Bygland: Moi (EIS 9) ♀, Valle: Besteland (EIS 9) ♂.

On dead *Pinus sylvestris* infested with *Trichaptum fuscoviolaceus*, found in large numbers only once. (NS).

Liothrips setinodis (Reuter, 1880)

BV Kvam: Svevatn (EIS 31) ♀♂ leg. J. Skartveit. On *Epilobium*, not common. (NFD).

Maderothrips longisetis (Bagnall, 1910)

AK Nesodden: Fagerstrand (EIS 28) ♀♂, Rælingen: Tappenbergvann (EIS 29) ♀. **HES** Åsnes: Basknappen (EIS 46) ♀♂. **HEN** Åmot: Deset (EIS

64) ♂. **ON** Nord-Fron: Tagestad (EIS 62) ♀♂. **VE** Stokke: Melsomvik (EIS 19) ♀♂. **AAV** Grimstad: Grimstad (EIS 6) ♀♂.

On branches and in bark of dead trees, probably predacious and common. (NS).

Megathrips lativentris (Heeger, 1852)

AK Nesodden: Fagerstrand (EIS 28) ♀♂.

On fungus spores in litter, widespread but infrequently collected. (NSFD).

Phlaeothrips annulipes Reuter, 1880

AK Nesodden: Fagerstrand (EIS 28) ♀♂. **HES** Grue: Skasenden (EIS 47) ♀♂.

On dead branches and in bark of dead trees. (NSFD).

Phlaeothrips coriaceus Haliday, 1836

AK Nesodden: Fagerstrand (EIS 28) ♀♂.

On dead branches and in bark of dead trees. (NSFD).

Xylaplothrips fuliginosus (Schille, 1910)

Ø Rygge: Evje (EIS 19) ♀. **AK** Frogn: Holt (EIS 28) ♀, Havsjødalen (EIS 28) ♂, Nesodden: Fagerstrand (EIS 28) ♀♂. **HEN** Stor Elvdal: Messelt (EIS 64) ♀, Tynset: Brydalen (EIS 73) ♂. **BV** Sigdal: Heimseteråsen (EIS 35) ♀ leg. J. Skartveit & K. H. Thunes. **TEI** Notodden: Tinnfoss (EIS 27) ♀.

On twigs and under bark of dead trees, quite common. (NSFD).

DISCUSSION

The reference collection of the Plant Protection Centre presently includes 109 species of which 22 are not published from Norway previously.

In addition Olsen & Solem (1982), Olsen (1987), Olsen & Midtgaard (1996) and zur Strassen (pers. com.) reported the following species from Norway: *Aeolothrips intermedius* Bagnall, 1934 (NSF), *Aurantothrips orchidaceus* Bagnall, 1909 (NSD), *Heliothrips haemorrhoidalis* (Bouche, 1833) (NSFD), *Oxythrips ulmifoliorum* Haliday, 1836) (NSF), *Pezothrips frontalis* (Uzel, 1895)

(NF), *Scolothrips uzeli* Schille, 1911 (NS), *Thrips conferticornis* Priesner, 1922 (NF), *Thrips funebris* Bagnall, 1824 (N), *Thrips palustris* Reuter, 1899 (N), *Thrips simplex* (Morrison, 1930) (NS), *Haplothrips hukkineni* Priesner, 1939 (NS), *Haplothrips setigeriformis* Fabian, 1938 (N), *Holothrips schaubergeri* (Priesner, 1920) (NS), *Hoplothrips semicaecus* (Uzel, 1895) (ND), *Liothrips vaneeki* Priesner, 1920 (N) and *Phlaeothrips bispinosus* Priesner, 1919 (NS).

Thus the number of thrips species known to Norway is at present 125, which is exceeding the «Ottesen estimate» (Ottesen 1993). Of these, 114 species are naturally occurring in Norway and 11 are intercepted or imported greenhouse species. For comparison, the number of species known from Iceland is 11 (Lindroth et al. 1973, Kobro 1996), while 104 and 118 are known from Denmark and Finland, respectively (Kobro unpublished, zur Strassen pers. com.) and 120 from Sweden (Kobro & Nittérus 1999, Vasiliu-Oromulu & al. 2001). The total number of species known from the Nordic countries is 176.

As the limited effort based on occasional collection by one person only has given 22 species new to Norway, of which several also are new to the Nordic countries, there is reason to believe that the number of species present is higher. The distribution presented here is not representative for the occurrence of these species, and further investigation is needed.

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Distribution and ecology of harvestmen (Opiliones) in the Nordic countries

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Occurrences of the twenty-four Nordic Opiliones species in coniferous-, deciduous-, mixed- wood, heather, grazing land, garden and beach are presented. Three harvestmen are taken in all these types of biotopes; *Oligolophus tridens* (C.L. Koch, 1836), *Lacinius ephippiatus* (C.L. Koch, 1835) and *Mitopus morio* (Fabricius, 1779). Densities of most of the species throughout the year are given in detailed curves. Two Opiliones species are certainly present throughout the whole year; *Nemastoma bimaculatum* (Fabricius, 1775) and *Nemastoma lugubre* (Müller, 1776). The earliest species appears with a maximum abundance in June and the latest with a top in November. The distributions in the Nordic countries are illustrated in 24 maps. Three harvestmen species; *Lacinius ephippiatus* (C.L. Koch, 1835), *Mitopus morio* (Fabricius, 1779) and *Rilaena triangularis* (Herbst, 1799) live in the whole region, whereas five species; *Trogulus tricarinatus* (L., 1758), *Paroligolophus meadii* (Pickard-Cambridge, 1890), *Lacinius horridus* (Panzer, 1794), *Platybunus bucephalus* (C.L. Koch, 1835) and *Leiobunum limbatum* L. Koch, 1861 are very rare in the Nordic countries.

Key words: Opiliones, Nordic countries, ecology, distribution.

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INTRODUCTION

There exists no summarizing survey of the ecology and distributions of the Nordic Opiliones. Comments to their ecology have previously been given by a few authors, for instance Henriksen (1938), Thydsen Meinertz (1964a), Martens (1978), Stol (1982, 2002a) and Hillyard & Sankey (1989). Fieldwork carried out by the author during 1997–1998 has thrown new light on the ecology of several species and has resulted in a detailed insight of biotope preferences and yearly densities of the animals. Compared to previous investigations the distribution is presently much better known. New species have been discovered and the distribution of others are better known. The limits of northern distribution are still little studied, but may be predictable as one roughly knows the vertical distributions of most species (Stol 2000). A survey of the entire distribution of the Nordic Opiliones in Europe has recently been published by Stol (2002b).

MATERIAL AND METHODS

The present study is based on material from Zoological Museum of Bergen (ZMB), Zoological Museum of Oslo, fieldwork carried out in 1982, 1994, 1997–1998 and relevant literature. The material from the fieldwork is deposited at ZMB and some at the University of Tottori, Japan. Sampling was carried out in coniferous-, deciduous-, and mixed forests, heather, grazing land, gardens and beaches with average of 5 pitfall traps per locality and an average of half an hour hand-picking in each locality throughout the year from Southern Norway. Plant communities typical for West Norwegian biotopes are discussed in Stol (1982, 1997, 1999a, 2002a). Ecological investigations are mainly performed on the island **RY**: Karmøy (EIS 13) in Western Norway. Biotope results are presented in Table 1, and population densities are shown by curves in Figures 1–6. The curves are based on adult animals only. No. of individuals in Figures 1–5 are summarized and adjusted.

ted numbers in every month to clearly differentiate the curves based on Thydsen Meinertz (1964b) and Stol (1982, 1997, 1999a). No. of individuals in Figure 6 represent the sum of numbers in every month based on Solhøy (1982), Olsen (2000) and Kauri (1980), but unfortunately on few individuals only. In Figure 7 which applies to four rare species one only knows the months in which the species are present, based on Martens (1978). Too little data still exist on several species.

Distributions have been studied by fieldwork from STY, Trondheim (EIS 91) in the north and southwards throughout the whole Southern Norway (Stol 1982, 1994, 1999a). Important distributional informations are also given in publications of recent date, for instance Kauri (1966, 1977, 1980), Ilvessalo (1981), Solhøy (1982), Stol (1982), Gruber (1984), Enghoff (1987, 1988), Meidell & Stol (1990), and Olsen (2000) regarding new finds and corrections of distributions of species. A survey of the distributions of the 24 known Nordic harvestmen species is presented in 24 maps (Maps 1-24).

RESULTS AND DISCUSSION

Biotope preferences

The biotopes are divided into seven different types; deciduous wood, coniferous wood, mixed wood, heather, grazing land, garden and beach. A list of the species and their occurrences in these biotopes are presented in Table 1.

Species no. 1 and 4 prefer coniferous wood, whereas deciduous wood is the main biotope of no. 1, 2, 3, 5, 9, 11, 15, 17, 20, 21, 22, 23 and 24. Species 1, 16 and 19 are preferably found in mixed wood, whereas two species mainly live in heather; no. 8 and 18. Grazing land is preferred by no. 7, 10 and 12, whereas no. 6, 7, 12, 13, 20 and 21 preferably exist in garden. In the extreme biotope beach, with unorganic sand, high light intensity and high salinity, species 5, 8, 9, 11 and 14 are present, and is in fact preferred by no. 14. The species 5, 9 and 11 are very euryecious and are thus found in all these types of biotopes.

Few data are available on the distribution of 1, 4, 8, 10, 15, 19 and 24 which are rather rare in the Nordic countries. Available information about these harvestmen is partly found in Martens (1978) and

Table 1. Presence of the 24 so far known Nordic species in 7 different biotopes. ○: found in the biotope. ●: preferably in this biotope.

SPECIES	CONIFER. WOOD	DECID. WOOD	MIXED WOOD	HEATHER	GRAZING LAND	GARDEN	BEACH
1. <i>Trogulus tricarlinatus</i> (L., 1758)	●	●	●			○	
2. <i>Nemastoma bimaculatum</i> (Fabricius, 1775)	○	●	○	○		○	
3. <i>Nemastoma lugubre</i> (Müller, 1776)	○	●	○				
4. <i>Mitostoma chrysomelas</i> (Hermann, 1804)	●	○	○				
5. <i>Oligolophus tridens</i> (C.L.Koch, 1836)	○	●	○		○		○
6. <i>Oligolophus hanseni</i> (Kraepelin, 1896)		○				●	
7. <i>Paroligolophus agrestis</i> (Meade, 1855)	○	○	○	○	●	●	
8. <i>Paroligolophus meadli</i> (Pickard-Cambridge, 1890)				●			○
9. <i>Lacinius ephippiatus</i> (C.L.Koch, 1835)	○	●	○	○	○	○	○
10. <i>Lacinius horridus</i> (Panzer, 1794)					●		
11. <i>Mitopus morio</i> (Fabricius, 1779)	○	●	○	○	○	○	○
12. <i>Phalangium opillo</i> L., 1758	○	○	○		●	●	
13. <i>Opilio parietinus</i> (De Geer, 1778)					○	●	
14. <i>Opilio saxatilis</i> C.L.Koch, 1839				○	○	○	●
15. <i>Opilio canestrinii</i> (Thorell, 1876)	○	●	○				
16. <i>Megabunus diadema</i> (Fabricius, 1779)	○	○	●				
17. <i>Rilaena triangularis</i> (Herbat, 1799)	○	●	○				
18. <i>Lophopilio palpinalis</i> (Herbst, 1799)	○	○	○	●			
19. <i>Platybunus bucephalus</i> (C.L.Koch, 1835)	○	○	●				
20. <i>Nelima gothica</i> Lohmander, 1945	○	●	○	○	○	●	
21. <i>Leiobunum rotundum</i> (Latreille, 1798)	○	●	○		○	●	
22. <i>Leiobunum rupestre</i> (Herbst, 1799)		●	○			○	
23. <i>Leiobunum blackwalli</i> Meade, 1861		●	○		○	○	
24. <i>Leiobunum limbatum</i> L.Koch, 1861		●	○				

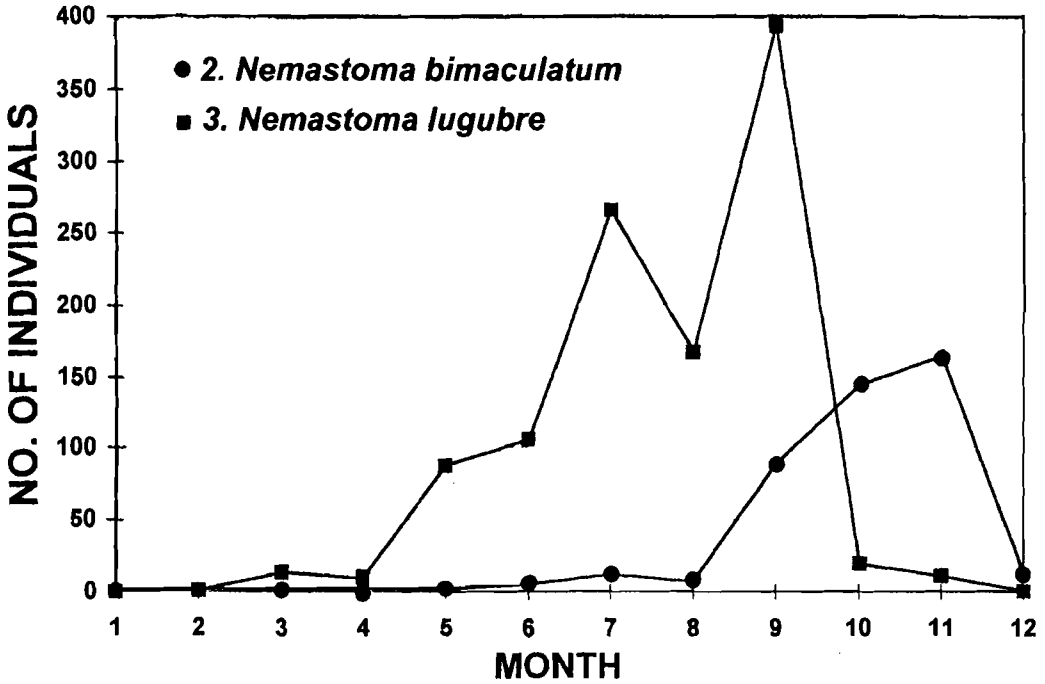


Figure 1. No. of individuals caught during the year of the following two species: 2. *Nemastoma bimaculatum* and 3. *N. lugubre*.

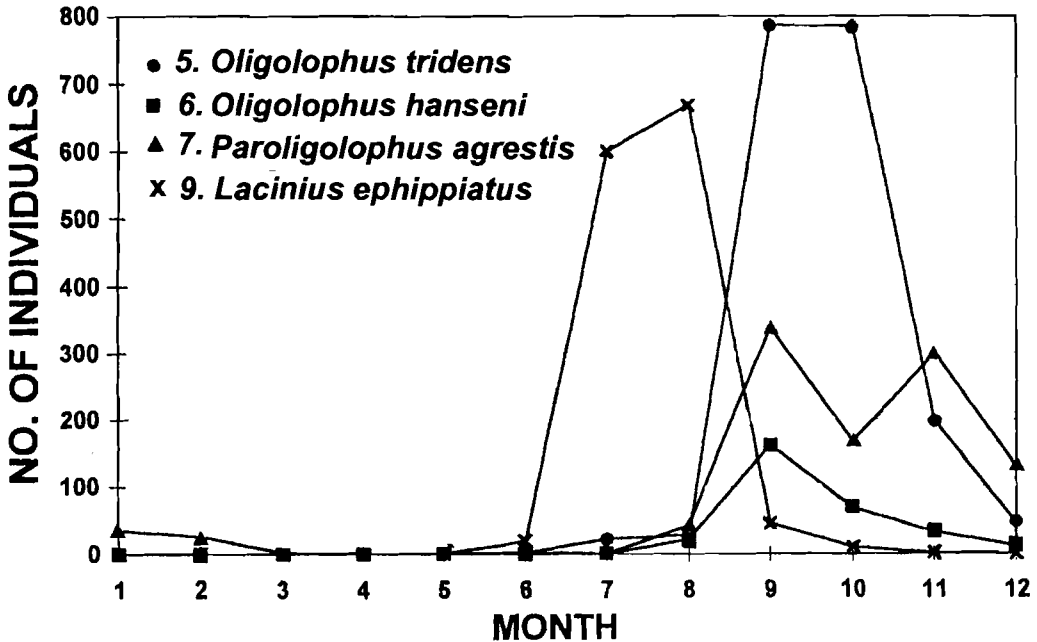


Figure 2. No. of individuals caught during the year of the following four species: 5. *Oligolophus tridens*, 6. *O. hanseni*, 7. *Paroligolophus agrestis* and 9. *Lacinius ehippiatus*.

