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Front cover: *Peltis grossa* (Linnaeus, 1758) (Coleoptera, Trogossitidae). Artist: Karl Erik Zachariassen.

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Taxonomic status and geographical range of some recently revised complex-species of Coleoptera in Norway

Frode Ødegaard

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The Norwegian material on ten pairs of closely related species of Coleoptera is revised based on museum and private collections. The following six species are reported for the first time from Norway: *Rybaxis laminata* (Motschulsky, 1836) as distinguished from *R. longicornis* (Leach, 1817), *Philonthus micanthoides* Benick & Lohse, 1956 as distinguished from *P. micans* (Gravenhorst, 1802), *Tachyporus dispar* (Paykull, 1789) as distinguished from *T. chrysomelinus* (Linnaeus, 1758), *Sphaeridium marginatum* Fabricius, 1787 as distinguished from S. *bipunctatus* Fabricius, 1781, *Negastrius arenicola* (Boheman, 1853) as distinguished from *N. pulchellus* (Linnaeus, 1761), and *Rhynchaenus pseudostigma* (Tempere, 1982) as distinguished from *R. stigma* (Germar, 1821). The Norwegian material formerly determined as *Ebaeus pedicularius* (Linnaeus, 1758) and *Onthophagus ovatus* (Linnaeus, 1767) was also revised. These specimens actually belong to *Ebaeus lapplandicus* Evers, 1993 and *Onthophagus joannae* Goljan, 1953, respectively. The Norwegian material of the species pairs *Ochthebius minimus* Fabricius, 1792 / *O. alpinus* (Ienistea, 1979) and *Rhynchaenus calceatus* (Germar 1821) / *R. testaceus* (Müller, 1776) are distinguished. Taxonomic status, distribution maps and current records in Norway are presented for each species.

Keywords: Coleoptera, sibling species, geographical range, new species in Norway.

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INTRODUCTION

Taxonomic revisions of the last decades have revealed several complex species-groups of Coleoptera occurring in northern Europe. In most cases sibling species are separated from species conventionally interpreted as one species. There are also cases where closely related species are well established as true species, but the geographical distribution of each of them is not well documented. Typically, sibling species recognised in Central-Europe often prove to be present in Scandinavia after revision of the available material. Such unveilings may often be due to better and more available literature, but also to the awareness of the phenomenon.

The Norwegian material of some complex species is already revised. The *Apion seniculus - meieri*-complex (Brentidae), and the *Amara aulica - gebleri*-complex (Carabidae) were distinguished by Sagvolden & Hansen (1996), while the Norwegian material of *Anthonomus rubi* and *A. brunneipennis* was revised by Sagvolden & Hansen (2001). The aim of this work is to continue this process through an examination of the present status and distribution range in Norway of some recently revised complex species-groups of Coleoptera.

METHODS

Beetle species that have been under systematic revision in Europe or elsewhere in recent times were the target taxa of the study. Those sibling species with probable occurrences in Norway were selected for further study. Probability assessments were based on whether or not the species is recorded from neighbouring countries. All available material of the selected species in Norwegian museums and private collections was examined by the author. Nomenclature follows Lawrence & Newton (1995) at family level and Lundberg (1995) at species level, if not otherwise mentioned. The results are presented as distribution maps for each species. Detailed locality information is also given exept for the most common species. Complete information about all records can be obtained on request to the author or in COLARB-database (Torstein Kvamme, NISK).

The following abbreviations are used in the text: MNHT = Museum of Natural History and Archaeology, NTNU, Trondheim; NISK = Norwegian Forest Research Institute; SM = Museum of Stavanger; TM = Museum of Tromsø; ZMB = Zoological Museum, University of Bergen, ZMO = Zoological Museum, University of Oslo. Provincial abbreviations follow Økland (1981).

THE MATERIAL

Hydraenidae

Ochthebius minimus Fabricius, 1792 and *O. alpinus* (Ienistea, 1979)

The *Ochthebius minimus* species-group was revised by Jäch (1990). Based on this revision, Cuppen & Nilsson (1991) found that the Scandinavian fauna consists of two species, *O. minimus* and *O. rugulosus*. A re-examination of *O. rugulosus* has shown that this species also consists of a number

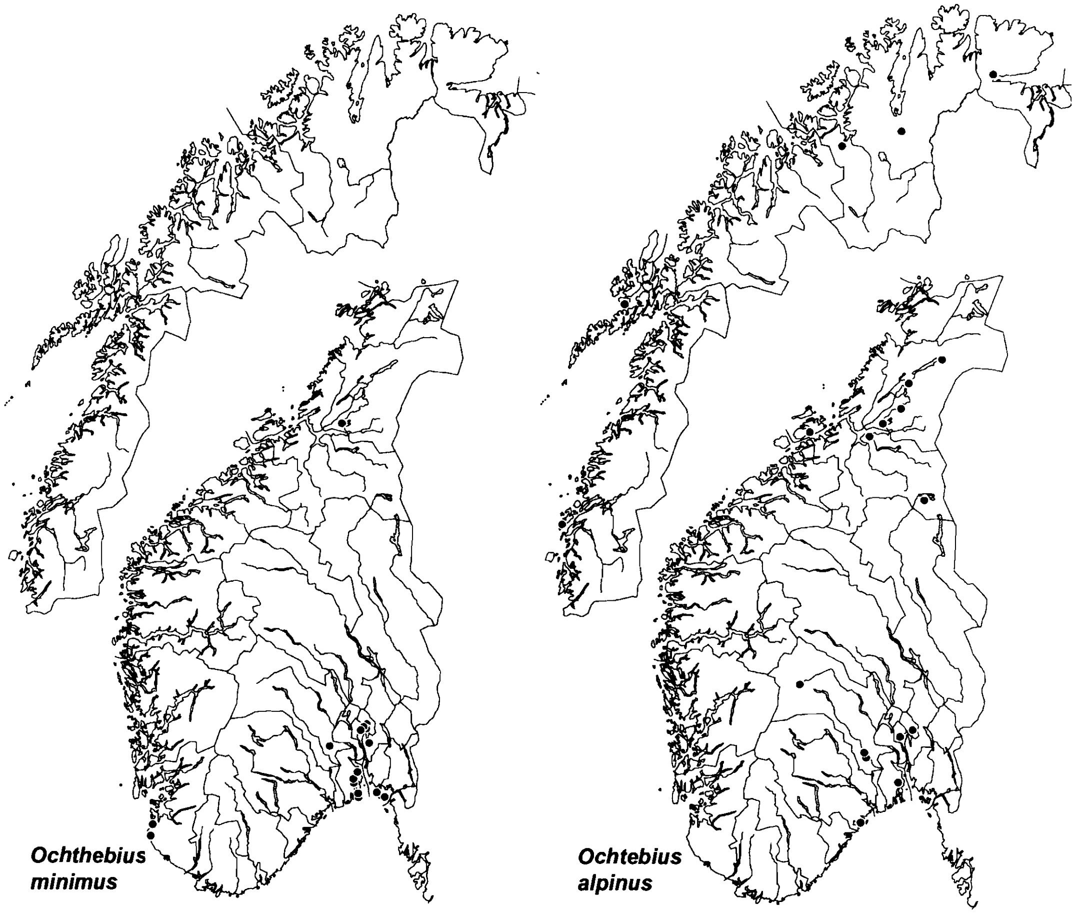

Figure 1. The known distribution of *Ochthebius minimus* and *O. alpin*us in Norway.

of closely related species. The Scandinavian material belongs to *O. alpinus*, while the true *O. rugulosus* is restricted to Madeira (Jäch 1998).

The revision of the Norwegian material is based on 119 specimens of which 49 were identified to *O. minimus* and 70 to *O. alpinus*. An examination of parts of the Fennoscandian material indicates that *O. minimus* is a southern species, while *O. alpinus (rugulosus)* is a northern species in the region (Cuppen & Nilsson 1991). This pattern is similar in the Norwegian material, but there are overlapping zones both in SE Norway and in Trøndelag where the species occur sympatric (Figure 1). Both species are found in the same pond at **NTI** Frosta: Tautra, and there are sympatric records also from **AK** Oslo: Brønnøya and **VE** Tønsberg: Jarlsberg.

O. minimus is registered from the following localities: **Ø** Hvaler: Kirkøya, Arekilen, Guttormstangen (EIS 12). **AK** Bærum: Ostøya (EIS 28); Oslo: Brønnøya, Snarøya, Lysaker (EIS 28); Frogn: Nesset (EIS 28). **BØ** Øvre Eiker: Fiskum (EIS 27). **VE** Tjøme: Mostranda, Kjæreskogen (EIS 19); Sem: Akersvannet (EIS 19); Tønsberg: Jarlsberg (EIS 19); Borre: Borre (EIS 19). **RY** Klepp: Orresanden (EIS 7); Sola: Kolnes (EIS 7). **NTI** Frosta: Tautra (EIS 97).

O. alpinus is registered from the following localities: **AK** Oslo: Brønnøya, Tøyen (EIS 28). **BØ** Kongsberg: Kongsberg, Sandsvær (EIS 27). **BV** Hol: Geilo (EIS 43). **VE** Tønsberg: Jarlsberg (EIS 19). **TEY** Kragerø: Skåtøy (EIS 11). **STY** Hitra (EIS 90). **STI** Røros: Aursund (EIS 81); Trondheim: Trondheim (EIS 92). **NTI** Frosta: Tautra (EIS 97); Levanger: Skogn (EIS 98); Steinkjer: Steinkjer (EIS 101); Snåsa: Snåsa (EIS 102). **NSY** Herøy: Sydherøy (EIS 117). **NNV** Hadsel: Melbu (EIS 143). **FI** Alta: Kåfjord (EIS 173). **FN** Nesseby: Nyborg (EIS 177).

The report on *O. minimus* from **NSI** (Lindroth 1960) should be deleted, because it is based on an incorrect regional denotation of the locality «Melbu» which belongs to **NNV** (Strand 1946).

Staphylinidae

Rybaxis laminata (Motschulsky, 1836) and *R. longicornis* (Leach, 1817)

Rybaxis longicornis (*sanguinea*) was first reported from Norway by Hansen et al. (1998a). At that time the species was considered as a synonym of *R. laminata* (Besuchet 1989). Through examination of the male genitalia it is now clear that *R. longicornis* and *R. laminata* are separate species (Hansen 1968, Ziegler 1995, Hansen et al. 1998b). The males are easily distinguished in Hansen (1968) and the genitalia are illustrated in Hansen et al. (1998b). Females can yet not be certainly separated. An examination of the Norwegian material showed that both species are present in Norway. There are only recent records of both species, and all the specimens are collected after 1991. In three of four localities the species occurred sympatric.

Males of *R. longicornis* are recorded from the following localities: **TEY** Kragerø: Valberg (EIS 11). **VE** Sem: Akersvannet (EIS 19); Tjøme: Moutmarka (EIS 19). **Ø** Hvaler: Arekilen, (EIS12).

Males of *R. laminata* are recorded from the following localities: **TEY** Kragerø: Valberg (EIS 11). **VE** Sem: Akersvannet (EIS 19); Tjøme: Mostranda (EIS 19).

Philonthus micans (Gravenhorst, 1802) and *P. micanthoides* Benick & Lohse, 1956

The status of *Philonthus micans* and *P. micantoides* as separate species has been doubted by Palm (1963) and Hansen (1969), due to the existence of intermediate forms. Recently, the species commonly are considered as separate species (Hansen et al. 1996). They can only be certainly distinguished by examination of the male genitalia (see Palm 1963, Lohse 1964, Hansen 1969). The different illustrations of the genitalia show some of the variation in these two species.

Both species are common in Denmark (Hansen 1996, Hansen et al. 1996). An examination of the Norwegian material gave 29 ♂♂ of *P. micans* and 92 ♂♂ of *P. micanthoides* and 91 unidentified ♀♀. The result indicates that *P. micanthoides* is the most common of the two species in Norway, and it is recorded north to Trøndelag (Figure 2). *P. micans* is restricted to a few areas in SE Norway. However, two isolated records are registered from **STI** Røros. There is an accumulation of records of *P. micans* in the southern part of **BØ** (Figure 2).

Males of *P. micans* are registered from the following localities: **Ø** Trøgstad: Hemnessjøen (EIS 20). **AK** Asker: Semsvannet (EIS 28). **BØ** Drammen: Konnerud (EIS 28); Nedre Eiker: Mjøndalen (EIS 28); Øvre Eiker: Fiskum, Hokksund (EIS 27); Hole: Krokskogen (EIS 27); Kongsberg, Kongsberg (EIS 27). **VE** Hof: Eidsfoss (EIS 28); Larvik: Larvik (EIS 19). **TEY** Drangedal: Sandnes (EIS 11). **AAY** Birkenes: Birkeland (EIS 6). **STI** Røros: Hådalen, Hitterdalen (EIS 81).

Males of *P. micanthoides* are registered from the following localities: **Ø** Aremark: Gjølsjø (EIS 21); Eidsberg: Eidsberg (EIS 20). **AK** Oslo: Sørkedalen, Røa, Snarøya, Østensjøvann, Aker, Bygdøy (EIS 28); Asker: Sem (EIS 28); Skedsmo: Lillestrøm (EIS 29); Enebakk: Ekeberg skog (EIS 29). **HES** Kongsvinger: Kongsvinger (EIS 38); Eidsskog: Slettmoen (EIS 38); Odalen (EIS 37); Stange: Ilseng (EIS 46); Ringsaker: Nystuen (EIS 45). **HEN** Åmot: Rena (EIS 55). **OS** Østre Toten: Hekshus (EIS 45); Gausdal: Follebu (EIS 54); Gran: Gran (EIS 36); Gjøvik: Gjøvik (EIS 45); N-Aurdal: Fagernes (EIS 53). **ON** Sel: Sel (EIS 71); Dovre: Lågen (EIS 71). **BØ** Kongsberg: Kongsberg (EIS 27); Øvre Eiker: Fiskum (EIS 27). **BV** Rollag: Rollag, Veggli (EIS 35). **VE** Sem:

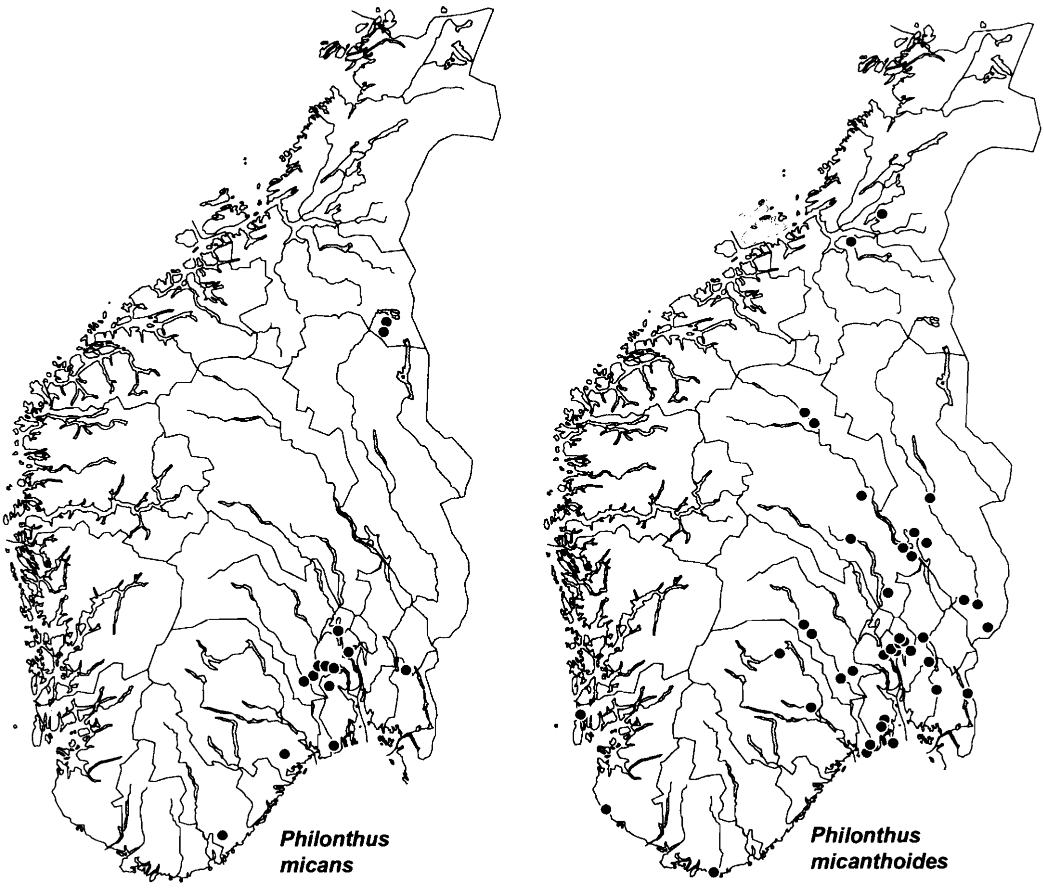

Figure 2. The known distribution of *Philonthus micans* and *P. micanthoides* in Norway. The maps are based only on males.

Akersvannet (EIS 19); Tjøme: Mostranda, Moutmarka (EIS 19); Larvik (EIS 19); Stokke (EIS 19); Stavern (EIS 19). **TEY** Sauherad: Gvarv (EIS 18). **TEI** Tinn: Vestfjorddal (EIS 26). **VAY** Mandal: Mandal (EIS 2). **RY** Jæren (EIS 3/7); Haugesund (EIS 13). **STI** Trondheim: Trondheim (EIS 92). **NTI** Levanger: Hammarvatnet (EIS 98).

Tachyporus chrysomelinus (Linnaeus, 1758) and *T. dispar* (Paykull, 1789)

Specimens formerly identified as *Tachyporus chrysomelinus* consist of the two species, *T. chrysomelinus* and *T. dispar* (Booth 1988). In addition to differences in male genitalia, *T. dispar* can be easily distinguished from *T. chrysomelinus* through the presence of four and not three apical setae at the hind margin of elytra (Booth 1988). In England, *T. dipar* prefers dry areas while *T. chrysomelinus* dominates in more moist areas (Hansen et al. 1990). This pattern seems to apply in Norway too, although both species apparently are eurotopic with overlapping occurrences along this gradient.

The revision of the Norwegian material included 343 specimens of *T. chrysomelinus* and 230 specimens of *T. dispar*. Both species are widely distributed north to Troms county. In the northern part of Norway, *T. chrysomelinus* is restricted to more continental parts of the country, while *T. dispar* seems to dominate in coastal areas (Figure 3). Registered regional records of the two species are the following: *T. chrysomelinus*: **Ø, AK, HES,**

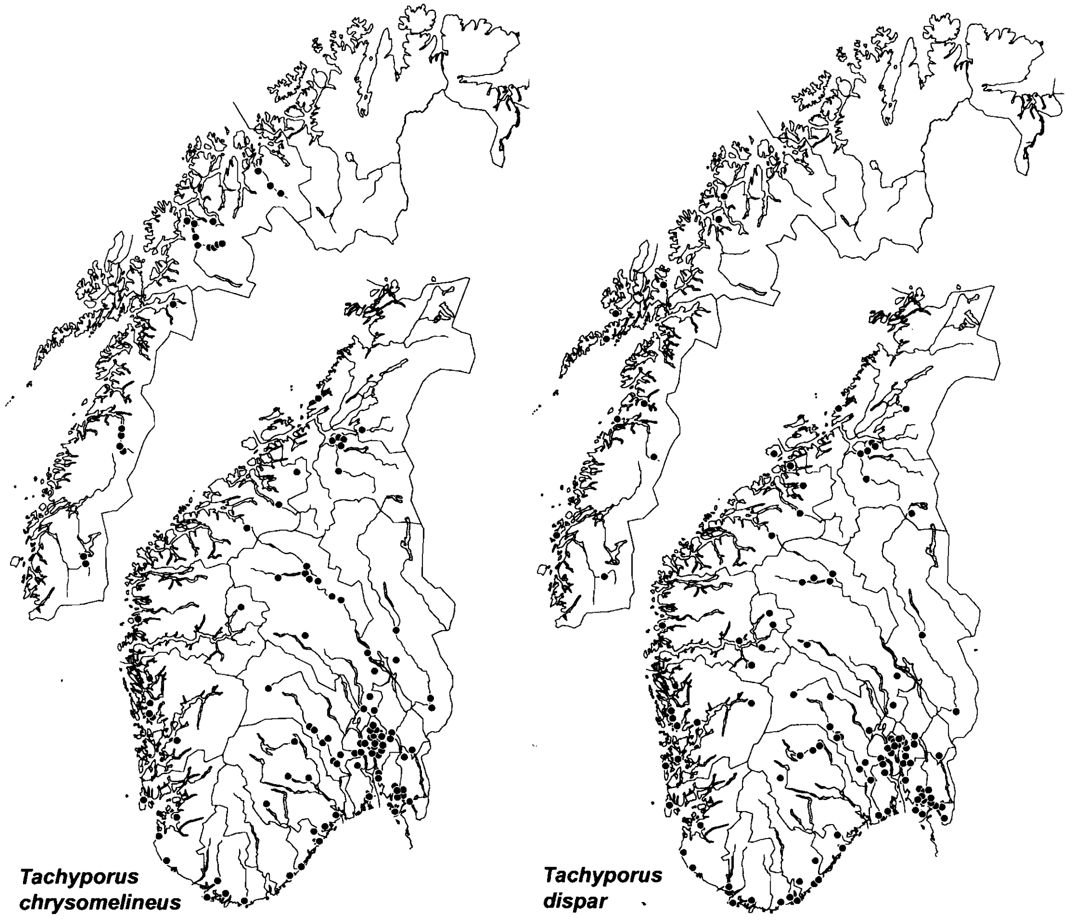

Figure 3. The known distribution of *Tachyporus chrysomelinus* and *T. dispar* in Norway.

HEN, OS, ON, BØ, BV, VE, TEY, TEI, AAY, VAY, VAI, RY, RI, HOY, HOI, SFY, SFI, MRI, STY, STI, NTI, NSI, NNØ and **TRI**. *T. dispar*: **Ø, AK, HES, HEN, OS, ON, BØ, BV, VE, TEI, AAY, VAY, RY, HOY, HOI, SFY, SFI, MRY, MRI, STI, NTI, NSY, NSI, NNV, NNØ, TRY** and **TRI**.

Hydrophilidae

Sphaeridium bipunctatus Fabricius, 1781 and *S. marginatum* Fabricius, 1787

A revision of the Danish material of *Sphaeridium bipustulatum* revealed that this is a complex group consisting of three different species (Hansen 1990). The Danish material consisted of about 300 specimens of *S. bipustulatum*, about 300 specimens of *S. marginatum* and a few specimens of *S. substriatum* Faldermann, 1838.

An examination of the Norwegian *Sphaeridium*-material showed that both *S. bipustulatum* (48 specimens) and *S. marginatum* (44 specimens) are present in Norway (Figure 4). Both species have their main distribution in the Oslofjord area. In addition, there are isolated records of *S. marginatum* from **NTI** and **VAY**, and an isolated record of *S. bipustulatum* from **TEI.** Most records of both species are old (before 1950), indicating a decrease in present populations, probably due to changes in agricultural pratice.

S. bipustulatum is recorded from the following localities: **Ø** Halden: Halden (EIS 20); Hvaler:

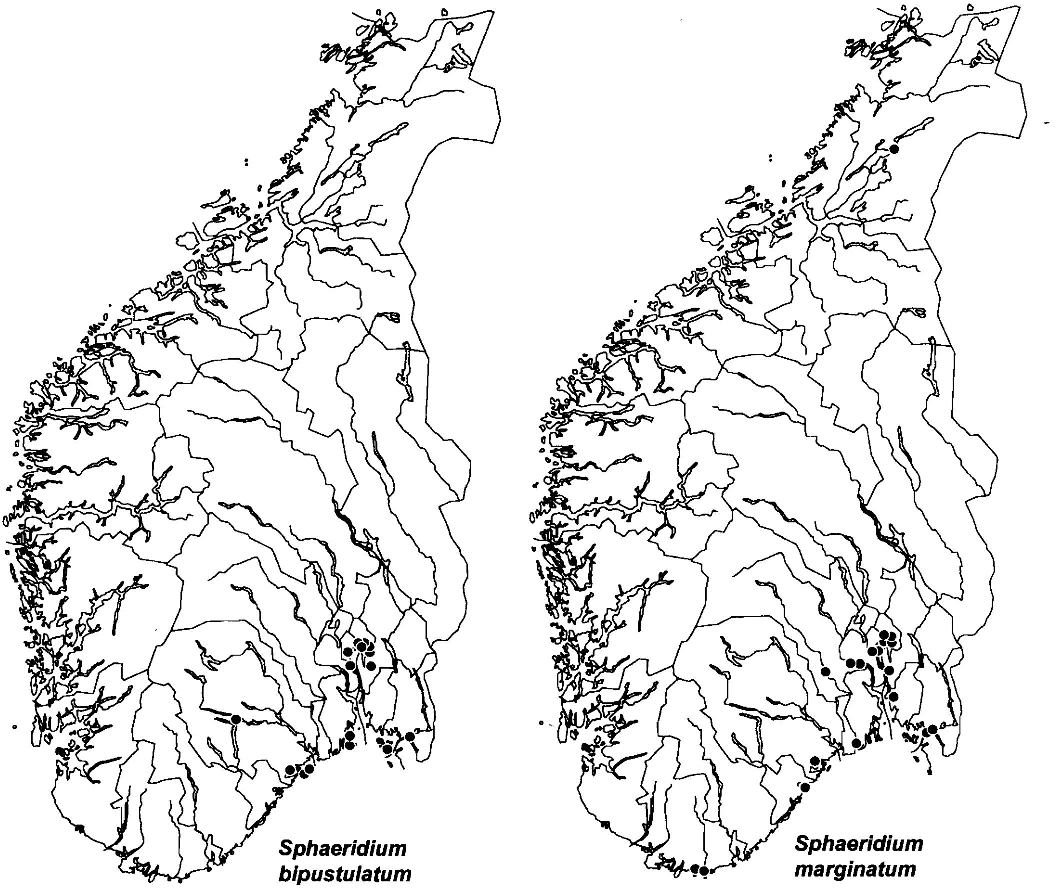

Figure 4. The known distribution of *Sphaeridium bipustulatum* and *S. marginatum* in Norway.

Hvaler (EIS 12). **AK** Oslo: Oslo, Aker, Etterstad, Tøyen, Bygdøy (EIS 28), Asker (EIS 28); Oppegård: Oppegård (EIS 28). **VE** Nøtterøy: Nøtterøy (EIS 19); Tjøme: Mostranda (EIS 19). **TEY** Kragerø: Kragerø, Jomfruland (EIS 11). **TEI** Kviteseid: Kviteseid (EIS 17).

S. marginatum is recorded from the following localities: **Ø** Moss: Moss (EIS 19); Halden: Halden, Hov (EIS 20). **AK** Oslo: Oslo, Røa, Brønnøya, Aker (EIS 28); Asker: Hvalstad (EIS 28); Frogn: Drøbak (EIS 28). **BØ** Kongsberg: Kongsberg (EIS 27); Drammen: Drammen, Gulskogen (EIS 28). **VE** Larvik: Gon (EIS 19). **TEY** Kragerø: Kragerø, Nes Verk (EIS 11). **AAY** Risør: Risør (EIS 11). **VAY** Mandal: Mandal (EIS 2), Unndal (EIS 5). **NTI** Steinkjer: Steinkjer (EIS 101).

Scarabaeidae

Onthophagus joannae Goljan, 1953

An examination of the Norwegian material determined as *Onthophagus ovatus* (Linnaeus,1767) revealed that all the specimens belong to the closely related *O. joannae*. For identification, see Machatschke 1969, Krell & Fery 1992 and Hansen et al. 1993.

The material of *O. joannae*: **AK** Asker: Hesthagan (EIS 28), ca. 1875 (Schøyen 1879), 1 ♂, 1 ♀, leg. T. Helliesen, det. M. A. Ienistea, vid. F. Ødegaard, coll. ZMO. **TEI** Kviteseid: Dalen (EIS 17), 1938, 1 ♀, leg. O. Meidell, det. F. Ødegaard, coll. ZMO. In ZMB there is an additional unlabeled ♂ of *O. joannae* that comes from the collection of O. Meidell. The specimen from **BØ** Øvre Eiker: Hokksund (EIS 27), 5 June 1877, leg. T, Münster (Schøyen 1879) was not found in any of the Norwegian museums. Accordingly, the taxonomic status of that specimen remains unclear. A revision of the Danish material showed that the real *O. ovatus* is the rarer of the two species (Hansen et al. 1993). On the other hand, *O. ovatus* has been recorded from more Swedish districts than *O. joannae* (Lundberg 1995).

Elateridae

Negastrius pulchellus (Linnaeus, 1761) and *N. arenicola* (Boheman, 1853)

Negastrius arenicola has been considered as a form of *N. pulchellus* for a long time. The two taxa are now considered as separate species (Lohse 1976, 1979). Typical individuals can easily be determined after Lohse (1979). However, both species vary considerably both in colour patterns and diagnostic characters. Therefore, a larger sample often is needed for certain identifications. A good diagnostic character seems to be the puncture of the 2nd interstria in the scutellar region. In *N. pulchellus,* this region is smooth and shiny in more than half of its breadth, while in *N. arenicola* the 2nd interstria is more keel-shaped and more or less roughly punctured throughout. If there is a shiny area, the breadth of this is less than half of the total breadth of the interstria. Moreover, the pubescence of *N. arenicola* is denser and silver grey in colour, while in *N. pulchellus* the weaker pubescence is more golden.

In Denmark, both species are present and apparently widely distributed (Mahler 1987, Hansen 1996). An examination of the Norwegian material of *Negastrius* has shown that both species are present in Norway. The real *N. pulchellus* (65 specimens seen) is mostly restricted to riverbanks and sandy shores in the Oslofjord area, while *N. arenicola* (247 specimens seen) is widely distributed, mostly on sandy riverbanks, in other parts of the country (Figure 5). The species is reported from «all regions in Trøndelag» (Lysholm 1937), but material from **STY** and **NTY** was not found in B. Lysholm's collection at MNHT. Sympatric records of the two species exist only from **HES** Kongsvinger.

N. pulchellus is recorded from the following localities: **Ø** Fredrikstad: Engelsviken (EIS 20); Hvaler: Kirkøy, Ørekroken (EIS 12); Sarpsborg: Børstadbråten (EIS 20). **AK** Ås: Bjørnebekk (EIS 28); Oslo: Aker, Loelva, Kværner, Røa (EIS 28). **HES** Kongsvinger: Kongsvinger (EIS 38). **VE** Larvik: Heggdal, Bommestad, Gjønnesvatnet (EIS 19).

N. arenicola is recorded from the following localities: **HES** Grue: Grinder (EIS 37); Kongsvinger:

Kongsvinger (EIS 38); Våler: Våler (EIS 46). **HEN** Åmot: Rena (EIS 55); Folldal: Krokhaugen (EIS 72); Storelvdal: Koppang (EIS 64). **OS** Ringebu: Kirkestuen (EIS 63). **ON** Lom: Lom (EIS 70); Sel: Lågen (EIS 62); Dovre: Lågen (EIS 71); Vågå: Sørum (EIS 71). **VAY** Kristiansand: Kristiansand (EIS 2). **RY** Hå: Kvalbein (EIS 7), Brusand (EIS 3); Klepp: Orre (EIS 7). **MRI** Sunndal: Furu (EIS 78). **STI** Melhus: Melhus, Udduvoll (EIS 92); Midtre Gauldal: Støren (EIS 87). **NTI** Stjørdal: Stjørdal, Sandferhus, Langøra (EIS 92); Levanger: Rinnleiret (EIS 98). **NSI** Saltdal: Rognan (EIS 127). **TRI** Målselv: Framnes, Målsnes, Rostavann, Målselvdal, Rundhaug, Moen (EIS 154); Nordreisa: Storslett (EIS 163), Bilto (EIS 164); Balsfjord: Bakkehaug (EIS 154). **FV** Alta: Alta, Alta River Camp, Bossekop (EIS 173). **FI** Karasjok: Karasjok (EIS 167). **FN** Tana: Maskjok bru, Seida (EIS 176), Levajok (EIS 175); Porsanger: Lakselv (EIS 174).

Melyridae

Ebaeus lapplandicus Evers, 1993

Recently, *E. lapplandicus* was separated from *E. pedicularius* as a closely related species (Evers 1993). *Ebaeus pedicularius* (Linnaeus, 1758) has been reported from **ON** Nord-Fron: Vinstra (EIS 62), **OS** Sør-Fron: Hundorp (EIS 62) and **VE** Tjøme (EIS 19) (Sagvolden & Hansen 1993, Ødegaard 1994).

An examination of the Norwegian material revealed that only *E. lapplandicus* is present in Norway. The record of *Ebaeus* from **VE** Tjøme, leg. T. An-

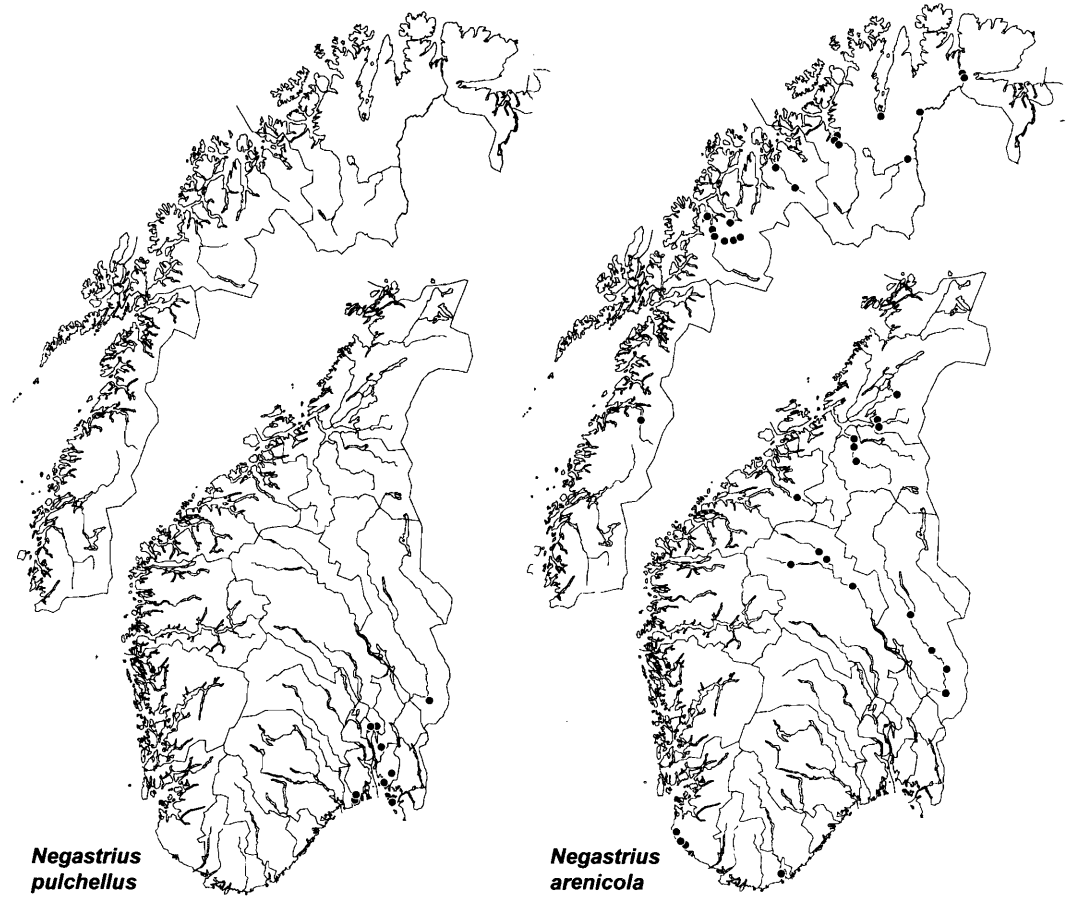

Figure 5. The known distribution of *Negastrius pulchellus* and *N. arenicola* in Norway.

dersen (K. E. Zachariassen in litt.) was unfortunately not available for examination. However, it is not reasonably that the real *E. pedicularius* is present in Norway, because all South-Swedish material also belongs to *E. lapplandicus* (Lundberg 1995).

Curculionidae

Rhynchaenus stigma (Germar, 1821) and *R. pseudostigma* (Tempere, 1982)

Rhynchaenus pseudostigma has recently been separated from *R. stigma* (Dieckmann & Tempère 1984). The two species are easily distinguished by examination of the male genitalia, but females of *R. pseudostigma* are also often possible to identify through a denser puncture without shiny areas at the rostrum between eyes and basis of antennae.

In Denmark, 14 of 246 specimens belonged to *R. pseudostigma* (Palm 1988). By comparison, the Norwegian material included 25 *R. pseudostigma* and 192 *R. stigma*. After revision, *R. stigma* is still found throughout the country in the following regions: **Ø, AK, HES, HEN, OS, ON, BØ, BV, VE, TEY, TEI, AAY, VAY, VAI, RY, RI, HOY, HOI, SFI, MRI, STI, NTI, NSI, TRI, FI, FV** and **FØ**. The report on *R. stigma* from **NNØ**, Hamarøy, leg. E. Strand (Strand 1946, Lindroth 1960) has not been seen and can thus not be confirmed. *R. pseudostigma* seems to be restricted to the SE parts of the country. There are two isolated records from **STI**, however (Figure 6).

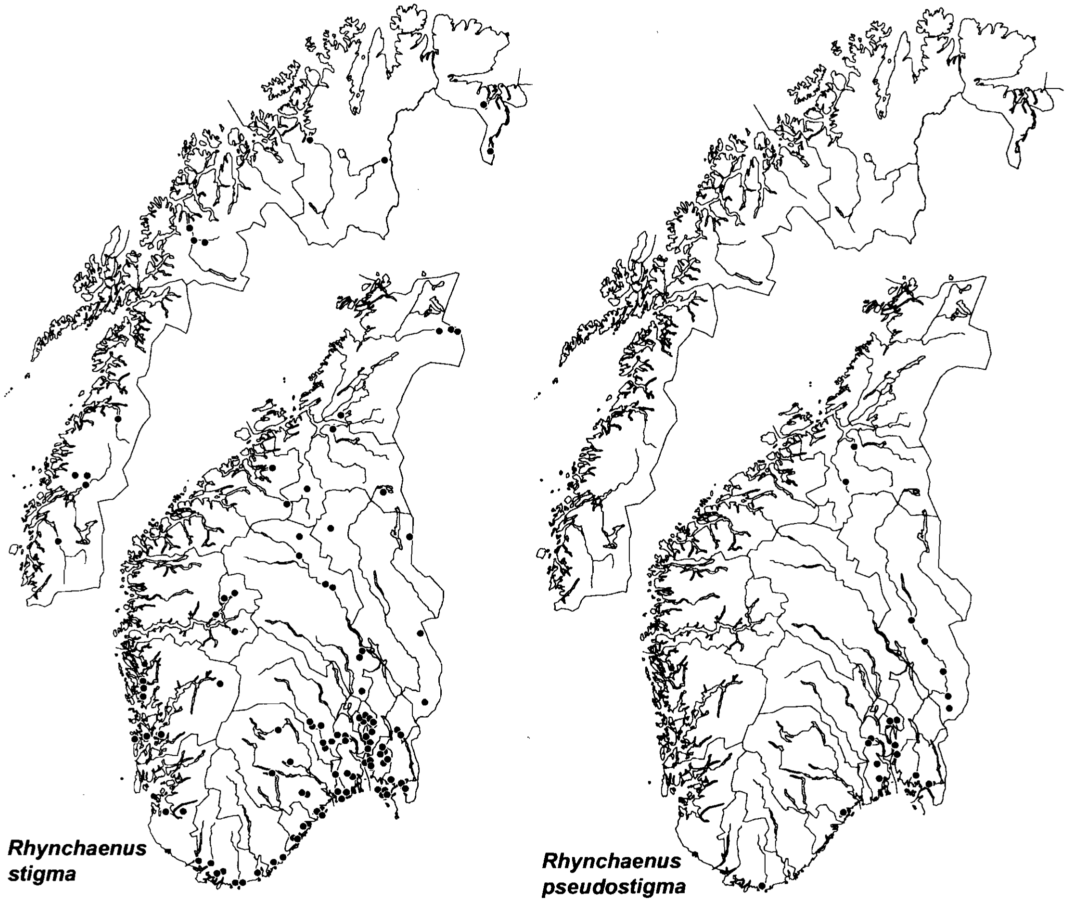

Figure 6. The known distribution of *Rhynchaenus stigma* and *R. pseudostigma* in Norway.