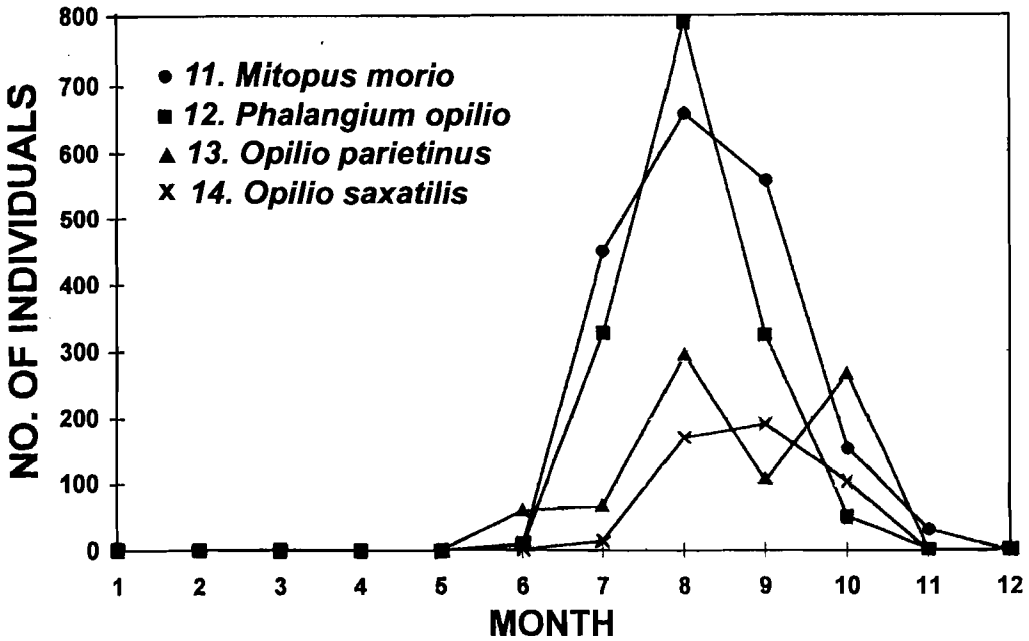


Figure 3. No. of individuals caught during the year of the following four species: 11. *Mitopus morio*, 12. *Phalangium opilio*, 13. *Opilio parietinus* and 14. *O. saxatilis*.

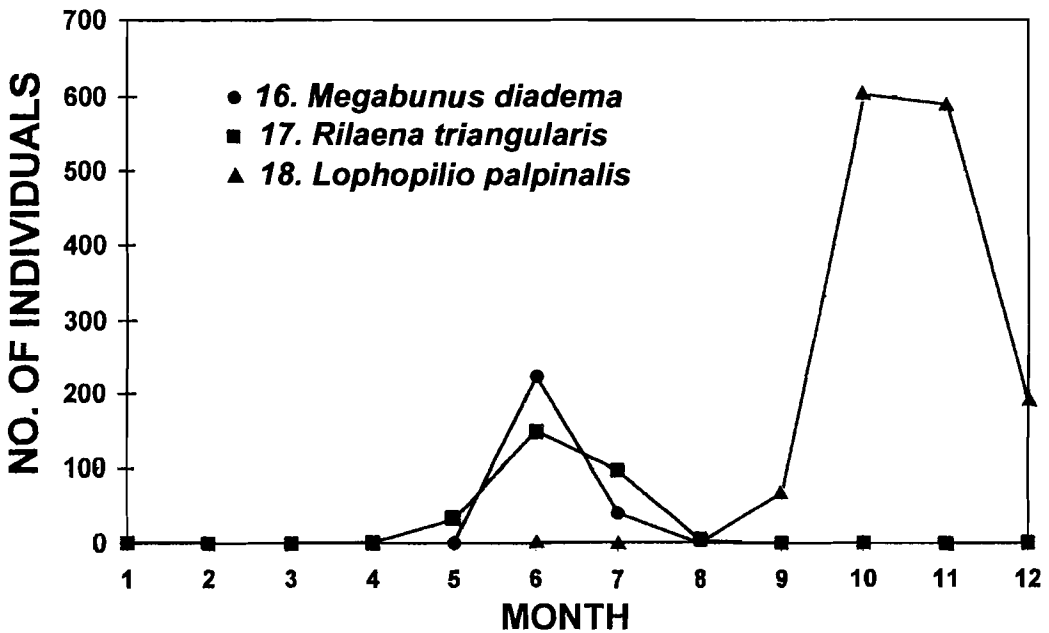


Figure 4. No. of individuals caught during the year of the following three species: 16. *Megabunus diadema*, 17. *Rilaena triangularis* and 18. *Lophopilio palpinalis*.

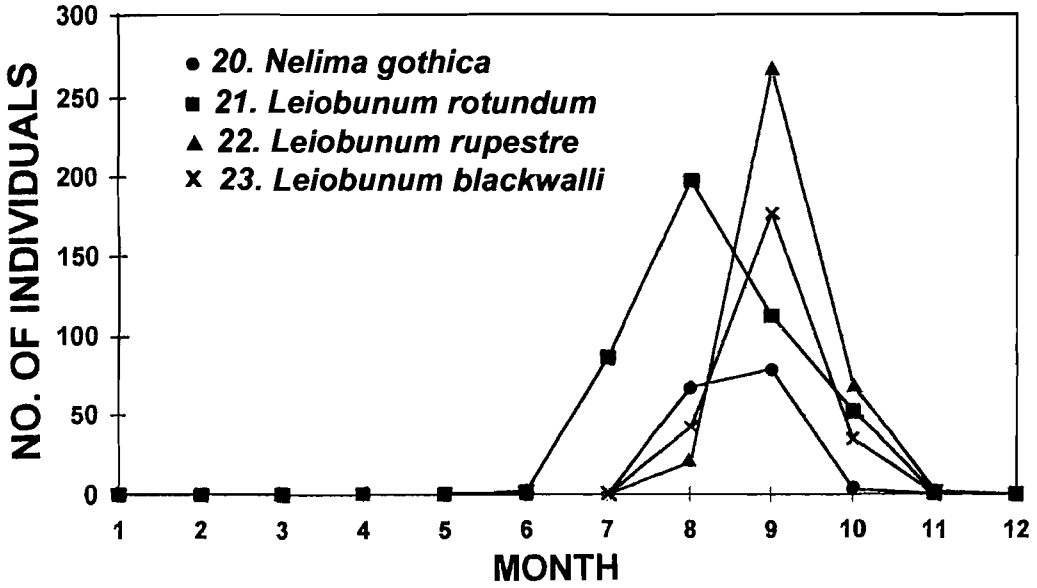


Figure 5. No. of individuals caught during the year of the following four species: 20. *Nelima gothica*, 21. *Leiobunum rotundum*, 22. *L. rupestre* and 23. *L. blackwalli*.

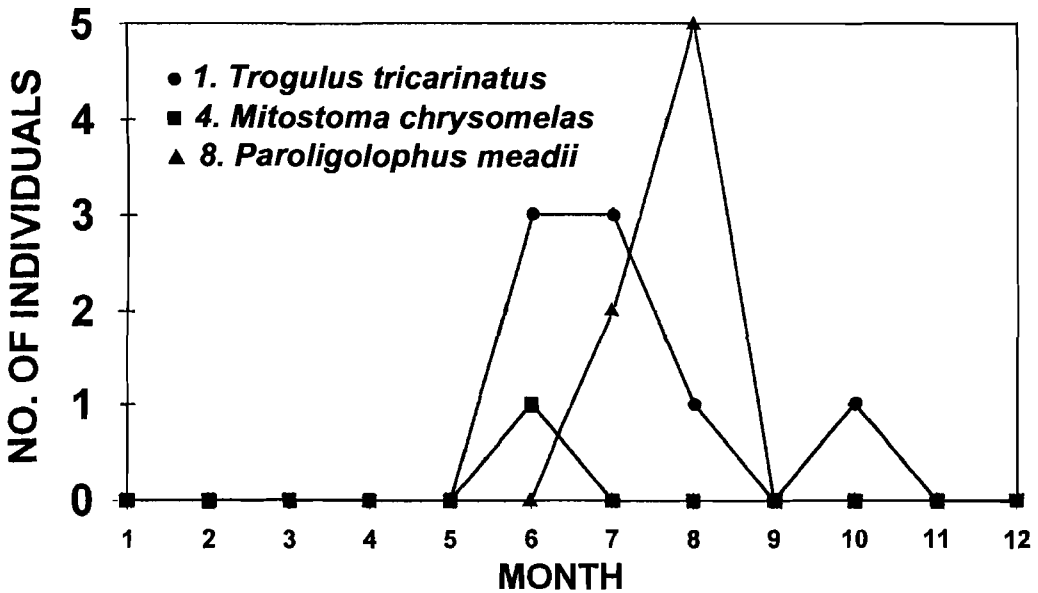


Figure 6. No. of individuals caught during the year of the following three species: 1. *Trogulus tricarinatus*, 4. *Mitostoma chrysomelas* and 8. *Paroligolophus meadii*.

Hillyard & Sankey (1989). Species no. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 18 are ground living, while species no. 5, 6, 7, 9, 10, 11, 12, 14, 17, 18, 20, 21, 22 and 23 are found in the herbaceous layer. In the bush-, tree- and stone wall- layer the species 6, 7, 11, 12, 13, 15, 16, 19, 21, 22 and 24 are found. Highly synanthropic harvestmen are species no. 7, 10, 12, 13, 15, 21 and 23.

No. of individuals per month

Information about the life cycles is found in Thydsen Meinertz (1964b), Martens (1978) and Stol (1982, 1999a, 2002a). Juveniles are not included in the present study. It is known, however, that they almost always appear earlier than the adults. Adults of the well-known species no. 2 and 3 are found throughout the year. This is, however, not clearly shown by the curves in Figure 1.

Species 16 and 17 are Opiliones with a top of density in month 6, and species 9, 11, 12, 13 and 21 in month 8. Species 3, 5, 6, 7, 14, 20, 22 and 23 are mainly present in month 9, and harvestman 18 reaches a maximum in month 10. Species 2 on the other hand, dominates in month 11 (Figure 1). Opiliones which need more investigations are species 1, 4, 8, 10, 15, 19 and 24. Only few individuals of these species were collected (Figures 6 and 7). In Figure 7 only

the monthly occurrences of the animals are given without the exact numbers.

Distribution

In the Nordic countries 24 different species of harvestmen are found, of which 17 live in Norway, 20 in Sweden, 18 in Denmark, 12 (?) in Finland, 7 in the Faroe Islands and 7 (?) in Iceland, Stol (1993, 1999b). The Nordic countries are here defined as; Iceland, the Faroe Islands, Norway, Denmark, Sweden and Finland. The distributions of the species are shown in Maps 1-24. Occurrences in Scotland and Northern England are also shown in the maps according to Stol (2002b).

In recent years Kauri (1966, 1977) published species 9, 18 and 21 as new to Norway, Solhøy (1982) species 1, Stol (1980, 1982) no. 6 and 20 and Olsen (2000) species 4. Stol (1982) found with certainty harvestman 22 in Norway and Olsen (1995) species 13. It is uncertain if species 13 exists in Iceland (Spoek 1963, Olsen 1999). Martens (1978) mentions species 24 as new to the Nordic countries (Sweden). Kauri (1980) reported no. 8 as new to the region (the Faroe Islands), and Enghoff (1987, 1988) published species 15 as new to Sweden and Denmark and thus also new to the Nordic countries. It is not clear if species 19 lives in Finland (Heinäjäjoki

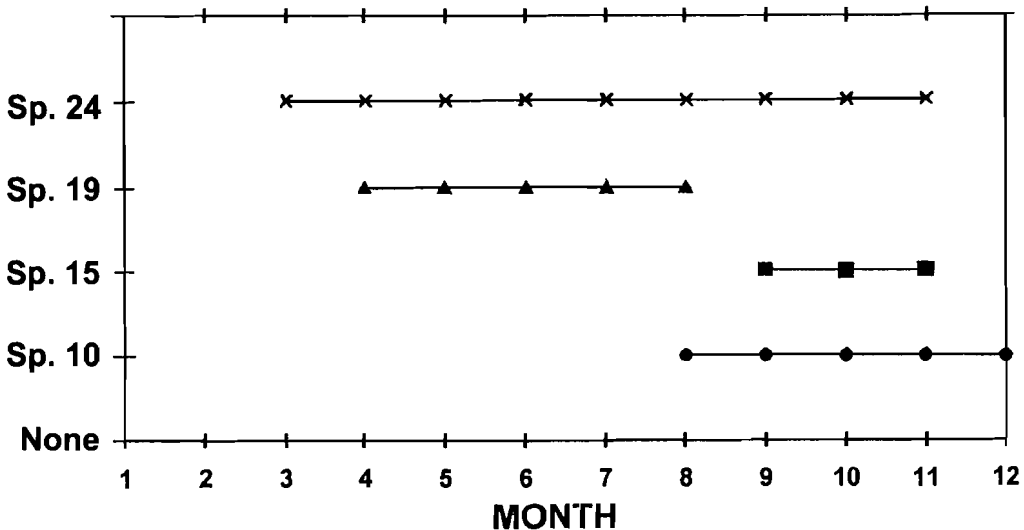
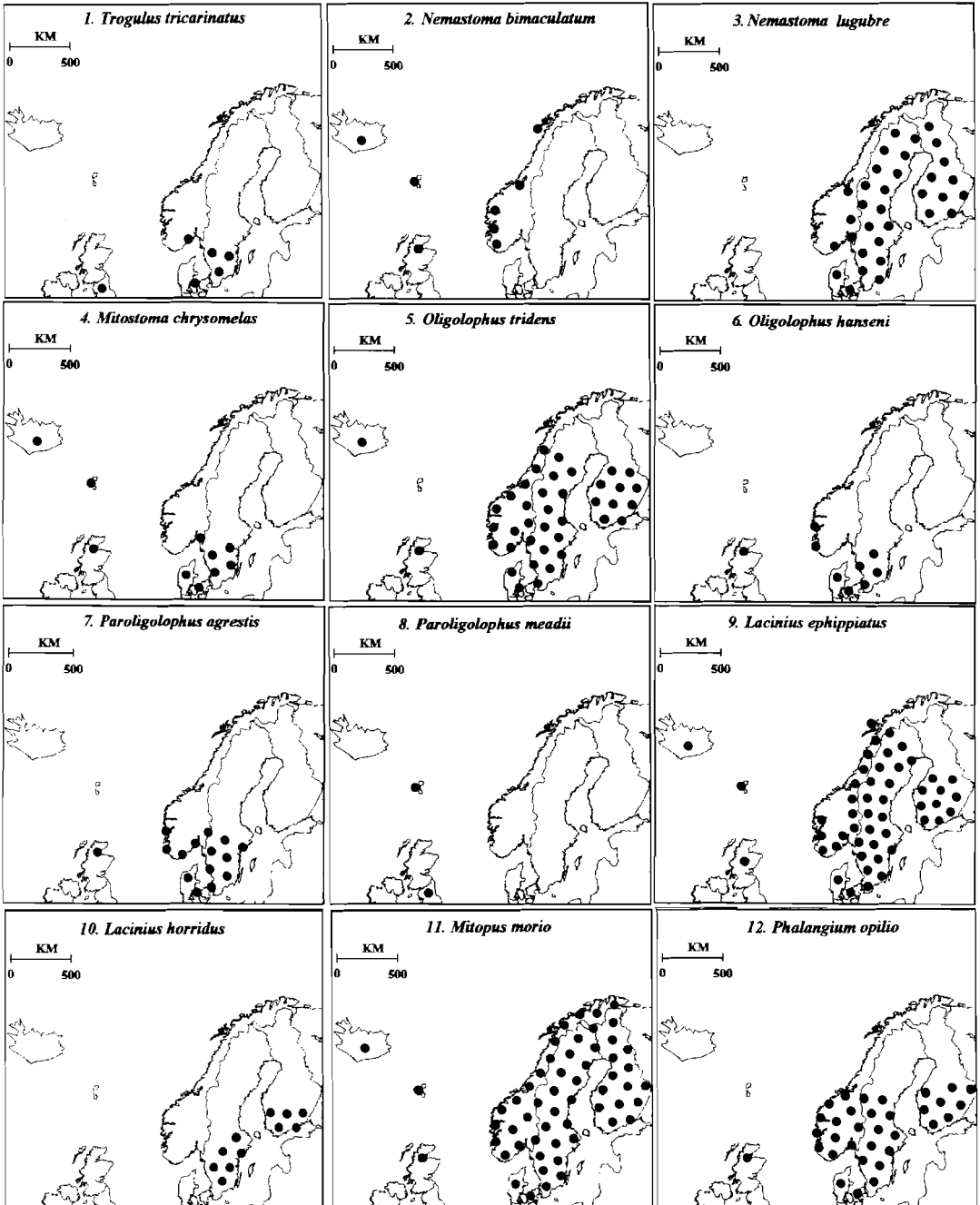
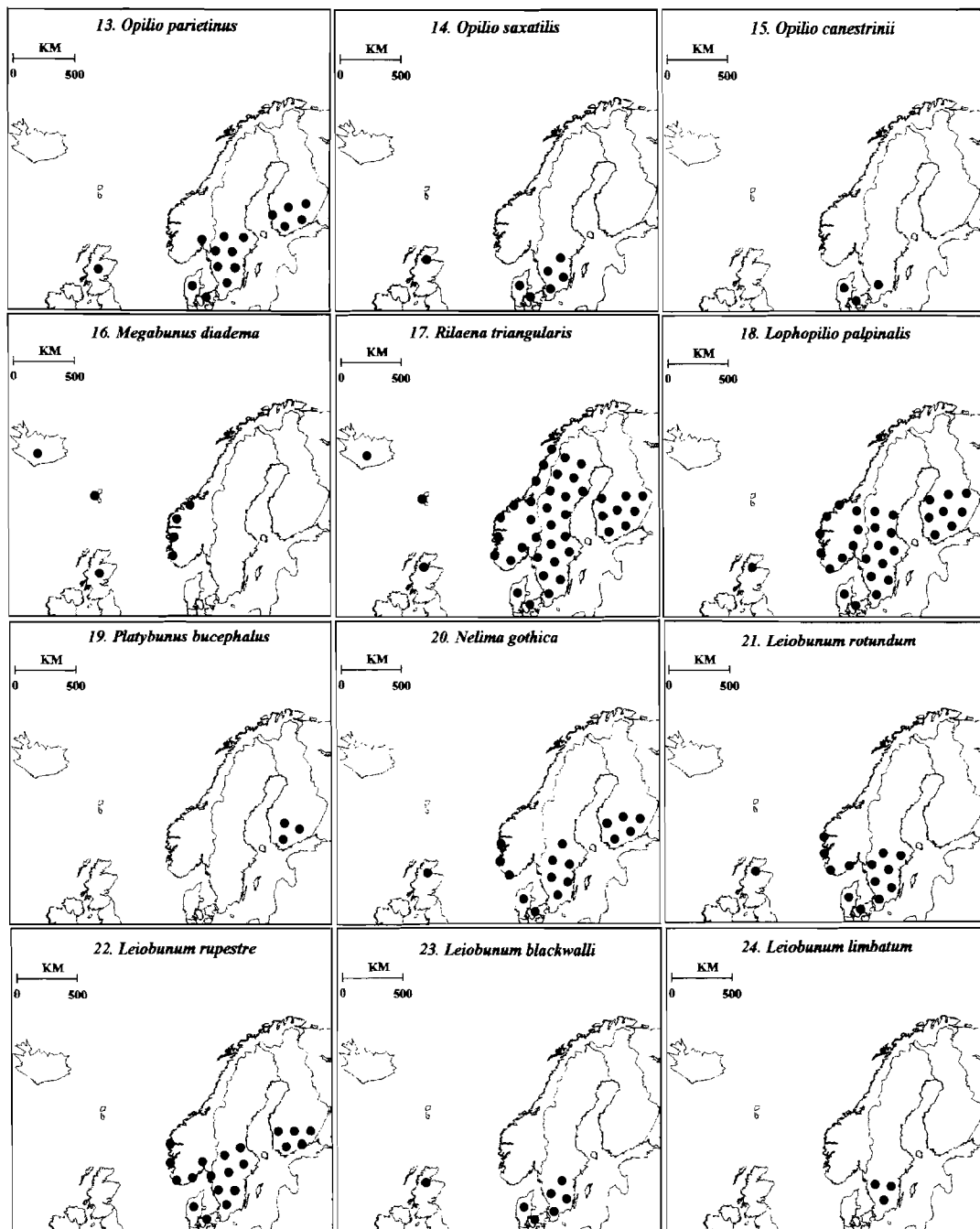


Figure 7. Presence of four rare species during the year: 10. *Lacinius horridus*, 15. *Opilio canestrinii*, 19. *Platybunus bucephalus* and 24. *Leiobunum limbatum*.



Map 1-12: The distribution of the Opiliones species of the Nordic countries, Scotland and Northern England. 1. *Trogulus tricarinatus*, 2. *Nemastoma bimaculatum*, 3. *N. lugubre*, 4. *Mitostoma chrysomelas*, 5. *Oligolophus tridens*, 6. *O. hanseni*, 7. *Paroligolophus agrestis*, 8. *P. meadii*, 9. *Lacinius ephippiatus*, 10. *L. horridus*, 11. *Mitopus morio* and 12. *Phalangium opilio*.



Map 13-24. The distribution of the Opiliones species of the Nordic countries, Scotland, and Northern England. 13. *Opilio parietinus*, 14. *O. saxatilis*, 15. *O. canestrinii*, 16. *Megabunus diadema*, 17. *Rilaena triangularis*, 18. *Lophopilio palpinalis*, 19. *Platybunus bucephalus*, 20. *Nelima gothica*, 21. *Leiobunum rotundum*, 22. *L. rupestre*, 23. *L. blackwalli* and 24. *L. limbatum*.

1944, Hippa 1975, Martens 1978). Thydsen Meinertz (1962) mentions no. 9 from Iceland, but it is not reported from this country in the literature of recent date. Only species 9 (?), 11 and 17 exist in all Nordic countries. Species 1, 8, 10, 19, and 24 are very rare harvestmen in this region.

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***Pholcus phalangioides* (Fuesslin, 1775) (Araneae, Pholcidae) first record from Norway.**

Oscar Ingebrigtsen & Erling Hauge

Ingebrigtsen, O. & Hauge, E. 2003. *Pholcus phalangioides* (Fuesslin, 1775) (Araneae, Pholcidae) first record from Norway. *Norw. J. Entomol.* 50, 42.

The species here recorded from the first time in Norway, was caught in a private house on the island of Stord, Western Norway.

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During the last years several spider nets disorderly spread out in the corner of rooms of a private residence have been observed in Western Norway at **HOY**: Stord, Ådland (EIS 23). Spiders were present in several nets. In November 2002 one male spider was collected by one of the authors (O.I.) and identified to belong to the species *Pholcus phalangioides* (Fuesslin, 1775), confirmed by E.H. During last winter several active specimens have been observed in the heated rooms of the house (especially in the basement). The species is here reported for the first time in Norway. However, this is probably not surprising, as the species previously has been reported from Iceland (Agnarsson 1996) and rather recently from the Faroe Islands (Hauge et al. 2002); in both cases indoors only.

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Life history, egg cold hardiness and diapause of *Argyresthia retinella* (Lepidoptera: Yponomeutidae)

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Elverum, F., Johansen, T. J. & Nilssen, A.C. 2003. Life history, egg cold hardiness and diapause of *Argyresthia retinella* (Lepidoptera: Yponomeutidae). Norw. J. Entomol. 50, 43–53.

During the first half of the 1990-ies, the microlepidopteran *Argyresthia retinella* Zeller (Lepidoptera: Yponomeutidae) had an outbreak in mountain birch (*Betula pubescens* Ehrh. ssp. *czerepanovii* (Orlova) Hämet-Ahti) forests along the coast of northern Norway. In these regions, *A. retinella* has a univoltine life history and passes the winter as diapausing eggs, contradictory to previous reports from more southern latitudes of Europe, where newly hatched larvae overwinter. Eggs were deposited under lichen, mainly on branches and twigs, and avoided freezing by their ability to supercool. The mean supercooling points (SCPs) from October to March ranged between -35.5 and -36.5 °C (lowest in January), and the eggs did not survive exposure below these temperatures. Diapause was terminated in the middle of February, and in April and May the SCP rose to about -30 °C. Pre-freeze mortality was evident and had a significant impact on survival when eggs were exposed to temperatures above the SCP.

Key-words: Egg diapause, cold hardiness, life cycle, pre-freeze mortality, *Argyresthia retinella*, Yponomeutidae

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INTRODUCTION

The microlepidopteran *Argyresthia retinella* Zeller (Lepidoptera: Yponomeutidae) has recently been identified as a new pest species of mountain birch (*Betula pubescens* Ehrh. ssp. *czerepanovii* (Orlova) Hämet-Ahti) in northern Norway (Solberg et al. 1994, Johansen & Kobro 1996, Tenow et al. 1999). Outbreaks and larval damage occurred in several large coastal birch forests in 1991 to 1995. Previously, *A. retinella* outbreaks and larval damage to birch have not been reported in northern Norway or elsewhere. Nevertheless, the species is widely distributed and common both in Norway and the rest of Europe (Agassiz 1987, 1996, Johansen & Kobro 1996).

Reports from continental Europe state that larvae of *A. retinella* mine buds and shoots of *Salix caprea* L., *Betula* and *Quercus* from April to June (Schütze 1931, Werner 1958, Agassiz 1987, 1996). In Britain, Robbins (1992) has observed it feeding in buds of *Betula* in May, causing wilting of the developing leaves. He also added the species to the list of British gall-causers due to swollen bases of the leaf petioles.

Pupation normally takes place on the trunk of trees (Agassiz 1987, 1996). In continental Europe, swarming moths are observed in June and the first half of July (Friese 1969) and in southern Scandinavia mainly in July and the first half of August (Petersen 1924, Svensson 1993). According to Werner (1958) and Agassiz (1996), eggs hatch in

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the autumn and the young larvae overwinter in buds or shoots.

The reasons for population growth and outbreak of *A. retinella* in northern Norway are not known. However, Tenow et al. (1999) have discussed a possible role of recent high temperature deviations. The impact of winter temperatures is dependent on the ability of the over-wintering stage to survive at low temperatures, or its cold hardiness (Salt 1961). This is most easily determined by observing the temperature at which the organism freezes, the supercooling point (SCP). Another aspect of insect cold hardiness, *the pre-freeze mortality*, is based on the many reports of high mortality in insects not frozen when they are exposed to sub-zero temperatures above their SCP for varying periods (Salt 1961, Bale 1993, 1996).

The objectives of this study were therefore to establish: (1) the life history of *A. retinella* in the outbreak area, (2) its overwintering strategy by determining the SCP and the impact of pre-freeze mortality, and (3) the occurrence of diapause in field-collected samples of the overwintering stage.

MATERIALS AND METHODS

Sites

Field studies were carried out on the island of Kvaløya (69°41' N, 18°47' E), near Tromsø, northern Norway, from May 1994 until September 1995. In both years, the moth damaged parts of the birch forest on the southern part of the island. Observations and material in this study originated from a site of about 400 m², 20 m above sea level, on birches of four to six metres height.

Standard temperature data for the area were recorded at Tromsø Airport Langnes (Figure 1), four km from the study area, by The Norwegian Meteorological Institute. Laboratory work was carried out at Holt Research Centre (Norwegian Crop Research Institute) and at the Phytotron at the University of Tromsø.

Life history

Egg-laying sites were located by studying samples of branches, twigs and bark collected in September 1994. At that time, the outbreak of *A. retinella* was at its peak. In the middle of August large

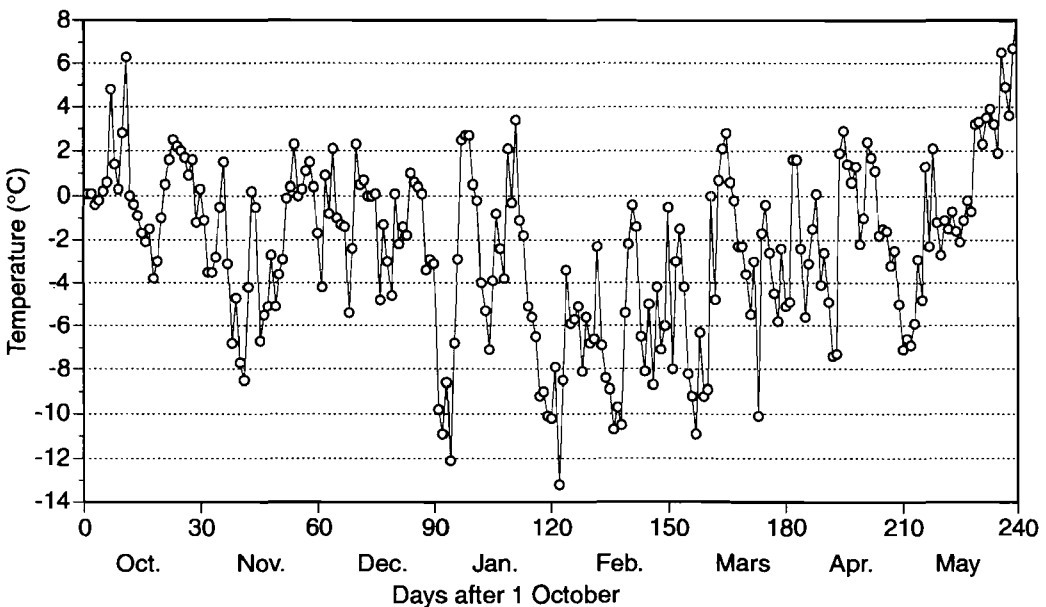


Figure 1. Daily minimum temperatures (o) from October 1994 to May 1995 in Tromsø.

numbers of adult moths were observed in the study area, indicating the period of mating and egg deposition.

Twigs, with damaged buds, shoots or leaves, were collected weekly in June and July 1994 and in May to July 1995. Buds and shoots were dissected for observation of development of mining larvae. Buds with fully developed larvae were collected at the end of June 1994 for rearing and adult moth identification. These buds were kept in cardboard boxes, 20 in each, and stored at room temperature (20–22 °C). S. Kobro and L. Aarvik at the Crop Protection Centre, Norwegian Crop Research Institute, identified emerged moths.

From July 1994, we searched for pupae in crevices in the bark and the lichen cover on birches in the study area. In addition we took samples from humus and litter under attacked trees to collect any pupated larvae. From this material 2–3 dm³ was gathered and stored in ventilated plastic bags at room temperature.

The study area was visited twice weekly in August 1994 and 1995 to observe any swarming or egg-depositing moths. Adult individuals were collected at Alta (69°57' N, 23°10' E) and at the main study area Kvaløya for species identification.

Throughout the field study, we also collected possible parasitoids of the larvae. Material gathered during the summer of 1995 with suspicious eggs and larvae alongside dead or paralysed larvae of *A. retinella* were placed in ventilated plastic boxes and stored at room temperature for rearing. K. J. Hedqvist at the Swedish Natural History Museum, Stockholm, identified the emerged parasitoids.

Cold hardiness

The supercooling points (SCPs) of individual eggs were determined by using an ultra-freezer with cooling at a constant rate of 1 °C min⁻¹. Eggs were carefully removed from branch samples from a selection of trees and placed in petri dishes. Handling time for eggs, from sampling until the onset of tests, ranged from three to four hours.

In each SCP-test, at approximately monthly intervals from October 1994 to May 1995, an average

of 48 eggs (range 38–68) was used. The whole batch of eggs was attached with silicon paste to the end of a 0.2 mm copper-constantan thermocouple. This thermocouple was inserted into a hollowed cylindrical aluminium core, which in turn was placed in the ultra-freezer. The decreasing temperature was continuously recorded graphically and the SCPs were discerned in the falling temperature curve as upward «spikes», caused by the heat of crystallisation as each egg froze. By using a paper feed of 2 cm min⁻¹ the resolution was sufficient to separate the SCPs of at least 60 eggs at each test. A detailed description of the instruments and technique is given in Kaurin (1985) and Nilssen & Tenow (1990). The lethal effect of freezing was controlled after each SCP-test.

Pre-freeze mortality was studied on eggs collected on 9 March 1995. The eggs were placed in petri dishes, twenty in each. The dishes were kept in polystyrene boxes and exposed to temperatures of -18 and -27 °C in two different freezers. Survival was recorded by transferring one dish from each freezer to room temperature (20–22 °C) at intervals of 2, 4, 8, 12, 14 and 21 days.

Diapause

At monthly intervals, from 10 October 1994 until 9 May 1995, 30 eggs on pieces of lichen from the field samples were reared at room temperature (20–22 °C). The lichens with eggs were kept in petri dishes placed on moist filter paper in a plastic boxes to secure high humidity. The boxes were kept in darkness. Every 24 hours, emerged larvae were removed and percentage cumulative hatching as a function of time was calculated. Also the final mortality and the presence of diapause were evaluated from the same data.

RESULTS

Life history

Eggs of *A. retinella* were found almost exclusively on lichens, mainly on *Parmelia olivacea* (L.) Nylander. This species of lichen is common in the study area and covers all trees exceeding a certain age. When deposited, the eggs were wedged be-

tween the lichen and the rind of the branches and twigs. Some eggs seemed attached with glue or a string while others lacked any attachment. Considerably more eggs were found on the branches and twigs than on the stems. On young trees and bushes where no lichen had settled, eggs were only found in cavities formed by previous years' attacked buds. These buds appeared with swollen cracks.

The eggs had not hatched by the onset of frost (end of September 1994) and were therefore considered to be the overwintering stage. These findings and the availability of large numbers of eggs made it possible to test cold hardiness and diapause status.