R. pseudostigma is registered from the following localities: **Ø** Halden: Halden (EIS 20); Sarpsborg: Råkil (EIS 20). **AK** Oslo: Oslo, Lysakermyra (EIS 28); Frogn: Drøbak (EIS 28); Vestby: Emmerstad (EIS 28). **HES** Kongsvinger: Kongsvinger (EIS 38); Eidsskog: Slettmoen (EIS 38); Grue: Grue (EIS 47); Elverum: Prestøya (EIS 55). **HEN** Åmot: Rena (EIS 55). **BØ** Drammen: Drammen, Konnerud (EIS 28). **VE** Sem: Akersvannet (EIS 19); Våle: Svinevoll (EIS 19). **TEY** Kragerø (EIS 11). **STI** Melhus: Melhus (EIS 92); Rennebu (EIS 87).

Rhynchaenus testaceus (Müller, 1776) and *R. calceatus* (Germar 1821)

Rhynchaenus calceatus can be separated from the closely related *R. testaceus* through the more shining and stronger curved rostrum (Lohse 1983, Dieckmann & Behne 1994). The two species utilise different host plants. *R. testaceus* is reported from *Alnus* spp. while *R. calceatus* is found on *Betula* spp. (Viramo 1970, Lohse 1983).

A review of *Rhynchaenus testaceus* and *R. calceatus* in Europe (Viramo 1970) has shown that both species are found in all the Fennoscandian countries. Detailed regional ranges of the two species in Norway are shown in Figure 7. A total of 136 specimens of *R. testaceus* and 69 specimens of *R. calceatus* have been studied. *R. testaceus* is common throughout the country and records are present from: **Ø, AK, OS, ON, BØ, BV, VE, TEI, AAY, VAY, RY, RI, HOY, HOI, STI, NTI, NSI, NNV, TRI** and **FN.** The report on *R. testaceus*

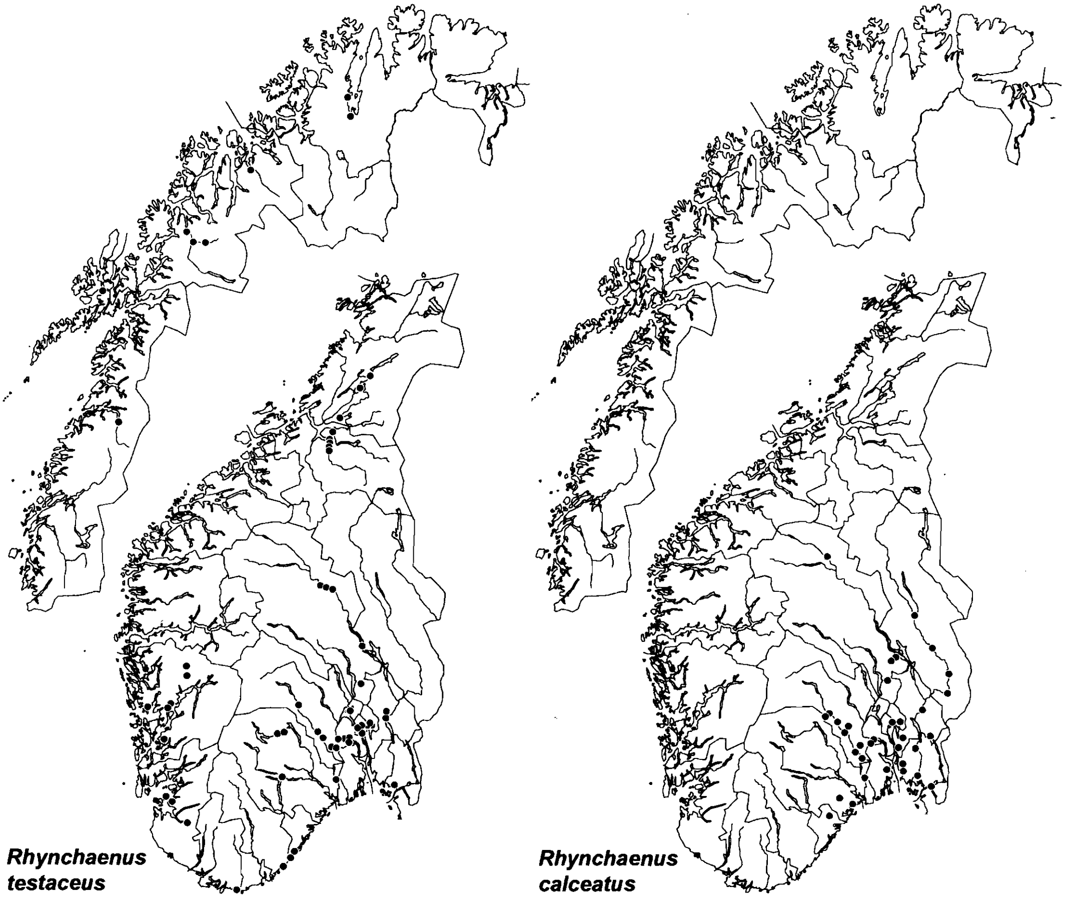

Figure 7. The known distribution of *Rhynchaenus testaceus* and *R. calceatus* in Norway.

from **SFI** (Lindroth 1960) can not be confirmed, because the material has not been available.

R. calceatus is restricted to SE Norway and the localities are the following: **Ø** Moss: Vannum (EIS 19); Sarpsborg: Råkil (EIS 20); Halden: Hov (EIS 20); Fredrikstad: Sildebogen (EIS 20); Spydeberg (EIS 29). **AK** Frogn: Drøbak (EIS 28); Bærum: Lommedalen (EIS 28); Oppegård (EIS 28); Oslo: Tøyen (EIS 28); Aurskog Høland: Hemnes (EIS 29); Sørum: Blaker (EIS 37). **HES** Kongsvinger: Kongsvinger (EIS 38); Elverum (EIS 55); Grue: Grue (EIS 47). **HEN** Åmot: Rena (EIS 55). **OS** Gran: Brandbu (EIS 36); Gjøvik: Gjøvik, Skumsjøen (EIS 45). **ON** Dovre (EIS 71). **BØ** Flesberg: Lyngdal (EIS 27); Kongsberg: Labru, Sandsvær (EIS 27), Passebekk (EIS 18); Øvre Eiker: Fiskum (EIS 27); Drammen: Konnerud (EIS 28). **BV** Rollag: Rollag, Veggli, Gladheim (EIS 35). **VE** Lardal: Bergandammen (EIS 18); Borre (EIS 19). **TEY** Drangedal: Sandnes; Bamble: Helle. **AAY** Gjerstad (EIS 10).

DISCUSSION

The present study demonstrates some consequences of taxonomic work for distribution patterns of species. Although good taxonomic revisions should include distribution notes on the species, these are often restricted to coarse regional scales. At least for common species the amount of material may be very large and often inaccessible. Subsequent to taxonomic revision, the range of a given species should therefore be revised nationally, in order to understand the details of the geographical ranges of the separated species. Such detailed studies often reveal that closely related species have different geographical ranges, a finding that may serve as additional evidence for the distinct status of each species. In some cases the splitting of species is associated with differences in ecological traits amongst the forms. In this way, taxonomic revisions may help understanding of the biology of the species.

The present study stresses the importance of voucher collections for understanding biogeographical patterns of species. A general trend is that common species are underrepresented in collections, especially if the species are easily identified in the field. Distribution maps of such species may give a skewed picture of the real distribution. This phenomenon becomes particularly prominent when such species splits, because the records of each separated species would be apportioned on the map. Therefore, sampling of common and widespread species is important for the understanding of geographical and temporal patterns in species occurrence.

Another artefact in the maps presented in this paper is the extremely skewed sampling intensity in different parts of the country. The area in the vicinity of Oslo is very well collected, while most areas along the western and northern coast of Norway are extremely poorly collected. Species-maps showing a SE dominated distribution in Norway may be an artefact due to sampling error. However, it has to be pointed out that this area is climatically favourable for many species compared to other parts of Norway.

The selection of target taxa for this study was not meant to be complete. The future will certainly show that more species need to be split due to progress in taxonomic research. At the same time, geographical ranges of closely related species-pairs are probably not satisfactorily mapped. Therefore, it is expected that more sibling species will be discovered in Norway in the future.

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Bokanmeldelse • book review

Böcher, Jens. 2001. Insekter og andre smådyr – i Grønlands fjeld og ferskvand. 302 s. Forlaget Atuagkat. ISBN 87-90393-62-7. 560 DKK.

For første gang er der med denne bog givet en samlet, let tilgængelig fremstilling af den grønlandske smådyr-fauna på land og i ferskvand (insekter, edderkopper, mider, krebsdyr, bløddyr, orme, tardigrader m.m.). Forfatteren, dr. scient. Jens Böcher, har samlet og studeret den grønlandske flora og fauna i over 40 år og har nyligt udgivet bøger om arktisk økologi og om Grønlands planteverden. Hans faglige speciale er arktisk palæoentomologi (med naturlig hovedvægt på Coleoptera), et emne der kun berøres meget kort i bogens indledning om smådyrenes levevilkår i Grønland. Men i den fyldige litteraturliste kan den specielt interesserede læser bringes på sporet af den fornødne speciallitteratur, overskueligt opdelt efter emner.

Bogen er i det hele taget udformet, så den kan bruges af nybegyndere. Ud over at være overdådigt illustreret med nøjagtige farvetegninger udført af Vita Pedersen og Jakob Sunesen, og med farvefotos, der for størstedelens vedkommende er taget af forfatteren, er der en introduktion til indsamling og præparation samt illustrerede bestemmelsesnøgler til de fleste ordener og familier. Mens behandlingen af Coleoptera er næsten fuldstændig, og især Lepidoptera og Araneae omtales ret fyldestgørende, kan der med store, dårligt kendte grupper som Diptera og Hymenoptera kun gives typiske eksempler fra de enkelte familier. Ud over en morfologisk beskrivelse er der udførlige oplysninger om udbredelse og biologi. Igen og igen bemærkes det, hvor store huller der er i vor viden om udbredelse og biologi for de fleste arter.

For tiden leder Jens Böcher et større projekt til udarbejdelse af et videnskabeligt og tilstræbt komplet bestemmelsesværk om Grønlands insektfauna, under medvirkning af talrige specialister. I forbindelse med dette projekt planlægges endvidere indsamling i de store områder i Grønland, som endnu er helt uudforskede hvad angår smådyr. Så forhåbentlig vil megen ny viden om få år kunne føjes til en revideret udgave af det her anmeldte oversigtsværk (som også udkommer i en grønlandsk udgave). Særlig må det håbes, at mange grønlændere og tilrejsende vil fatte interesse for de grønlandske smådyr, hjulpet godt på vej af Böchers formidable håndbog. Den burde – sammen med hans nyudgivelse i 2001 af Tyge W. Böchers (hans fars) værk «Det grønne Grønland» – blive årsag til en tiltrængt opblomstring af interesse for Grønlands naturhistorie i en videre kreds. Her er en stadig indsats af amatører meget savnet. Indfødte frem for tilrejsende burde ligesom i vore lande bidrage til tilvejebringelsen af det nødvendige grundlag for den videnskabelige udforskning.

Men først og fremmest må man håbe på en stor virkning af Böchers bog, fordi flere på Grønland ved hjælp af den vil kunne få en dybere glæde over deres storslåede natur. Hans begejstring for emnet har sat sig spor i bogen. De færreste vil kunne undgå at inspireres af den. Det gælder enhver med interesse for arktiske smådyr, også for den der vil have kvalificeret og hurtig viden om noget udenfor sit eget speciale.

Peter Neerup Buhl

Dioxyna bidentis (Robineau-Desvoidy, 1830) (Diptera, Tephritidae) new to Norway

Lita Greve

Greve, L. 2001. *Dioxyna bidentis* (Robineau-Desvoidy, 1830) (Diptera, Tephritidae) new to Norway. Norw. J. Entomol. 48, 250.

Dioxyna bidentis (Robineau-Desvoidy, 1830) is recorded as new genus and species to Norway from Bråvann, Kristiansand,Vest-Agder (VAY), South Norway. The nearest records of this species originate from South - Eastern Sweden.

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Introduction

The family Tephritidae includes three subfamilies in NW Europe (White 1988). The Tephritinae has the highest number of species most of which have a characteristic dark wing pattern with many hyaline droplets.

Species of the genus *Dioxyna* look very much like species of the genus *Campiglossa* which is represented in Norway with several species. However, in *Dioxyna* the genae are narrow and the mouthparts are very long and geniculate combined with very short apical scutellar setae, less than one-quarter the length of the basal scutellar setae. In most species of *Campiglossa* the genae are broad and the mouthparts short combined with apical scutellar setae longer than one-quarter the length of the basal scutellar setae. Note should be made of *Campiglossa producta* (Loew,1844), however, in which the genae are narrow and the mouthparts are long and geniculate, but with long apical scutellar setae. *D. bidentis* has femora all yellow, compared to *C. producta* which has the femora either black or with distinct black marks. *C. producta* has still not been recorded from Norway and is not with certainty recorded from Sweden (Hedström 1995), but is known from England, The Netherlands and Finnland.

The record

VAY Kristiansand: Bråvann (EIS 2) 21 September 1998 1 ♀ leg. K. Berggren.

Biology and distribution

The host plant for the larvae of *D. bidentis* is the genus *Bidens* (Family Asteráceae) (Merz 1994) of which two species *B. tripartita* L. and *B. cernua* L. are fairly common in South Eastern Norway. *Galinsoga parviflora* Cav. and *Tagetes* sp. are also mentioned as possible hostplants. In Switzerland adults have been collected from May untill October. Most adults fly in August and September (Merz 1994).

D. bidentis is recorded from Sweden (Hedström 1995), but only from areas on the south-eastern coast from Skåne to Upland including Öland. It is interesting that the single Norwegian record is far apart from the distribution area in Sweden. *D. bidentis* is also recorded from Finland (Hackman 1980) and throughout Great Britain and southern Ireland (White 1988). Merz (1994) gives the distribution as the whole Palaeartic.

Acknowledgements. I am very grateful to Kai Berggren, Kristiansand, who collected the specimen and kindly donated it to Zoological Museum, University of Bergen.

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Distribution of the Codling Moth, *Cydia pomonella* L. (Lepidoptera: Tortricidae) in Southern Norway

May-Guri Sæthre & Torgeir Edland*

Sæthre, M.-G. & Edland, T. 2001. Distribution of the codling moth, *Cydia pomonella* L. (Lepidoptera: Tortricidae) in Southern Norway. Norw. J. Entomol. 48, 251-262.

The distribution of the codling moth, *Cydia pomonella* L., was investigated during 1974-1999 in southern Norway, using pheromone traps. The results from these investigations, as well as other confirmed records of the species, are given. It was found that the species is commonly distributed in eastern Norway up to Lillehammer, except on the eastern side of the lake Øyeren. The only record of the species in western Norway is from Sogndal. It was also found that the distribution of *C. pomonella* in Norway coincides with the mean July temperature of 14-16 °C. Possibilities for further spread and establishment of the species in relation to the Norwegian climate and topography for both eastern and western Norway are discussed.

Key words: Codling moth, *Cydia pomonella,* Norway, distribution.

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**Deceased.*

INTRODUCTION

The codling moth, *Cydia pomonella* L. (Lepidoptera: Tortricidae) is a true cosmopolitan, well known as a common and worldwide pest of apple (CAB International 1995). The codling moth was known already in the 4th to 2nd Centuries B.C. in the antique Greece-Latino, and the first short description of the larva was given by the Dutchman J. Gædaert in 1635 (Balachowsky 1966). Since then the codling moth has been reported from almost every apple producing region of the world (CAB International 1995).

Extreme ecological plasticity is a particular characteristic of the codling moth, and it is difficult to name another species with such capacity for acclimatization and migration (Shel'deshova 1967). Its rapid and continuing spread with fruit crops indicates that its original range was determined by host plants rather than by climatic factors.

In Norway the codling moth has been mentioned in the annual reports on agricultural pests from 1891(Schøyen 1891) and almost every year thereafter. The same and even older Norwegian sources referred to by Edland (1977), reported that the codling moth was distributed in all counties in the south-eastern part of the country, and also in the inner parts of Hardanger, Hordaland and the outer parts of Sogn og Fjordane county. Since 1974 pheromone traps have been used to investigate the distribution of the species.

The importance of this pest in Norway appears to be very much related to temperature, and in commercial apple orchards in Norway the codling moth is not considered to be an annual pest (Edland & Nybøle 1993). The use of insecticides against other lepidopteran pests is often sufficient to reduce the codling moth population to an acceptable level. In organic orchards and private gardens the situation is quite different, and in some years the codling moth is a difficult problem to handle.

W.M. Schøyen (1893, 1899) and T.H. Schøyen (1916, 1920, 1928, 1942) reported that severe damage by the codling moth in Norway occurred in 1892, 1898, 1915, 1919, 1926-1929, and 1934-1938. In 1926-1927 and in 1935-1936 the damage was extreme.

In the late 1960s and in the 1970s in the south-eastern part of Norway, and in 1992 in the south-east, the south and the west (Sogndal), severe damage by the codling moth was observed (Edland & Berle 1994).

The main host plant of the codling moth is apple (*Malus pumila*), but it has also been recorded from several other plants. Host records listed by Zhang (1994) include pears (*Pyrus communis, Pyrus pyrifolia*), quinces (*Cydonia oblanga*), apricots (*Prunus armeniaca, Prunus mume*), peaches (*Prunus persica*), plums (*Prunus cerasifera, Prunus domestica*), almonds (*Prunus dulcis*), nectarines (*Prunus persica*), pomegranates (*Punica granatum*), *Malus sylvestris*, walnuts (*Juglands regia*), chestnuts (*Castanea sativa*), *Ficus, Sorbus* and *Quercus*. In Norway many of the host plants listed above are present in commercial orchards, private gardens or as native trees (*Malus sylvestris, Quercus* and *Sorbus*) (Sjøborg & Eidisson 1982).

Damage to apple caused by codling moth larvae shows characteristic symptoms that are easily recognisable. The newly hatched larva enters the fruit, typically one per infested fruit, and forms a small cavity just below the fruit skin. After feeding for a few days it burrows into the core (Alford 1984). From the outside the entry hole looks prominent and red-ringed, characteristically blocked by dry frass. Within the fruit, the larva eats away large amounts of the flesh and also attacks the pips, and the cavity becomes filled with brown frass. The entry point at the surface is greatly enlarged as tissue beneath is eaten away, and the larva eventually escapes leaving a small, unplugged exit hole. Sometimes a larva will attack another fruit in the same cluster before becoming fully grown (Alford 1984). The codling moth hibernates as a fourth or, a major proportion, as a fifth instar diapausing larvae beneath tree bark, or at the base of the tree.

The codling moth has one to five generations per year in different parts of the world (Agricultural Research Service 2000). The number of generations gradually increases toward the lower latitudes in both the Northern and the Southern Hemispheres. In Norway, there is one generation per year, however, Edland & Berle (1994) reported a second generation in Lier, south-eastern Norway, in 1976.

The objective of this article is to update the work conducted on the distribution of the codling moth in Norway in the last twenty-five years, and use these data to assess its potential to spread when exposed to the Norwegian climate and topography.

MATERIALS AND METHODS

Three-dimensional white cardboard traps (sized 21.0 cm long, 9.5 cm wide and 8.5 cm high) with sticky glue on the bottom and baited with codling moth sex pheromone, codlemone, was used. The pheromone and traps used in 1974-75 were delivered by Astra-Ewos AB, Södertalje, Sweden. The loading of active ingredients in the dispensers is not known. From 1987 red rubber lures were obtained from the PHERO BANK in Wageningen, The Netherlands. The pheromone dispensers had a loading of about three mg of active ingredients (F.C. Griepink, PHERO BANK, pers. com.).

Traps were hung in apple trees in commercial orchards or private gardens. The height was about 150-200 cm above the ground, depending on the size of the tree. Orchards or private gardens with older trees were normally used, because of the codling moth's preference for such habitats. The pheromone traps were put up in May and the first half of June (Table 1), with a few exceptions, to be at the location before the codling moth flight period started, which in Norway commonly occurs in the first half of June. Most traps operated until late July to the end of August (Table 1). All traps were brought to the Plant Protection Centre at Ås for further examination in the laboratory. Specimens considered to be *C. pomonella* were removed from each trap and their genitalia examined to confirm the species. The eight traps collected in western Norway in 1994 were not brought to Ås, because none of them were suspected to contain *C. pomonella* (Table 1).

When the use of pheromone traps started in 1974 and 1975 the locations chosen were mostly in

Table 1. Survey of *Cydia pomonella* in southern Norway by pheromone traps or by other methods. Pheromone trapping (Ph) is indicated with Pos. = catch of *C. p.*, or Neg. = no catch of *C. p.* Other methods (Other) is indicated with Pos. = catch of *C. p.* Localities included in the program of prognosis and forecasting of codling moth attack in southern Norway, are marked with an asterisk (*).

EIS-grid number	Geographic region	Municipality	Location	Date	Trapping method Ph	Other
1	VAY	Lyngdal	Lene	26.V-2.VIII.1998	Neg.	
1	VAY	Lyngdal	Lyngdal	26.V-2.VIII.1998	Neg.	
2	VAY	Kristiansand	Kuholmen	17.VII.1967		Pos.
2	VAY	Kristiansand	Gimle	13.VIII.1976		Pos.
2	VAY	Kristiansand	Stangenes	4.VII.1977		Pos.
2	VAY	Kristiansand	Belteviga, Flekkerøy	22.VII.1999		Pos.
2	VAY	Mandal	Mandal	26.V-2.VIII.1998	Pos.	
2	VAY	Søgne	Søgne	26.V-2.VIII.1998	Pos.	
4	VAI	Kvinesdal	Kvinesdal	30.V-29.VIII.1975	Neg.	
4	VAI	Kvinesdal	Kvinesdal	26.V-2.VIII.1998	Neg.	
4	VAY	Flekkefjord	Flekkefjord	26.V-2.VIII.1998	Pos.	
5	VAY	Kristiansand	Tveit	26.V-2.VIII.1998	Pos.	
6	AAY	Arendal	Arendal	3.IX.1972		Pos.
6	AAY	Arendal	Revesand, Tromøy	13.VI.1989		Pos.
6	AAY	Arendal	Bjelland, Tromøy	26.VI.1991		Pos.
6	AAY	Grimstad	Dømmesmoen	15.V-31.VIII.1975	Pos.	
6	AAY	Grimstad	Landvik	15.V-24.VIIII.1975	Pos.	
6	AAY	Grimstad	Landvik	20.VI-1.VII.1980		Pos.
6	AAY	Grimstad	Dømmesmoen*	V-VIIII.1995-1999	Pos.	
6	AAY	Grimstad	Grimstad	26.V-2.VIII.1998	Pos.	
6	AAY	Tvedestrand	Borøy	14.V.1977		Pos.
9	AAI	Bygland	Vassenden	26.V-2.VIII.1998	Neg.	
11	TEY	Kragerø	Kjøllbrønn	14.V-14.VIII.1975	Pos.	
11	TEY	Kragerø	Kil	25.V-31.VII.1998	Pos.	
11	AAY	Tvedestrand	Laget	17.VI.1925		Pos.
12	Ø	Hvaler	Huser	25.VII.1996		Pos.
14	RI	Hjelmeland	Hjelmeland	2.VI-1.X.1975	Neg.	
17	TEI	Bø	Haugland	16.V-31.VII.1975	Pos.	
17	TEI	Seljord	Seljord	2.V-12.VIII.1999	Pos.	
18	TEI	Bø	Oterholt	2.V-12.VIII.1999	Pos.	
18	TEI	Sauherad	Dem. og forsøksgård	13.VI-31.VII.1974	Pos.	
18	TEI	Sauherad	Dem. og forsøksgård	14.V-31.VII.1975	Pos.	
18	TEI	Sauherad	Akkerhaugen	2.V-12.VIII.1999	Pos.	
18	TEI	Sauherad	Gvarv	2.V-12.VIII.1999	Pos.	
18	TEI	Sauherad	Holte*	2.V-12.VIII.1999	Pos.	
18	TEI	Sauherad	Nes	2.V-12.VIII.1999	Pos.	
18	TEY	Nome	Helgja	14.VI-30.VIIII.1974	Pos.	
18	TEY	Nome	Helgja	14.V-30.VIIII.1975	Pos.	
18	TEY	Nome	Helgja	31.V-10.VI.1980		Pos.
18	TEY	Sauherad	Nes g. Skole*	V-VIIII.1995-1999	Pos.	
18	TEY	Skien	Skien	11.V-31.VII.1974	Pos.	

Table 1. Continued.

EIS-grid	**Geographic**				**Trapping method**	
number	**region**	**Municipality**	**Location**	**Date**	**Ph**	**Other**
18	TEY	Skien	Skien	12.V-31.VII.1975	Pos.	
19	VE	Borre	Undrumsdal	14.VI-31.VII.1974	Neg.	
19	VE	Larvik	Gon	23.VII.1982		Pos.
19	VE	Stokke	Gjennestad*	V-VIIII.1994-1998	Pos.	
19	VE	Svelvik	Knem*	V-VIIII.1990-1999	Pos.	
19	VE	Holmestrand	Holmestrand	3.V-13.VIII.1999	Pos.	
19	Ø	Moss	Moss	-		Pos.
20	Ø	Halden	Halden	24.V.1975		Pos.
20	Ø	Råde	Tomb jordbrukssk.	11.VI-9.VIII.1975	Pos.	
26	TEI	Hjartdal	Hjartdal kirke	2.V-12.VIII.1999	Neg.	
26	TEI	Seljord	Flatdal kirke	2.V-12.VIII.1999	Pos.	
27	BØ	Kongsberg	Kongsberg	2.V-12.VIII.1999	Pos.	
27	BØ	Øvre Eiker	Fiskum*	V-VIIII.1995-1999	Pos.	
27	TEI	Notodden	Nordre Sem	2.V-12.VIII.1999	Pos.	
28	AK	Asker	Sem	21.VI-19-VII.1974	Pos.	
28	AK	Asker	Sem	21.V-4.VIII.1975	Pos.	
28	AK	Bærum	Ostøya	24-31.VII.1983		Pos.
28	AK	Nesodden	Nesoddtangen	26.VII.1983		Pos.
28	AK	Oslo	Blindern	VI.1952		Pos.
28	AK	Oslo	Bogerudmyra	12.VIII.1996		Pos.
28	AK	Ås	Ås	19.VIII.1973		Pos.
28	AK	Ås	Fellesbygget	11.VI-25.VI.1974	Pos.	
28	AK	Ås	Herumhagen	16.VI-26.VI.1974	Pos.	
28	AK	Ås	Skogfaret	14.VI-3.VII.1974	Pos.	
28	AK	Ås	Fellesbygget	21.V-30.VII.1975	Pos.	
28	AK	Ås	Herumhagen	21.V-10-VI.1975	Pos.	
28	AK	Ås	Skogfaret	23.VI-25.VII.1975	Pos.	
28	AK	Ås	Ås	13.VIII.1994		Pos.
28	AK	Ås	Kroer Søndre	5.V-30.VIII.1996	Pos.	
28	BØ	Hurum	Holmsbu	3.VII.1976		Pos.
28	BØ	Lier	Jensvoll	19.V-19.VII.1975	Pos.	
28	BØ	Lier	Sørnes	25.V-23.VI.1975	Pos.	
28	BØ	Lier	Jensvoll	29.V-10.VI.1980		Pos.
28	BØ	Lier	Foss Gård*	V-VIIII.1995-1999	Pos.	
28	BØ	Lier	Nordre Lian*	V-VIIII.1995-1997	Pos.	
29	AK	Aurskog Høland	Aurskog	25.V-4.VIII.1999	Neg.	
29	AK	Aurskog Høland	Hemnes	25.V-4.VIII.1999	Neg.	
29	AK	Fet	Fetsund	25.V-4.VIII.1999	Neg.	
29	AK	Skedsmo	Lillestrøm	23.V.1985		Pos.
29	Ø	Askim	Kykkelsrud	2.VII.1998		Pos.
29	Ø	Askim	Askim	25.V-4.VIII.1999	Pos.	
29	Ø	Eidsberg	Haga jordbrukssk.	9.-11.VI.1975	Pos.	
32	HOI	Ullensvang	SFL Ullensvang	25.V-31-VII.1974	Neg.	
35	BV	Rollag	Rollag	3.V-13.VIII.1999	Neg.	

Table 1. Continued.

EIS-grid	Geographic				Trapping method	
number	region	Municipality	Location	Date	Ph	Other
36	BØ	Ringerike	Norderhov*	V-VIIII.1995-1999	Pos.	
37	AK	Skedsmo	Skedsmo	25.V-4.VIII.1999	Pos.	
37	BV	Eidsvoll	Julrud	25.V-4.VIII.1999	Neg.	
41	HOI	Ulvik	Ulvik	13.V-20.VIII.1998	Neg.	
45	HES	Ringsaker	SFL Kise	11.VI-13.VI.1975	Pos.	
45	HES	Ringsaker	SFL Kise*	V-VIIII.1995-1999	Pos.	
45	OS	Gran	Røykenvik	9.-11.VI.1975	Pos.	
45	OS	Gran	Røykenvik	12.VII.1980		Pos.
45	OS	Østre Toten	Valle	11.VII.1975	Pos.	
46	HES	Stange	Ottestad	25.V-4.VIII.1999	Pos.	
50	SFI	Leikanger	Hamre	VI-VIII.1994	Neg.	
50	SFI	Leikanger	Njøs	VI-VIII.1994	Neg.	
50	SFI	Leikanger	Vestrheim	VI-VIII.1994	Neg.	
50	SFI	Sogndal	Sogndalsfjøra	4.VIII.1977		Pos.
50	SFI	Sogndal	Sogndalsfjøra*	V-VIIII.1992-1999	Pos.	
50	SFI	Sogndal	Åmla	VI-VIII.1994	Neg.	
50	SFI	Sogndal	Nornes	VI-VIII.1994	Neg.	
51	SFI	Lærdal	Rikheim	VI-VIII.1994	Neg.	
51	SFI	Lærdal	Stødno	VI-VIII.1994	Neg.	
51	SFI	Lærdal	Øye	VI-VIII.1994	Neg.	
51	SFI	Lærdal	Eri	4.V-13.VIII.1999	Neg.	
51	SFI	Lærdal	Lærdal	4.V-13.VIII.1999	Neg.	
54	HES	Ringsaker	Vea	30.V-31.VIII.1975	Neg.	
54	OS	Lillehammer	Hov Nordre	25.V-4.VIII.1999	Pos.	
54	OS	Gjøvik	Birivn. 76	25.V-4.VIII.1999	Pos.	

regions with commercial production of apples and other fruits (Table 1). The commercial production of apples, pears, plums and cherries take place as far north as Valldal, Møre og Romsdal, at 62°18′ N (Edland 1997). However, the main areas of fruit growing are located along the western side of the Oslofjord, around some lakes in the eastern part of the country and in the fjord districts of the west. In the summer of 1998 and 1999 the use of pheromone traps was extended as part of a Ph.D research project on the codling moth, and it was decided to include localities without commercial apple production in the investigation (Table 1).

Since 1990 prognosis and forecasting of codling moth attack has been conducted by the use of pheromone traps (at the Plant Protection Centre), and from 1995 to 1999 this system included eight to ten different localities in southern Norway. The localities included in the program of prognosis and forecasting are marked with an asterisk in Table 1, column four. From 1990 to 1999 the level of activity in collecting codling moth data was much higher than the previous years (1925-1990), thus the data were divided in two eras, 1925-1990 and 1990-1999 (Table 2).

In addition to the data collected by the authors, the material used here also include codling moth data from an entomological database (called LepArb database), located at the Norwegian Forest Research Institute, Ås (see Aarvik et al. (2000) for more information about the database and / or about LepArb). Trapping methods used to collect these data are not known to the authors in every case, but light traps and pheromone traps are common methods included here (Table 1). The data from LepArb database are distinguished from the authors' data by column seven (Other = Other methods), Table 1.

Localities referred to in the older Norwegian sources, such as the annual reports on agricultural pests, are not included in the results presented in this article.

The distribution is presented according to the revised Strand system (Økland 1981), and EIS-grid numbers are also given.

RESULTS

Table 1 shows the localities of *C. pomonella* in southern Norway from 1925 to 1999. All localities investigated with pheromone traps baited with codlemone the last twenty-five years are listed in Table 1, and the positive or negative results of the trapping are shown in column six. The first known record of *C. pomonella* in Norway was from AAY Tvedestrand: Laget (EIS 11) in 1925 (Table 1).

Ninety-three localities in 27 different EIS-grids in southern Norway have been investigated during the years 1925 to 1999 (Table 1, Figure 1). The present distribution of *C. pomonella* is shown in Figure 1 as circles. The triangles mark the EIS-grids surveyed with pheromone traps, but without any catches of this species. Twenty of the 27 EIS-grids investigated contained a positive sample on one location or more, and seven EIS-grids were found negative (Figure 1).

The results indicate that *C. pomonella* is commonly distributed along the coast of southern Norway (Sørlandet) (Table 1, Figure 1). The distribution of the species was continuous along the coast from VAY Flekkefjord: Flekkefjord (EIS 4) to Ø Hvaler: Huser (EIS 12), near the Swedish border. The only exceptions here was VAY Lyngdal: Lene and Lyngdal (EIS 1) (Table 1, Figure 1). The southern-most record of *C. pomonella* was VAY Mandal: Mandal (EIS 2).

The positive findings in most of the localities investigated in eastern Norway, indicate that the codling moth is commonly distributed in this part of the country (Table 1, Figure 1). *C. pomonella* was found on both the western and eastern sides of the Oslofjord, and in several locations between the southern part of the Oslofjord and the border of Sweden. According to the results presented here, the species is absent from the eastern side of the lake Øyeren (AK, EIS 29) including the municipality Aurskog Høland (Table 1).

North of Oslo *C. pomonella* was found in most of the locations investigated up to OS Lillehammer: Hov Nordre (EIS 54), at an altitude of 180 m (Table 1, Figure 1). In 1975 though, it was not found at HES Ringsaker: Vea (EIS 54), and it was absent from a location close to BV Eidsvoll (EIS 37) investigated in 1999 (Table 1). The codling moth was also commonly found between the Oslofjord and the mountains in the west (Table 1, Figure 1). In this area *C. pomonella* was found up to an altitude of 200 m at BØ Kongsberg: Kongsberg (EIS 27), and at an altitude of 175 m even further west at TEI Seljord: Flatdal church (EIS 26). The species was absent at 260 m above sea level at TEI Hjartdal: Hjartdal church (EIS 26) (Table 1). The only record of *C. pomonella* from western Norway was from several private gardens located at SFI Sogndal: Sogndalsfjøra (EIS 50) (Table 1, Figure 1). The gardens in Sogndal were a few meters above sea level.

Some of the 93 localities included in the work, have been surveyed two or three times with pheromone traps (Table 1). Locations surveyed more than once showed the same result each year, either positive or negative (Table 1).

The distribution of *C. pomonella* from 1925 to 1990 is shown in Table 2. In this period, 40 locations distributed in 15 EIS-grids were surveyed (Table 2). *C. pomonella* was found in 35 locations (Table 1 and 2), and these locations were distributed on eleven EIS-grids. In 1974-1975 many locations were sampled with pheromone traps, and many of the locations were visited both years (Table 1).

In the surveys conducted from 1990 to 1999, *C. pomonella* was found in 38 of 59 locations (Table 1 and 2). Twenty-one locations surveyed with pheromone traps were found to be negative, with no catches of *C. pomonella* (Table 1 and 2). The surveys included 24 EIS-grids, and gave six new

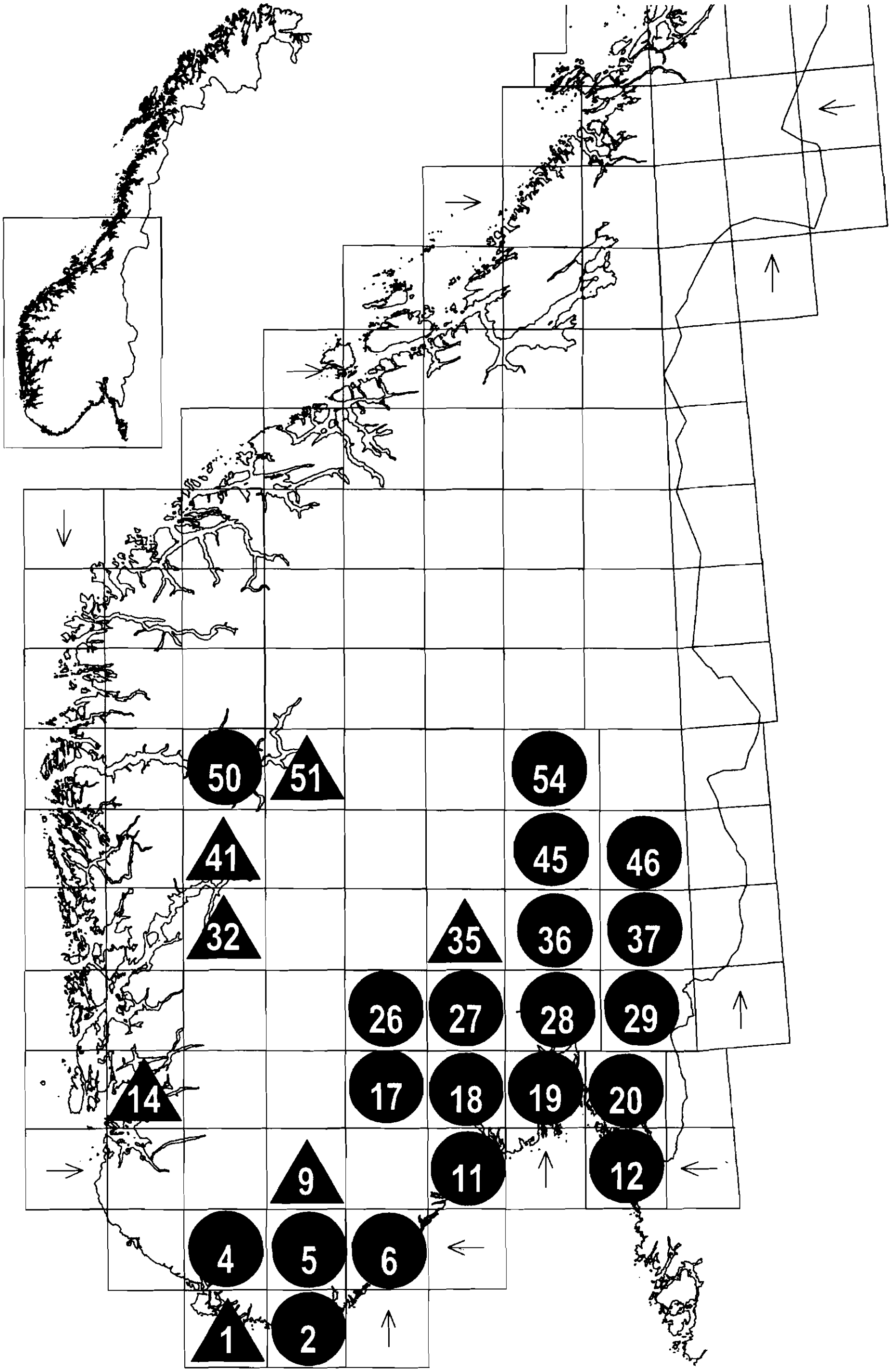

Figure 1. Distribution of *Cydia pomonella* in southern Norway investigated during 1925-1999. ● Records of the species. ▲ Areas searched with pheromone traps, with negative result. The numbers refer to the number of the EIS-grid.