In 1995, the larvae appeared in the buds on 18 May. The leaves started to unfold on 27 May. Newly hatched larvae were bright yellow with a marked black head capsule. After hatching they immediately started a search for suitable buds, which were entered through the scales or preferably through cracks between scales. Many larvae were found dead or stuck, unable to move, on the sticky resin covering the buds.

After entering the buds, the larvae fed extensively. Frequently, the leaves and shoots were unable to sprout or only partly sprouted before withering. About a week after entrance, buds were frequently found empty with only faeces and spun silk left. Along with these observations, about two mm long larvae, now with a light grey-green colour, were also found in sprouting buds with only small amounts of faeces and silk spin, indicating a recent entrance. The possibility of such re-entrance of buds was experimentally shown by moving larvae from infested buds to new un-attacked twigs. In this case, new shoots were entered within 24 hours at the base of the leaf stalk (petiole) of the growing shoot. Larvae were also observed hanging by the silk threads from branches.

At high larval population density, as during the summer of 1994, cannibalism was evident and common among larvae that entered the same buds or shoots. Often remnants (head capsules) of killed (possibly also eaten) larvae were found together with a single surviving larva in the bud.

The larvae completed their development by the end of June. At this stage they were almost white with a light brown head capsule and about six mm long. Adults reared from this larval material were identified as *A. retinella*. Pupae, covered by a light spun cocoon, were found between old leaves in the topmost part of the forest floor litter. From such litter kept at room temperature, adult moths identified as *A. retinella* appeared after 14 days. No pupae were found on branches or stems.

In the middle of August 1994 large numbers of *A. retinella* were observed swarming on evenings between 20:00 and 22:00 h. During the same period in 1995, only a few individuals were observed. Moths were never observed while laying eggs.

After 18-27 June we found several dead or paralysed *A. retinella* larvae with white, translucent, curved eggs on their body. After approximately 24 hours at room temperature these eggs hatched and the larvae immediately started feeding on the *A. retinella* larvae. Thus, ecto-parasitoids were present. Among 317 *A. retinella* larvae inspected on 21-22 June, 27 (9 %) were parasitised. In another sample from 26 June, 49 out of 78 individuals (63 %) were parasitised.

The ecto-parasitoid larvae left the shoots before pupating in a light spun cocoon. Within a week, a total of 17 parasitic wasps emerged from these pupae. Sixteen individuals (four ♀♀ and 12 ♂♂ males) were identified as *Bracon intercessor* Nees 1834 (Hymenoptera, Braconidae). According to Tobias (1986) and Achterberg et al. (1990) this species parasitises a wide spectrum of larvae belonging to Coleoptera (Curculionidae and Atteblabidae), Lepidoptera (Momphidae and Tortricidae) and Hymenoptera (Eurytomidae). *A. retinella* has until now been an unrecorded host. One individual was identified as *Di cladocerus euryalus* (Haliday 1834) (Hymenoptera, Eulophidae), a known parasitoid of *Argyresthia* spp. (Hedqvist, pers. comm.).

Supercooling points

The supercooling points (SCPs) of eggs collected monthly are shown in Figure 2. There was a slight lowering of SCPs from October to January ($p=0.03$,

Tukey's test following ANOVA). After January, the SCPs rose slightly until March, and between March and April (and May), the SCPs rose rapidly.

Pre-freeze mortality

Mortality of eggs increased with time of cold exposure. No eggs hatched after 21 and 14 days at -18 and -27 °C, respectively (Figure 3). In unhatched eggs exposed to -18 °C, black head-capsules of developed larvae could clearly be seen through the chorion, indicating that some development had occurred. On the other hand, in eggs exposed to -27 °C, no such larval development was apparent, indicating that death had occurred shortly after the start of the cold exposure.

Diapause

Eggs from field samples collected in October and November did not hatch at all (held at 90 days at room temperature), *i.e.* mortality = 100 percent. For eggs collected in December, the mortality was 13 percent and the median incubation period 32 days (Figure 4). In the following months, the median incubation period gradually decreased from 19 days in January to two days in May. The mortality remained below 10 percent throughout this period. The hatching curves in Figure 4, with no hatching or long incubation time and prolonged hatching time in autumn or early winter, are indicative of diapause.

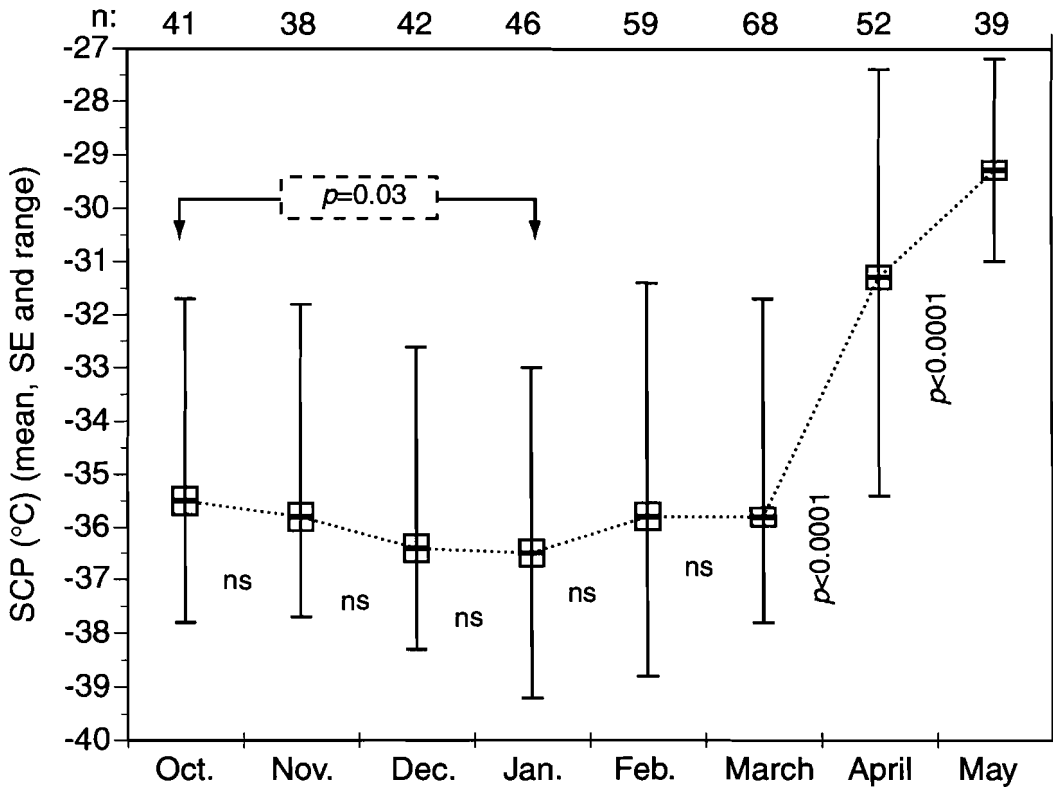


Figure 2. Distribution (means, SE and ranges) of the supercooling points of *A. retinella* eggs tested at monthly intervals. p -values: Tukey's test after ANOVA; ns: not significantly different ($p>0.05$).

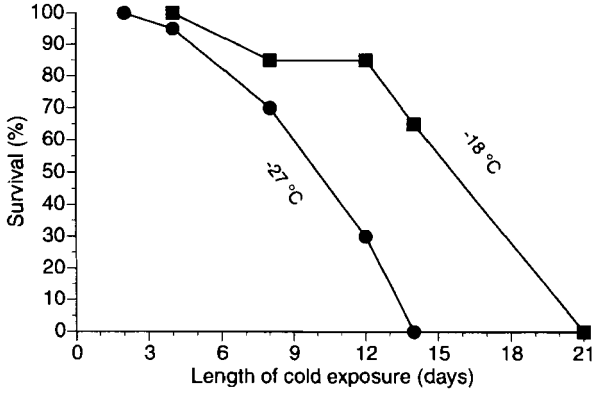


Figure 3. Percentage mortality of *A. retinella* eggs (collected 8 March 1995) following exposure to -18 °C and -27 °C at different lengths of cold exposure.

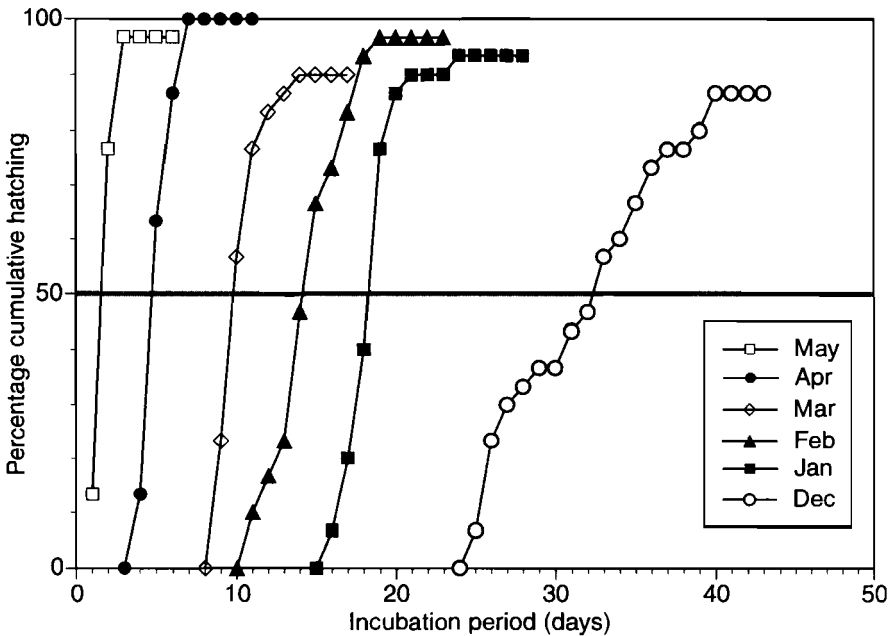


Figure 4. Cumulative hatching curves for field-collected eggs (n=30) transferred to room temperature in December (1994), January, February, March, April and May (1995). Eggs collected in October and November (1994) did not hatch at all.

Because there is no easy way to establish directly when diapause development ends and post-diapause development begins, an indirect method was used. In eggs, it is an accepted fact that no ordinary development (embryogenesis) will take place before the diapause development is finished (e.g. Danks 1987), and the observed incubation period therefore consists of two separate parts in the following order: diapause development and post-diapause development (= embryogenesis). The average date for completed diapause development was estimated on the basis of the total incubation time (see above and Figure 4). In this calculation the post-diapause period (= embryogenesis) was assumed to be 14 days at room temperature [a common incubation time for insect eggs if there is no diapause (Levine 1988, Nilssen & Tenow 1990)]. The model is based on a polynomial regression of the median incubation periods as a function of date (Figure 5).

In the regression equation

$$y = -0.335x + 0.000987x^2 + 32.86$$

y is the remaining diapause period + a post-diapause period (in days) and x is number of days after 1 December. When $y = 14$ days (i.e. no diapause development left), $x \approx 69$. This result indicates that 50 percent of the eggs in the field have completed their diapause development 69 days after 1 December, i.e. 7 February.

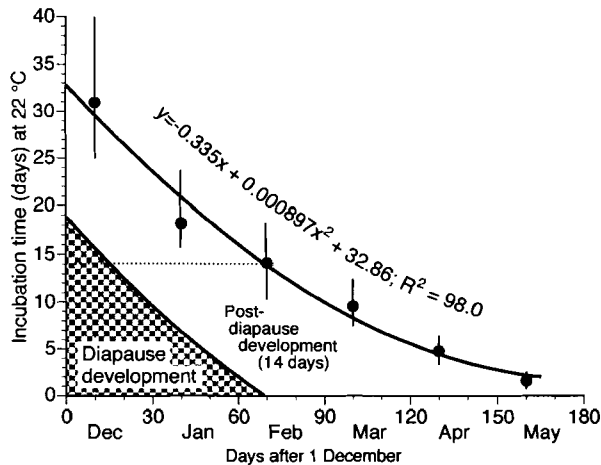


Figure 5. Polynomial regression of the median incubation periods (i.e. medians of the hatched specimens, ranges are also shown) at room temperature as a function of days after egg-laying. By subtracting an assumed post-diapause development of 14 days from the total incubation period, the remaining diapause (shaded area) is found. The estimated median end of diapause is 69 days after 1 December (=7 February).

DISCUSSION

Mountain birch forms the upper and northern border of the boreal forest in Scandinavia, and is the dominant natural ecosystem in northern Norway (Tenow et al. 1999). In addition to the fact that this birch forest is exposed to severe climatic restraints, it has many important defoliators and other herbivores (Tenow 1996). Some of these, e.g. the geometrids *Epirrita autumnata* (Borkhausen) and *Operophtera brumata* (L.), have outbreaks at more or less regular intervals, but such outbreaks are known to occur only in northern and mountainous parts (Tenow 1972). The reason why outbreaks only occur in these areas, is poorly understood, but is often assumed to be affected by climate (e.g. Ruohomäki et al. 1997). Presently, the mountain birch is confronted with another pest insect, *A. retinella*, which so far has had one documented outbreak.

Life history

The present study in northern Norway shows that *A. retinella* has a univoltine life history (Figure 6). The winter is passed in the egg stage, in contrast to the situation in continental Europe where the larva is the over-wintering stage (Werner 1958, Agassiz 1996). Also the pupation site seems to differ. In northern Norway, *A. retinella* larvae entered the litter under trees to pupate in late June, whereas previous reports from continental Europe

describe pupation on the tree trunks (e.g. Agassiz 1996).

According to our observations of the swarming, the eggs of *A. retinella* are most likely deposited at the end of August. They were deposited under thallus lobes of lichen, mainly *P. olivacea*. Most eggs were found under lichen on branches and twigs, close to buds and shoots. During the study, also eggs of other moth species, e.g. *Epirrita autumnata* and *Operophtera brumata* (Geometridae), were found under lichen, indicating that it is generally advantageous to overwinter in this habitat (Tanmaru et al. 1995). Bylund (1997) argued that eggs under lichens could be less liable to fall off the tree, more protected from predation and less subjected to extreme temperatures. In the published literature (Werner 1958, Agassiz 1996), *Salix caprea* and *Quercus* species are also listed as host plants of *A. retinella*. In the outbreak area, *S. caprea* is not covered by lichen and seemed un-attacked by this moth, whereas *Quercus* spp. is not present in northern Norway. Overwintering in the egg stage requires diapause to prevent the eggs from hatching in the event of an unusually warm autumn. Other studies in moths show that the most common cue for entering diapause is photoperiod, in some cases interacting with temperature (Young 1997). Therefore, the shorter photoperiod and/or lower temperatures, experienced by the eggs in August and September (or earlier in a previous stage, e.g. Sato 1977) may be cues for entering diapause. The diapause may also be obligate as a consequence of a genetic adaptation.

A. retinella has adopted an egg diapause similar to other northern populations of moth species, e.g. *E. autumnata* (Nilssen & Tenow 1990) and *O. brumata* (Nilssen & Tenow, unpublished). A common feature is that the eggs enter diapause shortly after egg-laying but there may first be a short pre-diapause embryogenesis, see Nilssen & Tenow (1990), and that the diapause lasts until mid-winter. It is often impossible to rear such eggs in autumn, and if they hatch, they do so after a long time with considerable mortality. Another typical feature is that the hatching is extended (asynchronous), often over several weeks. *A. retinella* eggs brought in for rearing in December hatched

after 25 to 40 days (Figure 4), probably because the individual eggs were in various states of diapause. When diapause is terminated, as in April and May (Figure 4), the hatching occurs almost synchronously, which is considered as another advantageous effect of diapause.

The previously known biology of the species (Agassiz 1996) is obtained from temperate areas where the climate is warmer than in our subarctic study area. Generally, eggs have a better cold hardiness than larvae (Sømme 1982), and switching of overwintering stage from larvae to eggs may therefore have an adaptive significance in areas with long and cold winters. If *A. retinella* lacks egg diapause in continental Europe we may suspect a clinal increase in diapause incidence with latitude. This has been found in the beetle *Atrachya menetriesi* in Japan (Ando 1983), and it has been shown that insects display a great variety of geographical adaptations in voltinism and seasonal regulation of growth and dormancy (Wipking 1988, Goto et al. 2001). In temperate or cold areas, cold hardiness and winter diapause are essential for survival in most overwintering insects, and different ecotypes of widely distributed species may have different diapause and cold hardiness characteristics as an adaptation to the climate (Goto et al. 2001).

Cold hardiness

Tests after the measurements of SCPs showed that eggs do not withstand freezing, and the SCPs are therefore the absolute minimum temperatures for the overwintering stage. The pre-freeze mortality was tested in March, and at the pre-freeze temperature of -27 °C, the survival of eggs gradually decreased, and maximum time of survival was about 14 days (Figure 3). Pre-freeze mortality at this temperature may well be caused by freezing, which is shown to occur when insects are maintained in a super-cooled state close to their «normal» supercooling point for extended periods (Salt 1961, Bale 1993) (a better term would therefore be *pre-SCP-freeze mortality*). Therefore, pre-freeze mortality had a significant impact on survival of *A. retinella*, also when exposed to temperatures well above the supercooling point. When

kept at $-18\text{ }^{\circ}\text{C}$, no eggs survived more than 21 days. This indicates that the ability to supercool is most important in order to protect the eggs from freezing during shorter periods of extreme temperatures. Unfortunately, we have no data on pre-freeze mortality of diapausing eggs (e. g. eggs from December and January), but according to

Sømme (1999) it is assumed that diapausing eggs withstand pre-freeze temperature better than eggs in later stages.

Based on these results, eggs of *A. retinella* belong to the chill tolerant group (according to the definition of Bale (1993)). Characteristic for this group

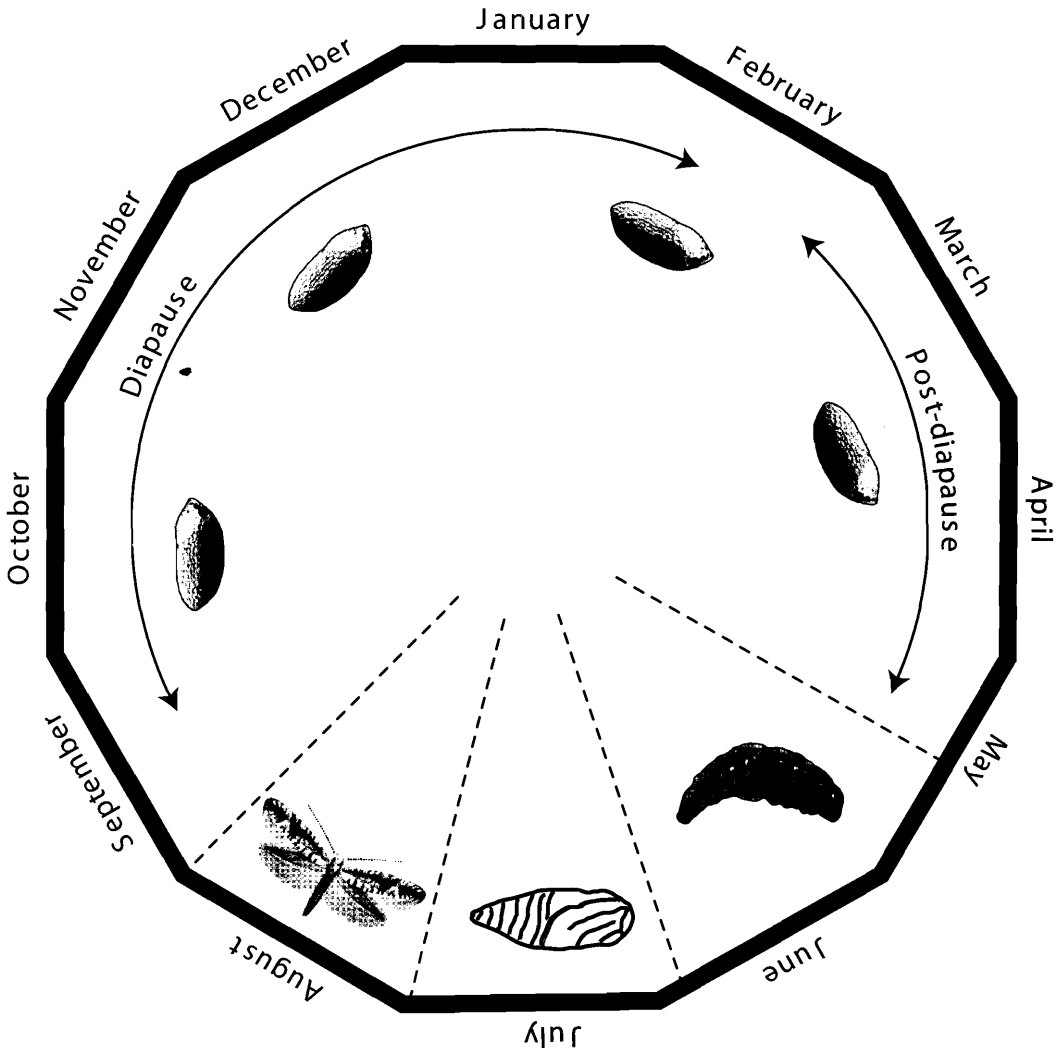


Figure 6. The life history of *Argyresthia retinella* in northern Norway. The eggs hatch and the larvae appear in birch buds and shoots in mid-May. The larvae mine one or more buds or shoots before leaving to pupate towards the end of June. After pupating in the litter the individuals eclose and the adult moths appear at the end of July. The moths swarm on evenings in August. The eggs are laid under lichen on the branches of birch trees from the end of August. The eggs enter diapause and are the overwintering stage of *A. retinella* in northern Norway. Diapause is terminated in February. The SCPs are below $-35\text{ }^{\circ}\text{C}$ from October to March; in April and March the SCPs rise to approximately $-30\text{ }^{\circ}\text{C}$.

is the occurrence of non-freezing mortality above the SCP and the ability to survive for long periods of time at the low or subzero temperatures encountered in the winter microhabitat (Bale 1993). In our test the temperature in the freezers was kept constant and we did not test pre-freeze mortality at higher temperatures than -18 °C. When the beech leaf mining weevil, *Rhynchaenus fagi* L. (Coleoptera: Curculionidae), was exposed to a constant sub-zero temperature of -15 °C mortality was 75 % after 84 days. In cycling treatments between +2 and -15 °C, the mortality was lower (Coulson & Bale 1996).

In our studies, the effect of pre-freeze mortality was only studied in post-diapause eggs. In *Choristoneura fumiferana* (Clem.) (Lepidoptera: Tortricidae), survival after 20 days of exposure to -15 °C was 80 % in mid-diapausing larvae and 20 % in late-diapausing larvae (Han & Bauce 1995). The effect was caused by a lower glycerol content in the late-diapausing larvae. The pre-freeze mortality of diapausing *A. retinella* eggs remains unknown, but the species seems well adapted to coastal winter temperatures (a typical year is shown in Figure 1) in the outbreak area. Temperatures in continental parts of northern Norway, on the other hand, will regularly drop below -20 °C, sometimes reaching extremes of -30 to -40 °C, for varying periods during the winter. This would affect survival of overwintering eggs as pre-freeze mortality at -18 and -27 °C was 100 % after 14 and 21 days, respectively (Figure 3), and explains why the outbreak only affected coastal areas. In other words, winter climate may restrict the geographic distribution of *A. retinella* within northern Norway.

A further discussion of the causes of the outbreak should be based on knowledge of both biotic and abiotic factors that interact with the populations, most of which remain to be studied. One of the population regulators, however, seems to be identified. In 1995, the braconid ectoparasitoid *B. intercessor* had a significant effect on survival of last instar larvae of *A. retinella* on Kvaløya. Normally, parasitoid rates of 40-90 percent in a generation are associated with a decline of lepidopteran populations (Berryman 1996). In the latest of our samples, 63 percent of the larvae were parasitized.

The outbreak of *A. retinella* resulted in many individuals that could be utilized as hosts by parasitoids. *B. intercessor*, which can use a wide spectrum of hosts, has obviously benefited from this and increased its own population size to high levels, and might, at least locally, have contributed significantly to the observed decline of *A. retinella*.

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***Acrometopia wahlbergi* (Zetterstedt, 1846) (Diptera, Chamaemyiidae) in Norway**

Lita Greve

Greve, L. 2003. *Acrometopia wahlbergi* (Zetterstedt, 1846) (Diptera, Chamaemyiidae) in Norway. *Norw. J. Entomol.* 50, 54.

One male of *Acrometopia wahlbergi* (Zetterstedt, 1846) (Diptera, Chamaemyiidae) was collected at Moutmarka, Vik (VE Tjøme), three females were netted in Iglatjødn Nature Reserve (HOY Stord) and one female was netted in the Svevatn area (HOI Kvam). The three females from Iglatjødn have been listed in a previous report (Greve & Hauge 1989).

Key words: *Acrometopia wahlbergi*, Diptera, Chamaemyiidae, Norway.

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The genus *Acrometopia* is a distinctive genus in the family Chamaemyiidae. The elongation of the head in *Acrometopia* compared to other genera in the family is characteristic. The genus *Acrometopia* was revised by Cogan (1978).

One species, *Acrometopia wahlbergi* (Zetterstedt, 1846), has been recorded from Denmark, Finland and Sweden (Hackman 1980; Petersen & McLean 2001, Tanasijtshuk 1984). *A. wahlbergi* has hyaline wings, and is distinguished from the other species within the genus on account of the pale, grey dusting of most parts of the body. The yellow legs are also evenly dusted with grey. *A. wahlbergi* is the type species of the genus, and is outside Fennoscandia and Denmark widely distributed in Europe.

Three females of *A. wahlbergi* were netted in a Nature Reserve at Stord HOY Stord: Iglatjødn (EIS 23), 21 July 1988. Two Malaise traps were operated from April to October, but no more specimens were caught (Greve & Hauge 1989). One male specimen from VE Tjøme: Moutmarka at Vik (EIS 19), 20 July 1983, leg. A. Fjeldså, was

recently discovered among undetermined flies in the collections of Zoological Museum. A female specimen was netted on a bog in HOI Kvam: The Svevatn area (EIS 31), 1 July 1997, leg. J. Skarveit.

A considerable material of Chamaemyiidae has been sorted out during the last decade, but the five specimens noted here are the only specimens of *A. wahlbergi*. The material is deposited in Zoological Museum, University of Bergen.

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***Synodites lineiger* (Thomson, 1893) (Hymenoptera: Ichneumonidae) new to Svalbard, with an updated list of ichneumonid species from the archipelago**

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Coulson, S. J., Jussila, R., Hodkinson, I.D. & Webb, N.R. 2003. *Synodites lineiger* (Thomson, 1893) (Hymenoptera: Ichneumonidae) new to Svalbard, with an updated list of ichneumonid species from the archipelago. *Norw. J. Entomol.* 50, 55–56.

The ichneumonid, *Synodites lineiger* (Thomson, 1893) (Hymenoptera: Ichneumonidae), is reported for the first time from Svalbard. Previously, 14 species of Ichneumonidae have been reported from the archipelago.

Key words: Spitsbergen, Arctic, Sticky trap, Ctenopelmatinae, Tenthredinidae

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INTRODUCTION

The ichneumonid fauna of Svalbard (excluding Bjørnøya), including the species newly recorded here, comprises 15 species (Table 1) (see also Coulson et al. 2001, Coulson & Refseth in press). As part of a detailed survey of invertebrate community assembly on glacier forelands, yellow sticky traps were operated at seven sites along a chronosequence across the pro-glacial region of Midtre Lovénbreen adjacent to Ny-Ålesund, Kongsfjord, Svalbard from 17 July to 6 August 2001. These traps caught large numbers of flying insects, including many Ichneumonidae.

RECORDS AND DISCUSSION

Seven species of Ichneumonidae were caught of which six, *Plectiscidea hyperborea* (Holmgren, 1869), *Atractodes pusillus* Förster, 1876, *Atractodes bicolor arcticus* Holmgren, 1872, *Aclastus borealis* (Boheman, 1866), *Gelis glacialis* (Holmgren, 1869) and *Stenomacrus groenlandicus*

Jussila, 1996 are already known from Svalbard (Coulson et al. 2001, Coulson & Refseth in press). A seventh species, *Synodites lineiger* (Thomson, 1893) (Ctenopelmatinae), however, is new for the archipelago. Two males were trapped at the «oldest» site along the chronosequence, on a low limestone ridge with complete plant cover (54% moss and 46% vascular plants) lying beyond the terminal moraines (Hodkinson et al. submitted).

The Ctenopelmatinae is a large, mainly north temperate subfamily (Gauld & Bolton 1988) and *S. lineiger* has previously been recorded from Northern and Central Europe (Yu 1999 and references therein). The majority of species are endoparasitoids of tenthredinoid or megalodontoid sawfly larvae (Gauld & Bolton 1988). Tenthredinidae (e.g. *Amauronematus* sp.) are relatively abundant at this one trapping location (S.J. Coulson & I.D. Hodkinson pers. obs.) and provide likely potential hosts.

The specimens of *S. lineiger* collected from Svalbard are held by R. Jussila (Zoological Museum,

* Corresponding author

Table 1. Ichneumonidae recorded from Svalbard. Note that *Plectiscus* sp.? is probably *Plectiscidea hyperborea* (Holmgren, 1869).

Sub-family	Species
Ctenopelmatinae	<i>Hypamblys leucopygus</i> (Holmgren, 1869) <i>Synodites lineiger</i> (Thomson, 1893)
Cryptinae	<i>Aclastus borealis</i> (Boheman, 1866) <i>Atractodes bicolor arcticus</i> Holmgren, 1872 <i>Atractodes pusillus</i> Förster, 1876 <i>Gelis glacialis</i> (Holmgren, 1869) <i>Phygadeuon</i> sp.
Mesochorinae	<i>Mesochorus palanderi</i> Holmgren, 1869
Orthocentrinae	<i>Orthocentrus nigricornis</i> Boheman, 1866 <i>Plectiscidea hyperborea</i> (Holmgren, 1869) <i>Plectiscus</i> sp.? <i>Stenomacrus groenlandicus</i> Jussila, 1996 <i>Stenomacrus pedestris</i> (Holmgren, 1869) <i>Stenomacrus validicornis</i> (Boheman, 1866)
Diplazontinae	<i>Tymmophorus obscuripes</i> (Holmgren, 1858)

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New records of Coleoptera from Northern Norway

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New data on the distribution of 71 species of Coleoptera in Northern Norway are given. Nine species are reported new to Northern Norway. 41 of the species are new to coastal parts of Troms (TRY), where the total number of recorded species now is 685. The species richness in some of the provinces is discussed. It is concluded that continental parts of Troms (TRI) probably has an extraordinarily rich beetle fauna comprising 1132 known species.

Key words: Coleoptera, Northern Norway, faunistics, biogeography

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INTRODUCTION

The climatical and vegetational conditions in Northern Norway are extraordinary on a global scale. Due to the mild climate, the southern and middle boreal vegetational zones are displaced further north than in any other part of the world (Moen 1999). At the same time there is a sharp east-west gradient in climate and vegetation over short distances. High mountains in the south-western parts, but low relief in the northeastern parts constitute barriers of a very different magnitude. This makes Northern Norway an interesting area for ecological and biogeographical studies of insects.

Coleoptera have been collected in Northern Norway since the first part of the eighteen century (Strand 1946). Strand (1946) gave all known localities of Coleoptera in Northern Norway at the actual time. Later all provincial records of Coleoptera in Norway were given by Lindroth (1960). This catalogue was supplemented with additions and corrections by Strand (1970, 1977). Later Vik (1991) published a catalogue of all the known provincial records of Coleoptera in Norway. The most recent contributions to the faunistics of Coleoptera in Northern Norway are those by Nilssen (1993), Vik (1995), Hanssen &

Olsvik (1998), Fossli & Andersen (1998), Andersen et al. (2000), Ødegaard & Ligaard (2000), Olberg et al. (2001), Ødegaard (2001) and Olsvik et al. (2001). Despite these investigations, the knowledge about the distribution of Coleoptera in Northern Norway is still fragmentary. The present paper is a contribution to the faunistics of beetles in Northern Norway.