Table 2. Comparison of locations with positive search results in 1925-1990 and 1990-1999.

Eis-grid number	1925 - 1990 Number of locations	Positive search	1990 - 1999 Number of locations	Positive search
1	-	-	2	0
2	3	3	3	3
4	1	0	2	1
5	-	-	1	1
6	5	5	3	3
9	-	-	1	0
11	2	2	1	1
12	-	-	1	1
14	1	0	-	-
17	1	1	1	1
18	3	3	6	6
19	3	2	3	3
20	2	2	-	-
26	-	-	2	1
27	-	-	3	3
28	11	11	5	5
29	2	2	5	2
32	1	0	-	-
35	-	-	1	0
36	-	-	1	1
37	-	-	2	1
41	-	-	1	0
45	3	3	1	1
46	-	-	1	1
50	1	1	6	1
51	-	-	5	0
54	1	0	2	2
Total	**40**	**35**	**59**	**38**

positive grids, with *C. pomonella* present (EIS 5, 12, 26, 36, 37 and 46, Table 2). These six grids had not previously been investigated (Table 2). The surveys also displayed one positive location in EIS-grid 4 and two positive locations in EIS-grid 54. Both of these were previously considered to be negative (Table 2). Five EIS-grids (1, 9, 35, 41 and 51, Table 2) had not been investigated before 1990, and were found negative in the survey. The remaining EIS-grids surveyed in the 1990s, confirmed the positive results from earlier investigations (Table 2).

The program of prognosis and forecasting of codling moth attack has shown that the population has gradually decreased from 1993 to 1998 in most of the localities observed over several years, and 1998 had the lowest trap catches since the prognosis and forecasting started. Use of pesticides against the codling moth has only been required in a few exposed orchards during 1993 to 1999.

DISCUSSION

Shel'deshova (1967) reported that the codling moths northern limit in Europe extends through Scotland and Scandinavia, where it reaches 64°N, and on through Southern Karelia, Kirov and Perm. Shel'deshova (1967) also reported that literature data indicate that a temperature above 15.5-16.0 °C is needed for the activity and oviposition of the moths. According to Balachowsky (1966) the codling moth is distributed up to 65°N in Scandinavia, and its northern limit is the isotherm of 15 °C in July in the northern hemisphere.

Based on experimental data concerning the effect of temperature and humidity and the field observations of a number of authors, Shel'deshova (1967) gives a general description of the conditions to which the species has adapted. The lower threshold of development for all preimaginal stages is around 10 °C or slightly lower. The optimum temperature is fairly high (20-27 °C), but the codling moth develops normally in experiments and under natural conditions at temperatures between 15 and 30 °C. It is only when exposed to continuous higher temperatures that the development is reduced, and the upper temperature limit is about 33.0 °C (Shel'deshova 1967).

Shel'deshova (1967) also summarized the findings of different American authors, including Shelford (1927), and found the sum of effective temperatures above 10 °C for one generation to be 610-625 degree-days. Pitcairn et al. (1992) reported that the accumulated number of degree-days during the first generation of codling moths in California was 596 (threshold temperature 10 °C).

The results presented in Table 1 and Figure 1 are the most detailed information on the distribution of *C. pomonella* in Norway reported so far. In Aarvik et al. (2000), *C. pomonella* is present in nine geographical regions, Ø, AK, OS, BØ, VE, TEY, AAY, VAY and SFI. The information in Table 1 and Figure 1 adds also TEI, with ten positive locations (EIS 17, 18, 26 and 27) and HES, with one location (EIS 45) to this list. New information is also added when the geographic regions with negative results, VAI, AAI, RI, HOI and BV are included (Table 1, Figure 1).

The species is distributed in all areas with commercial fruit growing in eastern Norway, while its distribution in the west is still very limited (Figure 1). The distribution in Norway coincides rather well with the mean July temperature of 14-16 °C (Figure 2), and it also to some extent confirms Balachowsky (1966), who reported that the northern limit of the codling moth is the isotherm of 15 °C in July in the northern hemisphere. However, at some of the localities reported here, the mean temperature for July is below 15 °C (Table 1, Figure 1, 2), which also is the case for some areas in Sweden and Finland (see below). The mean July temperatures in southern Norway, with emphasis on temperatures close to 15 °C, are shown in Figure 2. The map is based on monthly average temperatures (1961-90). Description and evaluation of the method used and the result is published by Tveito et al. (2000).

In Sweden *C. pomonella* is distributed in all provinces/counties except Gästrikland, including the islands Öland and Gotland, up to about 62° N (Svensson et al. 1987). According to Tveito et al. (2000), the mean July temperature in southern Sweden is between 14-18 °C, but in parts of Värmland and Dalarna the mean temperature in July varies between 10-14 °C. The species has also been recorded from Västerbotten, which is approximately between 63.5 and 65.5° N, by the Gulf of Bothnia (Svensson et al. 1987). The mean July temperature in Västerbotten is between 12-16 °C (Tveito et al. 2000).

In Finland *C. pomonella* is distributed in all provinces/counties almost up to 66° N (Kerppola et al. 1995), where the mean July temperature is between 14-18 °C (Tveito et al. 2000). In the eastern part of the country the species is present above the arctic circle, up to about 67.5° N (Kerppola et al. 1995), and the mean July temperature in these areas is between 10-14 °C (Tveito et al. 2000).

In Denmark *C. pomonella* is distributed throughout the country (Karsholt & Nielsen 1998), and

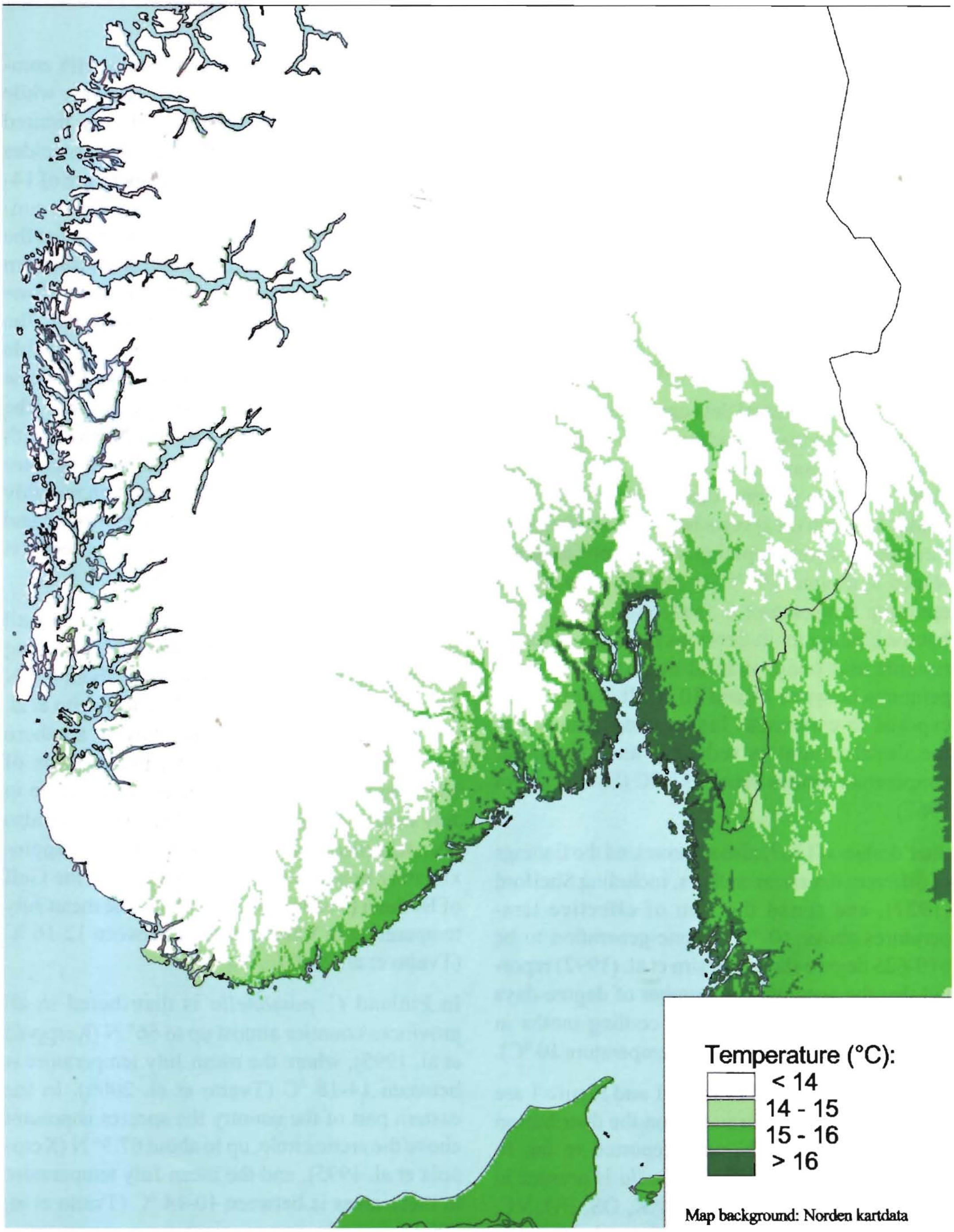

Figure 2. Mean July temperature for southern Norway 1961-1990 (Tveito et al. 2000).

the mean July temperature in Denmark is between 14-18 °C (Tveito et al. 2000).

As extreme ecological plasticity is a particular characteristic of the codling moth (Shel'deshova 1967), adaptation to lower temperatures by the northern population of the codling moth could explain the existence of the species in some areas in Norway, Sweden and Finland. To be successful, the codling moth has developed timing mechanisms with great plasticity which synchronize its life with the seasonal rhythms of climate and food availability (Riedl & Croft 1978). Local variations in the climate or microhabitats above those recorded by the standard meteorological network, could however, fit within the range essential to the activity of the moths and to normal development of the stages of the life cycle. It is however, beyond the scope of this article to pursue any of these factors further.

At least one characteristic can explain the lack of spread of the species in the west. The codling moth is considered to be rather sedentary, and several experiments on dispersal of both male and female moths have confirmed this (Mani & Wildbolz 1977). Experiments on female moths, referred to by Mani & Wildbolz (1977), showed that female moths were recaptured within distances of 50 to 400 m, and about 90 % of fruit infestations were within 305 m of the release area. In experiments conducted by Mani & Wildbolz (1977), almost 90 % of the male moths were recaptured within 1 km from the release point, however a few male moths dispersed over larger distances, up to 8 km. The topography in the west with the high mountains and the fjords also creates effective barriers preventing natural spread of adult codling moths.

The early introduction history and the history of spread of *C. pomonella* in Norway are unknown, and it is therefore difficult to predict whether there will be any further expansion of the species in Norway. The investigations conducted during 1990 to 1999 (Table 2) compared with earlier investigations (Table 2), could indicate that the species has recently spread to EIS 4 and 54. However, these two and the other six new positive EIS-grids presented in Table 2, could be a result of the expansion of the investigated area. In eastern Norway the topography is not a strong barrier as it is in the west, and the climate is also more suitable. One could therefore expect that the species could establish itself on the eastern side of lake Øyeren and possibly also further north on the eastern side.

Unfortunately, the northern limit of the species in eastern Norway was not established during this investigation. The trap put up at 61°05'N 10°26'E in 1999, was expected to confirm the negative results from earlier investigations (1975) around the same latitude (Table 1). This was not the case, and an extended survey further up the same valley (Gudbrandsdalen) could probably determine the northern limit of *C. pomonella*. The main host plant of the codling moth (apple) is commonly distributed in private gardens in Sør-Trøndelag county, and also at good climatic locations in Nord-Trøndelag (Levanger). The temperature conditions around the Trondheimsfjord (Tveito et al. 2000), are similar to the conditions by the Sognefjord were *C. pomonella* was found.

The investigations presented here, confirm that the distribution of *C. pomonella* in western Norway still is restricted to Sogndalsfjøra (Table 1). The history of the population in Sogndal is unknown, but it seems likely that the species has been introduced with infested apples or packing material from eastern Norway or from abroad. *C. pomonella* is a potential pest of apples in other parts of western Norway, since apple trees are available as host plants along the fjords and the July temperature are within the same range as in Sogndal (Figure 2).

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An invasion of migrating insects (Syrphidae and Lepidoptera) on the Faroe Islands in September 2000

Jens-Kjeld Jensen

Jensen, J.-K. 2001. An invasion of migrating insects (Syrphidae and Lepidoptera) on the Faroe Islands in September 2000. Norw. J. Entomol. 48, 263-267.

In late September 2000 there was an invasion of insects to the Faroe Islands, including five species of Syrphidae and fourteen species of Lepidoptera. Species such as *Xanthandrus comtus* (Harris, 1780), *Tinea pallescentella* Stainton, 1851 and *Chloroclysta siterata* (Hufnagel, 1767) are unexpected as migrating insects on the Faroe Islands. The different species seen in the invasion apparently arrived from at least two different geographical areas.

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INTRODUCTION

Among the Faroe Islands, Nólsoy Island is situated in the eastern part facing Norway. The island covers an area of 1028 ha and the position is 62°00'N, 6°38'W. The distances from the Faroe Islands to the nearest neighbouring countries are 300 km to Shetland, 450 km to Iceland and 600 km to Norway. The number of migrating insects arriving at the Faroe Islands varies from year to year, depending on the weather. During the first nine months of 2000 there were few migrating Lepidoptera and only two specimens of the syrphid *Episyrphus balteatus* (De Geer, 1776).

METHODS AND MATERIAL

Cathes of insects migrating to the Faroe Islands were carried out during 21 - 30 September 2000 using butterfly nets, light traps and traps baited with melasse. Most of the insects were caught on the Nólsoy Island, and a few at Sumba, Torshavn. The Lepidoptera were mainly caught at night or observed during daytime, All syrphids at Nólsoy Island were caught during daytime, while a few unidentified specimens were observed at Sumba during the day. Lepidoptera nomenclature is according to Karsholt & Razowski (1996). Syrphidae nomenclature is according to Torp (1994).

WEATHER CONDITONS

During the period of 21 – 29 September, one and two low-pressures were situated west and south of the Faroe Islands (Figure 1). One high-pressure was situated east and southeast of Norway and down to White Russia and another high-pressure had its centre in northern Italy (Meteo France). The wind direction on the Faroe Islands during this period was between south and east with 3 – 15 m/sec. (DMI). The arrows on the map in Figure 1 show the direction of the air current on 27 September heading directly from the English Channel to north of the Faroe Islands.

RESULTS AND DISCUSSION

The number of migrating insects that were caugth or observed on the Faroe Islands during the period of 21 – 30 September 2000 are shown in Figure 2. A few specimens of Lepidoptera appeared almost dayly in the early part of the period. The numbers increased considerably on 28 and 29 September, however, corresponding to the weather situation on the previous day (Figure 1). In contrast, syrphids were only collected on 28 September.

Lepidoptera

The different species of Lepidoptera caught or observed in this period are listed in Table 1. The numbers of observed specimens are approximate figures.

P. xylostella, R. senilella are both migrants and resident (Dahl 1956). *N. noctuella, V. atalanta, A. gamma, P. meticulosa, A. circellaris, P. saucia* and *A. ipsilon* are all migrants (Palm 1986, Skou 1991, Tolman et al. 1998, pers. obs.), seen almost every year. Some of the species are able to produce a new generation in the autumn, but have not been observed to survive the winter. *R. lutosa* and *X. c-nigrum* occur as rare migrants (pers. obs.). Since 1993, *X. c-nigrum* has previously only been observed five times and *C. miata* only six times. Consequently, *C. miata* must be considered as a rare migrant, although if it is reckoned as a local resident (Skinner 1984, Skou 1984). Skou (1984) considers *C. miata* and *C. siterata* to be immigrants to the Faroe Islands. Normally *T. pallescentella* is considered as an introduced species, but with the catch of two specimens during the present invasion, it must be reckoned as a migrant. Although it may be able to live in the Faroe Islands *T. pallescentella* has previously only been observed twice; in Tórshavn 23 October 1943 (Dahl 1956) and in Sumba 12 December 1997 (coll. A. Poulsen, det. K. P. Bland).

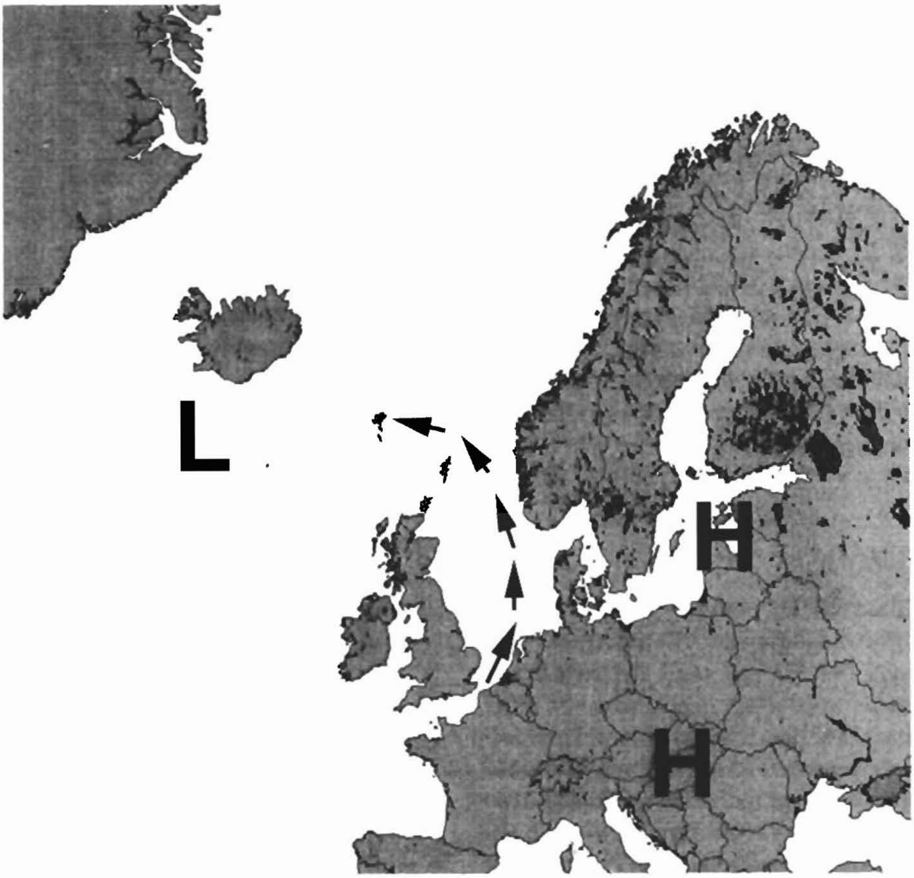

Figure 1. The low and high pressures were situated as in this figure during the period of 21 – 30 September 2000. The arrows on the map show the direction of the air currents on 27 September.

Table 1. The number of migrating Syrphidae and Lepidoptera caught or observed at the Faroe Islands during the period of 21 - 31 September 2000.

	Caught	Observed
Nólsoy		
Lepidoptera		
Agrochola circellaris (Hufnagel, 1766)	4	-
Agrotis ipsilon (Hufnagel, 1766)	6	-
Autographa gamma (Linnaeus, 1758)	1	-
Chloroclysta miata (Linnaeus, 1758)	4	-
Chloroclysta siterata (Hufnagel, 1767)	1	-
Nomophila noctuella (Denis & Schiffermüller, 1775)	>33	-
Peridroma saucia (Hübner, 1808)	1	-
Phlogophora meticulosa (Linnaeus, 1758)	12	-
Plutella xylostella (Linnaeus, 1758)	>20	-
Rhigognostis senilella (Zetterstedt, 1839)	>7	-
Rhizedra lutosa (Hübner, 1803)	1	-
Tinea pallescentella Stainton, 1851	2	-
Vanessa atalanta (Linnaeus, 1758)	-	>23
Xestia c-nigrum (Linnaeus, 1758)	1	-
Syrphidae		
Episyrphus balteatus (De Geer, 1776)	>5	-
Eupeodes corollae (Fabricius, 1794)	5	-
Scaeva selenitica (Meigen, 1822)	7	-
Syrphus torvus Osten Sacken, 1875	24	-
Xanthandrus comtus (Harris, 1780)	12	-
Sumba, Tórshavn, Miðvágur		
Vanessa atalanta (Linnaeus, 1758)	2	>22
Nomophila noctuella (Denis & Schiff., 1775)	>2	5
Syrphidae indet.	0	>3

Syrphidae

Among the Syrphidae (Table 1), *S. torvus, S. selenitica, E. balteatus* and *E. corollae* are all migrants (Torp 1994). *S. torvus* is the only one known as a local resident, although it is also observed as a migrating visitor to Nólsoy. *S. torvus* was not known from the Faroe Islands 90 years ago (Jensen 2001). *X. comtus* has never been considered as a migrant, but since the numbers of this species has increased considerably in the late 1980's (Stubbs & Falk 1983) it appears that *X. comtus* has become quite common in the northern Europe and therefore has started to migrate (Stubbs 1996).

Observations of insects in Shetland and Iceland

There is frequently a connection in the pattern of migrating birds and insects in Shetland and the Faroe Islands with a delay of 1-2 days in the Faroe Islands (pers. obs.). During 19 – 30 September the following species were observed in Shetland: *N. noctuella* 24 specimens 24 September and 11 specimens 30 September, *V. atalanta* 2 specimens 25 September and 1 specimen 26 September, 1 specimen of *Macroglossum stellatarum* (Linnaeus, 1758) 28 September and a few specimens of *P. saucia* and *X. c-nigrum* (Shetland Wildlife 2000, Pennington & Rogers 2001).

In Iceland almost the same species of Lepidoptera were observed during the same period as those in the Faroe Islands but no migrating Syrphidae (E. Ólafsson, pers. comm.).

Weather

The composition of the species observed during the ten days period indicates that they must come from different areas. Species such as *C. miata* and *C. siterata* has most likely migrated from Norway where they are common and very common (Hoffmeyer 1966, Skou 1984), but both species are very rare in the area around the English Channel and in Denmark. The catch of one specimen of *P. saucia* and a large number of *X. comtus* suggest that they must have migrated from southern countries, since *X. comtus* is rare in Norway (T. R. Nielsen, pers. comm.). Insects migrating from Norway across the North Sea on 27 September would most probably have been caught by the strong isobar (Figure 1) in the middle of the North Sea with wind force up to 15 m/sec. It is very likely that the same isobar also brought insects from both southern England, Holland, Belgium, North-West Germany and perhaps Denmark to the Faroe Islands. This theory is based on the difference in species of insects observed in Shetland and in the Faroe Islands during the same period. Still the possibility cannot be excluded that some of the insects arrived from countries situated further to the south-east since an unusual number of species of Noctuidae (Top-Jensen 2000) were caught on Bornholm, Denmark in late September. The reason, why no migrating Syrphidae were seen in Iceland, is probably due to unfavourable wind direction on 28 September (E. Ólafsson. pers. comm.).

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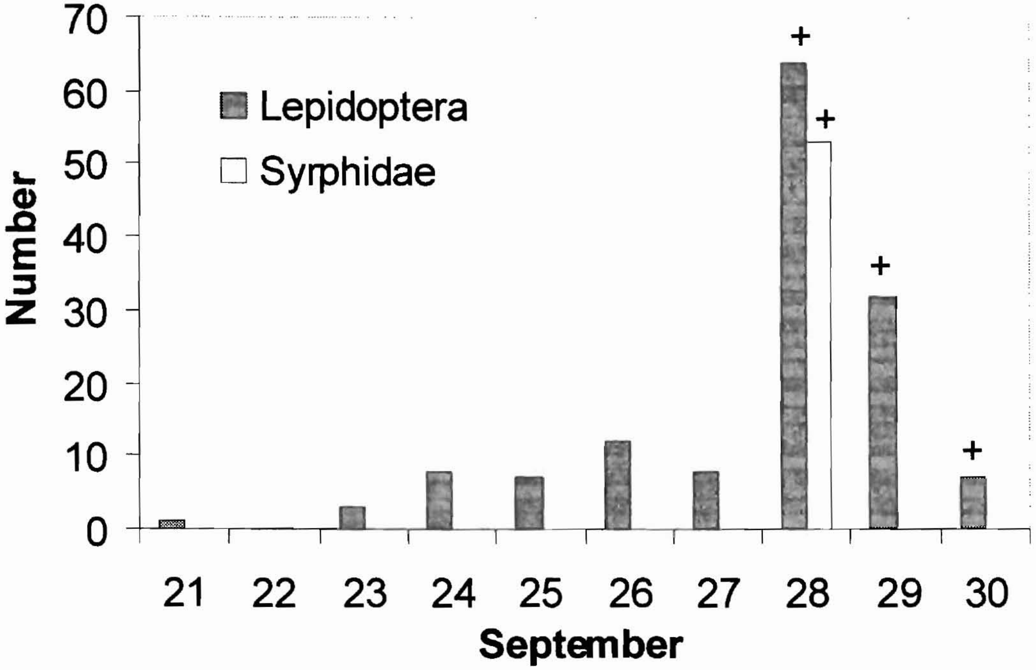

Figure 2. The number of migrating insects on the Faroe Islands in the period 21 September - 30 September 2000. + = more specimens observed.

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Widening the knowledge of *Dipoena torva* (Thorell, 1875) (Araneae, Theridiidae) in Norway

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Hauge, E. & Nielsen, T. R. 2001. Widening the knowledge of *Dipoena torva* (Thorell,1875) (Araneae, Theridiidae) in Norway. Norw. J. Entomol. 48, 268.

The species is reported from Sørlandet (southernmost parts of Norway), 1 male was collected 19 July 2000 in a pine forest.

Key words: Araneae, Theridiidae, southern Norway

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One male was found (T.R.Nielsen coll.) 19 July 2000 in a pine forest, surrounding the small lake Fidlandsvatn situated in VAY: Audnedal (EIS 5), southern Norway.

This is the forth record of the species in Norway during a short span of time, bringing it closer to the western areas of Norway, but still within the climatically more hospitable nemoral zone (its ultimate north-western part in Europe covering the southernmost coast-near region of Norway). The species is rare in northern parts of Britain (Locket et al.1974) and elsewhere in Europe (Miller 1967, Heimer & Nentwig 1991) but obviously common in southern Finland (Palmgren 1974).

The species was recently recorded for the first time in (south-eastern) Norway (Aakra 2000a), later reported (Aakra 2000b) as far north as inner areas of Northern Trøndelag (its northern outpost in Europe). Finally it is, like in Britain (Bratton 1991), red-listed in Norway (Aakra & Hauge 2000); endangered in Slovakia (Gajdos et al. 1999). The most urgent task in the conservation of *Dipoena torva* in these marginal areas of its distribution will be to take care of its habitat. Most records of this small spider are from crevices in the bark of old, mature pines and oaks (Palmgren 1974, Bratton 1991, Roberts 1995, Simon 1997, Aakra & Hauge 2000).

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South American *Rheotanytarsus* Thienemann et Bause, with the description of one new species (Diptera: Chironomidae)

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Andersen, T. & Kyerematen, R.A.K. 2001. South American *Rheotanytarsus* Thienemann et Bause, with the description of one new species (Diptera: Chironomidae). Norw. J. Entomol. 48: 269-274.

Rheotanytarsus pantanalensis sp. n. from Brazil is described and figured as male imago, and *R. pelus* (Roback) from Peru is redescribed. A key to the male imagines of South American species is provided.

Key words: Chironomidae, *Rheotanytarsus*, South America, new species.

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INTRODUCTION

The genus *Rheotanytarsus* Thienemann et Bause *in* Bause, 1913 is a species rich genus with 93 valid species distributed in all zoogeographical regions except Antarctica. The larvae of *Rheotanytarsus* are filter feeders, using nets suspended between arms at the anterior end of their cases (Pinder & Reiss 1983). They live in slow to moderately fast flowing rivers, and in streams, creeks and ponds. *R. ceratophylli* (Dejoux, 1973) and apparently all larvae of the *ceratophylli* group live in temporary stagnant waters (Dejoux 1973).

The present paper forms part of a review of the *Rheotanytarsus* species in the Oriental, Afrotropical and Neotropical region. A world revision of the *R. pellucidula* group was published separately (Kyerematen, Sæther & Andersen 2000), while the Oriental species was treated by Kyerematen, Andersen & Sæther (2000), the Afrotropical species by Kyerematen & Sæther (2000) and the Central American and Mexican species by Kyerematen & Andersen (2001). Sæther & Kyerematen (2001) outlined the phylogeny and zoogeography of the genus.

In their recent catalogue of the Neotropical and Mexican chironomids Spies & Reiss (1996) list 3 *Rheotanytarsus* species from Continental South America: *R. pelus* (Roback, 1960) from Peru and *R. globosus* Reiss, 1972 and *R. lamellatus* Reiss, 1972 from Chile and Argentina. Both *R. globosus* and *R. lamellatus* are described in detail by Reiss (1972: 64). During field work in Chile the first author has collected both species, *R. globosus* near Talca in Region VII and *R. lamellatus* near Puerto Aisen in Region XI. In the present paper one new *Rheotanytarsus* species, *R. pantanalensis* sp. n. from Brazil is described, and *R. pelus* is redescribed.

TERMINOLOGY AND MATERIAL

The general terminology and morphology follow Sæther (1980). The counts of setae on the wing veins include both dorsal and ventral setae. Setae, which stand at the margin of a vein, are regarded as belonging to the vein. The measurements are given as ranges. The male hypopygium is figured with anal point and tergite IX removed; dorsal aspect to the left, ventral aspect to the right. Dorsal view of tergite IX, anal point, superior and inferior volsella and gonocoxite and gonostylus are figured separately, as well as the superior and median volsella.

The holotype of *R. pantanalensis* sp. n. is housed in the Zoologische Staatssammlung München, Germany (ZSM), while the paratype is in the Museum of Zoology, Bergen, Norway (ZMBN). The type material of *R. pelus* was borrowed from the Academy of Natural Sciences, Philadelphia, USA (ANSP).

SYSTEMATICS

Rheotanytarsus pantanalensis sp. n.

(Figures 1 - 8)

Type material: Holotype male, **Brazil:** Mato Grosso: Pantanal, 16°57'S, 56°53'W, Malaise trap, 11 - 12 June 1994, U. Nolte leg. (ZSM). Paratype 1 male, same data as holotype (ZMBN).

Diagnostic characters: R. pantanalensis n. sp. shows similarities to *R. exiguus* (Johannsen, 1905), but can be separated on its smaller size and on the median volsella, which has a broader apical plate. Its mid tibia bears two spines unlike that of *R. exiguus*, which has none.

Etymology: Named after Pantanal in Brazil, using the Latin suffix *-ensis* denoting place, locality.

Description: Male imago (n = 1 - 2). Total length 1.94-1.99 mm. Wing length 1.09-1.10 mm. Total length / wing length 1.76-1.83. Wing length / length of profemur 2.09-2.11. Body entirely dark brown.

Head (Figure 1). AR 0.63-0.68. Thirteenth flagellomere 276-280 µm long. Temporal setae 7-8, including 3 inner verticals, 2-3 outer verticals, and 2 postorbitals. Clypeus with 15-16 setae. Tentorium 60-64 µm long, 16-18 µm wide at sieve pore and 8 µm wide at posterior tentorial pit. Stipes 70-72 µm long, 16 µm wide. Length of palpomeres (in µm): 26, 28, 64-66, 72, 130. Fifth palpomere / third palpomere 2.03.

Thorax (Figure 2). Dorsocentrals 7-8, acrostichals 16-18. Scutellum with 3 setae.

Wing (Figure 3). VR 1.49-1.51. Brachiolum with 1 seta, R with 14-16, R_1 with 17-22, R_{4+5} with 44-45 setae. Sc bare. RM with 1 seta, M with 0-2, M_{1+2} with 40, M_{3+4} with 23-26, Cu with 17, Cu_1 with 12-15, PCu with 42-45, and An with 25 setae. Cells m with 5 setae, r_{4+5} with about 150, m_{1+2} with about 120, m_{3+4} with about 50, cu with 10, and an with 5 setae.

Legs. Spur of front tibia 14 µm long, spurs of middle tibia 6-8 and 10 µm long, of hind tibia 8-10 and 12-16 µm long, all excluding comb. Comb of middle tibia 10 µm long, of hind tibia 12 µm long. Width at apex of front tibia 30-34 µm, of middle tibia 28-30 µm, of hind tibia 32-34 µm. Lengths (in µm) and proportions of legs as in Table 1.

Hypopygium (Figures 4-5). Tergite IX with 6-7 setae. Anal point 48-52 µm long, 20 µm wide at base, 4-6 µm wide at apex. Crest well developed, open and V- shaped with 2-4 setae in between anal tergite bands. Phallapodeme 66-68 µm long, transverse sternapodeme 22-28 µm long. Gonocoxite 80-82 µm long, gonostylus 84-90 µm long. Superior volsella (Figure 6) 26-30 µm long, subtriangular with pointed apex; inferior volsella 58-64 µm long; median volsella (Figures 7-8) 42 µm long, markedly curved with lamelliform setae fused into plate. Inferior and median volsellae with microtrichia, superior volsella without microtrichia. HR 0.91-0.95, HV 2.21-2.30.

Distribution: The species is known from Brazil only.

Rheotanytarsus pelus (Roback)

(Figures 9 - 12)

Calopsectra pela Roback, 1960: 105
Rheotanytarsus pelus (Roback), Spies & Reiss 1996: 73

Material examined: Holotype male, **Peru:** Tingo Maria, Hotel Tourista, 27 September 1955, S.S. Roback leg. (ANSP 6830). Paratypes 1 male genitalia, 1 male foreleg as holotype except 24 – 27 September 1955 (on slide) (ANSP).

Diagnostic characters: The hypopygium of *R. pelus* shows similarities to *R. rioensis* Langton et Armitage, 1995, described from the Canary Islands. However, the species can be easily separated from other species of the genus by having a median volsella with a petal-like apical plate.

Redescription: Male imago (n = 1). Wing length 1.48 mm. Wing length / length of profemur 1.84. Thorax, abdomen and legs pale.

Head. Features on head not measurable.

Thorax. Setae not countable.

Wing. Brachiolum with 1 seta, R with 15, R_1 with 21, R_{4+5} with 48 setae. Sc, RM and M bare. M_{1+2} with 51 setae, M_{3+4} with 28, Cu with 14, Cu_1 with 15, PCu with 45 and An with 19 setae. Cells m with 5 setae, r_{4+5} with about 170, m_{1+2} with about 150, m_{3+4} with about 50, cu with 16 and an with 10 setae.

Legs. Spur of front tibia 18 µm long, spurs of middle tibia 10 and 18 µm long; of hind tibia 22 and 28 µm long, all excluding comb. Comb of middle tibia 14 µm long, of hind tibia 16 µm long. Width at apex of front tibia 50 µm, of middle tibia 40 µm, of hind tibia 46 µm. Lengths (in µm) and proportions of legs as in Table 2.

Hypopygium (Figures 9 - 12). Tergite IX with 10 setae. Anal point 66 µm long, 36 µm wide at base, 8 µm wide at apex. Crest well developed and V-shaped with 4 median setae. Phallapodeme 60 µm long, transverse sternapodeme 42 µm long. Gonocoxite 100 µm long, gonostylus 96 µm long. Superior volsella (Figure 11) 38 µm long; inferior volsella 76 µm long; median volsella (Figure 12) 60 µm long, with lamelliform setae fused into petal-like plate. Inferior and superior volsellae with microtrichia, median volsella without microtrichia. HR 1.04.

Distribution: The species is known from Peru only.