Several of the records were made in connection with projects on saproxylic beetles in different parts of Northern Norway (**NSI**, **NNØ**, **TRY**, **TRI** and **FØ**) (see Figure 1 for position of provinces). Other finds result from studies of ground-living beetles in various types of habitats. Faunistic surveys of the saproxylic beetles from **TRI** Målselv: Dividalen have been given previously (Andersen et al. 2000, Olberg et al. 2001). Riparian beetles and the saproxylic beetle fauna of **FØ** Sørvaranger: Pasvik will be dealt with separately. The present paper reports new records of non-saproxylic beetles from Dividalen and Pasvik as well as new finds of beetles from other provinces in Northern Norway. The following abbreviations and symbols have been used in the text: **FØ**: Frode Ødegaard, **JA**: Johan Andersen, **LH**: Lisbeth Haugen, **ØH**: Øystein Huse, **SO**: Stefan Olberg, **TF**: Tor Erik Fossli, *: Species not previously published from Northern Norway. The material collected by **JA**,

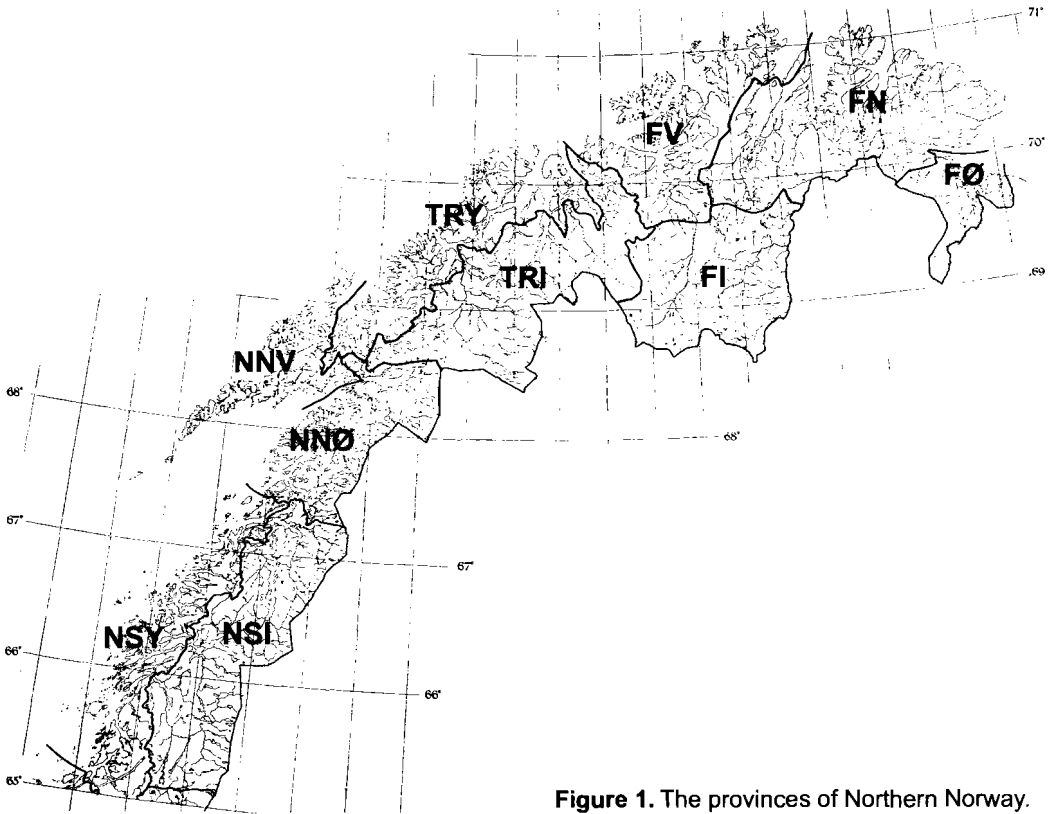


Figure 1. The provinces of Northern Norway.

LH, TF and ØH is deposited at the Department of Ecology/Zoology, University of Tromsø, whereas the material collected by FØ and SO is deposited in their private collections.

LIST OF SPECIES

Carabidae

Leistus terminatus (Hellwig, 1793)

TRY Tromsø: Bergskog (EIS 162) August/September 2001. 20 specimens in pitfall traps in a fallow field (leg. & coll. JA); **FN** Nesseby: Hamarnes Ø (EIS 177) 6 July 1998. One specimen (leg. & coll. FØ). Previously reported north to **TRI** Målselv (Lindroth 1945).

Trechus secalis (Paykull, 1790)

NSY Bodø: Heggmoen (EIS 130) August 2001. 7 specimens in a fallow field (leg. & coll. JA). Previous records from Northern Norway: **NSI** and **TRI** (Lindroth 1960, Vik 1991).

Trechus obtusus Erichson, 1837

TRI Balsfjord: Sandøyra (EIS 154) September 1997. Several specimens in pitfall traps in open birch (*Betula pubescens*) forest (leg. & coll. JA). The species has been found in the western parts of Norway north to **TRY** (Lindroth 1960, Vik 1991). It occurs both in forest and in open, mesic grassland.

**Agonum dolens* (Sahlberg, 1827)

FI Kautokeino: Kautokeino (EIS 157) 12 June 1999. 4 specimens on moist, muddy soil in *Carex*-vegetation at the river Kautokeinoelva (leg. & coll. SO). Previous northernmost record in Norway was **NTI** (Andersen et al. 1984). However, the locality in Kautokeino is closely connected with the species distributional area in Finland (Lindroth 1945).

Harpalus affinis (Schrank, 1781)

TRI Målselv: Høgskardhus (EIS 147) August 1995. 1 specimen in a window trap in dense forest of aspen (*Populus tremula*) and birch (leg. & coll.

JA). This is not a natural habitat for the species, since it is a typical member of open, more or less dry, often anthropogenic places (Lindroth 1986). The open areas in the vicinity of the forest have been intensively explored (both by hand collecting and with pitfall traps), but no further specimens have been found. It can not be taken for granted therefore, that the species has been established in Troms County. Nearest Norwegian record is **NSI**, whereas the northernmost occurrence in Sweden is Nb Pajala (Lundberg 1995, Vik 1991).

Histeridae

Gnathoncus buyssoni Auzat, 1917

FØ Sørvaranger: Vaggatem (EIS 160) June/July 1999. 1 specimen in a window trap in a mixed forest (leg. & coll. SO & JA). The species lives in bird's nests (Koch 1989a). The other records from Northern Norway are from **TRI** Målselv: Rundhaug (Strand 1946) and Dividalen (Huse 1997). In the southern part of the country it has been recorded north to **HEN**.

Dendrophilus pygmaeus (L., 1758)

FØ Sørvaranger: Skogum (EIS 160) August 1997. 2 specimens in window traps (leg. & coll. JA & SO). The species is myrmecophilous and occurs in nests of e.g. *Formica* spp. (Koch 1989a). Previous northernmost records: **TRY** and **TRI** (Vik 1991).

Hister unicolor L., 1758

TRY Tromsø: Tromsøya (EIS 162) 9 September 1993. 1 specimen on a road (leg. & coll. SO). Previous finds from Northern Norway: **NSI**, **TRI**, **FI** and **FØ** (Vik 1991).

Leiodidae

Hydnobius septentrionalis Thomson, 1874

NNØ Narvik: Elvegård in Skjomen (EIS 139) August 2000. 1 B& on a moist silty spot at the sea (leg. & coll. JA); **TRY** Tromsø: Breivikeidet (EIS 163) August 2002. 1 B& in a pitfall trap in a fallow field (leg. & coll. JA & SO). Previously reported from **ON**, **TRI** and Finnmark county (Vik 1991).

**Leiodes inordinata* (J. Sahlberg, 1898)

TRI Målselv: Frihetsli (EIS 147) July 2002. 1 specimen in a pitfall trap in a fallow field (leg. & coll. JA & SO). *L. inordinata*, which in Norway previously was known from **NTI** Lierne and Mosvik (Ødegaard & Ligaard 2000), is probably a northeastern species. It is known from Finland, Russia and in Sweden from Värmland (Vr) to Torne Lappmark (To) (Lundberg 1995). The pitfall trap where the specimen was caught, was situated in a xeric-mesic, open area. The substratum consisted of gravel-mixed sand and was covered by a very scattered vegetation of *Empetrum* sp., *Antennaria dioica* and *Omalotheca supina*. *L. inordinata* was collected together with *Patrobus assimilis* Chaudoir, 1844, *Calathus melanocephalus* (L., 1958) and *Pterosticus adstrictus* Eschscholtz, 1823. The species has mostly been collected in traps in dense forest (Ødegaard & Ligaard 2000). It is therefore possible that it mainly is a forest species.

Leiodes punctulata (Gyllenhal, 1810)

TRI Målselv: Frihetsli (EIS 147) September 1998. Some specimens in pitfall traps (leg. & coll. SO). Previous Norwegian records were from **VE** and **FØ** (Vik 1991).

Agathidium seminulum (L., 1758)

FØ Sørvaranger: Noatun (EIS 160) June/July 1999. 2 specimens in window traps in mixed forest (leg. & coll. SO & JA). In Northern Norway previously reported from **TRI** Målselv: Rundhaug (Vik 1991).

Agathidium atrum (Paykull, 1798)

TRY Tromsø: Tromsøya (EIS 162) June 2000. Some specimens in pitfall traps in mixed forest (leg. & coll. SO). In Northern Norway previously recorded from the continental parts of Nordland, Troms and Finnmark (Vik 1991).

Agathidium nigrinum Sturm, 1807

TRY Tromsø: Tromsøya (EIS 162) June 2000. Several specimens in pitfall traps in spruce (*Picea abies*) plantation and in birch forest (leg. & coll. SO). The other records from Northern Norway

are from the inner provinces (**NSI**, **TRI** and **FØ**) (Vik 1991).

Colon latum Kraatz, 1850

TRY Tromsø: Sandeggen (EIS 163) June 2002. 1 specimen in a pitfall trap in a fallow field (leg. & coll. JA & SO). Previous North Norwegian records: **NSY**, **NSI**, **TRI** and **FØ** (Vik 1991).

Scydmaenidae

Stenichnus bicolor (Denny, 1825)

TRY Tromsø: Tromsøya (EIS 162) July 2000. 1 specimen in a pitfall trap in a birch forest (leg. & coll. SO). Previous North Norwegian records: **NSY**, **NSI**, **TRI** and **FØ** (Vik 1991).

Staphylinidae

Pselaphaulax dresdensis (Herbst, 1792)

TRY Tromsø: Tromsøya (EIS 162) August 2001 and July 2002. 3 specimens in pitfall traps in a bog (leg. & coll. SO). Previous northernmost record in Norway: **NSI** (Vik 1991).

Philonthus succicola Thomson, 1860

TRY Tromsø: Tromsøya (EIS 162) May 2002. 1 specimen (leg. & coll. SO). The species is distributed throughout the country north to Troms county (Vik 1991).

Euryporus picipes (Paykull, 1800)

TRY Tromsø: Lakselvbykt (EIS 163) June 2001. 1 specimen in a pitfall trap in a birch forest (leg. & coll. SO). The species is distributed throughout Northern Norway to **TRI** Nordreisa (Strand 1946, Vik 1991).

Quedius plagiatus (Mannerheim, 1843)

TRY Tromsø: Oldervikdalen (EIS 163) August 1995. Some specimens in window traps in birch forest (leg. & coll. JA). The species has been found in most of the provinces in Northern Norway (Strand 1946, Vik 1991).

Lithocharis nigriceps Kraatz, 1859

FØ Sørvaranger: Svanvik (EIS 168) 29 June 1997. 1 specimen sweep-netted on a warm evening (leg. & coll. JA & SO). The only other record from

North Norway is from **TRI** Nordreisa: Bilty (Strand 1953). This synanthropic species, which is a typical inhabitant of compost heaps, is a recent immigrant in Scandinavia and has expanded very rapidly northwards (Ødegaard 1999).

Stenus geniculatus Gravenhorst, 1806

TRY Tromsø: Sommarøy (EIS 162) July 2002. 1 specimen in a pitfall trap in a fallow field (leg. & coll. JA & SO). In Northern Norway previously recorded from **TRI** and **FN** (Vik 1991, Olsvik et al. 2001).

Stenus nitens Stephens, 1833

TRY Tromsø: Tønsvik (EIS 162) June 2002. 1 specimen in a pitfall trap in a fallow field (leg. & coll. JA & SO). In Northern Norway previously recorded from **FØ** (Vik 1991).

**Proteinus crenulatus* Pandelle, 1867

TRY Tromsø: Tromsøya (EIS 162) July 2001. 1 ♂ in a pitfall trap in a bog (leg. & coll. SO). The occurrence is very isolated from the rest of the distributional area since it previously has been found north to **STY** in Norway (Lindroth 1960, Vik 1991) and to Ångermanland (Ång) in Sweden (Lundberg 1995).

Hapalaraea sahlbergi (Luze, 1906)

FØ Sørvaranger: Svanvik (EIS 168) 29 June 1997. 2 specimens sweep-netted on a warm evening (leg. & coll. JA & SO); Langmyra (EIS 160) 8 July 1998. 1 specimen (leg. & coll. FØ); **FN** Tana: Alletnjarga NØ (EIS 176) 6 July 1998 (leg. & coll. FØ). Previous Norwegian records: **TRY**, **TRI** and **FI** (Vik 1991).

Trichophya pilicornis (Gyllenhal, 1810)

TRI Målselv: Frihetsli (EIS 147) August 1996. 1 specimen in a window trap (leg. LH, coll. JA). Previously found north to **NTI**, and in **FI** (Vik 1991).

Gyrophæna affinis Mannerheim, 1830

FØ Sørvaranger: Vaggatem (EIS 160) July 1997. 1 ♂ in a window trap (leg. & coll. JA & SO). Previous northernmost record in Norway was **TRI** Bardu: Setermoen (Andersen 1962).

Gyrophæna pseudonana Strand, 1939

FØ Sørvaranger: Lyngmo (EIS 160) July 1967. 1 specimen sweep-netted on a warm evening (leg. & coll. JA). This rare species, which is red-listed both in Sweden and Norway (Gärdenfors 2000, Direktoratet for Naturforvaltning 1999), seems to have a highly discontinuous distribution in Fennoscandia. Besides the new record, the other known Norwegian provinces of the species are **ON** and **TRI**. In Sweden, however, the northernmost published province is Jämtland (Jä) (Lundberg 1995), which is situated much further south (south of 65°N) than the two northernmost localities in Norway (about 69°N). The few available descriptions of the bionomic of *G. pseudonana* in Scandinavia (Strand 1946, Palm 1968) suggest that it may be confined to mushrooms growing in fluvial forests and meadows. Fluvial forests also have some other beetle species with a highly discontinuous distribution in Fennoscandia e.g. *Gyrophæna transversalis* Strand 1939 and *Anthobium fusculum* (Erichson, 1840) (Andersen & Hanssen 1994).

Oxypoda lugubris Kraatz, 1856

TRY Tromsø: Sandeggen (EIS 163) July 2002. 1 specimen in a pitfall trap (leg. & coll. JA & SO). The other North Norwegian records are from **NSI**, **TRI**, **FN** and **FØ** (Vik 1991).

Oxypoda spectabilis Märkel, 1844

TRY Tromsø: Oldervikdalen (EIS 163) August/September 2002. 1 specimen in a pitfall trap (leg. & coll. JA & SO). In Northern Norway otherwise found in **NNV**, **TRI** and **FI** (Vik 1991).

Aloconota insecta (Thomson, 1856)

TRY Tromsø: Tromsøya 20 June 2001. 1 specimen caught swarming (leg. & coll. SO). Previously reported from the continental parts of Northern Norway north to **FI** (Vik 1991).

Aloconota sulcifrons (Stephens, 1832)

TRY Tromsø: Sandeggen (EIS 163) July-September 2002. 6 specimens in pitfall traps (leg. & coll. JA & SO). Previous records from Northern Norway: **NSI** and **TRI** (Vik 1991).

Liogluta granigera (Kiesenwetter, 1850)

TRY Tromsø: Tromsøya, Håkøybotn (EIS 162) and Breivikeidet (Flalmo) (EIS 163) July/August 2002. Some specimens in pitfall traps, both in birch forest and on open ground (leg. & coll. JA & SO). The other North Norwegian records are from **NSI**, **NNV**, **TRI** and **FV** (Vik 1991).

Liogluta microptera (Thomson 1867)

TRY Tromsø: Tromsøya (EIS 162) July 2000. 2 specimens in pitfall traps in a birch forest (leg. & coll. SO); Bergskog, Håkøybotn and Sommarøy (EIS 162) June-July 2002. Some specimens in pitfall traps (leg. & coll. JA & SO). The species is distributed throughout Northern Norway north to **TRY** (Strand 1946, Vik 1991).

Atheta ebenina (Mulsant & Rey, 1873)

TRY Tromsø: Tromsøya (EIS 162) 20 June 2001. 2 specimens swarming in the afternoon (leg. & coll. SO). According to Strand (1946) found in Tromsø (**TRY**) but not reported in Lindroth (1960), Strand (1970, 1977) or Vik (1991). Earlier North Norwegian records: **NNV**, **TRI**, **FN** and **FØ** (Vik 1991).

**Atheta paracrassicornis* Brundin, 1954

TRY Tromsø: Laukslett (EIS 162) June/July 2002. 2 ♂♂ in pitfall traps in a sandpit (leg. & coll. JA & SO). Previous records from Norway were from the southern parts of the country (Vik 1991), but it is more widespread in Sweden and recorded north to the province most adjacent to Troms, i.e. Torne lappmark (To) (Lundberg 1995).

Clambidae*Clambus armadillo* (De Geer, 1774)

TRY Tromsø: Tromsøya (EIS 162) June-August 2002. Some specimens in pitfall traps in a bog (leg. & coll. SO). In Northern Norway previously reported from **TRI** and **FØ** (Vik 1991).

Elmidae*Elmis aenea* (Müller, 1806)

TRY Harstad: Møkklandsvatn (EIS 145) 1 September 1994. 2 specimens in gut content of

trout (*Salmo trutta*) caught in a small stream (leg. & coll. SO); Tromsø: Tønsvik (EIS 162). Several larvae in a small stream (leg. T. Hesthagen, coll. JA). Previous records from North Norway: **FI** and **FØ** (Vik 1991).

Cantharidae

Absidia rufotestacea (Leitzner, 1845)

TRY Tromsø: Oldervikdalen (EIS 163) August 1995. 2 specimens in window traps (leg. & coll. JA). The species has otherwise been found in the continental parts of Northern Norway north to **FØ** (Strand 1946, Vik 1991).