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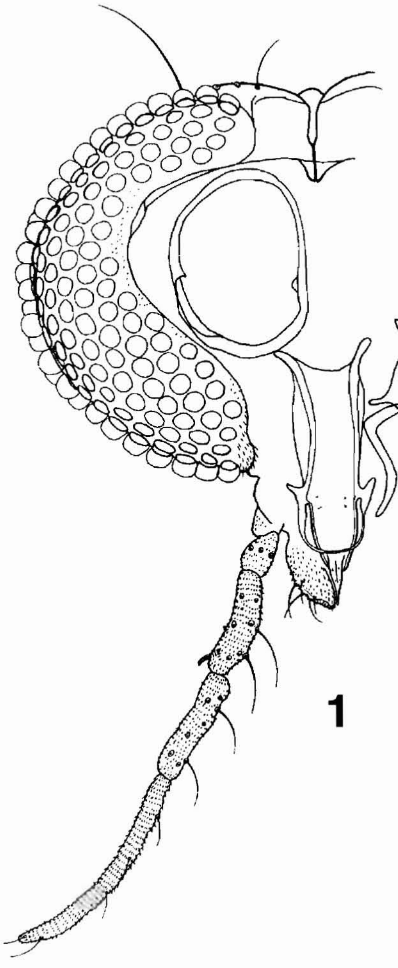
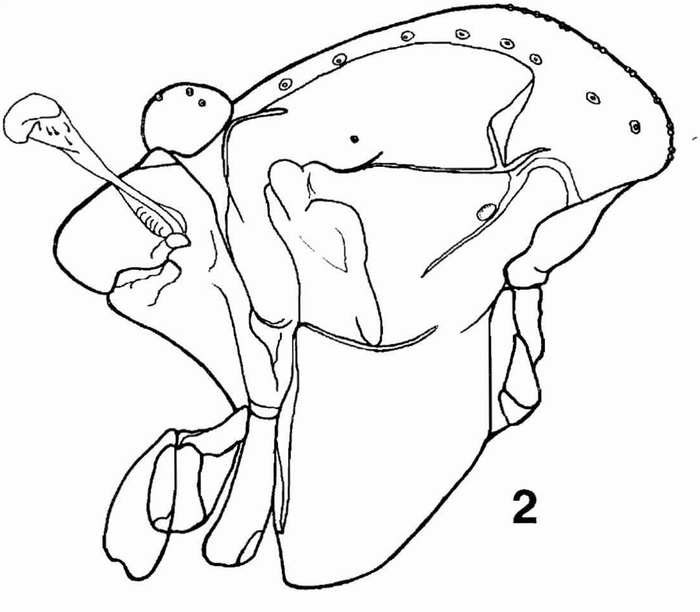
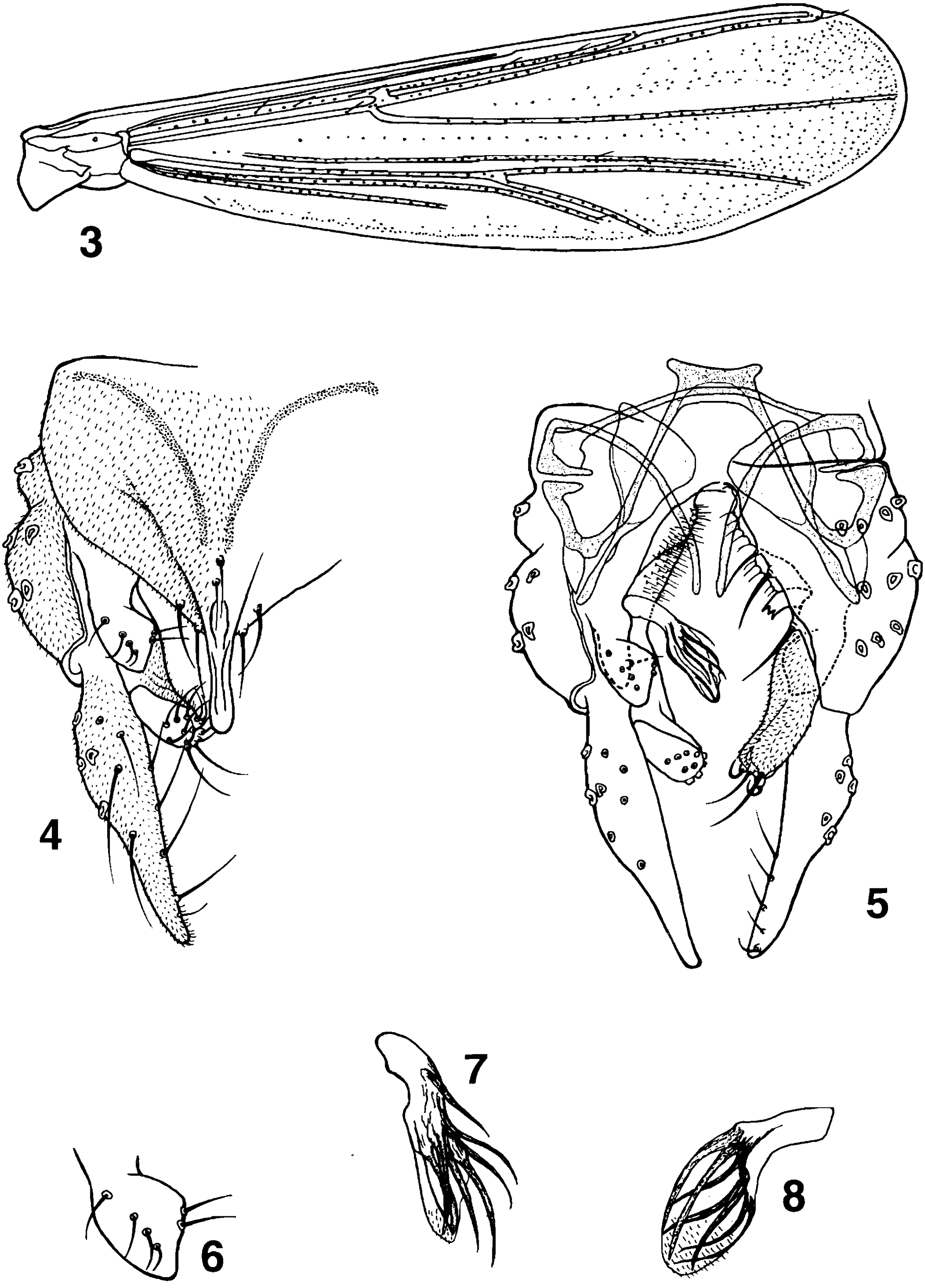
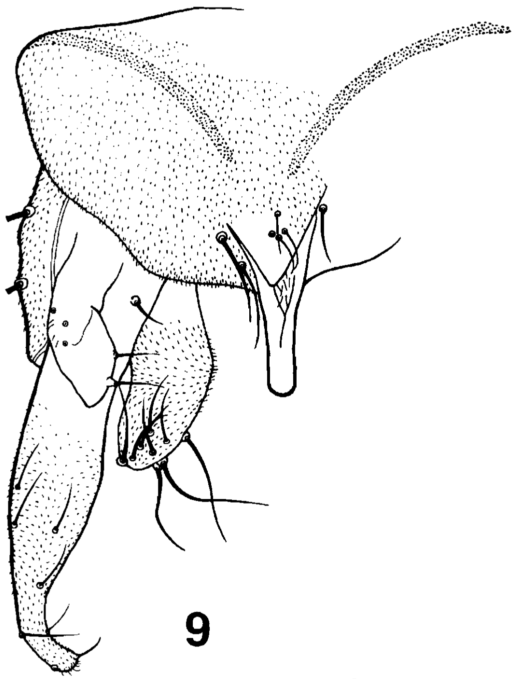


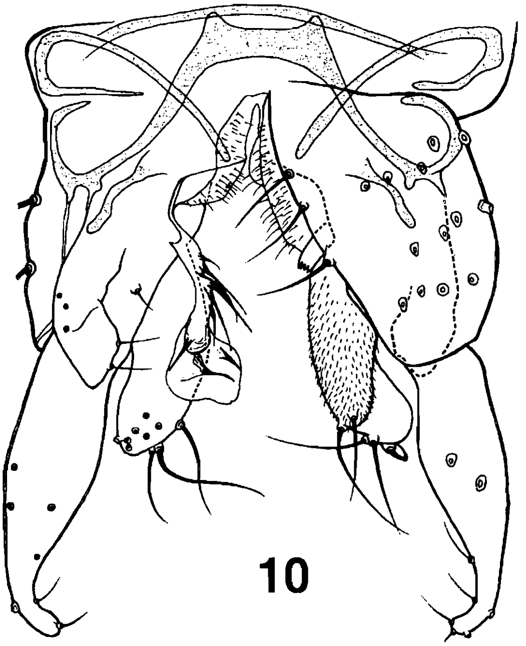


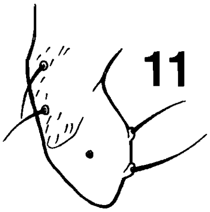
Figures 1-2. *Rheotanytarsus pantanalensis* sp. n., male imago. 1, head; 2, thorax.



Figures 3-8. *Rheotanytarsus pantanalensis* sp. n., male imago. 3, wing; 4, tergite IX, anal point and dorsal aspect of left gonocoxite and gonostylus; 5, hypopygium with tergite IX and anal point removed, left dorsal aspect, right ventral aspect; 6, superior volsella; 7-8, median volsella, different views.







Figures 9-12. *Rheotanytarsus pelus* (Roback, 1960), male imago. 9, tergite IX, anal point and dorsal aspect of left gonocoxite and gonostylus; 10, hypopygium with tergite IX and anal point removed, left dorsal aspect, right ventral aspect; 11, superior volsella; 12, median volsella.

Key to male imagines of South American *Rheotanytarsus* Thienemann et Bause

1\. Median volsella with apical plate reaching tip of superior volsella or shorter, wing length < 2 mm 2

\- Median volsella with apical subulate setae, distinctly longer than superior volsella; wing length > 2 mm. Chile, Argentina. (Reiss 1972, Figure 11) .... *R. globosus* Reiss

2\. Median volsella with rounded, apical plate 3

\- Median volsella with distinct petal-like apical plate. Peru. (Figures 9-12) .... *R. pelus* (Roback)

3\. Superior volsella rounded, wing length about 1.75 mm. Chile. (Reiss 1972, Figure 12) .... *R. lamellatus* Reiss

\- Superior volsella subtriangular, wing length about 1.10 mm. Brazil. (Figures 1-8) .... *R. pantanalensis* n. sp.

Table 1. Lengths (in µm) and proportions of legs of male *Rheotanytarsus pantanalensis* sp. n.

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	520	232	632-648	340	244-248	160-172	72-80	2.72-2.79	1.67-1.70	1.16-1.19	-
p_2	512-516	396-400	220	116	92	56	44	0.55	3.66	4.13	5.1
p_3	560-564	488-500	300	192	160	108	60	0.61	2.60	3.51	-

Table 2. Lengths (in µm) and proportions of legs of male *Rheotanytarsus pelus* (Roback, 1960).

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	800	332	1004	432	320	252	112	3.02	1.91	1.13	2.8
p_2	692	548	288	136	104	60	52	0.52	4.34	4.30	-
p_3	760	640	372	240	220	140	72	0.58	2.64	3.76	-

ral Sciences, Philadelphia, U.S.A. for lending us the type material of *R. pelus* (Roback). Professor Ole A. Sæther commented on the manuscript and Gladys Ramirez made the slide preparations. The article was written while the junior author had a scholarship from The Norwegian Universities' Committee for Development, Research and Education (NUFU). Fieldwork in Chile was funded through the Norwegian Research Board (NF) project no.: 121975/720.

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A new species of *Morulina* (Collembola, Neanuridae, Morulininae) from Siberia

Anatoly B. Babenko & Arne Fjellberg

Babenko, A. B. & Fjellberg, A. 2001. A new species of *Morulina* (Collembola, Neanuridae, Morulininae) from Siberia. Norw. J. Entomol. 48, 275-280.

The new species *Morulina theeli* n. sp. was detected fifteen years ago among the type specimens of *Morulina gigantea* Tullberg, 1876, collected by the Swedish Nordenskiöld expeditions to Siberia more than 125 years ago. Its final description has been postponed until fresh specimens could be collected near the original sampling sites at Taimyr. The new species is distinguished by having multidentate mandibles in combination with fused De and Dl tubercles on Abd.4. Additional specimens were collected in Central Yakutia and near Lake Baikal.

Key words: Collembola, *Morulina theeli* sp. n., Siberia.

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INTRODUCTION

The genus *Morulina* comprices 12 species which are all large, conspicuous animals with dark colour and strongly warted body bearing long outstanding hairs. Distribution of the genus covers most of the Holarctic region, but so far there have been no West European records of the genus (Cassagnau 1997). Several species enter the arctic tundra where they are among the most easily collected springtails by their size and colour. The Swedish Nordenskiöld expeditions (1875-1880) brought back several samples of *Morulina* from the Russian arctic, from which Tullberg (1876) described the new species *M. gigantea*. Fjellberg (1985) re-examined the type material of *gigantea*, and in additional samples from southern Taimyr (Tolstyi Nos and Nikandrovskii Island), collected by the Swedish expedition in 1876, a few specimens of an unknown species of *Morulina* was detected. It was briefly described, but not formally named (Fjellberg 1985:112). Since then we have been looking for this new species on Taimyr and some other northern regions of Siberia. Finally, in 1999 it was collected not very far from the original sampling points.

DESCRIPTION

Morulina theeli sp.n.

Type material. Holotype: Female from «Southern Taimyr. Northern shore of Pyasino Lake (70°03' N, 87°38' E), 03.VIII.1999. Willow shrubs near stream (pit-fall traps). A. Babenko leg.» *Paratypes*: 4 ♀♀, 3 ♂♂ (slides), and 10 specimens (alcohol) from the same sample. Types are deposited in the collection of the Zoological Department of the Moscow Pedagogical University.

Additional material. In addition to the type specimens and the two samples from 1876 which are mentioned in the introduction, there are two recent records: Nine specimens from Central Yakutia (62°02' N, 129°42' E): Yakutsk, botanical garden, wet meadow near pool, 10. VII. 1992, M. Potapov leg. Two specimens from «Buryatia (53°16' N, 108°44' E): Southern shore of Baikal Lake, litter of coniferous forest near settlement Maksatikha, 23. VIII 1986, T. Zholtikova leg.»

Etymology. Named after the Sweedish zoologist Hjalmar Theel, member of Nordenskiöld's second arctic expedition.

Description. Colour dark blue, almost black. Size: 3-3.5 mm. Antennae rather short with coarser granulation on dorsal side of the first two segments. Ant.1-2 with 9-10 and 16-17 chaetae respectively, dorsal ones are clearly ciliated. Ant. 3 without dorsal chaetae, those on ventral, medial and lateral sides are almost smooth. Ant.4 apically with a small subapical organite and a 3-lobed bulb. Only 3 of the dorsal sensilla are well marked. Ventral side of Ant. 4 with many short and thin chaetae with bent tips. Ant. 3 organ normal, consisting of two outer sensilla with two curved sensory pegs between them, and a small ventral microsensillum. Ocelli 5+5. PAO with numerous small vesicles, about 1.5 times longer than diameter of nearest ocellus. Buccal cone sharply pointed (Figure 7). Mandibles strong, with 11-13 teeth (Figure 5). Maxillae styliform, capitulum with 2 apical teeth and two lamellae. Lam.1 fine and membranous, lam.2 needle-like, slightly passing tip of the capitulum (Figure 6). Labrum with 2,5,4 chaetae, labium with 7+3 chaetae and two small sensorial papillae (Figure 7).

Body tubercles are well marked by coarser integument granulation and clear reticulation. The following tubercles are fused: So and L on head, De and Dl on Abd.4, and Di, De and Dl on Abd. 5. Abd. 6 invisible from above, completely hidden under Abd. 5. The majority of dorsal chaetae are thick, blunt and clearly serrated (Figure 4). Sensorial formula as: 22/22211 (sometimes one or more sensilla may be doubled or absent on one or both sides). Dorsal chaetotaxy rather variable due to a moderate plurichaetosis (Figures 1, 2).

Head. Cl: 5, An: 5, Fr: 2-4 (usually 2), Oc: 3, Di + De: 7-8, Dl: 4-5, So + L: 8-11.

Thorax and abdomen: See Table 1.

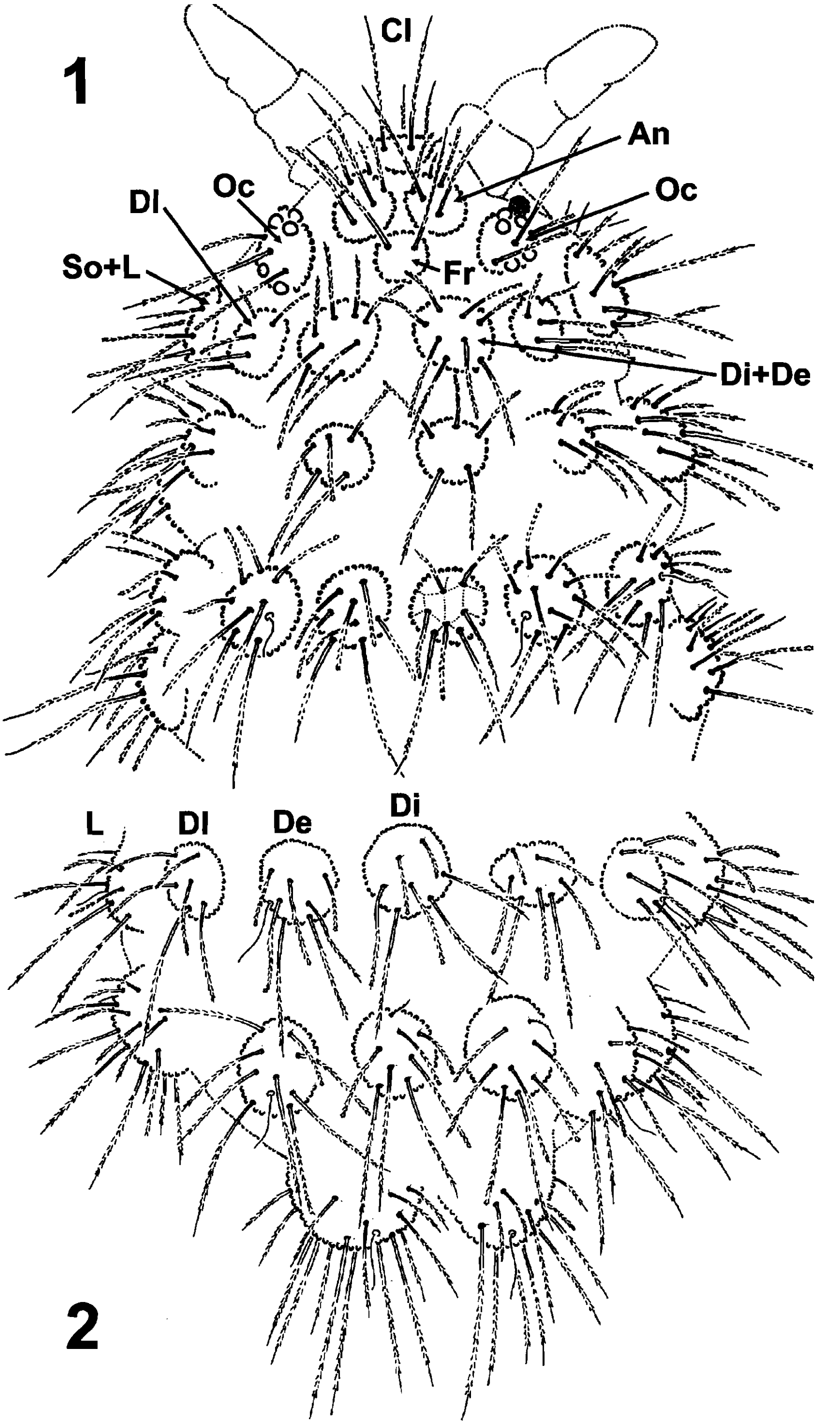
Ventral chaetotaxy of abdomen as Figure 3. Ventral tube with 10-13+10-13 lateral chaetae. Furca reduced to two small humps with 2-3 chaetae each. Unguis with distinct inner tooth (Figure 8).

DISTRIBUTION

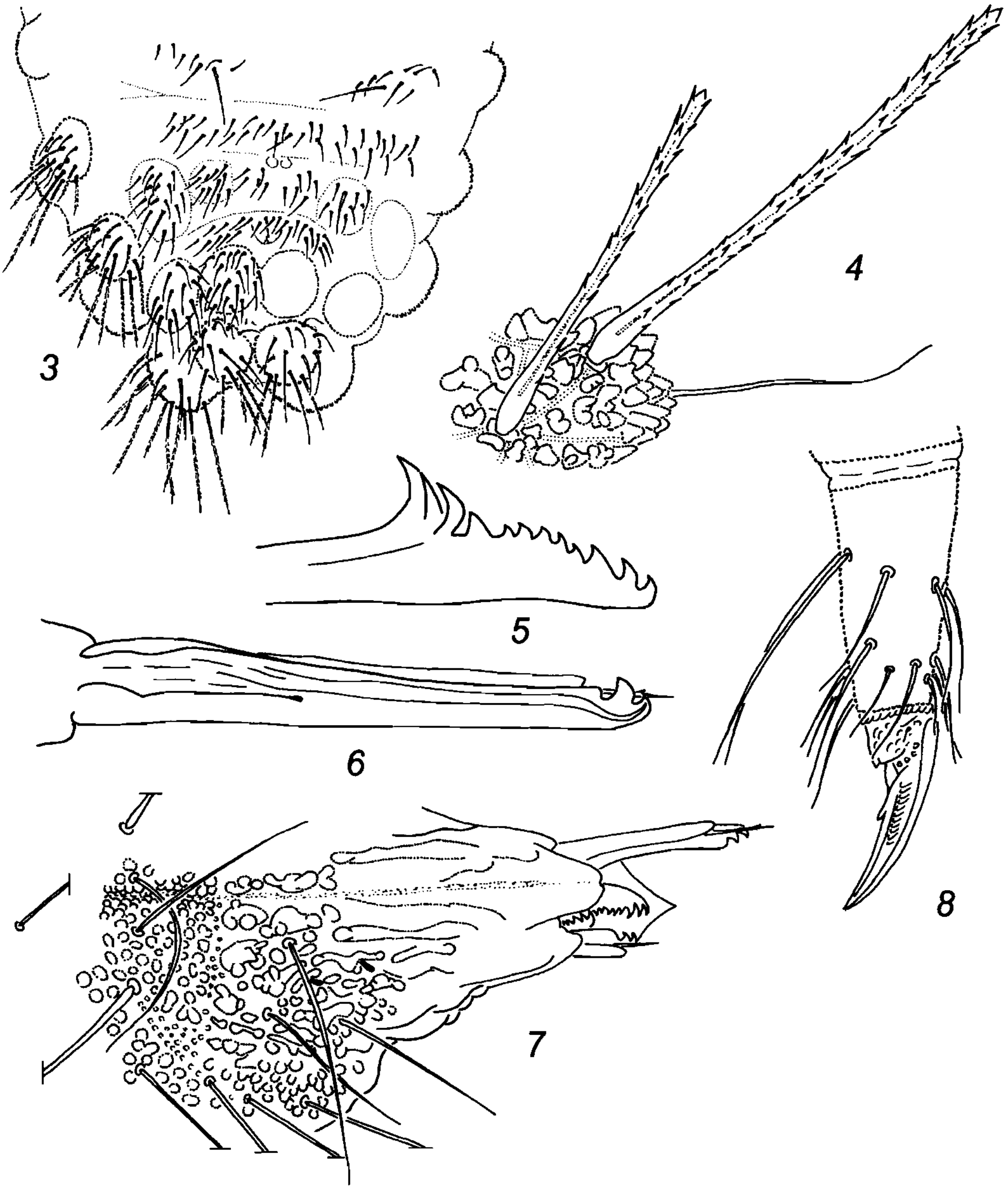
Only a few records form the northern and central part of Siberia (Figure 9). We assume a wide distribution in boreal forest and tundra.

DISCUSSION

The multidentate mandibles, resembling those of *M. mackenziana* Hammer, 1953 is the most characteristic feature of the new species. *M. mackenziana* differs in having clearly separated De and Dl tubercles on Abd. 4, fewer chaetae on body tubercles, and small (if any) tooth on unguis. Another unique feature of the new species is the presence of an additional sensillum on L tubercles of Abd. 1-3 (Figure 4). It shares this characteristic only with the sympatric *M. gigantea* (Tullberg, 1876) and one undescribed form from the Altai mountains. All the other species found on the former USSR territory (*M. alata* Yosii, 1954; *M. orientis* Tanaka,1984; *M. verrucosa* (Börner, 1903); *M. thulensis* Hammer, 1953) have the usual number (22/1111) of body sensilla. In addition to *M. theeli*, three other *Morulina* species have fused De and Dl tubercles on Abd.4: *M. gigantea*, *M. verrucosa* and *M. australis* Tanaka, 1984. Both *M. gigantea* and *M. theeli* have a strong tooth on unguis, supplementary sensillum on Abd.1-3 and moderate plurichaetosis. Apart from different maxillae and mandibles, *M. theeli* has more heavily serrated dorsal chaetae and differs also in chaetotaxy having more pronounced plurichaetosis on thorax and abdomen, while *M. gigantea* has more chaetae on cephalic tubercles, for instance, 5-6 on Oc and 8-9 on Dl (3 and 4-5 respectively in *M. theeli*). In mixed populations of the two, *M. theeli* can easily be separated by a more «hairy» appearance. *M. verrucosa*, living in the Carpathian mountains, resembles *M. theeli* in the styliform maxillae, increased numbers of teeth (7-8) on the mandibles, a strong tooth on unguis as well as clearly serrated chaetae, but differs by absence of the additional sensillum on Abd. 1-3. The shape and mutual position of interocular tubercles can also be used to separate *M. verrucosa* from *M. theeli*. The Japanese *M. australis* has only 5 mandibular teeth, feather-like macrochaetae (strongly serrated on opposite sides), the large triangular cephalic tubercle Fr furnished with 3 chaetae, and only 5-6 lateral chaetae on the ventral tube.



Figures 1-2. *Morulina theeli* n.sp. (1): Dorsal chaetotaxy of head and two first segments of thorax; (2): Dorsal chaetotaxy of Abd.3-5, the last abdominal segment being hidden.



Figures 3-8. *Morulina theeli* n.sp. (3): Ventral chaetotaxy of Abd.2-6; (4): Serrated macrochaetae and sensillum from the L-tubercle on Abd.2; (5): Mandible; (6): Maxilla; (7): Left labium with small sensilla (black) and mouthparts projecting: (8): Tibiotarsus and claw.

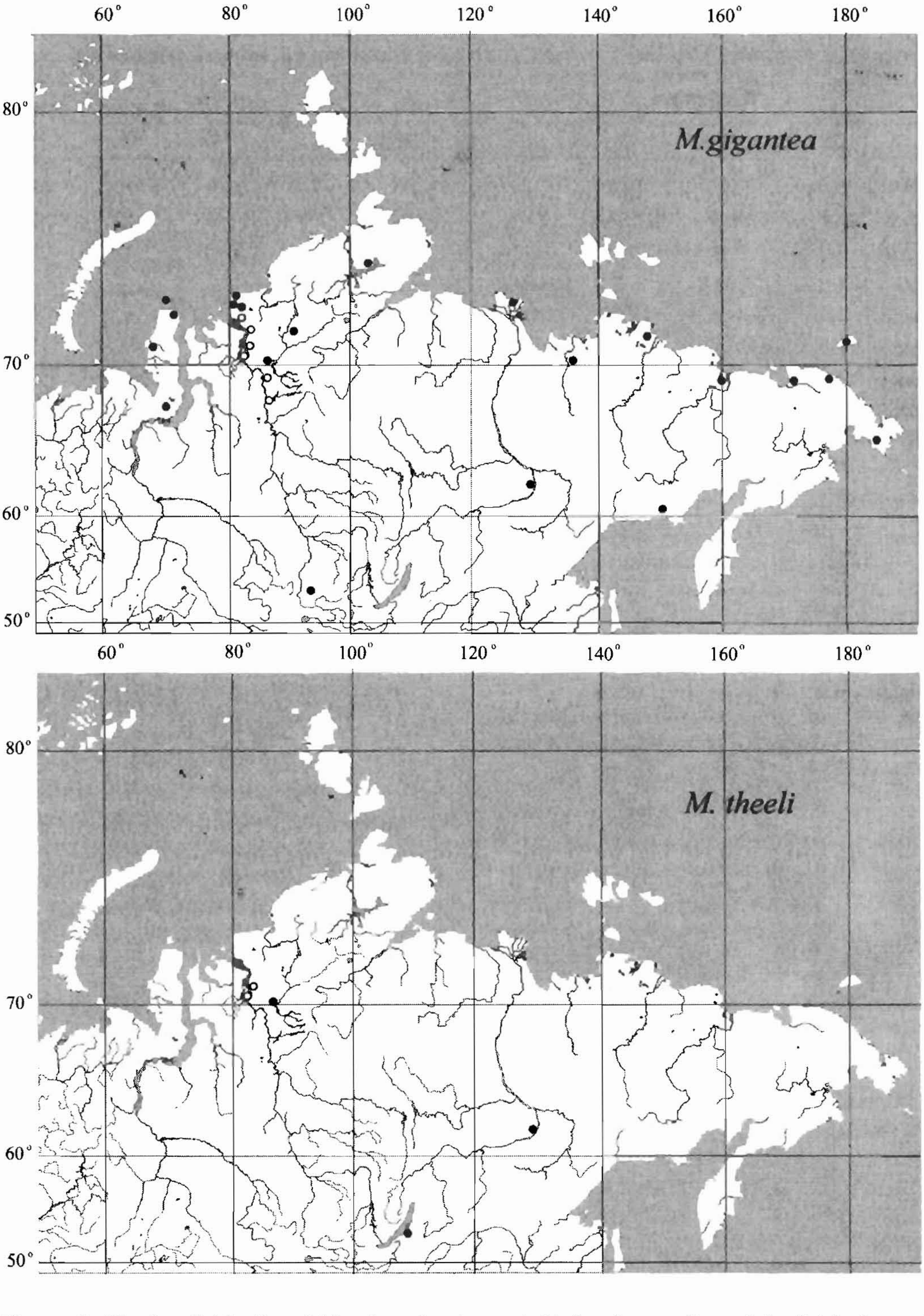


Figure. 9. Siberian distribution of *Morulina gigantea* and *M. theeli* n. sp. Open dots: Original samples from the Nordenskiöld expeditions (1875-1880). Filled dots: Recent samples.

Table 1. Chaetotaxy scheme of thorax and abdomen of *Morulina theeli* n. sp. Number of setae and sensilla (s) on dorsal tubercles (Di: dorsointernal, De: dorsoexternal, Dl: dorsolateral, L: lateral) and subsegments of the legs (Scx2: subcoxa 2, Cx: coxa, Tr: trochanter, Fe: femur, T: tibiotarsus).

	Tubercles				**Legs**				
	Di	De	Dl	L	Scx2	Cx	Tr	Fe	T
Th.1	5-8	7-11	7-11	0	0	2-3	6	13	19
Th.2	5-8	6-9+ s	8-10+s	5-11	3-4	8	6	12	19
Th.3	5-9	8-11+s	8-11+s	10-14	5-6	8-9	6	11	18
Abd.1	7-9	7-8+s	6-9	6-8+s					
Abd.2	7-9	6-8+s	6-8	7-12+s					
Abd.3	7-8	6-9 +s	6-8	8-13+s					
Abd.4	7-9	9-13+s		11-18					
Abd.5	12-18+s			12-15					

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Notes on Norwegian Coleoptera 5

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Sagvolden, B.A. & Hansen, L.O. 2001. Notes on Norwegian Coleoptera 5. Norw. J. Entomol. 48, 281-287.

The following seven species of Coleoptera are recorded for the first time in Norway: *Cercyon bifenestratus* Kuster, 1851 (Hydrophilidae), *Stenus pallitarsis* Stephens, 1833, *Ocalea badia* Erichson, 1837 (Staphylinidae), *Dermestes haemorrhoidalis* (Küster, 1852) (Dermestidae), *Scymnus ater* (Kugelann, 1794) (Coccinellidae), *Melandrya barbata* (Fabricius, 1787) (Melandryidae) and *Otiorhynchus rugosostriatus* (Goeze, 1777) (Curculionidae). The complex of the two sibling species *Anthonomus brunnipennis* Curtis, 1840 and *A. rubi* Herbst, 1795 (Curculionidae) are revised. Noteworthy records are given for the following species: *Porotachys bisulcatus* (Nicolai, 1822), *Bradycellus verbasci* (Duftschmid, 1812), *Perigona nigriceps* (Dejean, 1831) (Carabidae), *Gabrius tirolensis* (Luze, 1903), *Deleaster dichroeus* (Gravenhorst, 1802) (Staphylinidae), *Prionocyphon serraticornis* (Müller, 1821) (Scirtidae), *Gymnetron melanarium* (Germar, 1821) and *Xyleborinus saxeseni* (Ratzeburg, 1837) (Curculionidae).

Key words: Coleoptera, geographical range, sibling species, new species in Norway.

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INTRODUCTION

This account reports seven species of Coleoptera for the first time from Norway, together with some other noteworthy records. The Norwegian material of the two sibling species of the weevils *Anthonomus brunnipennis* Curtis, 1840 and *A. rubi* Herbst, 1795 are revised.

The aim of this paper is to summarise recent information concerning Norwegian Coleoptera, and this is the fifth contribution in the series. The previous accounts were Sagvolden & Hansen (1993, 1996), Hansen & Sagvolden (1995) and Hansen et al. (1998).

The nomenclature follows Lundberg (1995), the format for the records is according to Økland (1981), and the European Invertebrate Survey grid System (EIS) is given in accordance with Økland (1977). If nothing else is stated, the material is collected by the authors, and deposited in the collections of the senior author. The following abbreviations are used in the text: ADU = Alan Dufsberg; BMF = Bjørn M. Fjellstad; CN = car-net (modified model after Kronblad & Lundberg 1978); FED = Felles Entomologisk Dokumentasjons enhet (= Joint Entomological Documentation Unit), NISK, Ås; FØD = Frode Ødegaard; KB = Kai Berggren; KMO = Kjell Magne Olsen; LT = Light-trap; NISK = Norsk institut for skogforskning (= Norwegian Forest Research Institute); MT = Malaise-trap; OHA = Oddvar Hanssen; PFT = pit-fall trap; SLI = Sindre Ligaard; SN = sweep net; SO = Stephan Olberg; TJO = Thor Jan Olsen; WT = window trap; ZMO = Zoological Museum, University of Oslo; ZMB = Zoological Museum, University of Bergen; * = New to Norway.

THE RECORDS

Carabidae

Porotachys bisulcatus (Nicolai, 1822)

Ø Eidsberg: Hærland (EIS 29) 1 ex on *Trifolium hybridum*; Sarpsborg: Kvastebyen (EIS 20) 1 ex under stone close to stable (leg. & coll. TJO); **VE**

Lardal: Svarstad (EIS 19) 2 exx (CN); **BØ** Kongsberg: Hvamsia (EIS 27) 3 exx (CN); Drammen: Drammen centre – Sølvfastøya (EIS 28) 1 ex (CN); **BV** Rollag: Stærnes (EIS 27) 3 exx in decaying leaves at a pig-farm, 1 ex at decaying potatoes in a warehouse; Rollag –Veggli (EIS 35), a distance of 15 km, 26 exx captured in CN during the years 1992-1998; **OS** Gausdal: Svatsum (EIS 53) 1 ex (CN), Follebu (EIS 54) 1 ex (CN); **VAY** Kristiansand: Hamresanden (EIS 2) 1 ex (CN).

Ødegaard (1999) indicates that *P. bisulcatus* was originally associated with coniferous forest, but now it is found only at sawmills in heaps of damp, or fermenting spruce bark. He asks if the species ever has been present in natural habitats here? Several of the records listed above are certainly from localities far away from sawmills or fermenting spruce bark. So it is likely, that the species still uses natural habitats here. Some of the records seem to be from manure heap composts as reported from Sweden (Lundberg 1973b).

Bradycellus verbasci (Duftschmid, 1812*)*

Hansen et al. (1998) reported this species for the first time in Norway from **VE** Tjøme and **TEY** Kragerø. However, the first capture seems to be from **VAY**, Kristiansand: Augland (EIS 2), 1 ex 2 Aug. 1984 (leg. KB).

Perigona nigriceps (Dejean, 1831*)*

Ødegaard (1999) reported this invasive species from **VAY, OS** and **STI**. The following new records may be added: **BØ** Drammen: Drammen centre (EIS 28) 1 ex 12 Aug. 1996 (CN); **BV** Rollag: Rollag (EIS 35) 1 ex 16 Sept. 1991, Rollag - Veggli (EIS 35) 1 ex 23 June 1995 (CN).

Hydrophilidae

* *Cercyon bifenestratus* Kuster, 1851

Ø Hvaler: Asmaløy, Huser (EIS 20) 2 exx August 1995 (LT, leg. BMF, coll. SLI). The species is usually found in small ponds on sandy ground (Vogt 1971). It is recorded from all Danish districts (Hansen 1996), and in Sweden it is found scattered from Nä to Nb (Lundberg 1995).

Staphylinidae

Gabrius tirolensis (Luze, 1903)

This species was reported for the first time from Norway by Sagvolden & Hansen (1996). Although this is a quite huge *Gabrius* sp., it is easily confused with the closely related *G. astutoides* (Strand, 1946) and *G. astutus* (Erichson, 1840). Thus, all larger specimens of *Gabrius* in Norwegian museum collections and some private collections were investigated. No specimens of *tirolensis* were found. However, car-netting during May and June for the last seven years have revealed several new records (Table 1).

According to Sagvolden & Hansen (1996), it is usually swarming along small rivers and streams on warm and sunny days with calm air. Additionally, it has once been captured swarming in a pine forest in Gvarv, and captured in a PFT in an open calcareous pine forest at Hole (see Table 1). *G. tirolensis* seems to be locally common in the internal parts of SE Norway.

Deleaster dichrous (Gravenhorst, 1802)

Ø Våler: Svinndal (EIS 20) 1 ex 27 June 1986 (LT); Fredrikstad: Visterflo, Rolvsøy (EIS 20) several exx 13 July 1988 (leg. SLI, coll. SLI & FØD); **AK** Oslo: Sørkedalen (EIS 28) 15 exx 29 May 1988 (CN) (leg. & coll. FØD); **BØ** Lier: Lier (EIS 28) 1 ♂ at night 29 July 1997.

This nocturnal species has been taken under wet leaves on the ground near shores, and also repeatedly found in great numbers in soil with decomposed peat moss. Adults are usually observed in numbers flying, even indoors, late in the afternoon usually in the beginning of May (B. Ehnström pers. comm.). It has also been captured in light-traps in Sweden (Lundberg 1973a). *D. dichrous* is most certainly an antropochor, and probably expanding at the moment. It has previously been recorded once in Norway from **AK** Bærum (Hansen 1988).

* *Stenus pallitarsis* Stephens, 1833

BØ Øvre Eiker: Darbu (EIS 27) a single pair in copula among straws and decaying leaves at the

Table 1. The hitherto known records of *Gabrius tirolensis* in Norway; also inlcluding data from Sagvolden & Hansen (1996.)

Reg.	EIS	Municipality	Locality	DATE	N	Leg.	Coll.	Method
TEI	18	Sauherad	Gvarv	19 V 1990	1	FØD	FØD	SN
TEI	26	Tinn	Rjukan - Mæl	10 VI 1996	2	BAS	BAS	CN
BØ	28	Drammen	Konnerud - Skoger	16 VI 1996	1	BAS	BAS	CN
BØ	28	Drammen	Drammen centre	12 VI 1996	1	BAS	BAS	CN
BV	34	Nore & Uvdal	Fønnebøfjorden	26 VI 1996	9	BAS	BAS	CN
TEI	34	Tinn	Breisettdalen	02 VI 1998	2	BAS	BAS	CN
BV	35	Rollag	Rollag - Veggli	23 VII 1992	♂♀	BAS	BAS	CN
BV	35	Rollag	Rollag - Veggli	12 V 1993	♂	BAS	BAS	CN
BV	35	Rollag	Rollag - Veggli	7 VII 1993	♂♀	BAS	BAS	CN
BV	35	Rollag	Rollag - Veggli	V 1996 - VII 1998	17	BAS	BAS	CN
BV	35	Rollag	Rollag - Kjomme	5-23 VI 1995	5	BAS	BAS	CN
BV	35	Rollag	Rollag - Bruhaug	01 VI 1997	1	BAS	ADU	CN
BV	35	Sigdal	Prestfoss - Nes	12 VI 1996	1	BAS	BAS	CN
BØ	36	Hole	Søhol, Røysehalvøya	VI 1998	1	LOH	BAS	PFT
BV	43	Ål	Trillhus - Ål	13 VII 1996	1	BAS	BAS	CN
BV	43	NES	Rukkedalen	13 VII 1996	1	BAS	BAS	CN
BV	44	NES	Nesbyen East	13 VII 1996	1	BAS	BAS	CN

shore of lake Fiskumvannet, 27 Sept. 1994; Hole: Onsakervika (EIS 36) several exx 2 Sept. 2000 (leg. & coll. SLI).

S. pallitarsis prefers shores with rich vegetation, and may be found in tufts of *Carex* spp. just above the water level. Adults have been observed running on the water surface, and the species can be found numerous in winter among grassroots higher up at the shore (Palm 1961). The distribution is in Sweden scattered north to Pi (Lundberg 1995), and in Denmark it is reported from all districts except NWJ (Hansen 1996).

* *Ocalea badia* Erichson, 1837

AAY Grimstad: Molland (EIS 6) 1 ex at a small stream 10-20 July 1999; Grimstad: Ruakerkilen (EIS 6) 1 ex in swampy alder forest (*Alnus glutinosa*) primo August 2000 (leg. KMO).

O. badia is usually found on swampy ground with decaying leaves or moss near stagnant or flowing water (Hansen 1954), but may also occur in more open sandy areas (Palm 1972). This is a common species in Scandinavia, and it has a scattered distribution in Sweden north to Hr (Lundberg 1995). It is recorded from all Danish provinces (Hansen 1996).

Scirtidae

Prionocyphon serricornis (Müller, 1821)

VE Borre: Falkenstein, Veggefjellet (EIS 19) 1 ex July 1997 (WT); **AAY** Grimstad: Dynemyr, Saltmyr (EIS 6) 1 ex in hollow oak (*Quercus* sp.) July 1999 (WT, leg. KMO).

The species is previously recorded from **VE** Larvik (Hanssen & Hansen 1998); **AAY** Tvedestrand and **HOY** Standebarm: Tangerås (FED info by T. Kvamme).

P. serricornis develops in small water ponds in branch forks on different deciduous trees (Landin 1970). Larvae has been observed in numbers in cavities in trees with stagnant water and dead leaves. The adults are attracted to light, and can be caught in light traps (Ehnström pers. comm.). The Swedish distribution of *P. serricornis* is scattered north to Vs (Lundberg 1995) and in Denmark it is found in all districts except WJ (Hansen 1996).

Dermestidae

* *Dermestes haemorrhoidalis* (Küster, 1852)

AK Oslo: Tøyen (EIS 28) 1 ex indoor Feb. 2000 (Leg. Emma Billbäck, coll. ZMO), 1 ex indoor primo October 2000.

In England is this species assosiated with carrion and it has been found in nests of pigeons (Peacock 1993). These records may indicate that it has established sustainable populations in the Oslo area.

Coccinellidae

* *Scymnus ater* (Kugelann, 1794)

BØ Røyken: Kinnartangen (EIS 28) 1 ex August 1991 (MT, det. SLI & SLB).

S. ater is reported from dead aspen (*Populus* sp.) attacked by the fungus *Hypoxylon mammatum* (Wahlenberg) (Baranowski 1982). It is a predator on the mealy bug *Chionaspis salicis* (Linnaeus, 1758) (Fürsch 1967), and may be beaten down from deciduous trees such as oak (*Quercus sp.*), lime (*Tilia sp.*), sallow (*Salix sp.*), aspen (*Populus sp.*) and hazel (*Corylus sp.*). The distribution in Sweden is scattered in the south, but more continuous in the north (Lundberg 1995). It is so far not recorded from Denmark (Hansen 1996).

S. ater has previously been reported from Norway, but this turned out to be wrongly determined specimens of *S. limbatus* Stephens, 1832 (Strand 1975).

Melandryidae

* *Melandrya barbata* (Fabricius, 1787)

VE Borre: Falkenstein, Veggefjellet (EIS 19) 1 ex July 1997 in slope with old limes (*Tilia cordata*); **MRI** Nesset: Øvre Vike (EIS 78) 5 exx June 1998 and 2 exx June - July 1999 (leg. & coll. OHA).

M. barbata develops in old stumps and trunks of beech (*Fagus* sp.) and aspen (*Populus tremula*). At Öland, Sweden, it has been found in beech branches lying at the ground in shady forest (Ehnström & Walden 1986). Lundberg (1976) found numerous larvae in trunks of aspen lying on the ground in very wet, cold and shady forest, and with spruce (*Picea abies* L.) as the dominant tree. The attacks were on the parts of the trunk where bark had fallen off. It is so far found in five districts in Sweden, i.e. Sk, Öl, Me, Vb and Nb (Lundberg 1995), and four in Denmark, i.e. SJ, EJ, LFM and SZ (Hansen 1996).

Curculionidae

* *Otiorhynchus rugosostriatus* (Goeze, 1777)

AK Oslo: Sognsveien 85 (EIS 28) 1 ex at protected oaks (*Quercus* sp.) 25 June-17 July 2001 (PFT, leg. KMO).

This weevil was previously known only from the southern part of N Europe, and is possibly a recently established species. It was recorded in Denmark in 1892 and for the first time in Sweden in 1936. Though it is spreading, it is still rather scarce in N Europe. It inhabits dry areas and is found in woods and on cliffs, but also on hedges in towns. It is mainly nocturnal, but can also be found during daytime in debris beneath bushes (Palm 1996).

Anthonomus brunnipennis Curtis, 1840 and *A. rubi* Herbst, 1795

Runge (1991) was the first to point out that the weevil «*A. rubi*» covered the two sibling species *A. rubi* and *A. brunnipennis*in N Europe. Palm (1992) examined the complex in Sweden and Finland, and proved the existence of both species there. Examination of the Norwegian material showed that both species also occur in Norway. *A. brunnipennis* was recently reported for the first time from Norway from **VE** Stokke (Barševskis 2001).

The Norwegian distribution of *A. rubi* and *A. brunnipennis* is given in Figure 1. The distribution of *A. rubi* covers the provinces **Ø, AK, HES, OS, BØ, BV, VE, MRI** and **NTI**, and the EIS-grid squares 11, 19, 20, 28, 35, 36, 45, 78 and 97. The distribution of *A. brunnipennis* covers **Ø, AK, HES, OS, BØ, BV, VE, TEY, TEI, AAY, VAY, VAI, RY, HOY, HOI, SFI, MRY, STY** and **NTI**, and the EIS-squares 1, 2, [3 or 7], 4, 6, 11, 12, 16, 19, 20, 27, 28, 30, 31, 35, 39, 41, 50, 54, 55, 90, 92 and 96.

A. brunnipennis is associated with *Potentilla erecta* L. and *P. palustris* L. (Kevan 1966, Runge 1991), and some of the Norwegian specimens were collected on *P. erecta.* Several of the Norwegian specimens of *A. rubi* are from cultivated *Fragaria* sp. found in strawberry fields. There are, however, also specimens of *A. rubi* found in association with *Rubus idaeus, Rubus plicatus, Potentilla fruticosa, Pteridium aquilinium* and *Rosa* sp.

The absence of *A. rubi* at the west coast is remarkable, but this may be an artifact only. It is likely that the species is present here as well.

Gymnetron melanarium (Germar, 1821)

Ø Fredrikstad: Rolvsøy, Visterflo (EIS 20) 1 ex (SN, leg. & coll. SLI); **AK** Asker: Sem, Semsvannet (EIS 28) 1 ex (SN, leg. & coll. SLI); Vestby: Erikstad (EIS 28) several exx (SN, leg & coll. SLI); Ås: Pollen (EIS 28), 3 exx (SN); **BØ** Flesberg: Kronset (EIS 27), 5 exx including one on *Veronica chamaedrys* (SN); Hoff: Sæteråsen (EIS 28) 1 ex (SN, leg. & coll. SLI); **HES** Stange: Rotlia (EIS 46) 2 ex (SN, leg. & coll. SLI).

These records indicate that *G. melanarium* probably has a widespread distribution in Norway. It is previously reported once from Norway, i.e. **AK** Asker (Kvamme 1981). This species is oligophagus on *Veronica* spp. and hibernates as imago. The larva develops inside the plant stem, causing irregular deformations (Hansen 1965). It is found in nearly all Swedish districts north to Me (Lundberg 1995), and it seems more abundant in the eastern than the western parts of Denmark (Hansen 1996).

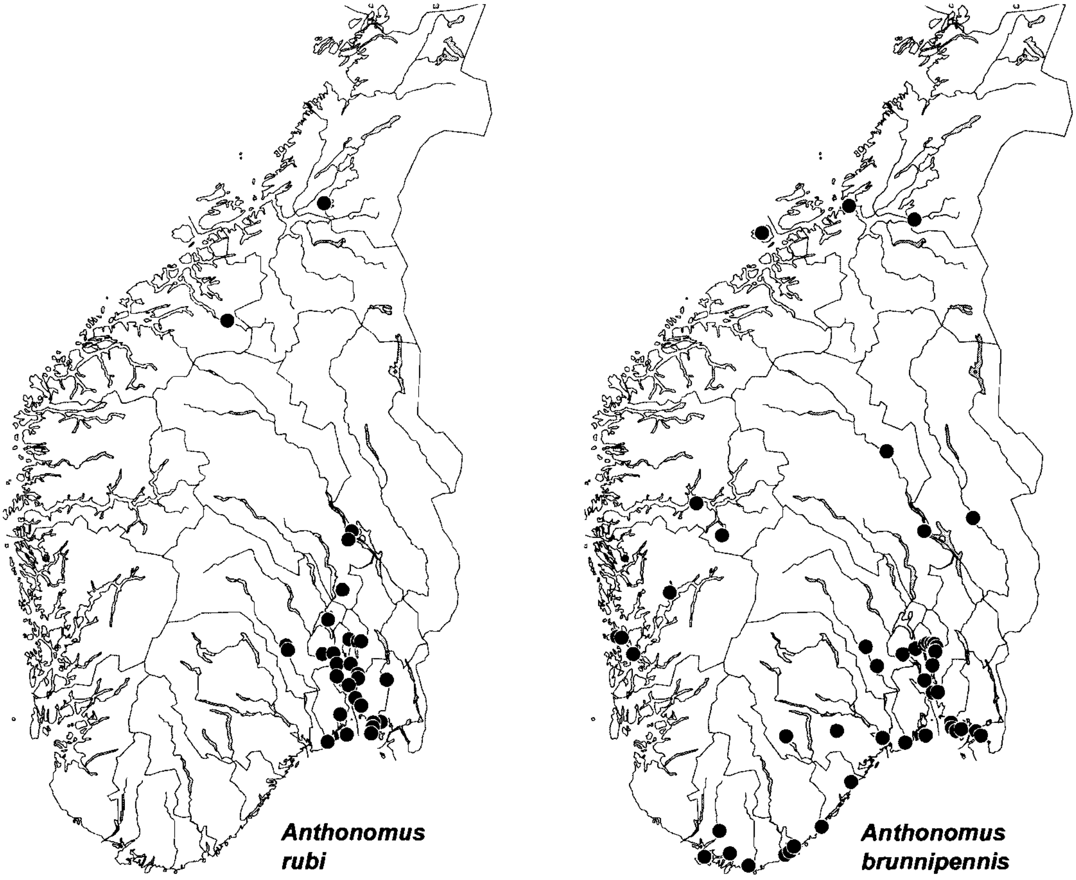

Figure 1. The known distribution of *Anthonomus rubi* and *A. brunnipennis* in Norway.

Xyleborinus saxesenii (Ratzeburg, 1837)

AK Oslo: Sognsveien 85 (EIS 28) 1 ex 3-13 July 2000 (WT) near old protected oaks (*Quercus* sp.) (leg. KMO); **VE** Borre: Falkenstein, Veggefjellet (EIS 19) 1 ex July 1997 (WT); Stokke: Melsomvik (EIS 19) 1 ♀ in a woodpile logg (mostly *Quercus* sp.) 31 July 2000 (leg & coll. SO).

The species has previously been recorded from a hemiboreal mixed forest reserve at **TEI**, Drangedal (Bakke 1999). It is polyphagous on almost all deciduous and some coniferous trees (Spessivtseff 1922). It is widely distributed in Europe (Pfeffer 1995), but only found in Sk, Sm, Öl and Vg in Sweden (Lundberg 1995), and since 1960 found in F, LFM, SZ and NEZ in Denmark (Hansen 1996).

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Semljicola lapponicus (Holm, 1939) (Araneae, Linyphiidae), new to Norway

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Aakra, K & Hauge, E. 2001. *Semljicola lapponicus* (Holm, 1939) (Araneae, Linyphiidae), new to Norway. Norw. J. Entomol. 48, 288.

The linyphiid spider *Semljicola lapponicus* (Holm, 1939) is reported from Norway for the first time. The species is only known from two localities at Hardangervidda, southern Norway.

Key Words: *Semljicola lapponicus*, new to Norway

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Specimens of *Semljicola lapponicus* Holm, 1939 (labelled *Eboria l.*) were recently discovered in the collections of Bergen Museum (coll. K. E. Jørstad, det. H. Kauri). Although never published the determination has been verified by the first author. The specimens include one male (taken 15 August 1969) and two females (14 August 1969). All specimens were collected near lake Øvre Hein in Hol municipality, Buskerud county. The locality is situated within the Hardangervidda national park, a high mountain plateu in central parts of southern Norway. These are the first records of this species from Norway and the southernmost from Fennoscandia. The species has a wide distribution in northern parts of the Holarctic, having been reported from northern Sweden (L. J. Jonsson pers. comm.), northern Finland, Siberia and North America (including Alaska) (Saaristo & Eskov 1996). The species obviously prefers rather wet habitats (Holm 1963, Palmgren 1976), the specimens reported here were taken in a bog (the male) and *Salix*-bushes (the females).

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The West Palaearctic species of the genus *Eristalis* Latreille (Diptera, Syrphidae)

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Hippa, H., Nielsen, T.R. & Steenis, J. v. 2001. The West Palaearctic species of the genus *Eristalis* Latreille (Diptera, Syrphidae). Norw. J. Entomol. 48, 289-327.

The identity of the 20 West Palaearctic species of the genus *Eristalis* is discussed, diagnostic characters including the male genitalia are presented, and a key to species is given. The following new synonyms are established: *E. fumigata* Becker, 1921 = *E. arbustorum* (Linnaeus, 1758), *E. germanica* Sack, 1935 = *E. abusiva* Collin, 1931, *E. nigritarsis* Macquart, 1834 = *E. cryptarum* (Fabricius, 1794), *E. nitidiventris* (Zetterstedt, 1843) = *E. anthophorina* (Fallén, 1817), *E. rubix* Violovitsh, 1977 = *E. tenax* (Linnaeus, 1758), *E. stackelbergi* Doležil & Rozkošný, 1967 = *E. lineata* (Harris, 1776), *E. tundrarum* Frey, 1932 = *E. hirta* Loew, 1866, *E. vitripennis* Strobl, 1893 = *E. rupium* Fabricius, 1805, *E. vitripennis* var. *fennica* Kanervo, 1938 = *E. picea* (Fallén, 1817), *Eristalis vitripennis* auct. = *E. vitripennis* var. *pseudorupium* Kanervo, 1938; *Eristalomyia auricalcica* Rondani, 1865 = *Eristalinus aeneus* (Scopoli, 1763). Lectotypes are designated for the following taxa: *E. anthophorina* (Fallén, 1817), *E. apiformis* (Fallén, 1817), *E. nemorum* var. *pyrenaica* Becker, 1921, *E. picea* (Fallén, 1817), *E. rupium* ssp. *hybrida* Kanervo, 1938, *E. rupium* var. *infuscata* Kanervo, 1938, *E. rupium* var. *nigrotarsata* Kanervo, 1938 and *E. vitripennis* Strobl. Neotypes are designated for *E. alpina* (Panzer, 1798), *E. rupium* (Fabricius). *E. rupium* var. *nigrofasciata* Kanervo and *E. vitripennis* var. *pseudorupium* Kanervo.

Key words: Diptera, Syrphidae, *Eristalis*, new synonyms, lectotypes, neotypes, West Palaearctic, descriptions, key.

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INTRODUCTION

The genus *Eristalis* Latreille, 1804, comprises a moderately large group of species, widely distributed in the Palaearctic region. Most species have a close resemblance to bees and bumble bees, with predominantly brown and black colour patterns on the abdomen. *Eristalis* species are most often met with in humid biotopes, but may fly some distance in search of attractive flowers.

The larvae are known as «rat-tailed maggots», as they have an extendable long breathing tube which enables them to feed on decaying organic matter whilst submerged in stagnant water or mud.

Peck (1988) listed 46 species in the Palaearctic region, while Telford (1970) reported 25 species from the Nearctic region.

The concept and delimitation of the genus has been variable. The genus *Eristalis* has sometimes been restricted only to its type species, *Musca tenax* Linnaeus, and *Eoseristalis* Kanervo (type-species *Eristalis cerealis* Fabricius) has been recognized for the other species (Thompson 1972). *Eoseristalis* is used as subgenus of *Eristalis* by many authors (e. g. Thompson 1981, 1997, Stubbs & Falk 1983, Vockeroth & Thompson 1987, Peck 1988, Maibach, Goeldlin & Dirickx 1992), as was originally proposed by Kanervo (1938). *Lathyrophthalmus* Mik (type-species *Conops aeneus* Scopoli) has been included as a subgenus by some authors (e.g. Wirth et al. 1965). The name *Eristalomyia* Rondani (type-species *Musca tenax* Linnaeus) has sometimes been used in belief that the type-species of *Eristalis* is not *tenax* but *intricaria* Linnaeus (e. g. Shiraki 1968). We use *Eristalis* in the broad sense to include both *Eristalis* and *Eoseristalis*, until it can be shown that this is phylogenetically incorrect.

Both the taxonomy and the nomenclature of many species of *Eristalis* have been problematic. This is especially true of the species resembling *E. rupium*. Kanervo (1938) made an important study of this group and solved many of the taxonomic problems, but unfortunately he did not study the relevant type material and so the nomenclatural problems remained. Recently, Holinka (2000) has surveyed the Czech and Slovak species of the *E. rupium* group and has given a key to Central European *Eristalis* species, but without having studied all the necessary types. In the present paper we aim to resolve the existing taxonomic problems as well as the nomenclature of all the West Palaearctic *Eristalis* species. We are taking this opportunity to review the entire West Palaearctic *Eristalis* fauna from the identification point-of-view. In a few cases, references to or comments on the East Palaearctic and Nearctic faunas have been necessary.

MATERIAL AND METHODS

The material studied is deposited in the following museums or private collections. **CCF:** Claus Claussen, Flensburg; **DDM:** Dieter Doczkal, Malsch; **FINS:** Forschnungsinstitut und Naturmuseum Senckenberg, Frankfurt/Main; **FMNH:** Finnish Museum of Natural History, Helsinki; **HUB:** Museum für Naturkunde, Humboldt-Universität zu Berlin; **JLR:** Jan A.W. Lucas, Rotteram; **JSU:** Jeroen van Steenis, Uppsala; **LCL:** The Linnean Collection, London; **LVH:** Lucien Verlinden, Herent; **MCZC:** Museum of Comparative Zoology, Cambridge (USA); **MMB:** Moravské Muzeum, Brno; **MNHNP:** Muséum National d'Histoire Naturelle, Paris; **MZF:** Museo Zoologico «La Specola», Florence; **NRS:** Swedish Museum of Natural History, Stockholm; **SCA:** Strobl Collection, Admont; **TNS:** Tore R. Nielsen, Sandnes; **UMC:** University of Minnesota Collections; **UZMC:** Universitetets Zoologiske Museum, Copenhagen; **VGA:** Volkert S. van der Goot, Amsterdam; **WSU:** Wouter van Steenis, Utrecht; **ZIASP**: Zoological Institute, Academy of Sciences, St. Petersburg; **ZMH:** Zoologisches Institut Hamburg; **ZML:** Zoological Museum, Lund University, Lund; **ZMUT:** Zoological Museum, University Turku, Turku. We have attempted to trace and study all type material, when this was needed. In cases where no type material was available, other specimens from the area of the type-locality have been examined.

The illustrations were made with the aid of a camera lucida attached to a stereomicroscope. The

WEST PALAEARCTIC SPECIES OF *ERISTALIS*

Key to species

1. Bumble bee like species; thorax with dense pile which obscures the ground colour .... 2.
– Bee like species; thorax with pile which does not obscure the ground colour .... 5.
2. Calypter greyish-black, the lateral hairs of postalar callus black. Arista with long hairs, similar to Figure 1G .... ***E. intricaria*** (Linnaeus)
– Calypter and lateral hairs of postalar callus white to yellow. Arista with short hairs, similar to Figure 1F .... 3.

3\. Scutellum, tergite 1 and base of tergite 2 white haired, tergite 4-5 foxy-red haired, abdomen otherwise with black pile .... ***E. oestracea*** (Linnaeus)

– Scutellum yellow haired, tergites with yellow or yellow and black hairs .... 4.

4\. The hairs below eyes yellowish white. Lower half of face rather pointed, ground colour of lateral parts of face yellow .... ***E. anthophorina*** (Fallén)

– The hairs below eyes black. Lower half of face less pointed, ground colour of lateral parts of face black .... ***E. fratercula*** (Zetterstedt)

5\. Antenna orange yellow. All tibiae orange .... ***E. cryptarum*** (Fabricius)

– Antenna brown to brownish black. At least tibia of fore and hind legs partly black .... 6.

6\. Face entirely pale pollinose (worn specimens may have a narrow trace of a shiny medial stripe on lower half) .... ***E. arbustorum*** (Linnaeus)

– Face with a shiny black medial stripe .... 7.

7\. Medial stripe of face very wide, up to 1/3 of width of face (Figure 1 E). Eye in the middle with a dorsoventral band of denser and generally darker pile. Katepimeron hairy (Figure 2 H) .... ***E. tenax*** (Linnaeus)

– Medial stripe narrower than 1/3 of face. Eye uniformly pilose. Katepimeron bare (Figure 2 G) .... 8.

8\. Tarsi of fore and mid legs entirely yellow .... ***E. pertinax*** (Scopoli)

– Tarsi of fore and mid legs partly or entirely dark .... 9.

9\. Arista long haired; the longest hairs about as long as 1/3 the length of arista (Figure 1 H). Pterostigma very long, about six times as long as broad (Figure 2 A) .... ***E. similis*** (Fallén)

– Arista hairs shorter than 1/3 the length of arista, pterostigma shorter (Figure 2 B) .... 10.

10\. Arista short haired, the longest hairs as long as about twice the thickness of arista at base (Figure 1 F and 1I) .... 11.

– Arista long haired, the hairs as long as several times the thickness of arista at base (Figure 1G). 12.

11\. Mesonotum with longitudinal greyish pollinose stripes. Scutellum shiny, the colour not contrasting much from that of mesonotum. Mid tibia at tip yellow or faintly darkened only. Hind femur dorsally with long, light hairs. Tergite 2 (and often tergite 3) with yellow lateral markings, on apical half yellow haired. Hind margin of tergite 2 broadly yellow, about as broad as, or broader than thickness of hind tibia at base .... ***E. abusiva*** Collin

– Mesonotum dull dark greenish grey without stripes. Scutellum dull, dirty yellow, contrasting well from the darker mesonotum. Mid tibia all black except for extreme base yellow. Hind femur dorsally with short, black hairs. Tergite 2 with small triangular greyish orange spots (sometimes obscured or lacking in female). Tergite 3-4 all shiny black .... ***E. gomojunovae*** Violovitsh

12\. Hind femur somewhat swollen and arcuate, more so in the male (Figure 2F). Anterior half of mesonotum dulled by greyish patterned pollinosity. Wings with a more or less obvious cloud across the middle .... ***E. alpina*** (Panzer)

– Hind femur slender and straight (Figure 2E). Anterior half of mesonotum not dulled by greyish patterned pollinosity .... 13.

13. Face yellow with a distinct black median stripe which is sharply separated from the yellow ground colour .... 14.

– Face black or only obscurely yellow at the sides .... 17.

14. Pterostigma very short, not longer than broad .... 15.

– Pterostigma longer than broad .... 16.

15. Mesonotum and pleura covered by light greyish-yellow pollinosity only. The longest ventral hairs on hind femur at least as long as thickness of femur. Tergite 3-4 in female shining, only vaguely dulled at base and apex .... ***E. interrupta*** (Poda)

– Mesonotum and pleura covered by dense yellowish pollinosity which almost completely hides the black ground colour. The longest ventral hairs of hind femur shorter than thickness of femur. Tergite 3-4 of female each with a broad, greyish dull band at base and apex .... ***E. rossica*** Stackelberg

16. Face deeply anteroventrally produced, in profile about as much as the width of an eye (Figure 1A). Hind femur normally black at base .... ***E. jugorum*** (Egger)

– Face less produced, in profile obviously less than the width of an eye (Figure 1C). Hind femur pale at base .... ***E. lineata*** (Harris)

17. Pterostigma long, 3-3.5 times longer than broad. Hind metatarsus orange yellow. Female with tergites 2-4 brightly shining, without dull transverse bands. Male genitalia, Figures 6 and 7 .... ***E. rupium*** Fabricius

– Pterostigma shorter .... 18.

18. Mesonotum dulled by even, light yellowish-grey pollinosity. Wing in both sexes with a brownish cloud in the middle, most distinctly in the female, the clouding extending to vein r-m. Scutellum in both sexes usually pale haired. Female with the hairs on tergite 3 erect (Figure 2 C). Male genitalia, Figure 8 .... ***E. picea*** (Fallén)

– Mesonotum brightly shining. Wing less distinctly clouded. Scutellum in both sexes most often with some black hairs .... 19.

19. Metatarsus of hind leg black. Male: dorsal eye hairs rather long, as long as the with of 3rd antennal segment. Female: the hairs at apex of tergite 3 erect. Vertex broad, distinctly broader than the distance between the ocelli of vertical triangle. Male genitalia, Figures 17 and 18. .... ***E. hirta*** Loew

– Metatarsus of hind leg orange yellow. Male: dorsal eye hairs shorter than the width of 3rd antennal segment. Female: the hairs at apex of tergite 3 adpressed (Figure 2D), tergite 3-4 slightly pollinose, with a shining transverse band in the middle. Vertex narrower, only slightly broader than the distance between the ocelli of vertical triangle. Male genitalia, Figure 9 .... ***E. pseudorupium*** Kanervo male genitalia were drawn in liquid after clearing with KOH. The other parts were drawn from untreated dry specimens. For some species, several drawings of the same characters were made to show the variation. The terminology follows Vockeroth & Thompson (1987) except for some structures in the male genitalia. The latter are illustrated in Figure 3.

No attempt was made to give the entire distribution area of each species.

To stabilize the nomenclature, lectotypes and neotypes were selected when ever regarded necessary.

The gender of the genus name *Eristalis* is feminine (ICZN, Article 31.1.1.). Consequently, adjectival names such as *alpinus, intricarius* and *piceus* must be written as *alpina, intricaria* and *picea.*

SYNOPSIS OF THE SPECIES

The approximate size of the flies, in terms of their body length, is expressed as follows: Small-sized flies: 8-11 mm, rather small-sized flies: 10-14 mm, medium-sized flies: 11-15 mm, rather large-sized flies: 12-16 and large-sized flies: 14-18 mm.

Eristalis abusiva Collin
Figures 1 F, 3 D-F

Eristalis abusiva Collin, 1931
Eristalis germanica Sack, 1935. **New synonym**

Type material: The type specimens of *E. abusiva* were not studied because the original description of this species does not leave any doubt as to its identity. The types of *E. germanica* were lost during a fire in Hamburg in 1943 (R. Abraham and W. Tobias, pers. com.). Based on the original description, we conclude that *germanica* is a junior synonym of *abusiva*. Torp (1989) was of the same opinion: «*Eristalis germanica* Sack, 1935, is listed as a doubtful species (p. 192), but it is a synonym of *E. abusiva* Collin, 1931». However, he did not make a formal synonymization.

Material studied: From the whole of Europe.

Diagnosis: A small-sized short-haired species with short setose arista. Face greyish-yellow pollinose except for a narrow shining black medial stripe on ventral part. Eyes in male narrowly separated or touching only for a distance which is shorter than the distance between anterior and posterior ocellus. Mesonotum pale pollinose with longitudinal stripes of weaker and heavier pollinosity. Mid tibia wholly yellow or only vaguely darkened on the apical part, wing unclouded. Male with an hourglass-shaped black medial patch over the pale tergites 2 and 3. Male genitalia as in Figures 3 D, E and F.

Discussion: *E. abusiva* is similar to *E. arbustorum,* with which it is often confused. In non-genitalic characters, these two species differ from the other West Palaearctic species by the entirely or almost entirely pollinose face. *E. abusiva* is distinguished from *arbustorum* by its short setose arista in which the longest setae are only slightly longer than the basal thickness of arista, whereas in *arbustorum* the setae are 4-5 times longer. Furthermore, in *abusiva* the face in profile is slightly more protruding and snout-like than in *arbustorum*. *E. abusiva* is also similar to the East Palaearctic *rabida* Violovitsh. The distinguishing characters are discussed under *arbustorum*.

Even the male genitalia of *abusiva* (Figures 3 D, E and F) and *arbustorum* (Figures 3 A, B and C) are similar. They differ from the other West Palaearctic species e.g. by the peculiar structure of the aedeagal lobe, which is abruptly thinned apically and gives the impression of an extra nail-like apical lobe, and by having strong tranverse ridges ventrally on sternum 9. *E. abusiva* is distinguished from *E. arbustorum* by the «upturned» apex of surstylus, by the lack of a subapical tooth-like projection on ventral margin of surstylus, by a longer and more angularly curved paramere with a rather large membraneous apicodorsal part, and by a more robust aedeagus. The genitalia of both species are also similar to those of *E. rabida*. The latter differs from both by a narrower and more pointed surstylus and paramere (see Violovitsh 1977, Figure 4).

Eristalis alpina (Panzer)
Figures 4A-D, 5A-D

Syrphus alpinus Panzer, 1798. **Neotype**
Eristalis alpinus var. *caucasica* Portschinsky, 1892
Eristalis kamtshatica Violovitsh, 1977 (Mutin and Barkalov, 1999)

Type material: E. alpina was described from Poland, «Silesiae montibus». Panzer's type material could not be found in HUB, but three male specimens from coll. Duda (in HUB), collected in Poland, were available for study. To fix the name with the identity of the species as interpreted by Kanervo (1938), Stackelberg (1970), Mutin & Barkalov (1999) and other workers, one of the males is here designated as neotype. It is labelled: 1) white label «21.7.07, Nimptsch (in Silesia)»; 2) white label «Scles Duda»; 3) white label «Coll Zool Mus Berlin»; 4) white label «*alpina* Panzer ♂»; and 5) red label «Neotype ♂, *Eristalis alpina* (Panzer, 1798), design. H. Hippa, T. Nielsen & J. van Steenis, 1998». We have not felt it necessary to study the type material of *E. alpina* var. *caucasica* and *E. kamtshatica*.

Additional material studied: From Belgium, Finland, Sweden and the Czech Republic.

Diagnosis: A medium-sized, short pilose, somewhat slender species with short setose arista. Anterior half of mesonotum with a light greyish pollinose patchy pattern, hind femur obviously arcuate and swollen, more so in male than in female. Wing clouded.

Discussion: E. alpina is similar to *E. rupium*. It can be distinguished from *rupium* by the grey pollinose pattern on mesonotum, which is wholly absent in *rupium*, by the arcuate and swollen hind femur (Figure 2 F), and in the female by the dull anterior and posterior bands on tergites 3 and 4, which are wholly shining in *rupium*. The East Palaearctic *E. japonica* v.d. Goot (syn. *E. nigricans* Matsumura) (Goot 1964) has much the same appearance as *alpina*, but the grey pollinosity on mesonotum is more even, the body pile is shorter, the yellow bands on hind margins of tergites broader, and the swollen hind femur is less arcuate.

The male genitalia (Figures 4 A – D and 5 A – D) have the general appearance of *E. rupium* (Figures 6 and 7), but are at once distinguished by the evenly broad paramere with a distinct membraneous apicodorsal part and by the long curved aedeagal lobe. For more discussion, see under *E. rupium*.

There are great similarities between *E. alpina* and the East Palaearctic *katoi* Shiraki, but at present we are not convinced that they are conspecific. The aristal hairs of *E. alpina* are shorter than in *katoi,* the hind femur in *alpina* male is distinctly more arcuate (only slightly so in *katoi*), and the hairs on tergites 3-4 in *katoi* female are adpressed (erect in *alpina* female). The male genitalia of *katoi* (Figures 4 E, F) and *alpina* are closely similar and we do not see any clear differences.

E. japonica (Figures 5 E, F) is similar but differs from both in the sclerotized apical margin of the paramere. The paramere is also slightly upturned apicodorsally, unlike *alpina* and *katoi.*

Eristalis anthophorina (Fallén)
Figures 12 A, 2 B-C

Syrphus anthophorinus Fallén, 1817. **Lectotype**
Eristalis bastardi Macquart, 1842
Eristalis nitidiventris Zetterstedt, 1843. **New synonym**
Eristalis nebulosa Walker, 1849
Eristalis semimetallicus Macquart, 1850
Eristalis montanus Williston, 1882
Eristalis occidentalis Williston, 1882
Eristalis anthophorina var. *lapponicus* Schirmer, 1913
Eristalis mellissoides Hull, 1925
Eristalis mellissoides var. *perplexus* Hull, 1925
Eristalomyia anthophorina var. *luleoensis* (Kanervo 1934)
Eristalis pacificus Violovitsh, 1977

Type material studied and synonymy: Syrphus anthophorinus was described from specimens collected in Scania (= prov. Skåne, Sweden). The syntypes, one male and one female in NRS, have been studied. In order to define the name with a well preserved male we herewith designate the male as lectotype. It is labelled: white label «S. anthophorina ♂», 2) white red-bordered label «Syrphus anthophorinus Fallén ♂, Lectotype, T. R. Nielsen design. 1981», 3) red label «423, 79», and green label «Riksmuseum Stockholm». The female is herewith designated as paralectotype. It

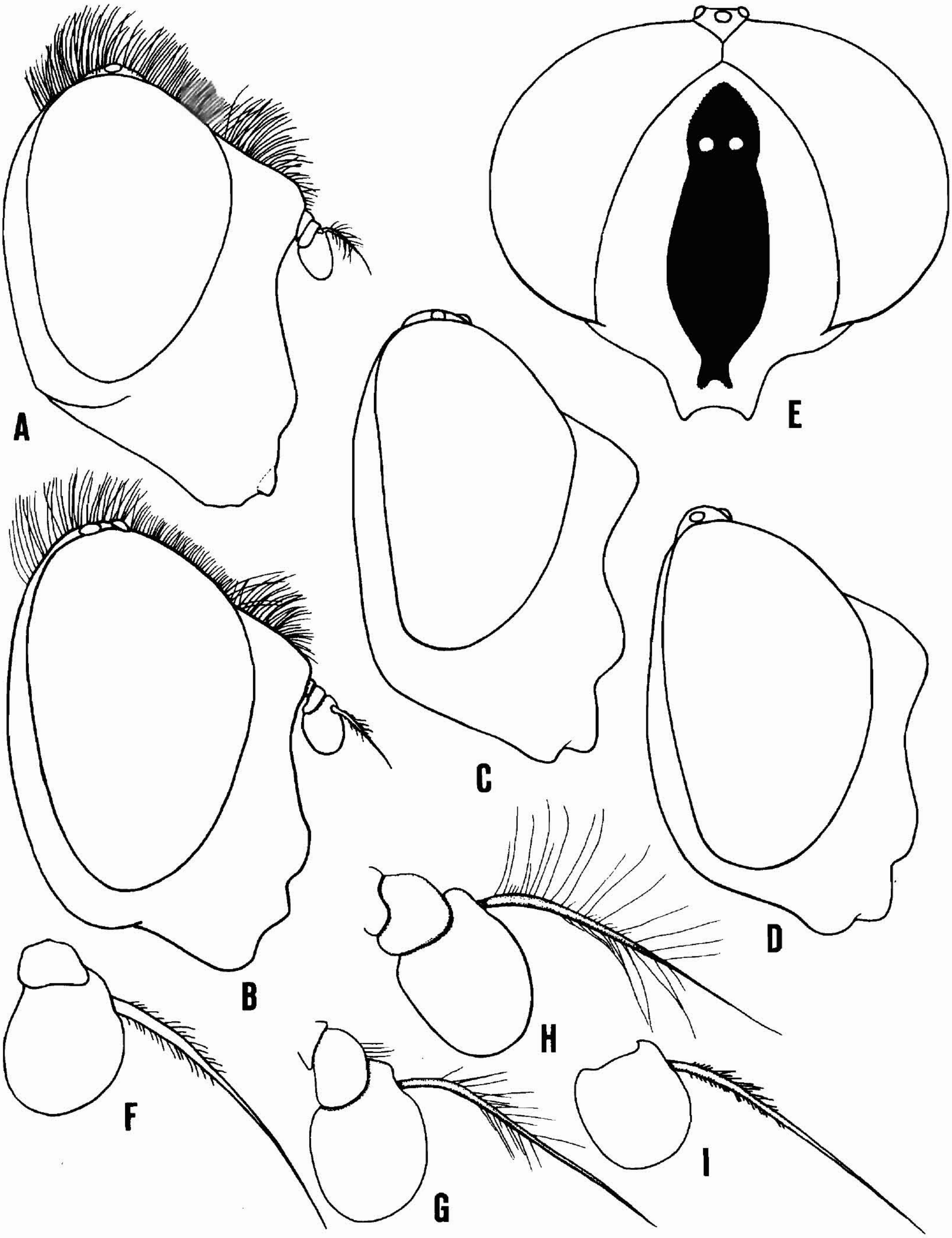

Figure 1. Male head, lateral view (A – D) and frontal view (E), and apical part of antenna, lateral view (F – I). Hairs omitted except for the dorsal ones in A and B, and those on arista in F - I. – A: *Eristalis jugorum* (Egger) (from Austria). – B: *E. hirta* Loew (from Norway). – C: *E. lineata* (Harris) (from Norway). – D: *E. pseudorupium* Kanervo (from Norway). – E: *E. tenax* (Linnaeus) (from Norway). – F: *E. abusiva* Collin (from Norway). – G: *E. interrupta* (Poda) (from Norway). – H: *E. similis* (Fallén) (from Norway). – I: *E. gomojunovae* Violovitsh (from Norway).

is labelled: 1) white label «S. anthophorina ♀», 2) white red-bordered label «Syrphus anthophorinus Fallén ♀, paralectotype, T.R. Nielsen design. 1981». The type material confirms the identity of this species according to the current usage.

Syrphus nitidiventris was described from Lummelund on the island of Gotland (Sweden), based on a single female. We studied this holotype specimen in ZML, and found it to be identical with *Eristalis anthophorina*.

We have seen no reason to study the type material of the previously established synonyms. It should be mentioned that Kanervo (1938) stated that the Nearctic *Eristalis occidentalis* Williston, 1882 could be a synonym of *E. anthophorina*. Hamrum & Becker (1962) reported minor differences in the male genitalia of specimens from Minnesota when compared with a single specimen from Germany. Telford (1970) synonymized the names.

Additional material studied: From Denmark, Finland, Greece, Norway, Sweden and the Netherlands.

Diagnosis: A medium-sized, rather broad and shaggy, bumble-bee-like species. Arista short pilose. Eyes in the male touching for a short distance only, for about as far as the distance between front and hind ocelli. Face somewhat pointed, anteroventrally produced. Ground-colour of face yellowish, except for the black median stripe. Hairs below eyes yellowish-white. Calypter and lateral hairs of postalar callus yellowish. Ground-colour of abdomen yellow and black, tergite 2 always with lateral yellow spots. Body hairs yellow to foxy-red, abdomen sometimes with bands of black hairs.

Discussion: E. anthophorina is similar to *fratercula*, *intricaria* and *oestracea*. It differs from *fratercula* by having yellow-white, not black hairs below the eyes, the yellow ground-colour of face instead of black, and the more produced face. *E. anthophorina* is distinguished from *E intricaria* by the short haired arista (plumose in *intricaria*), and whitish-yellow calypter, lateral hairs of postalar callus and hairs below the eyes; in the male the eyes touch for a shorter distance, and the face in both sexes is more produced anteroventrally. Furthermore, it differs from *E. oestracea* in the yellow and black ground-colour of the abdominal integument (all black in *oestracea*) and in the predominantly yellow body pile (black and foxy-red in *oestracea*). The male genitalia of *E. anthophorina* (Figures 12 A-C) are at once distinguished from those of *fratercula* (Figure 11) by the basally constricted or apically expanded paramere, the less concave ventral margin of surstylus and the pointed apicodorsal part of aedeagus. The male genitalia are in fact very similar to those of *E. intricaria* (Figures 13 D-F) and *E. oestracea* (Figures 13 A-C) and can be distinguished only in rather minor details such as the shape of surstylus, paramere and aedeagus. For further discussion, see under *E. intricaria*.

Eristalis arbustorum (Linnaeus)
Figures 3 A-C.

Musca arbustorum Linnaeus, 1758
Musca nemorum Linnaeus, 1758
Musca horticola De Geer, 1776
Musca lyra Harris, 1776
Syrphus deflagrata Preyssler, 1793
Eristalis fumigata Becker, 1921. **New synonym**
Eristalis bulgarica Szilády, 1934
Eristalis polonica Szilády, 1934
Eristalis strandi Duda, 1940

Type material studied: As there seems to be no doubt about the identity of this species, we have not studied the types of *E. arbustorum* nor the types of those nominal species already synonymized with *arbustorum*. Thompson et al. (1982) discuss the Linnaean names.

We examined the holotype female of *E. fumigata* (in HUB), originating from Liegnitz, now in Poland, and found it to be identical with *arbustorum*. The specimen was probably recently hatched and not fully hardened when collected, and is covered with a grainy blackish (coal?) dust.

Additional material studied: From Belgium, Denmark, Estonia, France, Great Britain, Luxemburg, Norway, Sweden and the Netherlands.