Malthodes marginatus (Latreille, 1806)

TRY Tromsø: Oldervikdalen (EIS 163) August 1995. 1 specimen in a window trap (leg. & coll. JA). Previous northernmost record in Norway: **NSI** (Vik 1991).

Malthodes brevicollis (Paykull, 1798)

TRY Tromsø: Sommarøy (EIS 162) June 2002. 1 specimen in a pitfall trap (leg. & coll. JA & SO). In Northern Norway otherwise found in **TRI** and **FI** (Vik 1991).

Elateridae

Neohypdonus arcticus (Candeze, 1860)

TRY Tromsø: Håkøybotn (EIS 162) June 2002. Several specimens in pitfall traps in a fallow field (leg. & coll. JA & SO). This Northern species has previously been found in the continental parts of the country from **NTI** to **FI** (Strand 1946, Vik 1991). *N. arcticus* is reported from more or less moist habitats such as swamps, lake shores and flotsam on river banks, but it should also occur on dry ground in birch forest (Strand 1946). However, our finds from Troms have been made in open, mesic-dry habitats with heterogeneous moraine soil, whereas we never have collected the species in wet or moist habitats.

Ascoliocerus hyperboreus (Gyllenhal, 1827)

TRI Målselv: Frihetsli (EIS 147) 18 June 1993 and July 1997 (leg. & coll. SO & JA). The species was abundant under stones on dry, open moraine

soil. In Norway previously found in Nordland (**NSI**, **NSY**) and Finnmark (**FV**, **FI**, **FN**) (Vik 1991).

Orithales serraticornis (Paykull, 1800)

NSY Bodø: Heggmoen (EIS 130) 23 June 2003. 1 specimen caught flying (leg. & coll. JA). Previously recorded from most of the North Norwegian provinces (Vik 1991).

Byrridae

Byrrhus arietinus Steffahn, 1842

TRY Tromsø: Fløya (EIS 162) July 1999. 2 specimens in pitfall traps (leg. & coll. SO). The species has now been reported from most provinces in Northern Norway (Vik 1991).

Dermestidae

Anthrenus museorum (L., 1761)

NSY Bodø: Heggmoen (EIS 130) 9 June 2002 and 23 June 2003. 3 specimens collected flying (leg. & coll. JA). Previous North Norwegian records: **TRY** and **TRI** (Vik 1991).

Anobiidae

* *Xyletinus hanseni* Jansson, 1947

TRI Målselv: Dividalen (EIS 147) July 1994, July/August 1996. 3 specimens in window traps (leg. JA, LH & ØH, coll. JA). *X. hanseni* has previously been found in the southernmost part of Norway (**AK**, **BØ**, **VE**), but it is distributed throughout Sweden north to To (Vik 1991, Lundberg 1995). As most other species of the genus, *X. hanseni* is regarded as xylophagous in Central Europe (Koch 1989b). However, in Scandinavia its larvae develop in dry faeces, preferably of hare (*Lepus* sp.) (O. Hanssen pers. comm.). Whether this difference reflects a real habitat shift is uncertain.

* *Caenocara bovistae* (Hoffmann, 1803)

TRI Målselv: Frihetsli (EIS 147) August 1996. 1 specimen in a window trap (leg. LH & JA, coll. JA). The species lives in puffballs (Fungi: Lycoperdaceae) (Koch 1989b). Previously recorded north to **ON** in Norway (Vik 1991), but it occurs north to To in Sweden (Lundberg 1995).

Nitidulidae

Eपुरaea angustula Sturm, 1844

TRY Tromsø: Oldervikdalen (EIS 163) August 1995. Some specimens in window traps (leg. & coll. JA). Previously only reported from the inner provinces of Northern Norway (**NSI**, **TRI**, **FI**, **FØ**) (Vik 1991).

* *Omosita depressa* (L., 1758)

TRI Målselv: Frihetsli (EIS 147) July 1994, 1996. 2 specimens in window traps (leg. JA, LH & ØH, coll. JA); Rostavatn (EIS 154) July 1999. 1 specimen on a flower of *Sorbus aucuparia* (leg. JA & SO, coll. SO); **FØ** Sørvaranger: Vaggetem (EIS 160) 11 July 1998. 1 specimen (leg. & coll. FØ). The species, which lives on bones and in dry carcasses (Koch 1989b), has previously been recorded north to **NTI** (Vik 1991), but it occurs north to To in Sweden (Lundberg 1995).

* *Thalycra fervida* (Olivier, 1790)

TRI Målselv: Frihetsli (EIS 147) July 1994. 1 specimen (leg. ØH, coll. JA); **FØ** Sørvaranger: Noatun (EIS 160) July 1999. 1 specimen (leg. JA & SO, coll. SO). On both places collected in window traps. *T. fervida* is mycetophilous and the larvae develop in various species of ground living Gastromycetes (Koch 1989b). Otherwise only recorded from South Norway (**AAV**, **VAY**, **ON**, **BØ**) (Vik 1991), but it is present north to Lule lappmark (Lu) in Sweden (Lundberg 1995).

Aspidiphoridae

Aspidiphorus orbiculatus (Gyllenhal, 1808)

TRY Tromsø: Breivikeidet, Flalmo (EIS 163) June 2002. 1 specimen in a pitfall trap (leg. & coll. JA & SO). The other North Norwegian records are from **NNØ**, **TRI** and **FI** (Vik 1991).

Corticariidae

Enicmus fungicola Thomson, 1868

TRY Tromsø: Oldervikdalen (EIS 163) August 1995. Some specimens in window traps in birch forest (leg. & coll. JA). The species has previously been found north to **NTI**, and in **TRI**, **FI** and **FØ** (Vik 1991).

Stephostethus lardarius (De Geer, 1775)

TRY Tromsø: Kroken (EIS 162) 21 September 1998. 1 specimen in a house; Tromsøya (EIS 162) 27 June 1999. 1 specimen sweep-netted from the vegetation on a meadow; June 2000. 1 specimen in a pitfall trap (leg. & coll. SO); Håkøybotn and Bergskog (EIS 162) June 2002. Some specimens in pitfall traps in fallow fields (leg. & coll. JA & SO). Previous records from Northern Norway: **NSI** and **TRI** (Vik 1991).

Corticaria impressa (Olivier, 1790)

TRY Tromsø: Sommarøy (EIS 162) July–August 2002. 4 specimens in pitfall traps in a fallow field (leg. & coll. JA & SO). In Northern Norway otherwise found in **NSI**, **NNV**, **TRI**, **FI** and **FØ** (Vik 1991).

Corticaria orbicollis Mannerheim, 1853

TRY Tranøy: Ånderdalen (EIS 153) July 1997. 1 specimen in a sporocarp of *Phellinus* sp. (leg. J. G. Brattli, coll. JA). In Northern Norway otherwise found in **NSI**, **TRI**, **FI**, **FN** and **FØ** (Vik 1991).

Ciidae

Cis hispidus (Paykull, 1798)

NNØ Narvik: Skjomdal (EIS 139) November 1996. Several specimens in sporocarps of *Trametes* sp., which is the host of the species (Fossli & Andersen 1998) (leg. TF, coll. JA). The species has been found in most of the provinces in Northern Norway (Vik 1991).

Cis punctulatus Gyllenhal, 1827

NNØ Narvik: Skjomdal (EIS 139) November 1996. The species was common in sporocarps of *Trichaptum fusco-violaceus*, which is the preferred host of the species (Fossli & Andersen 1998) (leg. TF, coll. JA). *C. punctulatus* has been recorded in the continental parts of Norway north to **TRI** (Vik 1991).

Ennearthron cornutum (Gyllenhal, 1827)

TRY Tranøy: Ånderdalen (EIS 153) July 1997. Some specimens in sporocarps of *Phellinus* sp. (leg. J.G. Brattli, coll. JA). Previously found in **TRI** (Fossli & Andersen 1998) and in South Norway north to **OS** (Vik 1991).

Sulcacis affinis (Gyllenhal, 1827)

TRY Tromsø: Oldervikdalen (EIS 163) July 1994. Some specimens in window traps (leg. & coll. JA). Previously found in **TRI** and in South/Central Norway north to **STI** (Vik 1991, Olberg et al. 2001). As the preceding species, *S. affinis* is distributed throughout Sweden north to Lu (Lundberg 1995).

Octotemnus glabriculus (Gyllenhal, 1827)

NSI Saltdal: Øvre Saltdal (EIS 127) 13 May 2000. Some specimens in sporocarps of *Trametes ochracea* (leg. & coll. JA). In Northern Norway previously recorded in **NNV**, **TRY**, **TRI** and **FØ** (Vik 1991).

Oedemeridae

Oedemera virescens (L., 1767)

FØ Sørvaranger: Svanvik (EIS 160) 29 June 1997. 1 specimen in a flower of *Trollius europaeus* (leg. JA & SO, coll. JA). The larvae of *Oedemera* develop in the stems and roots of various species of herbs (Koch 1989b). In North Norway the species has been found in Nordland and the continental parts of Troms and Finnmark (Strand 1946, Vik 1991).

Anthicidae

Omanodus floralis (L., 1758)

TRY Tromsø: Tromsø (EIS 162) 4 August 1998. 1 specimen on a house wall (leg. & coll. SO). In Northern Norway previously reported from **TRI** (Vik 1991).

Meloidae

Meloe violaceus Marsham, 1802

NNØ Evenes: Østervik (EIS 139) 2 specimens on the ground (leg. E. Rise, coll. JA). The species is distributed throughout Northern Norway to **FI** (Strand 1946, Vik 1991).

Chrysomelidae

Donacia aquatica (L., 1758)

TRY Tromsø: Tromsøya (EIS 162) 12 and 17 June 1994. 4 specimens on vegetation in a lake (leg. & coll. SO). In Northern Norway previously recorded from **NSY**, **NSI** and **TRI** (Vik 1991).

Clytra quadripunctata (L., 1758)

FØ Sørvaranger: Skogum (EIS 160) July 1997; Noatun (EIS 160) July 1999. 6 specimens in window traps in aspen forest (leg. & coll. JA & SO). The larva develops in nests of *Formica* spp. (Koch 1992). The other North Norwegian records of the species are from **NSY**, **NSI**, **NNØ** and **TRY** (Vik 1991).

* *Cryptocephalus pini* (L., 1758)

TRI Målselv: Frihetsli (EIS 147) July 1994. 1 specimen in a window trap (leg. ØH, coll. JA); Alappmoen (EIS 154) July 1999. 1 specimen in a window trap (leg. JA & SO, coll. SO). Previous northernmost records in Norway were **STY** and **STI** (Vik 1991), but it occurs north to To in Sweden (Lundberg 1995). The host plant of *C. pini* is various species of conifers, e. g. *Pinus sylvestris* (Koch 1992).

Phratora polaris (Sparre Schneider, 1886)

FØ Sørvaranger: Vaggetem (EIS 160) July 1999. 1 specimen in a window trap in mixed forest (leg. & coll. SO & JA). Most finds of the species from Norway are made above the timber line (Strand 1946).

Longitarsus holsaticus (L., 1758)

TRY Tromsø: Tromsøya (EIS 162) June 2001 and July 2002. 2 specimens in pitfall traps in a bog (leg. & coll. SO). In Northern Norway previously reported from **NSI** and **FØ** (Vik 1991).

Curculionidae

Sitona lineellus (Bonsdorff, 1785)

NSI Saltdal: Bleiknes (EIS 127) 10 June 2002. 4 specimens on dry sand at the base of *Astragalus alpinus* at the river Saltdalselva (leg. & coll. JA); **FN** Tana: Tana bru (EIS 176) 6 July 1998. 1 specimen on *A. alpinus* (leg. & coll. FØ). The species has now been recorded in most provinces in Northern Norway (see Vik 1991).

Rhinoncus castor (Fabricius, 1792)

TRY Tromsø: Oldervikdalen (EIS 163) 2 June 2000. Several specimens on dry sand in a sandpit (leg. & coll. JA). They occurred at the base of

Rumex acetosella, which is the preferred host (Koch 1992); Bergskog (EIS 162) June–August 2002. 16 specimens in pitfall traps (leg. & coll. JA & SO). Previous records of *R. castor* from Northern Norway: **NSI**, **TRI**, **FI** and **FN** (Vik 1991).

DISCUSSION

A majority of the new records (41) are from **TRY**. The total number of known beetle species from this province is now 685. By this calculation we have included a number of unpublished riparian species, but excluded five saproxylic species that have been reported from **TRY**. These latter five species are (with locality in brackets) *Stephanopachys substriatus* (Paykull, 1800) (Trondenes), *Serropalpus barbatus* Sellenius, 1786 (Tromsø), *Monochamus urossovii* (Fischer, 1806) (Tromsø), *M. galloprovincialis* (Olivier, 1796) (Tromsø) and *Grammopera ruficornis* (Fabricius, 1781) (locality unknown). The reason for excluding them is that they most likely represent introductions without establishment. Accordingly, *S. barbatus* and *M. urossovii* prefer, or are confined to, spruce (Bil Ω & Mehl 1989, Koch 1992). Spruce is an introduced species in **TRY** and at the time of the finds of these two beetle species in Tromsø (before 1918) there were hardly any established spruce plantations in the county (Nilssen 1978). Pine (*Pinus sylvestris*), which is the preferred host of *S. substriatus* and *M. galloprovincialis* (Bil Ω & Mehl 1989, Koch 1992), is so scatterly distributed in the district where the two beetles have been found in **TRY** (Benum 1958, Engelskjøn & Skifte 1995), that establishment of the beetles seems unlikely. *G. ruficornis* seems to be limited to the nemoral and boreonemoral zones. **TRY** is situated far north of these vegetational zones (Moen 1999) and we therefore find it unlikely that the species should have established in this province.

The number of recorded species from **TRY** is much lower than in the neighbouring province **TRI** where the total number of registered species now is 1132. A partial reason for this is differences in intensity of research. **TRI**, which constitute the continental part of Troms county, has attracted

entomologists for more than a century and especially the valley Målselvdalen with tributaries, has been visited many times by several collectors (see e.g. Strand 1946, Andersen 1962, Zachariassen 1972, Andersen et al. 2000, Olberg et al. 2001) whereas Reisadalen in the northernmost part of the county is less well investigated (Strand 1953). Although the areas around the town Tromsø in **TRY** now are fairly well investigated other parts of the province remain nearly unexplored. This, among others, applies to some districts that are supposed to harbour a richer beetle fauna than the areas around Tromsø. One of them is the island Senja whose southern parts are covered by pine forest. A quite rich saproxylic beetle fauna may be associated with these pine forests as is suggested by the investigations by Nilssen (1993).

Most other provinces in Northern Norway are also less well investigated than **TRI**. This especially applies to **NNØ** (see Andersen 1966, Nilssen & Andersen 1977) where less than 325 species have been recorded. The true number of species in this province is appreciably higher than published (Olberg in prep.).

Nevertheless, despite these differences in the investigation intensity between provinces, the real number of species in **TRI** is probably higher than in the other provinces in Northern Norway, perhaps except for the province **FI**. Circumstances supporting this are the following: In the provinces of Nordland (**NSY**, **NSI**, **NNV**, **NNØ**), which are situated south of **TRI**, barriers, perhaps also climate (high precipitation), may have prevented immigration of a number of saproxylic species that are present in Troms (Olberg et al. 2001). This may also apply to species reported from Troms in the present article since several of them are unknown from Nordland. In the province **TRY**, a less favourable summer climate with lower temperatures and higher precipitation than in **TRI** (Aune 1993, Moen 1999) may contribute to a lower number of species. Although continental parts of Finnmark county may have a favourable summer climate, the summer is short and the winter extremely cold (Aune 1993, Moen 1999). In accordance with this, most of Finnmark belongs to the northern boreal zone, whereas large parts

of **TRI** are situated in the middle boreal zone (Moen 1999). A number of plant- and animal species, including beetles, are known to be absent from the northern boreal zone (Andersen & Halvorsen 1984, Moen 1999, Andersen et al. 2000, Olberg et al. 2001). Considering its northern position (about 68.5-70°N) inner parts of Troms therefore probably have an extraordinarily high number of beetle species, comprising about 1/3 of the known Norwegian species.

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***Cheilosia chloris* (Meigen) in Norway (Diptera, Syrphidae)**

Ole Lønnve & Tore R. Nielsen

Lønnve, O. & Nielsen, T.R. 2003. *Cheilosia chloris* (Meigen, 1822) in Norway (Diptera, Syrphidae). *Norw. J. Entomol.* 50, 68.

A new Norwegian record of *Cheilosia chloris* (Meigen, 1822) is reported from Bonn, Frogn, Akershus county.

Key words: *Cheilosia chloris*, Syrphidae, Norway.

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The occurrence of *Cheilosia chloris* (Meigen, 1822) in Norway has up to now been uncertain. Siebke (1877) published one male and one female from Christiania (= Oslo), but the material has not been found and may be lost. A female of *C. chloris*, collected by the first author, verifies its occurrence in Norway. The dates are **AK** Frogn: Bonn (EIS 28), some 22 km south of Oslo, 7 May 2002. The specimen is kept in the last author's collection.