Diagnosis: A small-sized species with long setose arista and an entirely greyish-yellow pollinose

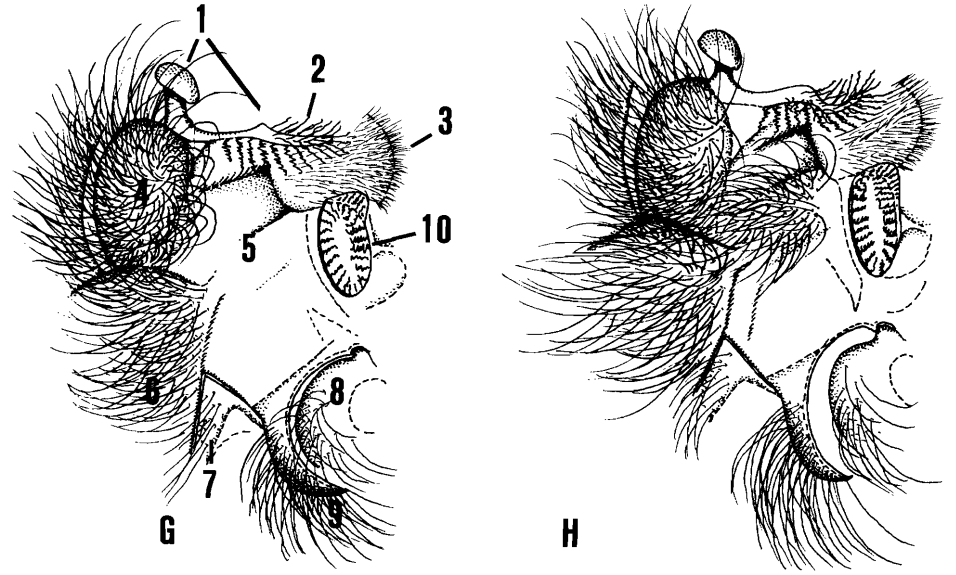

Figure 2. Pterostigma (A and B), dorsal hairs of female tergite 3, lateral view (C and D), and hind femur and tibia, prolateral view, hairs omitted (E and F), and posterior parts of thoracic pleura, lateral view (G and H). – A and G: *Eristalis similis* (Fallén) (from Norway). – B: *E. interrupta* Poda (from Norway). – C: *E. picea* (Fallén) (from Norway).– D: *E. pseudorupium* Kanervo (from Norway). – E: *E. rupium* Fabricius (from Norway). – F: *E. alpina* (Panzer) (from Finland). – H: *E. tenax* (Linnaeus) (Sweden). 1: subalar sclerite, 2: plumule, 3: laterotergite, 4: anepisternum, 5: katepimeron (barette), 6: katepisternum, 7: middle coxa, 8: hind coxa, 9: metasternum, 10: posterior spiracle.

face, but rubbed specimens may have a narrow shining black medial stripe on ventral part. Eyes in male touching for a distance which is longer than that between front and hind ocelli. Mesonotum with light greyish-yellow dusting, subshining. Wings unclouded. Mid tibia distinctly darkened at apex.

Discussion: *E. arbustorum* is similar to *abusiva*. For distinguishing characters, see under the latter.

We have compared *E. arbustorum* with paratypes of the very similar East Palaearctic *rabida* Violovitsh, 1977. *E. rabida* is larger than *arbustorum*, and is the size of *E. rupium,* and it has a broader appearance, especially in females. In the male the black marking on tergite 3 is more restricted and tergite 4 more shining than in *arbustorum*. In the female the entire frons is completely covered by dense greyish pollinosity, whereas in *arbustorum* the upper half of frons has light pollinosity only. The mesonotum has very dense yellow pile which, when seen from the side, hides the integument of thorax, unlike *arbustorum. E. rabida* also differs clearly from *abusiva* by its larger size, the long haired arista, and the black apex of mid tibiae, and in the male the eyes touch for a longer distance.

For characters of the male genitalia of all the three species, see under *E. abusiva.*

Eristalis cryptarum (Fabricius)
Figures 14 D - F

Syrphus cryptarum Fabricius, 1794
Eristalis nubilipennis Curtis, 1832
Eristalis nigritarsis Macquart, 1834. **New synonym**
Eristalis saltuum Rondani, 1857

Type material and synonyms: We have not found it necessary to study the type material of *Syrphus cryptarum* or of the species synonymized with it by earlier authors. No type material of *E. nigritarsis* could be found in the Macquart collections in MNHNP or in Lille (Speight pers. comm.). On the basis of the original description, *E. nigritarsis* is a synonym of *E. cryptarum*.

Material studied: From Finland, Norway, Russia and Sweden.

Diagnosis: A rather small-sized, round and colourful fly. Antennae, scutellum, abdominal spots and most of the legs bright reddish-orange. Tergites 2-4 with creamy-white hind margins, which feature makes *E. cryptarum* look much like a small *Sericomyia lappona* (Linnaeus) in the field.

Discussion: *E. cryptarum* does not closely resemble any other species of *Eristalis*. It is easily distinguished by its orange legs. The male genitalia (Figures 14 D-F) differ in the very pronounced basoventral lobe of surstylus. The thin aedeagal lobes recall *E. pertinax* and *E similis* (Figure 19).

Eristalis fratercula (Zetterstedt)
Figures 11 A - D

Syrphus fraterculus Zetterstedt, 1838
Eristalis pilosus Loew, 1866
Eristalis vallei (Kanervo 1934)
Eristalis tammensis Bagatshanova, 1980

Type material and synonymy: Nielsen (1995) recently studied the type specimens of *E. fratercula* and its synonyms.

Additional material studied: From Norway, Russia and Sweden.

Diagnosis: A medium sized, rather broad and shaggy species resembling *E. anthophorina* and *E. intricaria.* Abdomen predominantly black, but tergite 2 with a pair of dirty yellow and yellow haired spots, and apex with yellow or dirty whitish hairs.

Discussion: *E. fratercula* is similar to *anthophorina* and *intricaria*. It differs from *intricaria* by the yellowish calypter (blackish in *intricaria*) and from *anthophorina* by the black ground-colour of face (yellow in *anthophorina*) and black hairs below the eyes (yellowish white in *anthophorina*). In the male genitalia, *E. fratercula* (Figure 11) is easily distinguished from *anthophorina* (Figures 12 A-C) and *intricaria* (Figures 13 D-F) by its evenly broad, not basally constricted paramere, by having the paramere laterally largely membraneous, by having the ventral margin of surstylus strongly incised, and by lacking a medial posterodorsal pointed process on the aedeagus.

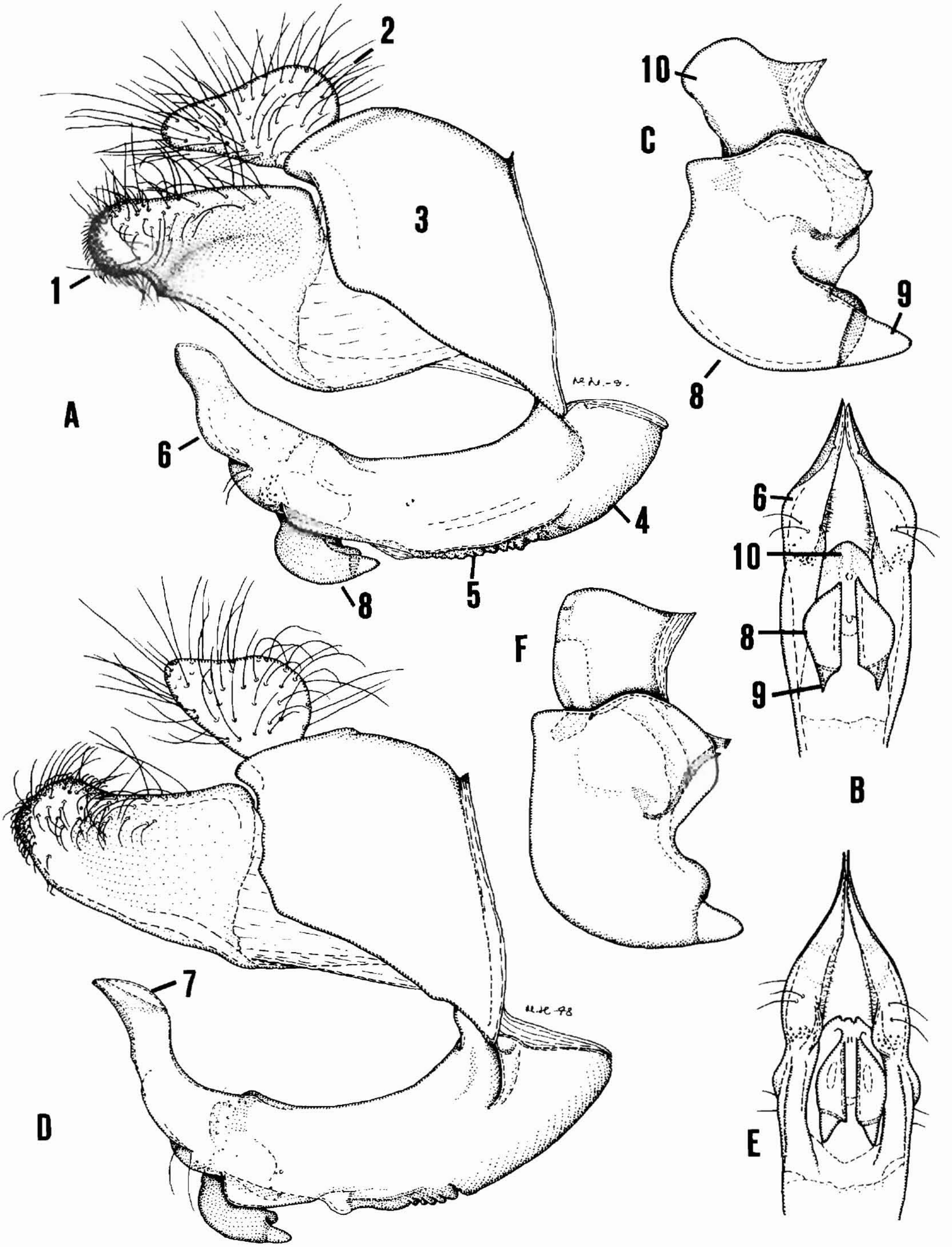

Figure 3. Male genitalia (A and D) and aedeagus (C and F), lateral view, and apical part of hypandrium (B and E), ventral view. – A-C: *Eristalis arbustorum* (Linnaeus) (from Sweden). – D-F: *E. abusiva* Collin (from Sweden). 1: surstylus, 2: cercus, 3: tergite 9, 4: sternite 9, 5 tranverse ridges on sternite 9, 6: paramere or superior lobe, 7: apical membraneous part of paramere, 8: aedeagal lobe, 9: thin apical part of aedeagal lobe, 10: dorsal part of aedeagus.

Eristalis gomojunovae **Violovitsh**
Figures 1I, 12 D-F

Eristalis gomojunovae Violovitsh, 1977.
Eristalis fratercula of Kanervo (1938) and Stackelberg (1970).

Type material: The holotype was studied by Nielsen (1995).

Additional material studied: From Finland, Norway and Sweden.

Diagnosis: A small to medium-sized species with dull dark greenish-grey mesonotum and shining black abdomen. Both sexes normally with a rather small triangular dirty-brown spot in basal corners of tergite 2. Tip of abdomen with white or yellow hairs.

Discussion: *E. gomojunovae* somewhat resembles a small *interrupta*, but differs by the black ground-colour of the face (yellow in *interrupta*), the black antennae (brown in *interrupta*) and the light chocolate-brown calypter (light yellow in *interrupta*). Hind femur dorsally with short, black hairs (long yellow hairs in *interrupta*), and tergites 3 and 4 wholly black (black with narrow yellow hind margins in *interrupta*).

The male genitalia (Figures 12 D-F) closely resemble those of *E. interrupta* (Figures 16 A-C) but differ by the conspicuously narrower surstylus, the broader paramere and the scarcely curved aedeagal lobe. The latter character somewhat recalls *E. lineata* (Figure 15), but otherwise the genitalia of the two species are abundantly different.

Eristalis hirta **Loew**
Figures 1 B, 17 A-F and 18 A-E

Eristalis hirtus Loew, 1866
Eristalis tundrarum Frey, 1932. **New synonym**

Type material studied and synonymy: The types of *E. hirta* in coll. MCZC and *E. tundrarum* in coll. ZMT have been studied by Nielsen and Hippa. These two taxa are synonyms, although some small differences were found in the male genitalia.

We have tried to find the type material of the very similar species *E. arashanica* Violovitsh (1982) from Kirgistan, but it seems to be lost or cannot be found at the moment (Kuznetsov, pers. com.). The synonymy of *E. arashanica* and *E. hirta* is probable.

Additional material studied: Numerous specimens from Canada, Finland, Norway, Russia and Sweden.

Diagnosis: A medium-sized species resembling *interrupta* and *rupium*, but with the following morphological features: mesonotum shining, pterostigma short, wing often with a faint cloud in the middle, and hind metatarsus black.

Specimens from the Palaearctic population are in general slightly darker than specimens from North America: ground-colour of face normally blackish (normally yellow in North American specimens), the yellow markings of tergite 2 a little smaller, the yellow hind margins of tergites 2-4 narrower and tergites more dark haired.

Discussion: When *E. hirta* is compared with *E. interrupta,* the following differences can be observed: antenna black (brown in *interrupta*), the hairs on dorsal part of the eyes black or brownish-black (yellow in *interrupta*) and mesonotum shining black (dulled by greyish-yellow pollinosity in *interrupta*). The pterostigma is short, about 1,5 times as long as broad (quadrate in *interrupta*). Males and most females have a black ground-colour on face (yellow in *interrupta*) and the males have black hairs behind on front femur, at least on apical half (yellow in *interrupta*). Some males also have a band of dark hairs on mesonotum, between the wing bases.

E. hirta separates readily from *rupium* by the shorter pterostigma and the black hind metatarsus.

The male genitalia (Figures 17 and 18) are rather variable in the detailed structure of the apex of paramere (Figures 17 A, C, F), which may be smooth or slightly serrate, as also noted by Telford (1970) and Bean (1949), and in the shape of the apicodorsal part of the aedeagus (Figures 18 A - E). Despite this, we have found no convincing evidence for the idea that *E. hirta* and *E. tundrarum*

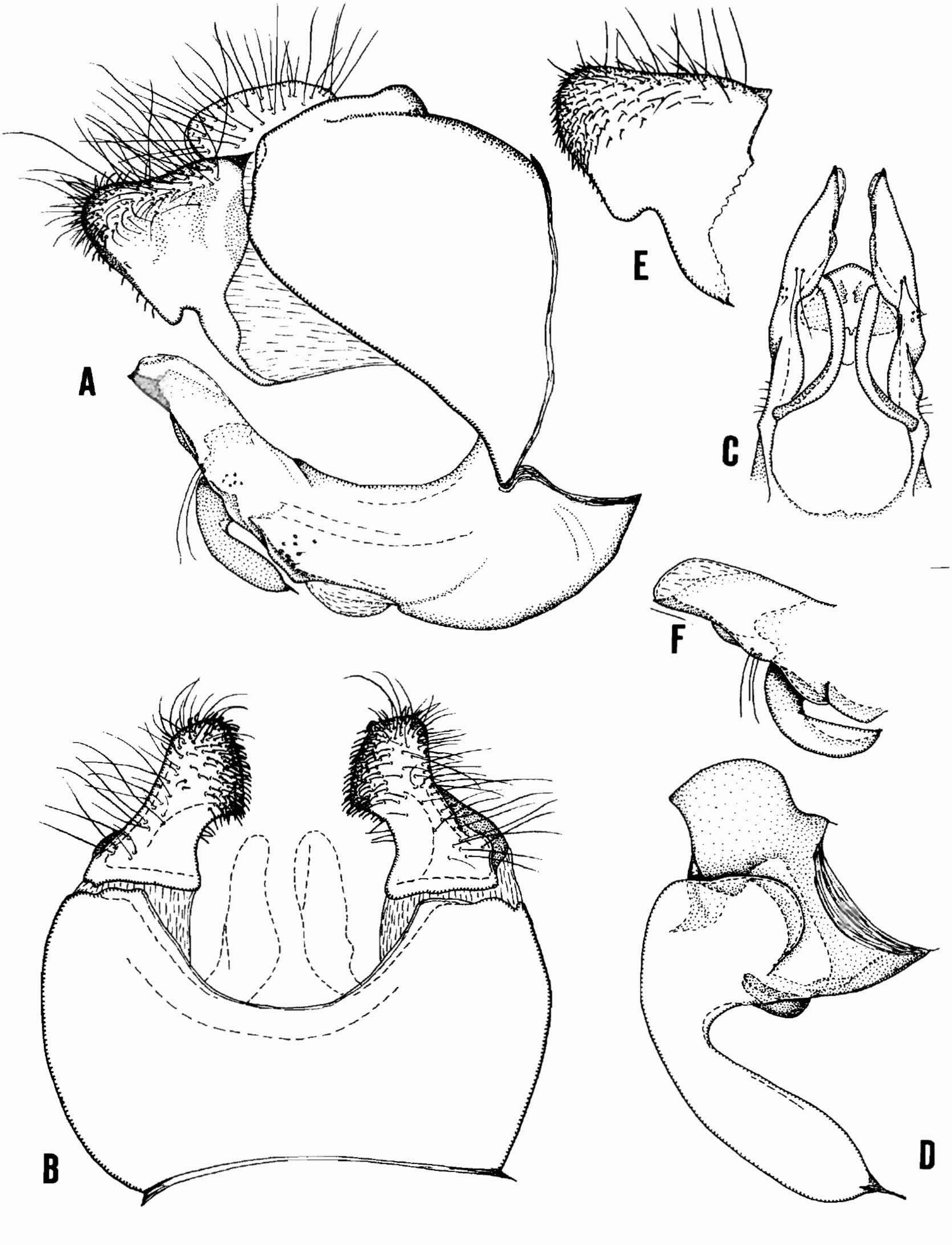

Figure 4. Male genitalia, lateral view (A), epandrium, dorsal view (B), apical part of hypandrium, ventral view (C), aedeagus, lateral view (D), surstylus, lateral view (E), and apical part of hypandrium, lateral view (F). – A – D: *Eristalis alpina* (Panzer) (from Finland). – E and F: *E. katoi* Shiraki (from Japan).

are separate species. The genitalia differ from those of *E. interrupta* (Figures 16 A-C), and also from the similar *E. gomojunovae* (Figures 12 D-F) and *E. rossica* (Figures 16 D-F), e.g. by the lack of a basoventral lobe on surstylus and by the more acute apicoventral angle of paramere.

Eristalis interrupta Poda

Figures 1 G, 2 B, 16 A-C

Eristalis nemorum auct. nec Linnaeus (1758)
Conops interrupta Poda, 1761
Conops fusca Scopoli, 1763; unjustified new name for *interrupta* Poda, 1761
Musca lineolae (Harris, 1776)
Eristalis obfuscata (Gmelin, 1790); unjustustified new name for *fusca* (Scopoli, 1763)
Eristalis sylvarum Meigen, 1838
Eristalis inornatus Loew, 1866
Eristalis toyohare Matsumura, 1911
Eristalis toyoharensis Matsumura, 1916
Eristalis nemorum var. *carelica* Kanervo, 1938

Type material and synonymy: We have not examined types of any of the names listed above as synonyms of *interrupta*.

Material studied: From all over Europe.

Diagnosis: A medium-sized to rather small, short haired *Eristalis* species resembling *arbustorum*, *lineata* and *jugorum*. It has a characteristic short, quadrate pterostigma with sharp boundaries and no extension of the colour, and the ground-colour of face is yellow except for the black median stripe. Mesonotum evenly dull without obvious stripes, wings unclouded. The yellowish-brown spots on tergite 2 shining on median part of tergite.

Discussion: *E. interrupta* differs from all similar species by the very short and well defined pterostigma. In addition, it differs from *E. arbustorum* and *E. abusiva* by the yellow ground-colour and shining median stripe of face, from *E. lineata* by the wholly shining pale spots on tergite 2 and unclouded wing, and from *E. jugorum* by a less anteroventrally protruding face and yellow hairs behind on male front femur. *E. interrupta* is also similar to the far larger *rossica*, but the latter has shorter hairs on the eyes and on mesonotum; and the pleura are dull, covered with dense pollinosity.

The male genitalia (Figures 16 A-C) are similar to those of *rossica* (Figures 16 D-F) and *gomojunovae* (Figures 12 D-F). *E. interrupta* can be distinguished from *gomojunovae* by its conspicuously broader surstylus, but also by the narrower paramere and the long and curved aedeagal lobe. It separates from *rossica* by the longer dorsal lobe of surstylus and the oblique, not transverse, apex of paramere.

Eristalis intricaria (Linnaeus)

Figures 13 D-F

Musca intricaria Linnaeus, 1758
Conops leucorrhaea Scopoli, 1763
Musca fusca Harris, 1776
Syrphus bombyliformis Fabricius, 1794
Syrphus aurea Panzer, 1804
Eristalis intricaria var. *furva* Verrall, 1901

Type material and synonymy: No type material was studied by us. The holotype of *E. intricaria* was examined by Thompson, Vockeroth & Speight (1982).

Additional material studied: Numerous specimens from Belgium, Denmark, Estonia, Finland, Norway, Sweden and the Netherlands.

Diagnosis: A medium-sized, rather broad and shaggy bumble-bee-like species. Arista plumose. Hairs below the eyes black, calypter greyish-black, and lateral hairs of postalar callus black. Variable in pile and ground-colour. Except for the dirty yellow scutellum, the ground-colour of the body ranges from black to extensively foxy-red at sides of abdomen.

Discussion: Some *intricaria* specimens may be confused with dark *anthophorina* specimens, but the following differences separate them: face of *intricaria* less anteroventrally protruding than in *anthophorina, intricaria* with black hairs below the eyes (yellowish-white in *anthophorina*), calypter and lateral hairs of postalar callus blackish (yellowish-white in *anthophorina*), and in the male the eyes touch for a distance which is twice the distance between front and hind ocelli (these distances are about equal in *anthophorina*).

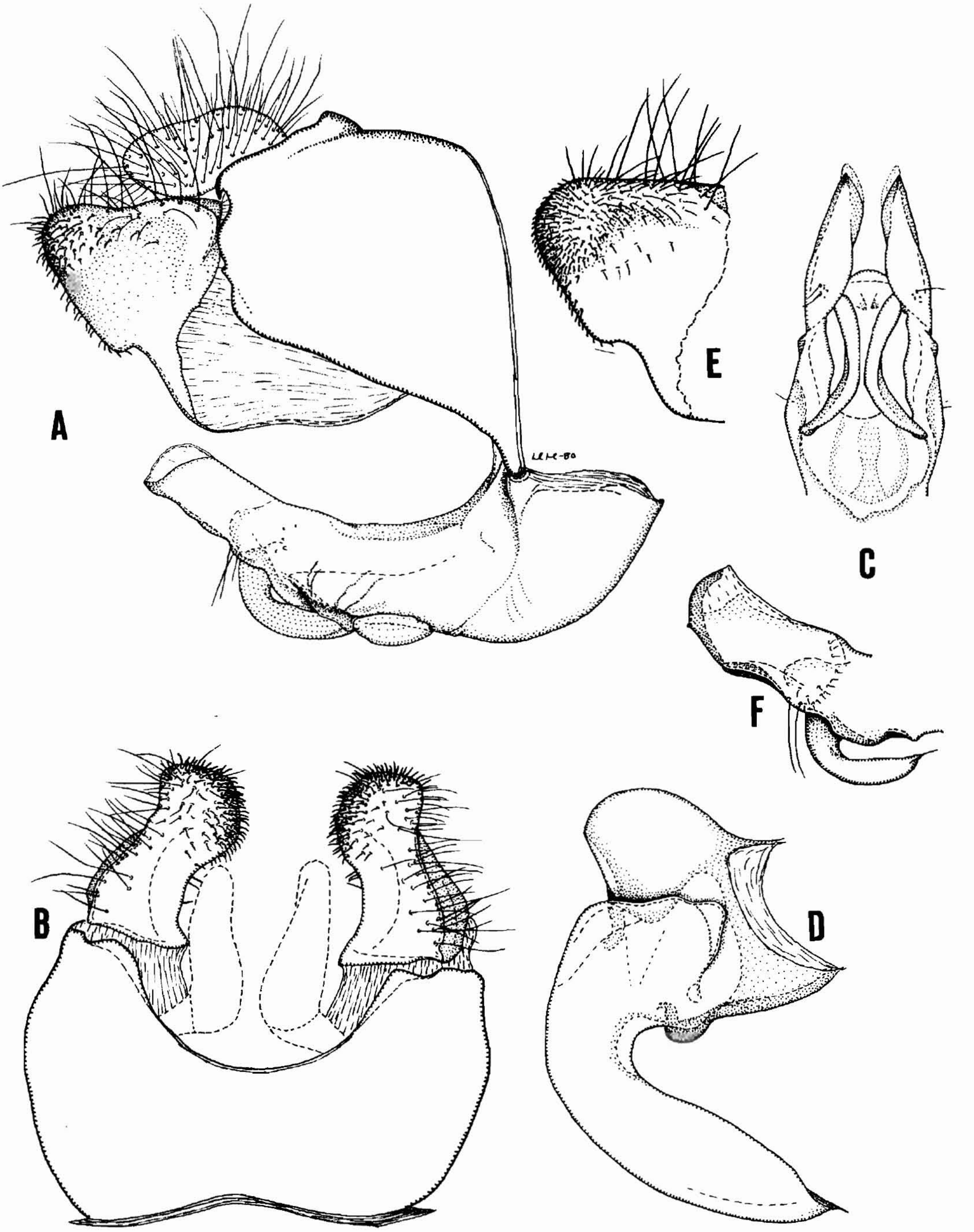

Figure 5.– A: Male genitalia, lateral view (A), epandrium, dorsal view (B), apical part of hypandrium, ventral view (C); aedeagus, lateral view (D), surstylus, lateral view (E) and apical part of hypandrium, lateral view (F). - A – D: *Eristalis alpina* (Panzer) (from Finland). – E and F: *E. japonica* v. d. Goot (from Japan).

The male genitalia of *E. intricaria* (Figures 13 D-F) are extremely similar to those of *oestracea* (Figures 13 A-C) and *anthophorina* (Figures 12 A-C). They differ in a more pronounced subapical ventral lobe on the surstylus and in the more expanded apical part of paramere, from *E. anthophorina* also in having two small tooth-like projections on ventral margin of paramere. The constancy of the last-mentioned character was not checked in all the specimens studied. The length of the aedeagal lobes are intermediate between *anthophorina* and *intricaria*. These three species are an example of a case in which there are no strong structural characters in the male genitalia between species, which otherwise seem to be well characterized.

Eristalis jugorum Egger
Figures 1 A, 14 A-C

Eristalis jugorum Egger, 1858

Eristalis nemorum var. *pyrenaica* Becker, 1921. **Lectotype**

Type material and synonyms. We have studied the syntypes, one male and one female, of *E. nemorum* var. *pyrenaica* from Gabas, French Pyrenees (in HUB) and found them identical with *E. jugorum*. The male labelled: 1) white label «Gabas 61036. VI», 2) white label «pyrenaicus var. B., det. Becker», and 3) red label «Typus», is herewith designated as lectotype in order to fix the identity of Becker's var. *pyrenaica*. The female is designated as paralectotype. It is labelled: 1) white label «Gabas 61036. VI», 2) red label «Typus».

Additional material studied: Many specimens from Austria, Belgium, France, Germany and Italy.

Diagnosis: Medium-sized to rather large, bee-like species. *E. jugorum* has a characteristic deep, anteroventrally produced face (Figure 1 A), hind femur black at base and male front femur normally black haired. It resembles *lineata* and *interrupta*.

Discussion: *E. jugorum* differs from *lineata* and *interrupta* in the more protruding profile of face. In the male, the hairs on hind side of front femur are normally black (yellow in *lineata* and *interrupta*), and the femora are normally black at base (yellow in *lineata* and *interrupta*). Also the male genitalia (Figures 14 A-C) are similar to those of *E. lineata* (Figure 15). For distinguishing characters, see under the latter.

Eristalis lineata (Harris)
Figures 1 C, 15 A-D

Musca horticola De Geer, 1776 auct.

Musca cincta Harris, 1776, junior primary homonym of *M. cincta* Allioni, 1766 and *M. cincta* Drury, 1770 (teste Peck 1988)

Musca lineata Harris, 1776

Musca lunula Villers, 1789

Eristalis flavicincta Fabricius, 1805

Eristalis stackelbergi Doležil & Rozkošný, 1967. **New synonym**

Type material and synonyms: *E. lineata* is the species usually named *horticola* by authors, which is an unjustified replacement name for *Musca nemorum* Linnaeus. The latter is a synonym of *E. arbustorum*. The identity of Harris' *lineata* is based on the opinion of earlier authors.

We also studied the holotype male of *E. stackelbergi* from the Czech Republic (MMB), but could not find any significant difference between this holotype and specimens of *lineata* from different regions. The cheeks of the *stackelbergi* holotype are a little broader than usual in *lineata*, and the length of the aristal hairs is less than width of the third antennal segment, unlike the usual length in *lineata*. The genitalia of the holotype (Figures 15 D, E) fit well within the variation range of *E. lineata*.

We have not studied the type material of the other synonyms listed above.

Additional material studied: From Belgium, Denmark, France, Luxemburg, Norway, Sweden and the Netherlands.

Diagnosis: A medium sized, short haired, bee-like species with yellow ground-colour of face (in dark specimens at least at sides), resembling *interrupta* and *jugorum*.

Discussion: *E. lineata* differs from *interrupta* in having the scutum of thorax shining (in *interrupta*

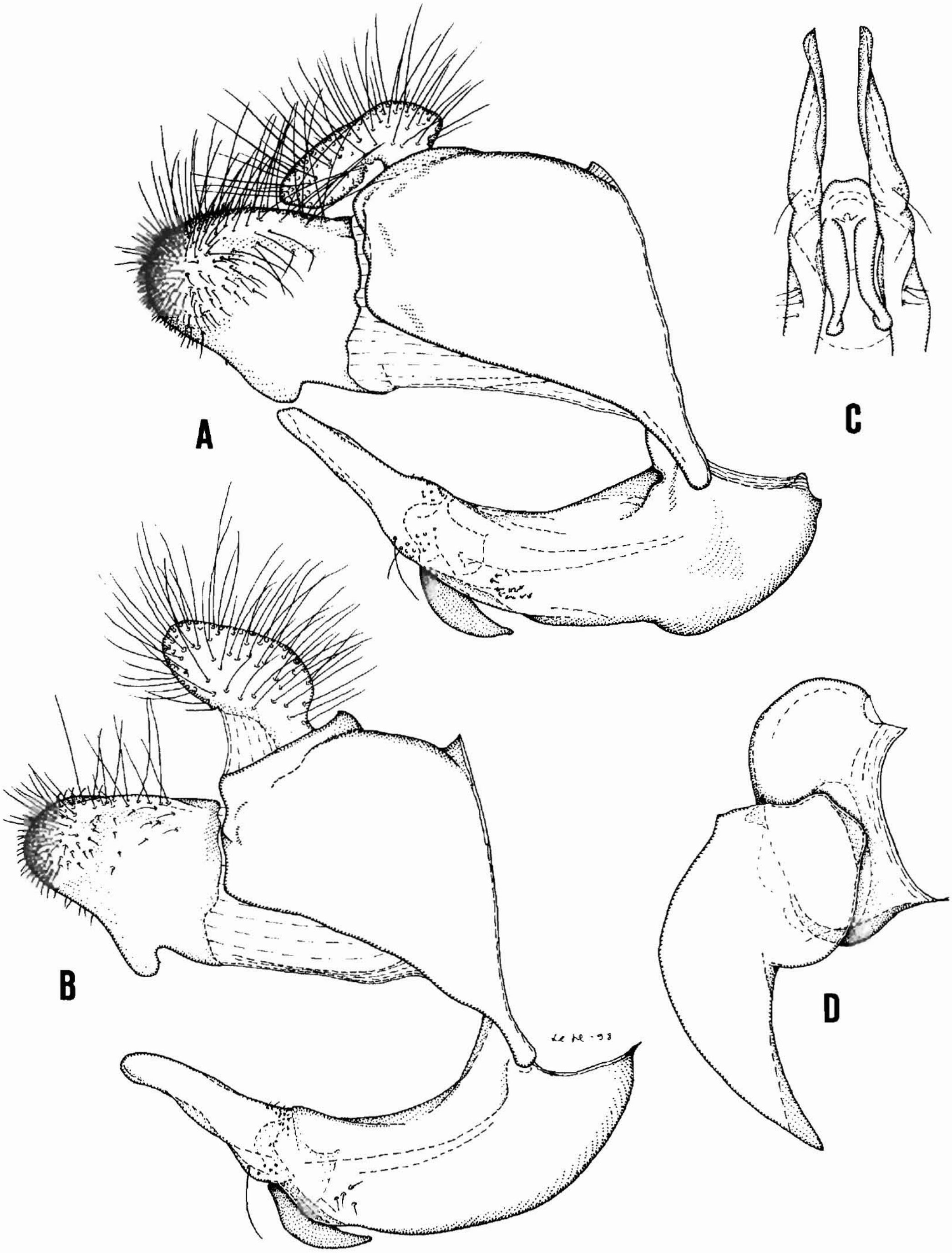

Figure 6. *Eristalis rupium* Fabricius. – A and B: Male genitalia, lateral view (A neotype, B from Finland). – C: Apical part of hypandrium, ventral view (from Finland). – D: Aedeagus, lateral view (from Finland).

somewhat dulled by greenish-grey pollinosity, more so in the female), pterostigma about twice as long as broad (square in *interrupta*) and wing more or less obviously clouded (unclouded in *interrupta*). The yellow spots on tergite 2 are dull towards the middle of tergite (shining in *interrupta*), and hind basitarsus is more slender: at base as thick as the length of tarsal joint 4 (in *interrupta* about twice the length of tarsal joint 4). *E. lineata* is distinguished from *jugorum* in having a less anteroventrally protruding face, a more shining scutum of thorax and a more slender hind basitarsus (basitarsus in *E. jugorum* similar to that of *interrupta*).

The male genitalia (Figure 15) most closely resemble those of *E. jugorum* (Figs 14 A-C). The *lineata* and *jugorum* genitalia differ from other species by the large apicoventral lobe on the paramere. In *E. lineata* the margin of this lobe at the apex of the paramere continues in a smooth curve to a dorsal tooth-like projection, whereas in *E. jugorum* there is a deep incision between the parts so that the apex of the paramere appears bifurcate.

Eristalis oestracea (Linnaeus)
Figures 13 A-C

Musca oestracea Linnaeus, 1758
Syrphus apiformis Fallén, 1817. **Lectotype**

Type material: We studied the existing syntypes, three females, of *E. apiformis* from Sweden (in ZML) and found them identical with *E. oestracea*. In order to fix the identyty of *apiformis* one female is herewith designated as lectotype. It is labelled: 1) «♀.», 2) «S. apiformis ♀ Holm», 3) «Häffner, Kongstväg. augusti». The other two females are designated as paralectotypes. The one is labelled with a small golden label and a white label »A. Wahlberg: apiformis. ♀ Stockholm» and the second with two old white labels: »S. apiformis ♀ Holmia» and »S. apiformis Fall.».

Additional material studied: From Denmark, Finland, Norway, Russia and Sweden.

Diagnosis: A medium-sized to large, long haired and conspicuous *Eristalis* species with creamy-white and white haired scutellum which contrasts with the velvet black body and the foxy-red haired tip of abdomen (segments 4-5). Arista short haired. Legs all black, black haired, except for the orange-yellow tarsi of mid and hind legs. Calypter and lateral hairs of postalar callus white, white haired. Face, frons and dorsal part of occiput with dirty white hairs. Female with a brown cloud across wing.

Discussion: Due to the contrasting colours, *oestracea* can hardly be confused with any other West Palaearctic *Eristalis* species. It resembles a dark *intricaria*, but the reddish abdominal tip and the orange-yellow tarsi in *oestracea* separate them. The male genitalia (Figs 13 A-C) are very similar to those of *intricaria* (Figures 13 D-F) and *anthophorina* (Figures 12 A-C). They differ from both by having a shorter aedeagal lobe, from *anthophorina* by a more pronounced subapical ventral lobe on the surstylus and by having two tooth-like projections on the ventral margin of paramere. The genitalia differ from *E. intricaria* by the slightly narrower surstylus with the subapical ventral lobe less pronounced. See also under *E. intricaria.*

Eristalis pertinax (Scopoli)
Figures 19 A-C

Conops pertinax Scopoli, 1763
Eristalis fossarum Meigen, 1822
Eristalis lucorum Meigen, 1838
Eristalis guadelupensis Macquart, 1842
Syrphus flavitarsis Malm, 1863
Eristalis inca Bigot, 1880

Type material and synonyms: The types of *lucorum*, *flavitarsis* and *inca* have been studied by Nielsen, and a neotype for *pertinax* was designated by Bičík et al. (1996). The type material of *fossarum* is lost (Bičík et al. 1996).

Additional material studied: A large material from Belgium, Czech Republic, Denmark, France, Germany, Great Britain, Luxemburg, Norway, Sweden, the Netherlands and Yugoslavia.

Diagnosis: A large, slender and bee-like species which is easily recognized by its orange-yellow

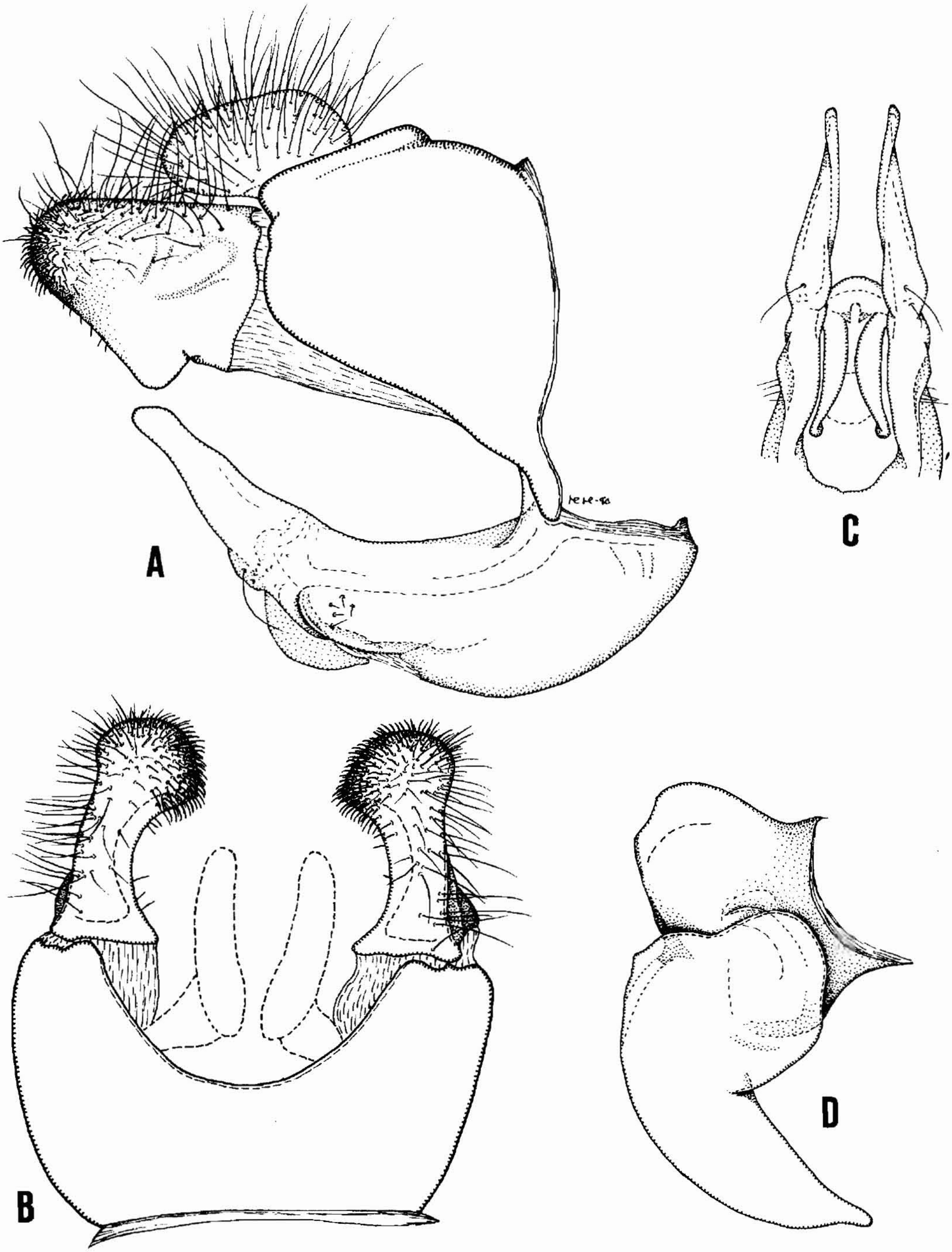

Figure 7. *Eristalis rupium* Fabricius (from Finland). – A: Male genitalia, lateral view. – B: Epandrium, dorsal view. – C: Apical part of hypandrium, ventral view. – D: Aedeagus, lateral view.

front and middle legs. Arista long haired, featherlike, hind tibia yellow at base, and abdomen long and tapering behind, especially in male. There are two different forms in Europe: a shaggy and shining spring form and a short haired, more dusted form in summer and autumn (Bičík et al. 1996).

Discussion: In the field, *E. pertinax* resembles *rossica, similis* and *tenax*, but differs from all of them by the orange-yellow front and mid tarsi and by the tapering male abdomen. The male genitalia (Figures 19 A-C) are similar to *similis* (Figures 19 D-F), and both *pertinax* and *similis* differ from all the other species treated in this paper by the narrow apically expanding surstylus, by the complicated apex of paramere, the complicated ventral lobe at the junction of sternum 9 and paramere, and by the enlarged dorsal part of aedeagus. *E. pertinax* differs from *similis* by the more expanded apex of surstylus and the more angular dorsal part of the aedeagus. The thin aedeagal lobes of *pertinax* (Figure 19 C) and *similis* (Figure 19 F) resemble those of *cryptarum* (Figure 14 F).

***Eristalis picea* (Fallén)**
Figures 2 C, 8 A-D

Syrphus piceus Fallén, 1817. **Lectotype**
Eristalis vitripennis subsp. *fennica* Kanervo, 1938. **New synonym**

Type material and synonyms: Fallén (1817) gives Sweden as type locality for *Syrphus piceus*; «Habitat cum praecedente (*flavocinctus*) in Scania rarior, in Suecica superiori frequentior». In the Fallén collection (NRM) there are one male and four females without any data. The male and three of the four females are conspecific with *E. rupium,* but one of the females is *picea* in the present sense. To preserve the current usage of this name we herewith designate the last-named female as lectotype. It is labelled: 1) red square label with the numbers 129 and 81, and 2) red label «Lectotype ♀ *Eristalis picea* (Fallén, 1817), design. H. Hippa, T. Nielsen & J. van Steenis, 1998».

E. vitripennis subsp. *fennica* was described from four females from south Finland and South Karelia. Based on the description, «Thoraxrücken kräftiger (than in *E. rupium*) weiss bestäubt», «die übrigen Segmente (probably meaning tergites 3 and 4) mit mattschwarzen, schmal weissgesäumten Hinterrändern», and «Flügelstigma höchstens 2mal länger als breit», it is undoubtedly *E. picea.* No material was found in coll. ZMH and no neotype is designated.

Additional material studied: From Belgium, Denmark, Finland, Germany, Norway, Russia, Sweden and the Netherlands.

Diagnosis: E. picea is a medium sized, bee-like species with much the same appearance as *pseudorupium* and *rupium.* Male wing slightly clouded, female wing distinctly so, and the cloud extending to vein r-m; tergite 3 in female with erect hairs. Scutellum in both sexes normally yellow haired, or just with a few black hairs intermixed.

Discussion: The various non-genitalic characters separating *E. picea* from *pseudorupium* and *rupium* are discussed under *pseudorupium* below. In the male genitalia (Figure 8), *E. picea* is easily distinguished from *pseudorupium* (Figure 9) and *rupium* (Figures 6 and 7) by the straight, not concave, dorsomesial margin of surstylus in dorsal view (Figures 7 B, 8 B and 9 B). This character is sometimes visible even in undissected specimens. *E. picea* also differs from both species in its broader surstylus. Furthermore, it differs from *rupium* by having the subapical lobe-like projection on the ventral margin of surstylus smaller and more apically placed and by having the aedeagal lobe longer and more strongly curved. The shape of the paramere, with its curved apicodorsal margin and its pointed apex, also distinguishes *picea* even if a shape closely similar to this can be found in *rupium* (Figure 6 B). The genitalia of *E. picea* and *psedorupium* are also readily distinguished by the shape of the paramere, which narrows toward apex in the former but broadens in the latter.

***Eristalis pseudorupium* Kanervo**
Figures 1 D, 2 D, 9 A-E and 10 E

Eristalis vitripennis var. *pseudorupium* Kanervo, 1938, a subspecific rank of name in sense of ICZN, Article 45. 6. **New status**
Eristalis vitripennis auct. nec Strobl, 1892

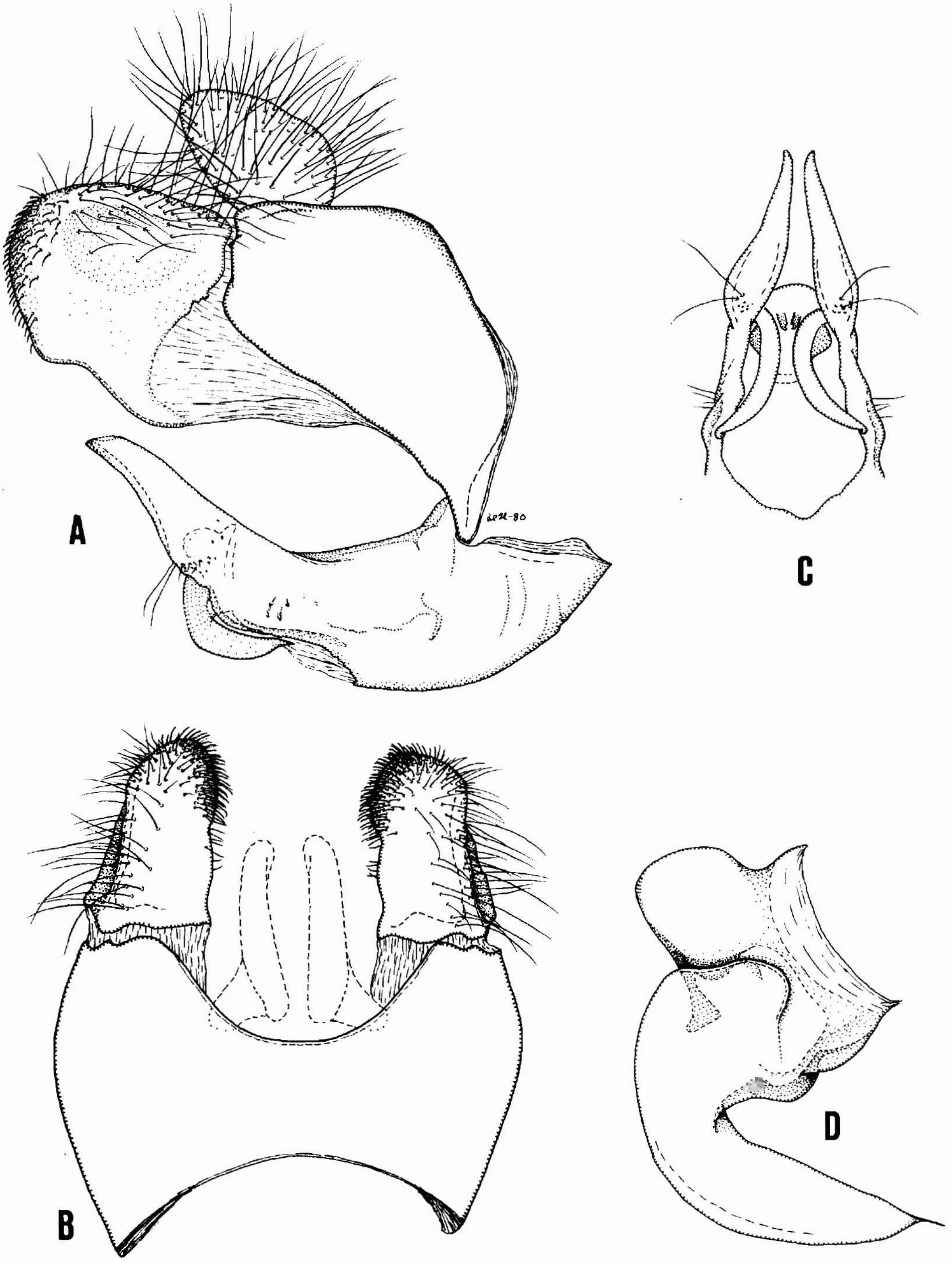

Figure 8. *Eristalis picea* (Fallén) (from Finland). – A: Male genitalia, lateral view. – B: Epandrium, dorsal view. – C: Apical part of hypandrium, ventral view. – D: Aedeagus, lateral view.

Type material and synonyms: *Eristalis vitripennis* var. *pseudorupium* was described from four males and one female from two Fennoscandian localities, Sortavala (South Karelia) and Lemmenjoki (Inari Lapland). The type material is lost. Because Kanervo (1938) based the identification of males on the genitalia, there appears to be no doubt about the conspecifity of var. *pseudorupium* and his *vitripennis* (not of Strobl). In order to preserve the name *pseudorupium,* to restrict the type locality and to fix the name for this common Holarctic species, we have selected a male from southern Finland which here is designated as neotype. It is labelled: 1) «Suomi EH Kalvola, Mäyrä 21-7-1948 K.J. Valle leg. 115»; and 2) red label «Neotype ♂, *Eristalis pseudorupium* Kanervo, 1938, design H. Hippa, T. Nielsen & J. van Steenis, 1998». In ZMH.

For type material and synonyms of *E. vitripennis* Strobl, see under *E. rupium.*

Additional material studied: From Belgium, Canada (Ontario), Denmark, Finland, Norway, Russia and Sweden.

Diagnosis: A species closely resembling *picea* and *rupium.* Mesonotum shining, scutellum in both sexes with at least some dark hairs on disc. Wing in male unclouded, in female more or less indistinctly clouded. Pterostigma 1.5 – 2.5 times as long as broad. Tergite 3 in female with a dull band along hind margin and the hairs at apex of tergite adpressed.

Discussion: *E. pseudorupium* can be separated from *E. rupium* by the shorter pterostigma. In the male, the pile at the base of tergite 3 is nearly as long as the thickness of hind femur at extreme tip, while it is slightly longer in *rupium.* The female of *pseudorupium* has a dull band at the apex of tergite 3, whereas this tergite is wholly shining in *rupium.*

Without referring to the male genitalia, *E. pseudorupium* is not easily distinguished from *picea*, but it has a more shining mesonotum and the scutellum is more black haired (normally yellow haired in *picea*). In the female the wing is less distinctly clouded than in *picea*, and the hairs on posterior part of tergite 3 are adpressed, whereas they are erect in *picea.* In the male genitalia (Figures 9 and 10 E), *E. pseudorupium* is distinguished from both species by its broad paramere, which expands towards apex, from *picea* (Figure 8) also by a narrower surstylus with the dorsomesial margin concave and from *rupium* (Figures 6 and 7) by a less pronounced subapical ventral lobe on surstylus and more strongly curved aedeagal lobe with the apex more strongly dorsoventrally flattened.

We studied the type material of two similar Nearctic species, *E. obscura* Loew (lectotype female in MCZ; not a male as was stated by Telford (1970) while designating it) and *E. beltrami* Telford (holotype male in UMC) whilst searching for the correct name for our *pseudorupium.* The male genitalia illustrated in the original description of *beltrami* are not similar to those of the holotype (Figure 10 A - D) but clearly belong to the species we here call *pseudorupium.* We believe that the holotype of *beltrami* is *obscura* and that the two names are synonyms. The illustration of male genitalia of *obscura* by Bean (1949) does not fit any of the two species. In the male sex, the almost parallel-sided paramere, that does not widen toward apex, distinguishes *obscura* from *pseudorupium,* and in the female the hairs on the posterior part of tergite 3 are erect, not adpressed as in *pseudorupium.* In these erect hairs the female of *obscura* resemble *picea* (Figure 2 C), but the hairs are short as in *pseudorupium* (Figure 2 D).

Eristalis rossica **Stackelberg**
Figures 16 D-F

Eristalis rossicus Stackelberg, 1958

Type material: We have studied the holotype ♂ from the St. Petersburg Region, Russia (in ZISP).

Additional material studied: 10 specimens from Russia.

Diagnosis: A robust large species with yellow ground-colour on face, mesonotum and pleura dulled by dense greyish-yellow pollinosity; pterostigma squarish, and with a broad, dull greyish band at base and on hind margin of tergites 2-4. In the female the intermediate shining black band of tergite 2 is reduced to a small triangle on each side of tergite.

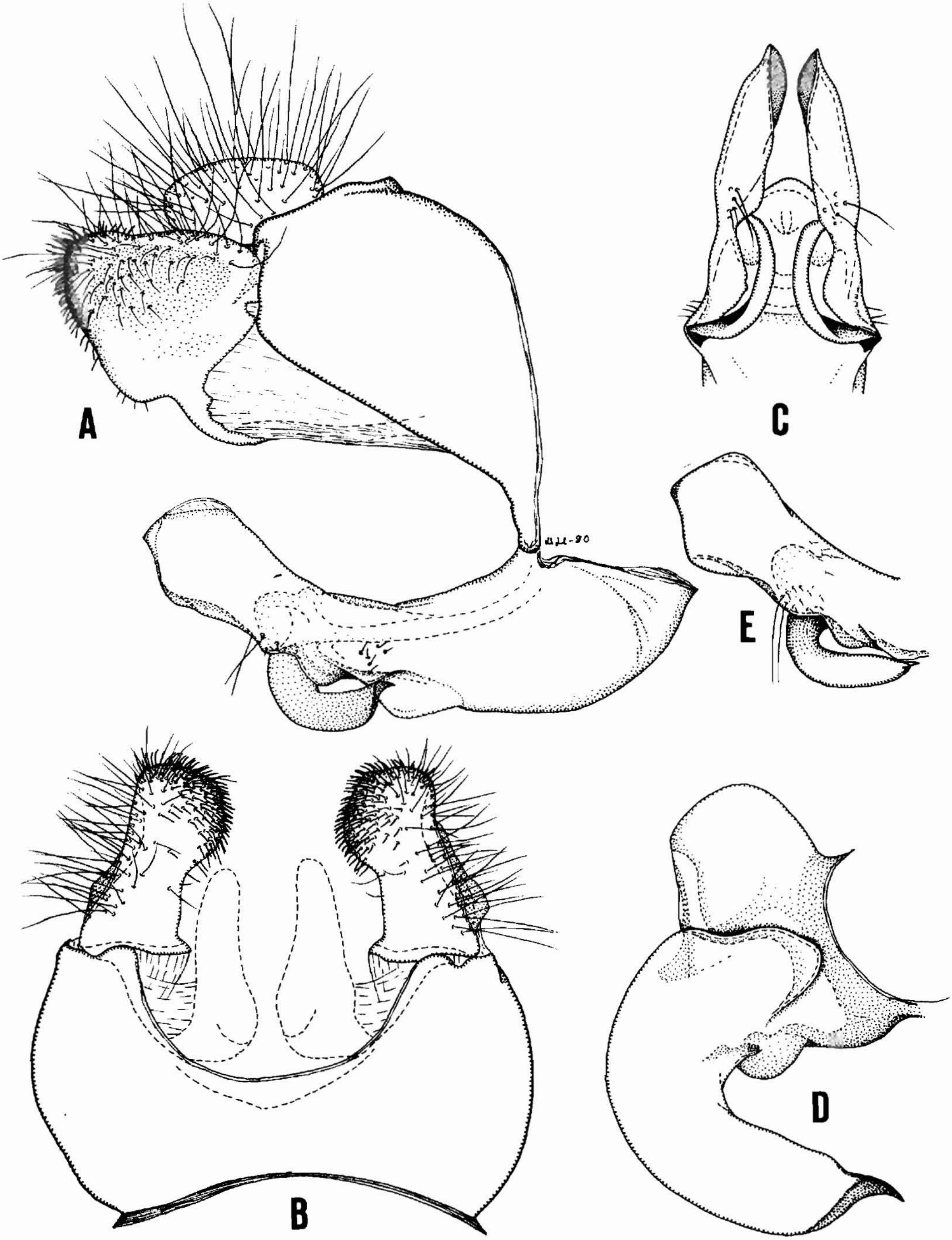

Figure 9. *Eristalis pseudorupium* Kanervo (A – D from Finland, E from Russia, Yakutia). – A: Male genitalia, lateral view. – B: Epandrium, dorsal view. – C: Apical part of hypandrium, ventral view. – D: Aedeagus, lateral view. - E. Apical part of hypandrium, lateral view.

Discussion: Except for its larger size, *E. rossica* closely resembles *interrupta* but the mesonotum and pleura are more densely pollinose, tergites 3-4 are partly dull, and the eye pile is shorter. It differs from the other large *Eristalis* species (*pertinax, similis* and *tenax*) by the yellow ground-colour of the face, the heavily greyish-yellow pollinose thorax, and the short pterostigma. The male genitalia (Figures 16 D-F) are similar to those of *interrupta* (Figures 16 A-C) and *gomojunovae* (Figures 12 D-F) but are readily distinguished from both by the transverse apex of paramere, from *gomojunovae* also by the broad surstylus and long and curved aedeagal lobe. If there are difficulties in distinguishing the genitalia of *rossica* and *hirta* (Figure 17), the former is recognized in having e.g. a large basoventral lobe on the surstylus. For additional discussion, see under *E. interrupta.*

Eristalis rupium Fabricius
Figures 2 E, 6 A-D, 7 A-D

Eristalis rupium Fabricius, 1805. **Neotype**
Eristalis cryptarum Panzer, 1804
Eristalis vitripennis Strobl, 1892. **New synonym, lectotype**
Eristalis nitidus Wehr, 1922
Eristalis rupium subsp. *hybrida* Kanervo, 1938. **New synonym, lectotype**
Eristalis rupium var. *infuscata* Kanervo, 1938. **New synonym, lectotype**
Eristalis rupium var. *nigrofasciata* Kanervo, 1938. **New synonym, neotype**
Eristalis rupium var. *nigrotarsata* Kanervo, 1938. **New synonym, lectotype**
Eristalis pigaliza Violovitsh, 1977.

Type material and synonyms: The description of *E. rupium* appears to be based on females, originating from Germany. The original specimen(s) is apparently destroyed since there is only an empty pin in the Fabricius collection in Copenhagen (Zimsen, 1961). We are continuing to call the species in which the female abdomen is entirely shining as *rupium*. This accords with the original description and with the interpretation of a number of authors (Verrall 1901, Lundbeck 1916, Sack 1932, Kanervo 1938, Torp 1994). To preserve the name of *E. rupium* in this sense, a neotype has been selected. It is labelled: 1) white label «Baden-Württemberg, Hinterzarten, NSG Bistenwald, UTM MU 30 940-990 m 2.6.1990, leg. D. Doczkal» and 2) red label «Neotype ♂ *Eristalis rupium* Fabricius, 1805, design. H. Hippa, T. Nielsen & J. van Steenis, 1998.» Coll. ZMC.

The type material of *E. vitripennis* consists of four males and two females in coll. Strobl, Admont, and of one male in coll. Loew, MCZC, Cambridge, USA. Although one male in Admont lacks its genitalia, we are convinced that all the specimens are conspecific with *E. rupium* as interpreted in this paper. To fix the identity of the name we designate one of the specimens in Admont as lectotype: It is labelled: Lectotype ♂ *E. vitripennis* with: 1) white label: «Admont, Steierm. Strobl ♂», 2) red label «Typen-Exemplar, rev. G. Morge 19..», 3) white label with the number 11 (in green), 4) white label «230, 6», and 5) red label «Lectotype *Eristalis vitripennis* (Strobl, 1892) design. Hippa, Nielsen 1981».

Eristalis rupium subsp. *hybrida* was described (from about thirty ♂♂ and ♀♀) from a number of localities in eastern Fennoscandia, ranging from the southern coast of Finland to the Arctic Ocean and Central Russia. Most of the original material seems to be lost. In coll. Frey (in coll. ZMH), there are a few specimens with the kind of labelling mentioned by Kanervo (1938), and one male (South Karelia, Sakkola) agrees perfectly with the description. At least this specimen can be regarded a syntype, especially as Kanervo (1938) mentioned that his subsp. *hybrida* was the same as Frey's unpublished subsp. *hybrida.* Kanervo's subsp. *hybrida* consists of pale *rupium* specimens, and, as he remarks, their genitalia are similar to other specimens of *E. rupium.* To fix the identity of Kanervo's subsp. *hybrida* we herewith designate this syntype as lectotype. It is labelled: 1) white label «Sakkola, R. Frey, 917» and 2) red label «Lectotype ♂, *Eristalis rupium* subsp. *hybrida* Kanervo, 1938, design. H. Hippa, T. Nielsen & J. van Steenis, 1998».

Of Kanervo's varieties, *E. rupium* var. *nigrotarsata* was described from about ten males and females from several localities in Southern and

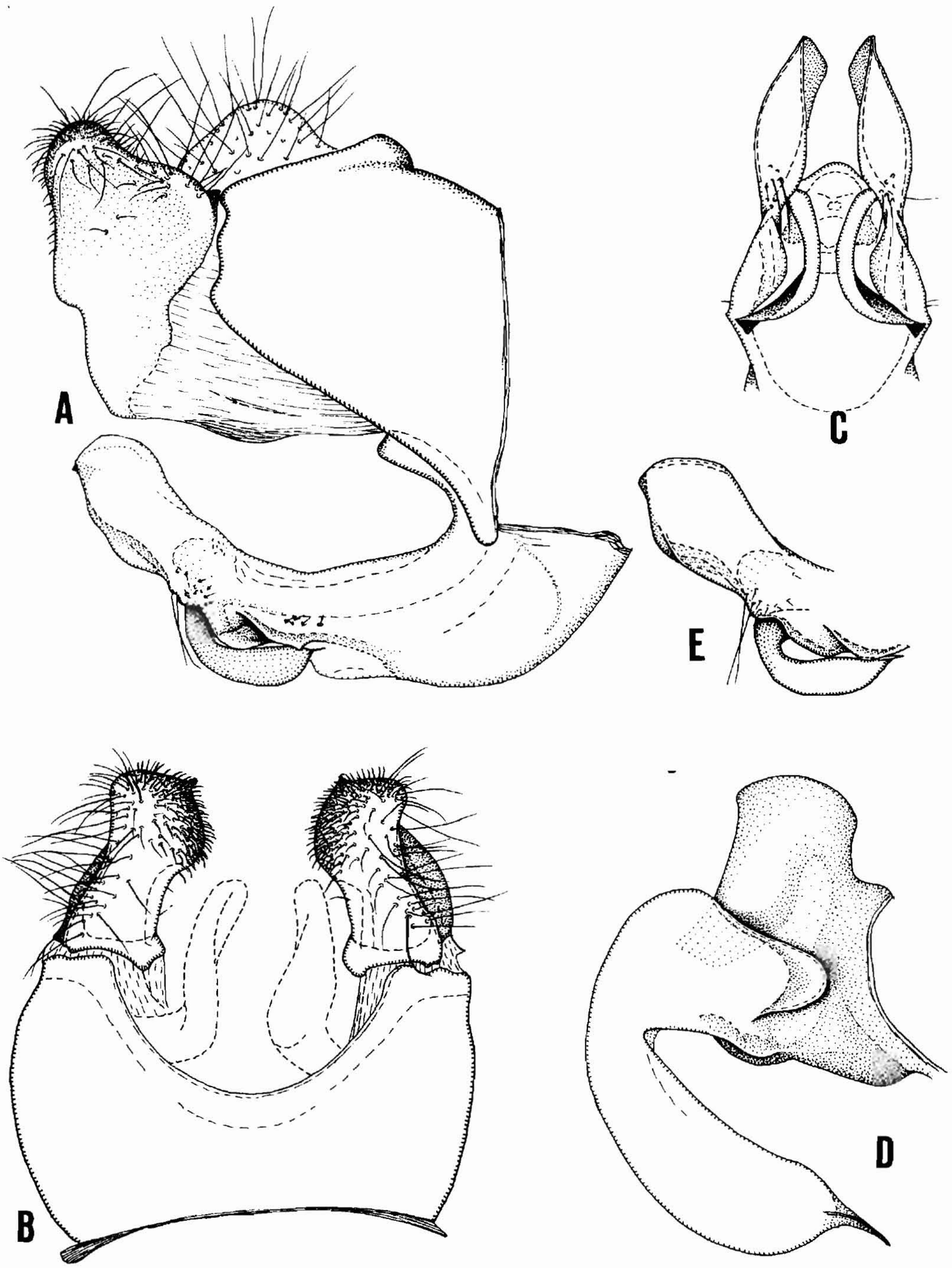

Figure 10. Male genitalia, lateral view (A), epandrium, dorsal view (B), apical part of hypandrium, ventral view (C), aedeagus, lateral view (D) and apical part of hypandrium, lateral view (E). – A – D: *Eristalis beltrami* Telford (from USA, holotype). – E: *E. pseudorupium* Kanervo (from Canada, Ontario).

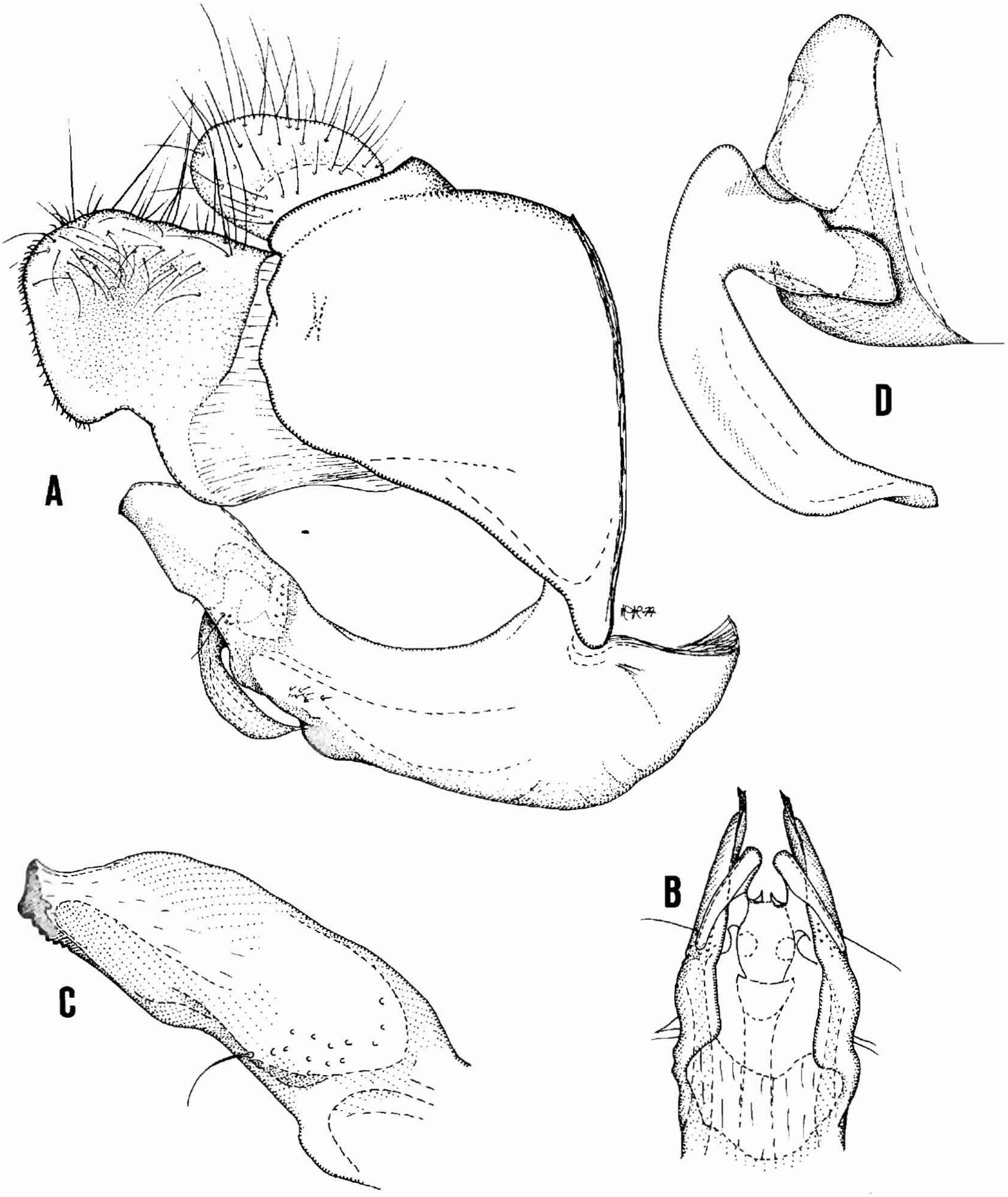

Figure 11. *Eristalis fratercula* (Zetterstedt). – A: Male genitalia, lateral view (From Russia, syntype of *E. vallei* Kanervo). – B: Apical part of hypandrium, ventral view (from Norway). – C: Paramere, lateral view (from Norway). – D: Aedeagus, lateral view (syntype of *E. vallei*).

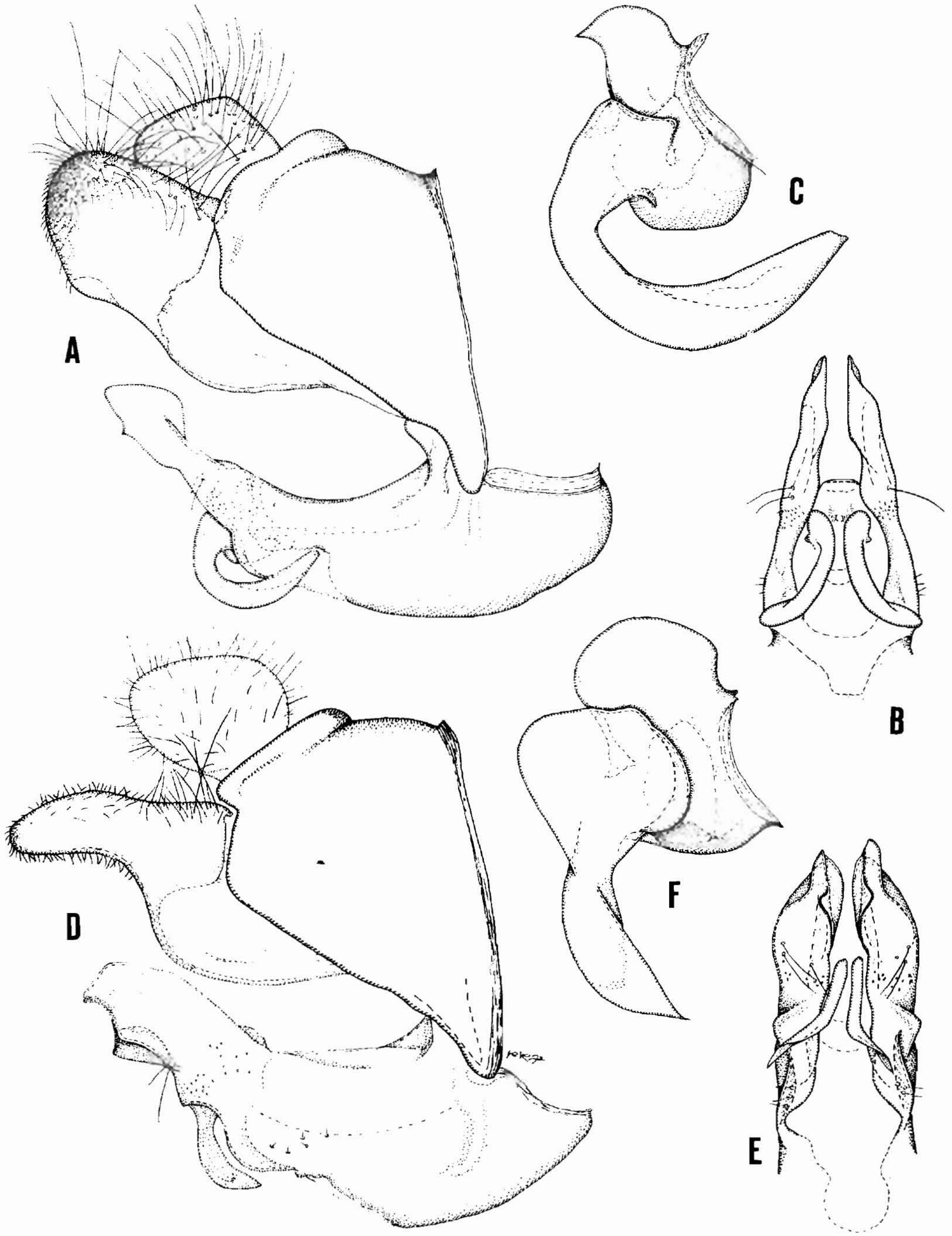

Figure 12. Male genitalia, lateral view (A and D), apical part of hypandrium, ventral view (B and E), and aedeagus, lateral view (C and F). – A-C: *Eristalis anthophorina* (Fallén) (from Sweden). – D-F: *E. gomojunovae* Violovitsh (D and E from Finland, F from Sweden).

Central Finland, South Karelia and Norway. In coll. ZMH there are specimens from Lojo (Finland) and Dovre (Norway) which seem to be some of those mentioned by Kanervo. The Norwegian specimen, identified by Kanervo without studying the genitalia, is *E. hirta* Loew. The other specimen is *E. rupium* and is herewith designated as lectotype in order to fix the identity of var. *nigrotarsata*. It is labelled: 1) white label «Lojo 23.7.1925 Håkan Lindb.» and 2) red label «Lectotype ♂ *Eristalis rupium* var. *nigrotarsata* Kanervo, 1938, design. H. Hippa, T. Nielsen & J. van Steenis, 1998».

Var. *nigrofasciatus* was described from three females from Sortavala, South Karelia. All the specimens are lost. Similar females with a black haired band on mesonotum are known from this and other localities. They are certainly *E. rupium*. In order to fix the identity of var. *nigrofasciata* we here designate a neotype. It is labelled: 1) white label «Sortavala, Kanervo, 5 25» and 2) red label «Neotype ♀ *Eristalis rupium* var. *nigrofasciata* Kanervo, 1938, design. H. Hippa, T. Nielsen & J. van Steenis, 1998».

Var. *infuscata* was based on three females, from South Karelia, from the USSR and from Salzburg (Austria). Only the one from Austria has been found (coll. ZMH). It is a dark winged form of *E. rupium*, also known from other localities. In order to fix the identity of var. *infuscata* we selected this specimen as lectotype. It is labelled: 1) white label «Salzburg Palmén 4506», 2) red label «var. *infuscata* Kanervo», and 3) red label «Lectotype ♀, *Eristalis rupium* var. *infuscata* Kanervo, 1938, design. H. Hippa, T. Nielsen & J. van Steenis, 1998».

The holotype ♂ of *Eristalis pigaliza* Violovitsh in coll. ZIAS was studied and found to be identical with dwarf forms of *E. rupium*, and so we support the synonymy proposed by Mutin & Barklov (1999).

Telford (1970) mentioned *E. flavocincta* (Fallén, 1817) as a synonym of *rupium*. This name was, however, an emendation of *flavicincta* Fabricius, 1805, which is a junior synonym of *E. lineata*. Moreover, the specimens named by Fallén as *flavocincta* (coll. NRS) belong to *E. lineata*.

Additional material studied: From Austria, Belgium, Denmark, Finland, Germany, Norway, Sweden and the Netherlands.

Diagnosis: The long pterostigma, three times as long as broad, is characteristic for this medium-sized *Eristalis*. The female is recognized by its mainly black, wholly shining abdomen, and wing often with a broad, distinct dark cloud in middle. The genitalia should be examined for certain identification of the male.

Discussion: *E. rupium* is very similar to *picea*, *pseudorupium* and to Palaearctic specimens of *hirta*, but is readily separated from these by its long pterostigma. The shining tergites 2-4 and a marked blackish-brown cloud on the wing are features of the female, but a less pronounced cloud may also be found in *picea* female.

The male genitalia of *rupium* (Figures 6 and 7) are somewhat variable in the shape and degree of development of the lobe-like projection on the ventral margin of surstylus, and also in the detailed shape of the paramere. The variation in the former case is often only arbitrary and depends much on the angle of view and the method of dissecting and viewing. The genitalia of *E. rupium* are easily distinguished from those of other similar species, *picea* (Figure 8), *pseudorupium* (Figure 9) and *alpina* (Figures 4 A-D and 5 A-D), by the short and only slightly curved aedeagal lobe. Furthermore, the genitalia of *rupium* differ from those of *picea* by the concave dorsomesial margin of surstylus, from *pseudorupium* and *picea* by a more pronounced lobe-like projection on the ventral margin of surstylus, and from *picea* by an apically more rounded apex of paramere (see also under *picea*). It is separated from *pseudorupium* by a tapering paramere, that does not expand towards apex, and from *alpina* by the tapering, not parallel-sided paramere and by the lack of a large membraneous area at apex of the paramere.

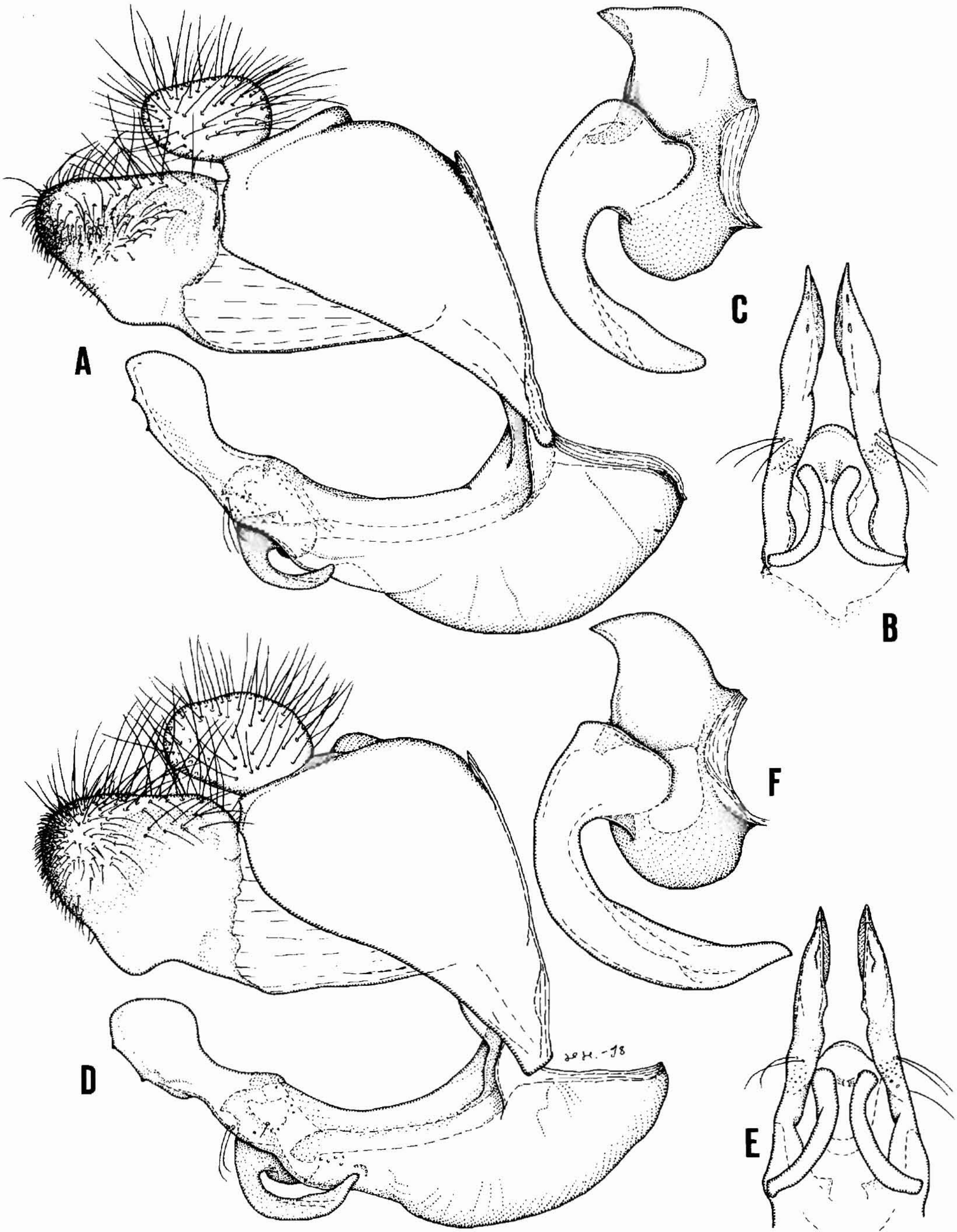

Figure 13. Male genitalia, lateral view (A and D), apical part of hypandrium, ventral view (B and E), and aedeagus, lateral view (C and F). – A-C: *Eristalis oestracea* (Linnaeus) (from Sweden). – D-F: *E. intricaria* (Linnaeus) (from Sweden).