Cheilosia chloris is known from most parts of Europe, from Sweden and Denmark south to the Pyrenees, and from Belgium eastwards into European parts of Russia and on into Siberia (Speight 2001). It has an early flight period, from the beginning of April till early July. In Denmark it has been found in deciduous forests and humid meadows and bogs (Torp 1994).

The larva was found in *Petasites paradoxus* (Kaltenbach 1874), in *Carduus* and *Scrophularia* (Kormann 1988) and the female has been observed ovipositing on *Carduus oleraceum* (Doczkal 1996).

Cheilosia chloris much resembles *C. fraterna* (Meigen, 1830), another northern species with an early flight period. *C. chloris* lacks bristles on the

scutellum margin (group C of Sack), scutum all yellow haired, and hind tibia in the male with a dark ring in the middle.

C. fraterna has (black) bristles on the margin of scutellum (group D of Sack), hind part of scutum black haired, and hind tibia all orange yellow (or sometimes just with a faint shadow).

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Giellis, Cees. 2003. World Catalogue of Insects. Volum 4. Pterophoroidea & Alucitoidea (Lepidoptera). 198 s. Innbundet. Apollo Books, Kirkeby Sand 19, DK-5771 Stenstrup, Denmark. ISBN 87-88757-68-4. DKK 320,- + porto. Ved abonnement på serien gis 10% rabatt.

Dette er første bind om Lepidoptera i denne viktige serien fra Apollo Books. Ytterligere bind om Lepidoptera er under forberedelse. De to overfamiliene Pterophoroidea og Alucitoidea omfatter gruppene som på norsk kalles henholdsvis fjærmøll og fingermøll. Alucitoidea har ikke vært katalogisert på verdensbasis siden Edward Meyricks del 17 i *Lepidopterorum Catalogus* utkom i 1917. Pterophoroidea omfatter 1139 arter, av disse er 33 påvist i Norge. For Alucitoidea er tilsvarende tall 205 og 2. Forfatteren har arbeidet spesielt med fjærmøll siden 1970-tallet, og har publisert tallrike revisjoner og beskrivelser av nye arter. I 1993 publiserte han en sjekklister og slektsrevisjon av familien Pterophoridae og i 1996 en monografi som omhandler Europas fauna av denne familien.

Informasjonen i katalogen er oppdatert til og med år 2002. I likhet med tidligere bind i serien, starter boka med en angivelse av antall arter i alle taxa over artsnivå. Alle taxa over art er ordnet i systematisk rekkefølge, basert på forfatterens arbeid fra 1993. Innenfor slektene er artene listet opp alfabetisk. For hver slekt angis typeart, og om typearten er utvalgt av beskriveren, ved en senere typeutvelgelse, eller monotypi. For hver art angis slekten som arten først ble kombinert med og typelokalitet (vanligvis landet). Hvor typematerialet befinner seg, blir ikke angitt. Alle synonymer og viktige stavefeil er inkludert. Det refereres til originalbeskrivelsen for alle navn. Utbredelsen angis grundig: Alle land der arten er påvist, listes opp, ordnet i faunaregioner. I tilfeller der det er kjent, angis også næringsplante(r). Nomenklatoriske endringer som innføres i boka, er nevnt i oppsummeringen aller først.

Hvert artsnavn er konsekvent stavet som i originalbeskrivelsen uavhengig av om arten på et senere tidspunkt er overført til en annen slekt. Nomenklaturkodens krav om at adjektiviske artsnavn skal bøyes i samsvar med slektsnavnets

kjønn, er derved ikke fulgt. Regelen om «gender agreement» er sterkt omstridt, og i 2002 vedtok den europeiske sommerfuglkongressen i Danmark en resolusjon der lepidopterologer oppfordres til å trosse den. Det er i mange tilfeller vanskelig for personer som ikke har skoling i klassiske språk å praktisere regelen korrekt. Forfatteren gjennomførte en test av enkelte navn som ble forelagt eksperter på klassiske språk, med det resultat at ekspertene delvis kom til ulike konklusjoner. Ved ganske enkelt å holde fast på den originale stavemåten, unngås endeløse diskusjoner om hva som er den korrekte endelsen på navnet. I katalogen heter det *Hellinsia distinctus*, ikke «*distincta*», for denne arten som opprinnelig ble beskrevet i slekten *Pterophorus*.

Litteraturlisten er svært omfattende (44 sider) og omfatter alt som er publisert om fjær- og fingermølls taksonomi, og jeg mener også at den omfatter så å si alt om disse gruppens biologi og faunistikk.

Det er ikke til å unngå at det sniker seg inn noen feil i et så stort arbeid. I «Summary» nevnes familienavnet Agdistopidae. Ellers i katalogen opererer man med navnet Macropiratidae for denne familien. Jeg har ikke systematisk jaktet på feil, men noe tilfeldig fant jeg at *Oxyptilus insomnis* mangler parentes rundt autor og årstall. Prøv å slå opp på referansen Pototski 1989! Litteraturhenvisningen der er ubegripelig. Den største mangelen ved boka er etter min mening at den er trykket på for simpelt papir!

I forhold til hensikten med katalogen, mener jeg at forfatteren fullt ut innfrir. Boka gir en komplett og autoritativ oversikt over de to overfamiliene når det gjelder nomenklatur, klassifikasjon, utbredelse og næringsplanter. Boka er viktig for alle som er interessert i fjærmøll og fingermøll i et perspektiv som strekker seg utover Europas grenser. For museer er den et viktig hjelpemiddel når samlingen skal stilles opp. Den gir et glimrende utgangspunkt for den som vil arbeide videre med fjær- eller fingermøllenes taksonomi og biologi.

Leif Aarvik

Hausmann, A. 2001. The Geometrid Moths of Europe. Volume 1. Introduction. Archiearinae, Orthostixinae, Desmobathrinae, Alsophilinae, Geometrinae. 282 s. Innbundet. Apollo Books, Kirkeby Sand 19, DK-5771 Stenstrup, Denmark. ISBN 87-88757-54-4. DKK 490,- + porto. Ved abonnement på serien gis 10% rabatt.

Mironov, Vladimir. 2003. The Geometrid Moths of Europe. Volume 4. Larentiinae II (Perizomini & Eupitheciini). 463 s. Innbundet. Apollo Books, Kirkeby Sand 19, DK-5771 Stenstrup, Denmark. ISBN 87-88757-40-4. DKK 720,- + porto. Ved abonnement på serien gis 10% rabatt.

Denne nye engelskspråklige serien om Europas målere vil til sammen omfatte 6 bind. Det er det første verk som behandler denne store gruppen av sommerfugler siden Jules Culot publiserte den berømte 4-binds-serien «Noctuelles et Géomètres d'Europe» for nesten 100 år siden. Faunaen i Europa teller nå mer enn 900 arter. Opplegget for serien kombinerer vitenskapelig metode og grundighet med en leservennlig layout og rikelig med illustrasjoner. Det gjør at bøkene er like nyttige for nybegynneren som for en erfaren fagperson. På fargeplansjene avbildes mange eksemplarer av hver art slik at hele spekteret av variasjon dekkes. Hannlige og hunnlige genitalier av alle arter er illustrert.

I vol. 1 utgjør introduksjonen til serien 65 sider. Her finner vi følgende kapitler (oversatt):

1. Kort historisk oversikt og status for utforskingen av Europas målerfauna.
2. Målerne og mennesket (skadearter og deres kontroll, truede arter og vern, innsamling og samlinger).
3. Målerne i deres livsmiljø (atferd og økologi).
4. Målerne: Et vellykket resultat av evolusjonen (morfologi).
5. Et naturlig system for familien Geometridae (fylogeni, taksonomi og nomenklatur).

Forfatterne har lagt vekt på å sikre stabilitet i navngivingen. For de 42 artene som behandles i

bind 1, måtte identiteten til nesten 400 navn kontrolleres. Alle synonymer og viktige feilbestemmelser blir listet opp og har referanser til litteraturen.

I den systematiske delen behandles følgende punkter for hver art: Diagnose, hannlige og hunnlige genitalier, utbredelse, flyvetid, biologi, habitat, lignende arter og eventuelle kommentarer. For hver art er det utbredelseskart der hele utbredelsesområdet er vist med grå farge, og forekomsten av kontrollert materiale i tillegg er angitt ved svarte prikker. Det er ikke nøkler til slekter og arter. Bøkene er lette å finne fram i. Hver art har et nummer som går igjen både i tekstdelen og ved alle illustrasjoner av arten. I begge bind er det svært omfattende litteraturlister. Til slutt er det systematiske sjekklister som omfatter ikke bare alle Europas arter, men også arter som finnes i Europas nærhet, for eksempel i Kaukasus og Nord-Afrika.

Slekten *Eupithecia* med 128 arter i Europa og mer enn 1300 i hele verden, representerer – ved siden av slekten *Idaea* – den største utfordringen for forfatterne av serien. *Eupithecia* er en slekt som mange lepidopterologer unngår fordi artene er relativt små og like av utseende. I en stor del av tilfellene kan dyrene bare bestemmes ved genitalundersøkelse. Ikke alt som har vært publisert om denne gruppen i seinere år har hatt den kvalitet som må til for å oppnå sikker artsbestemmelse. Mironov gjør et viktig grep for å skape struktur i massen av arter ved å fordele dem i en rekke uformelle artsgrupper. Forfatteren har i realiteten gjennomført en revisjon av hele Europas fauna av *Eupithecia*. Det fremgår indirekte av teksten at denne revisjonen egentlig omfatter hele Palearktis. Det hjelper også godt at de fotografiske fargeplansjene er de beste under tegnede har sett for denne gruppen. Sist, men ikke minst er genitallfigurene tydelige, og bærer preg av å være tegnet av en ekspert.

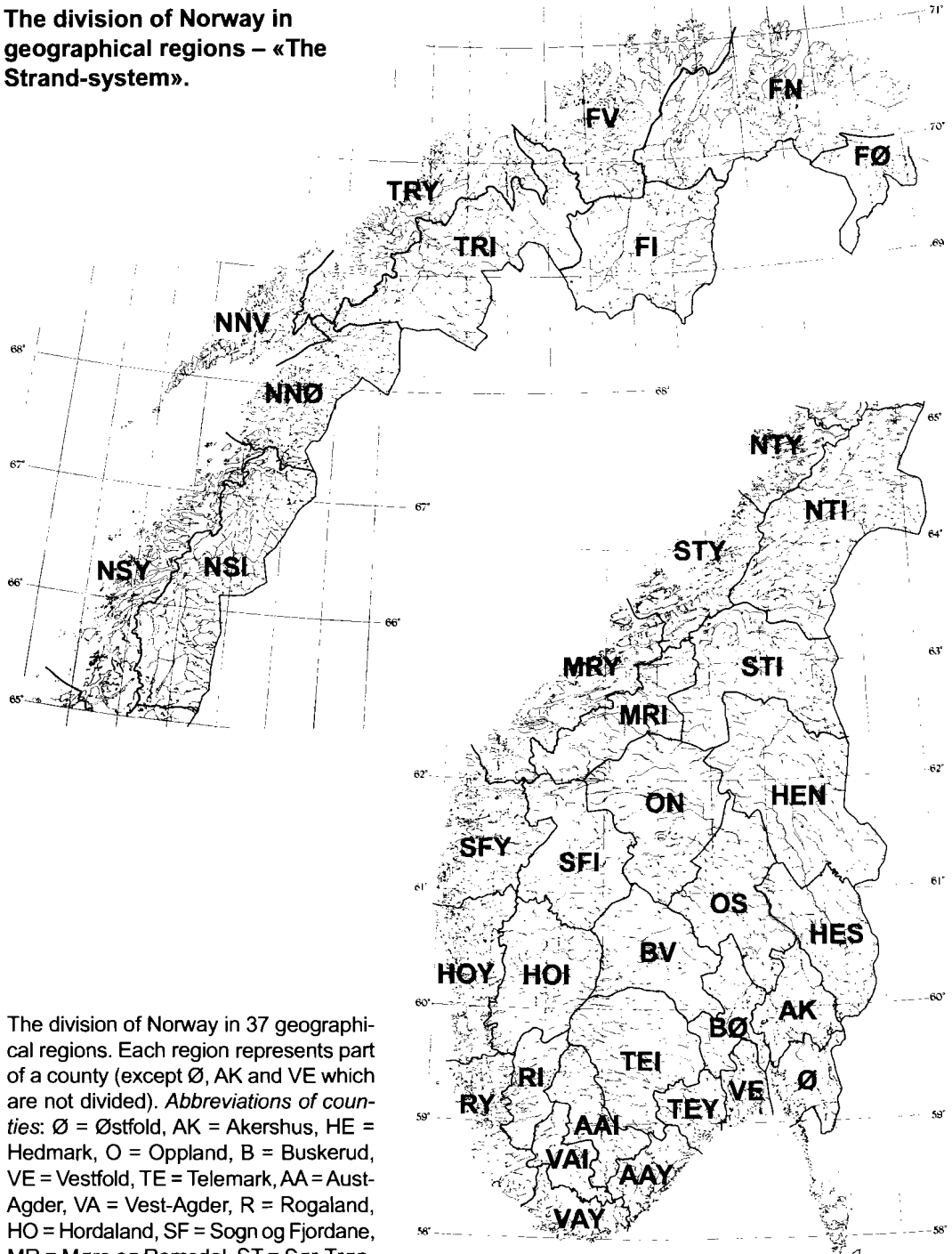
Anmelderen finner diskusjonen under kapitlet om vern særlig interessant. I Mellom-Europa (og i Norge) har det vært en tendens til å frede arter mot innsamling uten at man samtidig beskytter artenes levesteder. Her slås det entydig fast: «Det eksisterer intet vern av en art, uten at denne artens levested er vernet». Mange steder i Europa be-

traktes nå insektsamling nærmest som faunakriminalitet. Meningsløs lovgivning som kun freder arter, har bidratt til denne holdningen. Samtidig tillater politikerne at naturen ødelegges i industriell skala. Forfatteren gir noen eksempler som belyser problemstillingen rundt innsamling av insekter. En enkelt flaggermus spiser 1,8-3,6 kg. insekter pr. år, og av dette utgjør nattsommerfuglene ca. 10 000 individer. Det vil si at noen få flaggermus spiser flere nattsommerfugler enn alle Europas sommerfuglsamlere til sammen klarer å fjerne! Mange insekter blir drept ved kollisjon med biler på Europas tette og tungt trafikkerte veinett. På en 1-km veistrekning i Østerrike fant man ved en undersøkelse at 3000 insekter ble drept bare av en enkelt bil. Sterke flomlys ved et monument i Sør-Italia tiltrekker omkring 5 millioner natt-flyvende storsommerfugler i løpet av et år.

For øyeblikket er det under utgivelse flere serier som behandler Europas sommerfugler: Foruten denne målerserien er det Noctuidae Europaea og Microlepidoptera of Europe. Alle disse seriene har lagt seg på en høy standard både teknisk og faglig. Det er hyggelig at nykommeren av disse, The Geometrid Moths of Europe, ikke står noe tilbake i forhold til de andre to.

Leif Aarvik

The division of Norway in geographical regions – «The Strand-system».



The division of Norway in 37 geographical regions. Each region represents part of a county (except Ø, AK and VE which are not divided). *Abbreviations of counties:* Ø = Østfold, AK = Akershus, HE = Hedmark, O = Oppland, B = Buskerud, VE = Vestfold, TE = Telemark, AA = Aust-Agder, VA = Vest-Agder, R = Rogaland, HO = Hordaland, SF = Sogn og Fjordane, MR = Møre og Romsdal, ST = Sør-Trøndelag, NT = Nord-Trøndelag, N = Nordland, TR = Troms, F = Finnmark. *Abbreviations of subdivisions:* I = interior, Y = coastal, S = southern, N = northern, V = Western, Ø = eastern.

Instructions to authors

The language is English or occasionally Norwegian with an English summary. The authors are advised to consult previous issues for lay-out and fonts. All manuscripts will be considered by referees before acceptance.

Manuscripts, «one and a half» spaced on one side of the paper, must be submitted in duplicate. Separate sheets should be used for (1) title page with authors names, (2) abstract followed by the name(s) and postal address(es) of the author(s), (3) tables, (4) numbered figures and (5) legends to figures. *Acknowledgements* should be gathered under a single heading at the end of the text.

Abstract should not exceed 300 words and should cover the main results and conclusions of the paper. A list of up to five *key words* may be added on a separate line below the abstract. Authors, year, title of paper and Norw. J. Entomol. Vol. No. should be inserted above the abstract.

Tables are typed on separate sheets and numbered consecutively. Each table must have a heading. Write «Table» in full both in the text and table heading. Avoid vertical lines in the Table.

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Økland (1981), Fauna (Oslo) 34, 167-178, and preferably the EIS number should be added.

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Book

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Chapter in book

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