Eristalis similis (Fallén)
Figures 1 H, 2 A, 2 G, 19 D-F

Syrphus similis Fallén, 1817
Eristalis pratorum Meigen, 1822
Eristalis nigroantennata Schummel, 1844
Eristalis pascuorum Rondani, 1857

Type material: Recently Nielsen (1995, 1999) has studied the types of *similis* and found this name to be synonymous with *pratorum*. Speight (pers. comm.) examined the female holotype of *pratorum* in MNHNP and confirmed the current concept of that taxon. We also examined the holotype male of *nigroantennata* (in HUB) and agree that it is conspecific with *similis*.

Additional material studied: From Belgium, Czech Republic, France, Norway, Spain, Sweden and the Netherlands.

Diagnosis: A good character for this large species is the very long pterostigma, which is about six times as long as broad. The arista is long haired, the black central stripe of face narrow and the front and mid tarsi black.

Discussion: In the field *E. similis* is easily overlooked among the large majority of *pertinax*, but it may be identified by its black tarsi. It separates from *tenax* by a narrow median facial stripe, by the evenly brown haired eyes (lacking the dorsoventral band of denser and generally darker pile present in *tenax*) and by the narrower abdomen. The male genitalia of *similis* (Figures 19 D-F) and *pertinax* (Figures 19 A-C) are very similar. For distinguishing charaters, see under the latter.

Eristalis tenax (Linnaeus)
Figures 1 E, 2 H, 20 A-C

Musca tenax Linnaeus, 1758
Conops vulgaris (Scopoli, 1763)
Musca porcina (De Geer, 1776); unjustified new name for *tenax* Linnaeus, 1758
Musca obfuscata Gmelin, 1790; unjustified new name for *Conops fusca* Scopoli, 1763
Eristalis campestris Meigen, 1822
Eristalis hortorum Meigen, 1822
Eristalis sylvatica Meigen, 1822
Eristalis vulpina Meigen, 1822
Eristalis sinensis Wiedemann, 1824
Eristalis columbica Macquart, 1855
Eristalis ventralis Thomson, 1869
Eristalis tenax var. *alpina* Strobl, 1893
Eristalis tenax var. *claripes* Santos Abreu, 1924
Eristalis rubix Violovitsh, 1977. **New synonym**

Type material and synonyms: Thompson et al. (1982) examined the type material of *Musca tenax* (in LCL) and confirmed the current interpretation of this name. We studied the holotype of *E. rubix* (in ZIASP) from Russia, Altay. It showed to be an exceptionally small-sized specimen of *tenax*. No other types were studied by us.

Material studied: From all over Europe.

Diagnosis: A large and robust bee-like species, and the model for the name «drone fly». Black medial stripe of face broad, more than one third width of face. Arista short haired, almost bare, eyes with a dorsoventral band of generally denser and darker hairs than on other parts. Katepimeron hairy, front and mid tarsi black, and hind tibia with a conspicuous dorsal and ventral hair fringe on distal half. Pterostigma short. Abdomen broad and shining.

Discussion: *E. tenax* is not very similar to the other species treated in this paper. It is readily distinguished by the special pile on the eyes, as mentioned above, and by the hairy katepimeron (Figure 2 H). In size and appearance it resembles *pertinax* and *similis*, but the yellow fore and mid tarsi in *pertinax* and the long pterostigma in *similis* are useful characteristics for separating them.

E. tenax is slightly variable in colour pattern on the abdomen; the form *hortorum* Meigen has a dark brownish-black abdomen, while the form *campestris* Meigen has parts of tergites 3-4 more or less orange-yellow.

The male genitalia of *E. tenax* (Figure 20) are unique and readily distinguished by the short and broad, simple, sickle-shaped paramere.

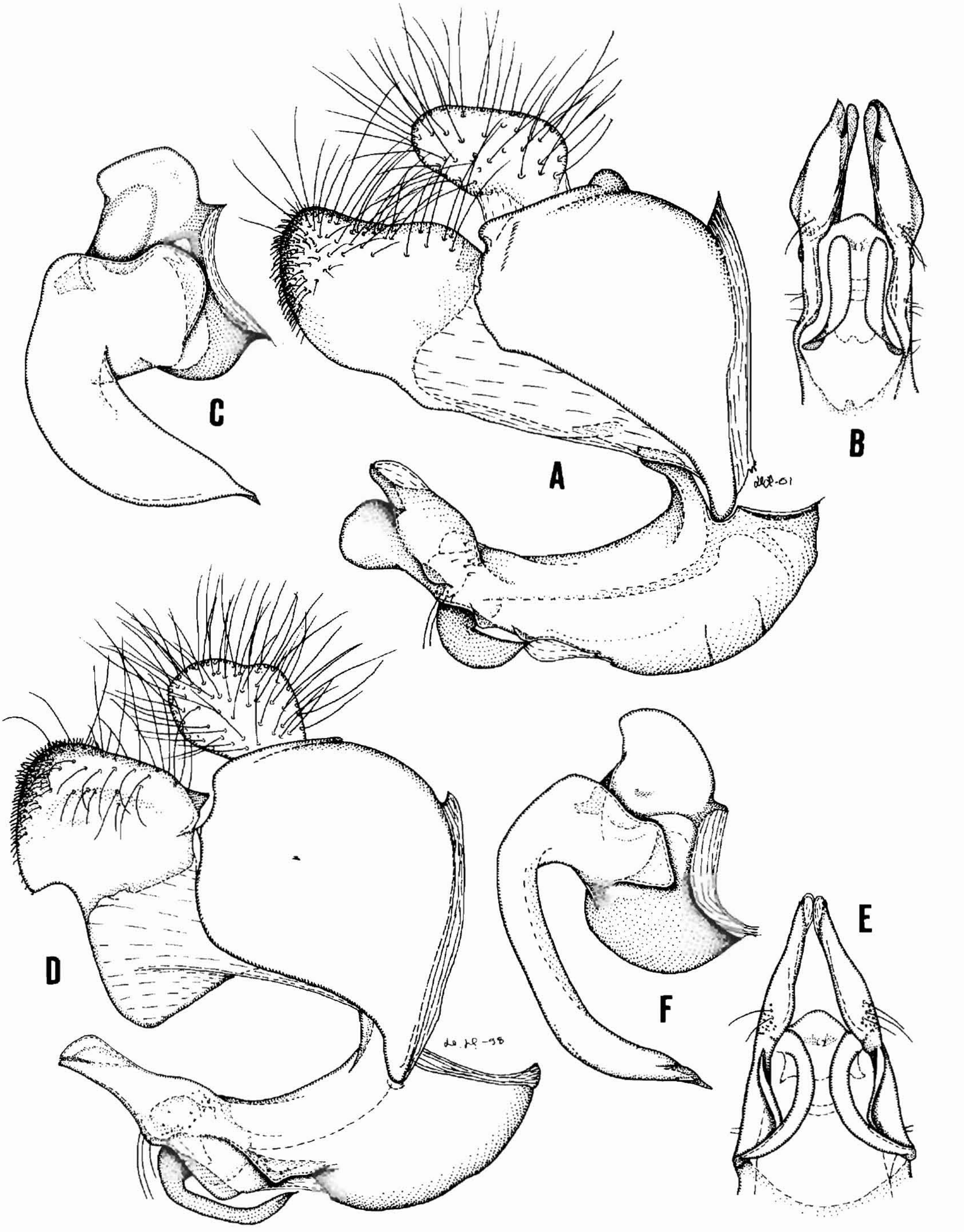

Figure 14. Male genitalia, lateral view (A and D), apical part of hypandrium, ventral view (B and E), and aedeagus, lateral view (C and F). – A-C: *Eristalis jugorum* Egger (from Austria). – D-F: *E. cryptarum* (Fabricius) (from Sweden).

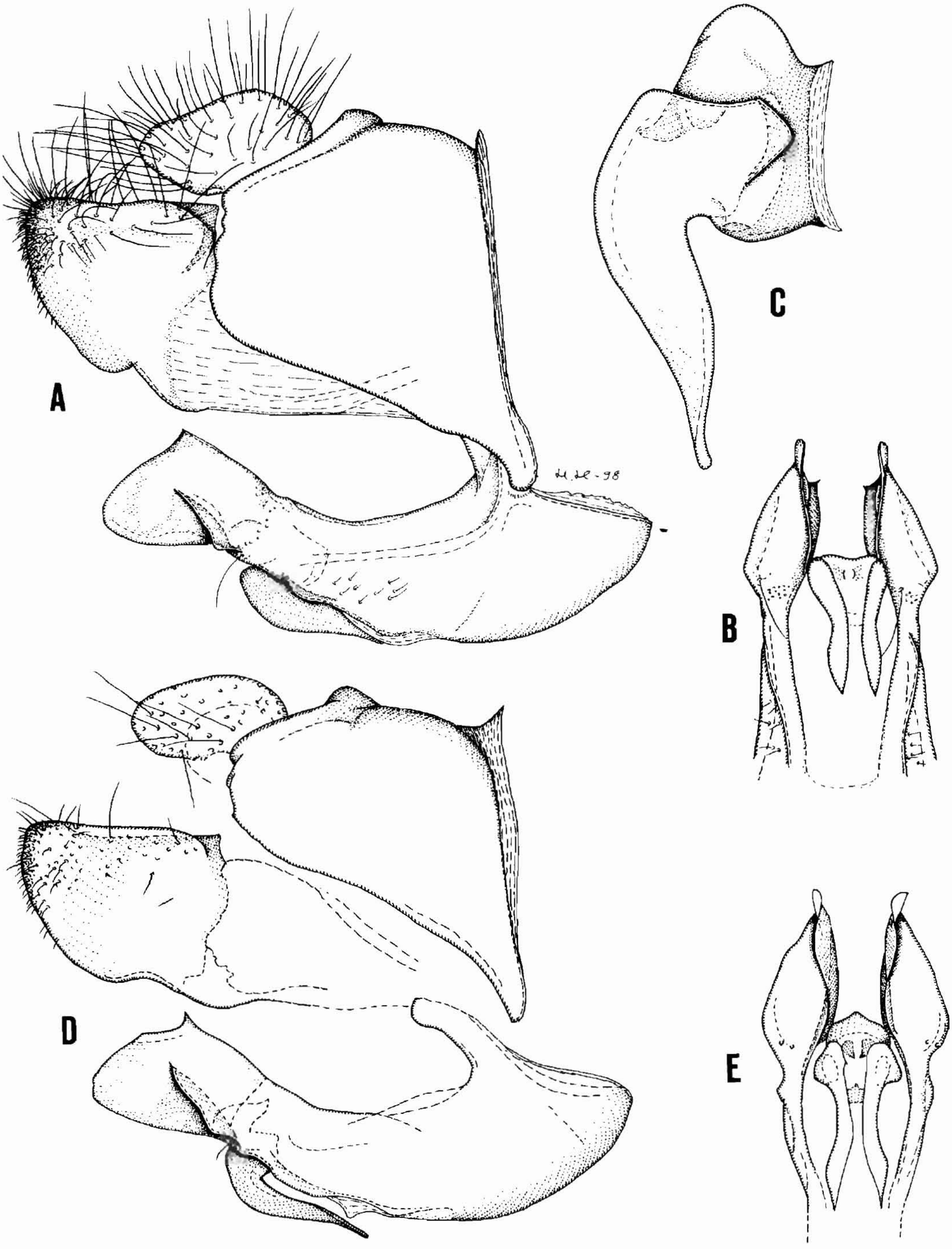

Figure 15. *Eristalis lineata* (Harris) (A, B and C from Sweden, D and E holotype of *E. stackelbergi* Doležil & Rozkošný from Czech Republic). – A and D: Male genitalia, lateral view. – B and E: Apical part of hypandrium, ventral view. – C: Aedeagus, lateral view.

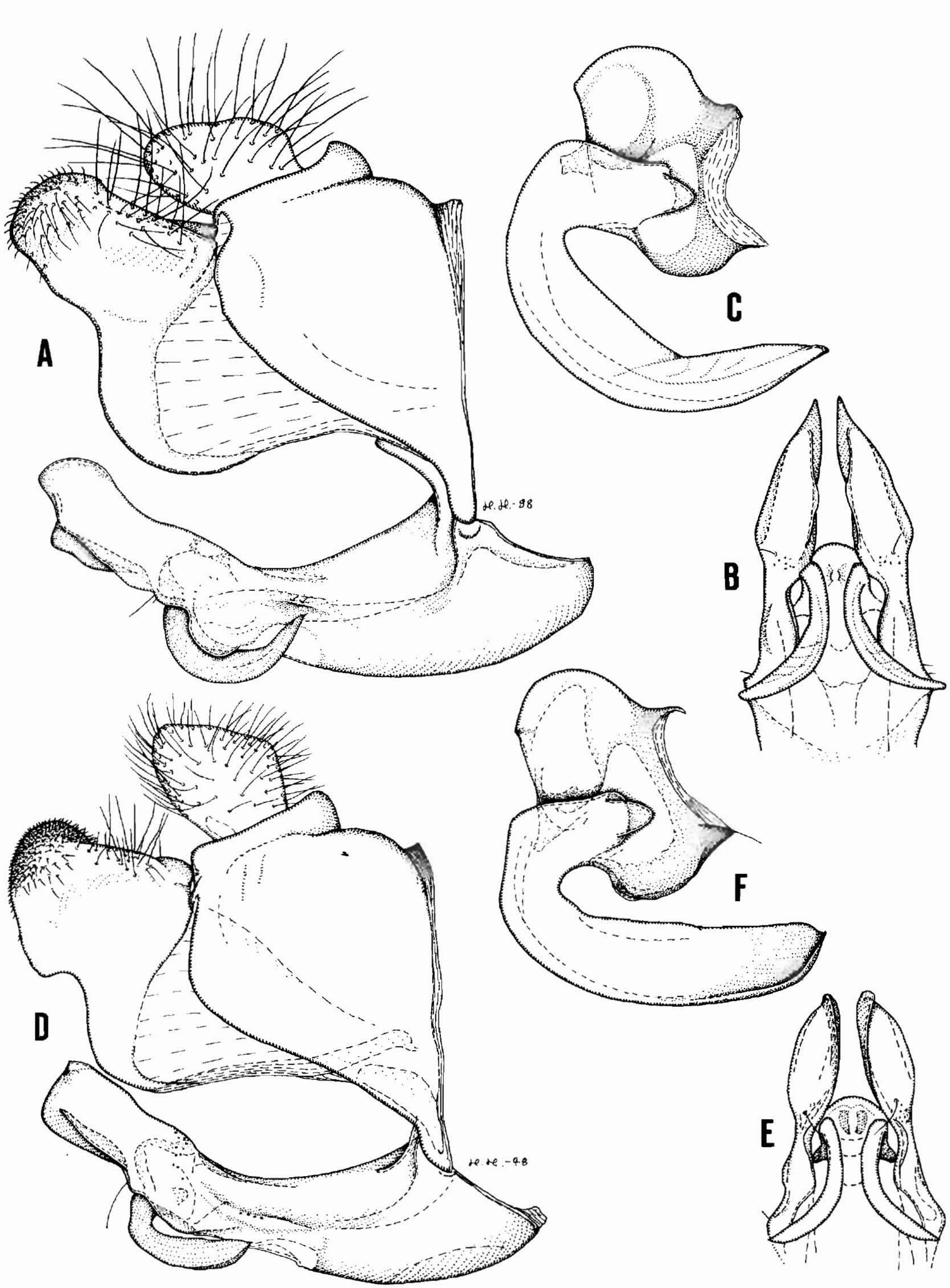

Figure 16. Male genitalia, lateral view (A and D), apical part of hypandrium, ventral view (B and E), and aedeagus, lateral view (C and F). – A-C: *Eristalis interrupta* (Poda) (from Sweden). – D-F: *E. rossica* Stackelberg (from Russia).

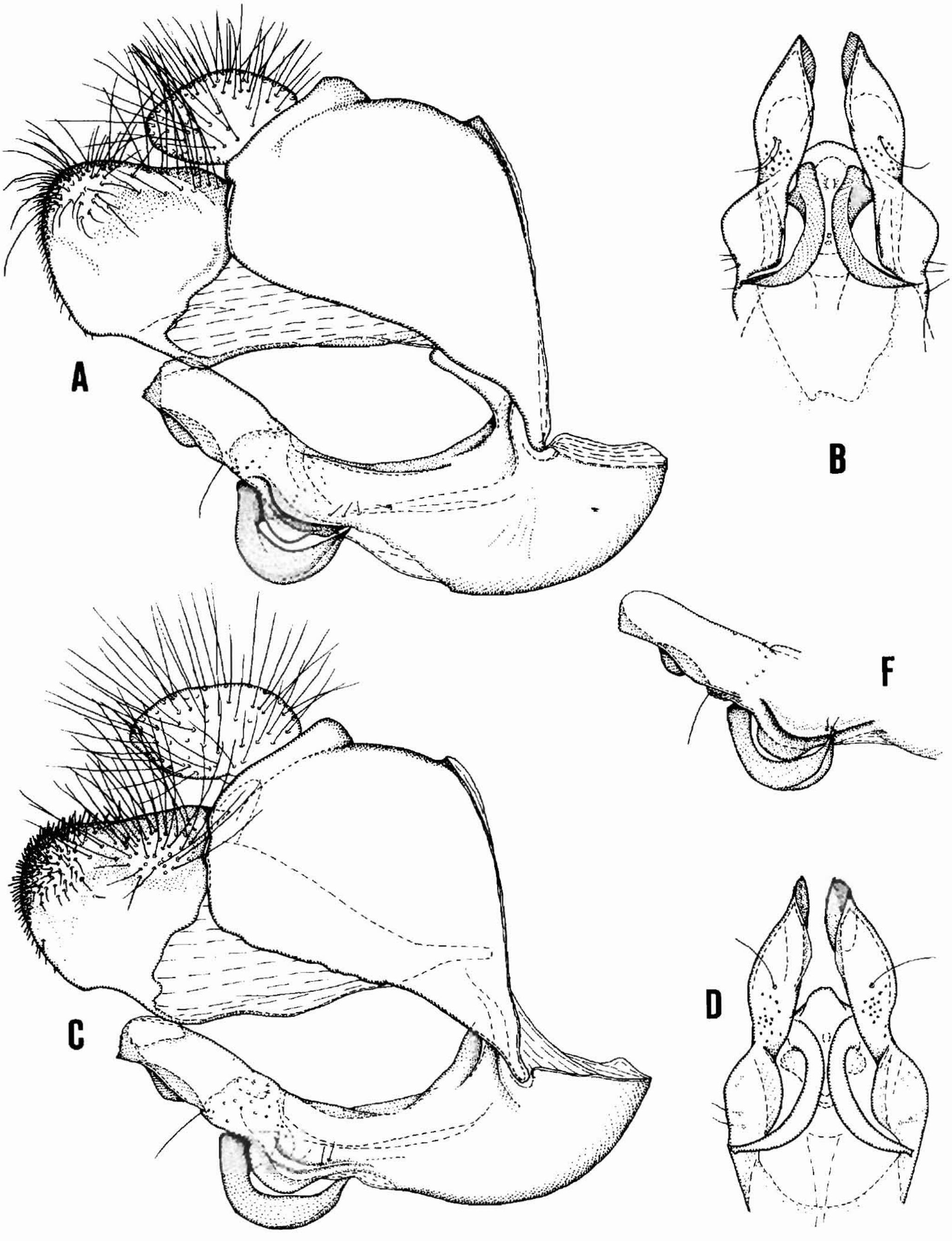

Figure 17. *Eristalis hirta* Loew. – A and C: Male genitalia, lateral view (A from Sweden, C from Canada, Alberta). - B and D: Apical part of hypandrium, ventral view (B from Sweden, D from Canada, Alberta). – F: Apical part of hypandrium, lateral view (from Canada, British Columbia).

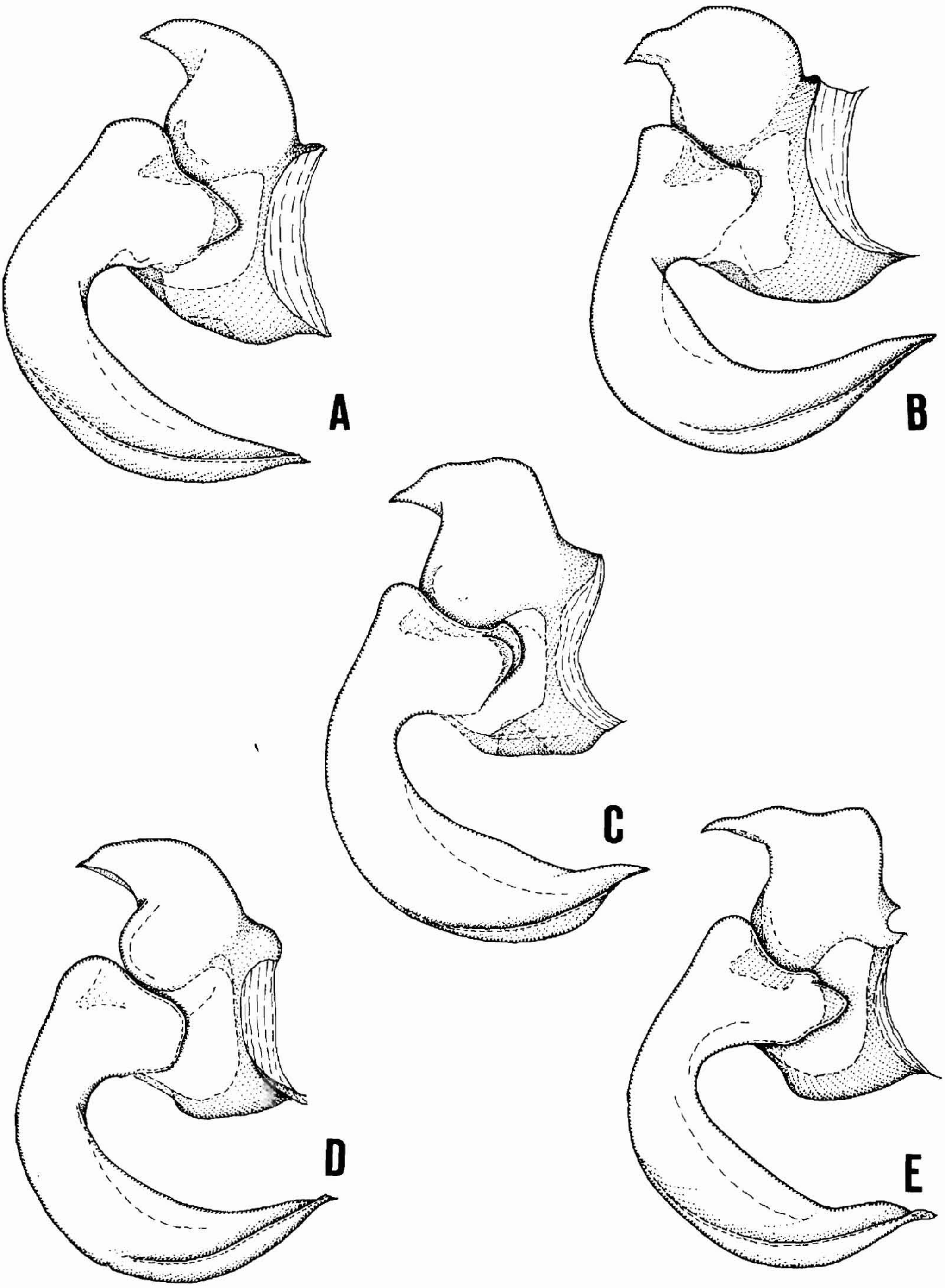

Figure 18. *Eristalis hirta* Loew: aedeagus, lateral view. - A from Sweden, B from Russia, Magadan, C from Russia, Kamchatka, D from Canada, British Columbia, and E from Canada, Alberta.

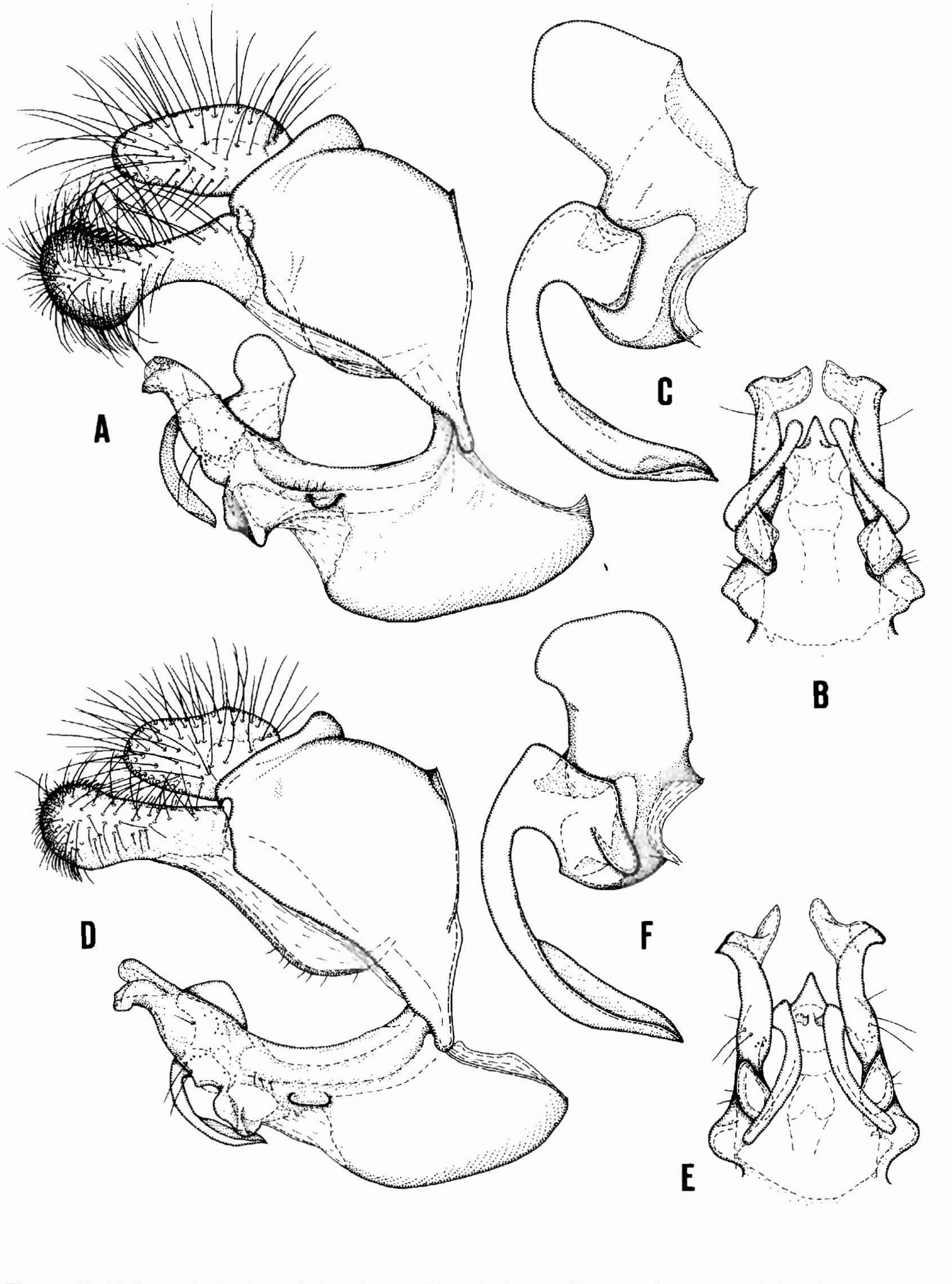

Figure 19. Male genitalia, lateral view (A and D), apical part of hypandrium, ventral view (B and E), and aedeagus, lateral view (C and F). – A-C: *Eristalis pertinax* (Scopoli) (from Sweden). – D-F: *E. similis* (Fallén) (from Sweden).

Eristalinus aeneus (Scopoli, 1763)

Eristalomyia auricalcica Rondani, 1865. **New synonym**.

Type material: The male holotype of *auricalcica* was studied (sternites partly eaten away by insects). It has three labels: 1) a small, square dark violet label, 2) a small, rectangular white label with handwritten «Abruz», and 3) a small, oval label with printed in red «42», in coll. MZF. We found it to be identical with *Eristalinus aeneus*.

Unrecognized taxon

Eristalis nigrifrontis Brullé, 1833

This is undoubtedly an *Eristalis*, but the type material has been lost and the description is too general to decide which species it might be.

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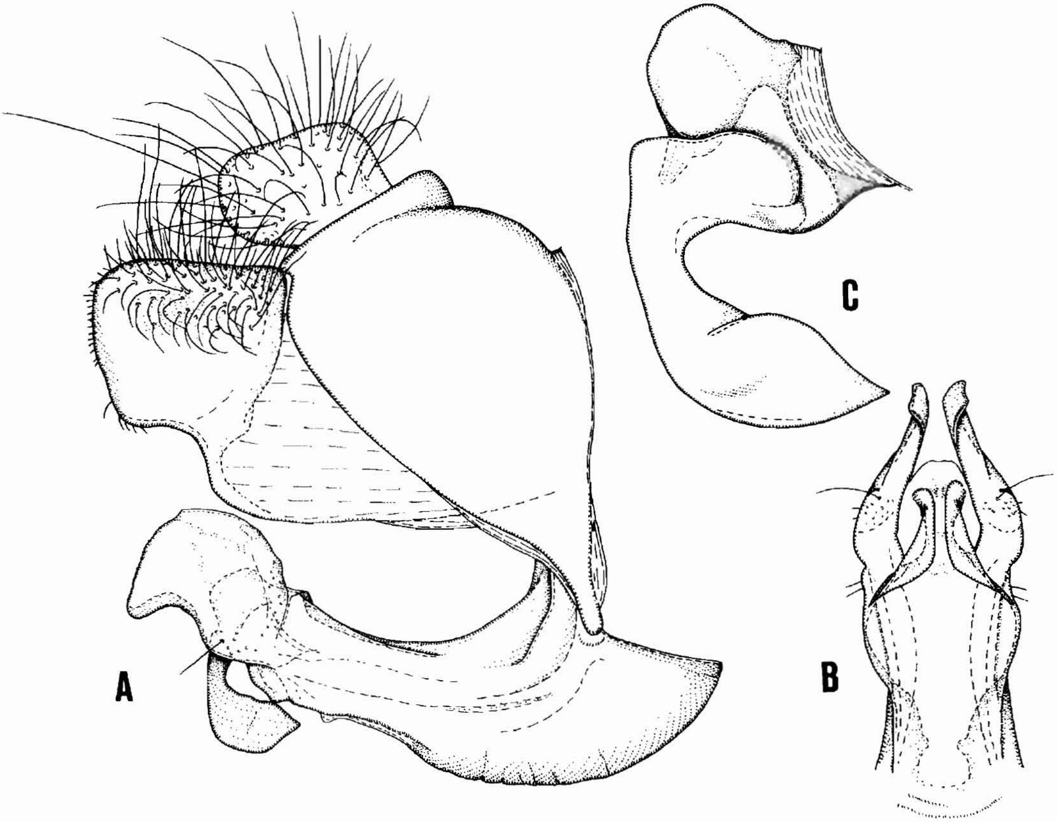

Figure 20. *Eristalis tenax* (Linnaeus) (from Sweden). – A: Male genitalia, lateral view. – B: Apical part of hypandrium, ventral view. – C: Aedeagus, ventral view.

holm), J. R. Vockeroth (Ottawa), A. Vujic (Novi Sad), H. Wendt (Berlin) and S. Whitman (Florence).

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Atractodes pusillus **Förster, 1876 and *Stenomacrus groenlandicus* Jussila, 1996 (Hymenoptera: Ichneumonidae), new records to Svalbard, Norway**

Stephen J. Coulson, Ian D. Hodkinson, Reijo Jussila, Nigel R. Webb & Joanna A. Harrison

Coulson, S. J., Hodkinson, I.D., Jussila R., Webb, N.R. & Harrison, J. A. 2001. *Atractodes pusillus* Förster, 1876 and *Stenomacrus groenlandicus* Jussila, 1996 (Hymenoptera: Ichneumonidae), new records to Svalbard, Norway. Norw. J. Entomol. 48, 328.

Two ichneumonids, *Atractodes pusillus* Förster, 1876 and *Stenomacrus groenlandicus* Jussila, 1996 (Hymenoptera: Ichneumonidae), are reported for the first time from Svalbard.

Key words: *Atractodes, Stenomacrus*, Svalbard, Spitsbergen, Arctic.

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Introduction

Pitfall traps were arranged at seven sites along a chronosequence constructed across the pro-glacial region of the Midtre Lovénbre adjacent to Ny-Ålesund, Svalbard, between 16 July and 3 August 2000. These traps operated as water traps and caught a large number of flying insects including many Hymenoptera Parastitica. Conditions were generally overcast with light winds. For a full site description see Hodkinson et al. (2001).

Records and discussion

Four species of Ichneumonidae were caught. Two are already known from Svalbard: *Plectiscidea hyperborea* (Holmgren, 1869) (7 ♂♂ and 10 ♀♀) and *Aclastus borealis* (Boheman, 1866) (12 ♂♂ and 4 ♀♀) (Coulson & Refseth in press). However, *Atractodes pusillus* Förster, 1876 (Cryptinae) (4 ♂♂ and 1 ♀) and *Stenomacrus groenlandicus* Jussila, 1996 (Orthocentrinae) (15 ♂♂ and 5 ♀♀) were new records to the archipelago. The specimens collected from Svalbard are held by R. Jussila (Zoological Museum, University of Turku, Finland).

S. groenlandicus was first identified from the Scoresbysund region of Greenland (Jussila 1996). Two ♀♀ of the Svalbard specimens have short wings but the other three ♀♀ and all ♂♂ long wings. All Greenlandic specimens we have seen have long wings (Jussila 1996).

A. pusillus, is a well known circumpolar species with several synonyms which include *Atractodes alpigradus* Förster, 1876, *A. linearis* Förster, 1876, *A. calceolatus* Förster, 1876, *A. niger* Förster, 1876, *A. tenellus* Förster, 1876, *A. liogaster* Thomson, 1884 and *A. pernitens* Kokujev, 1909 (Jussila 1979).

These new records bring the known ichneumonid fauna of Svalbard to 14 species. Both new records are likely to be a parasites of the larvae of nematoceran Diptera common on Svalbard.

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The genus *Loxocera* (Diptera, Psilidae) in Norway

Lita Greve & John Skartveit

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The genus *Loxocera* (Diptera, Psilidae) in Norway is reviewed based on the material in the collections of the Norwegian university museums and material in some private collections. Distributional data are given for five species: *Loxocera albiseta* (Schrank, 1803), *L. aristata* (Panzer, 1801), *L. fulviventris* (Meigen, 1826), *L. nigrifrons* Macquart, 1835 and *L. sylvatica* Meigen, 1826. *L. nigrifrons* is recorded as new to Norway and marked with an asterisk. A key to the Norwegian species of the genus *Loxocera* is given.

Keywords: *Loxocera*, Psilidae, Diptera, Norway.

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INTRODUCTION

The Psilidae is a well defined family comprising two subfamilies and around two hundred species on the world level. The family is represented in the Palaearctic region with at least 110 species (Iwasa 1998). Twenty species have been recorded from Germany (Schumann 1999) and eighteen from Denmark (Lyneborg 1964). The Norwegian fauna of Psilidae has not been reviewed since the time of Siebke (1877) with the exception of the genus *Chyliza* treated by Greve & Midtgaard (1989). Siebke (1877) listed three species of *Loxocera* in this order: *Loxocera ichneumonea* L. 1761, *L. sylvatica* Meigen, 1826 and *L. fulviventris* (Meigen, 1826).

This survey treats the genus *Loxocera* which is distributed in the Holarctic, Oriental and Afrotropical regions (Iwasa 1992). The genus *Loxocera* is easy to recognize even in the field on account of the remarkable lengthened third antennal segment (first flagellomere) which is longer than the length of the face. The head in profile is conical. The body is slender and the pleurae without setae. The legs are slender without stout spines except short bristles. There is a pad of short dense pile near tip of ventral side of hind femur. Wings as in other Psilidae with «a distinct subcostal break before end of subcosta and a transverse hyaline line from its break extending to posterior end of second basal cell» (Iwasa 1998).

Only *Loxocera* Meigen, 1803 (s.str) is represented in the Norwegian material. One species belonging to another subgenus *Loxocera* (*Platystyla* Macquart*)* *hoffmannseggi* Meigen, 1826 has been recorded from southern Denmark (Lyneborg 1964). It is included in the present key.

The psilid larvae are phytophagous and burrow in roots, bulbs and stems of plants. The larvae of the genus *Loxocera* is associated with the plant genera *Juncus* and *Luzula* (Juncaceae) according to Chandler (1975). Some Psilidae are well known agricultural pests, but there are none in the genus *Loxocera*.

MATERIAL AND METHODS

Listed in this survey is all material in the Norwegian University Museum collections of Oslo (ZMO), Bergen and Tromsø (TM). We have also included material from the private collections of Tore Randulff Nielsen, Sandnes (= TRN Coll.) and Knut Rognes, Stavanger (= KR Coll.), and additionally information on material from the collections of the Museum of Zoology, Lund, Sweden (MZLU). Where nothing else is mentioned the material is in the collections of the Zoological Museum, University of Bergen. Regional abbreviations are given in accordance with Økland (1981).

The material consists of 424 specimens, 226 ♂♂ 193 ♀♀ belonging to 5 species, 5 specimens not sexed.

LIST OF SPECIES

Loxocera albiseta (Schrank, 1803)

Synonym *L. ichneumonea* (L. 1761), pro parte.

Material: 6 ♂♂ 8 ♀♀

Records: **VE** (1 ♂ 4 ♀♀) Larvik: Larvik (ZMO), Omsland; Våle: Langøya; Tjøme: Moutmarka. **TEY** (1 ♂ 3 ♀♀) Porsgrunn: Sandøya, Solvang; Kragerø: Portør. **VAY** (4 ♂♂ 1 ♀) Mandal: Eskelandsmyra, Near road to Valand; Lindesnes: Haraldstad (TRN Coll.).

EIS 1, 2, 11, 19.

Captured 2 July - 26 October, most specimens in July-August.

Judged from the material in this survey, *L. albiseta* has a distinctly southern distribution in Norway as it has only been found in the SE parts and here it must be considered as rare. All records are from localities in the vicinity of the coast and some from islands. The habitats are open bogs, near beaches and basiphilous pine-forest.

L. albiseta is present in Sweden (Hugo Andersson, pers. comm.). *L. ichneumonea* (L.1758) is listed by Hackman (1980), but it is uncertain which of the two species *L. albiseta* or *L. aristata* is meant. *L. albiseta* has a southern distribution in the British Isles and is not recorded from Scotland (Collin 1944, Chandler 1975). According to Soós (1984) *L. albiseta* is distributed in all parts of Europe and the former USSR.

Loxocera aristata (Panzer, 1801)

Synonym *L. ichneumonea* (L.1761), pro parte.

Material: 89 ♂♂ 117 ♀♀ 3 specimens not sexed.

Records: **Ø** (3 ♀♀) Halden: Halden (ZMO), Prestbakke. **AK** (8 ♂♂ 11 ♀♀, 1 specimen) Oslo: Oslo (ZMO and TM), Tveter, Tøyen, Østensjø; Asker: Bjørkås; Enebakk: Enebakk (ZMO). **HES** (3 ♀♀) Ringerike: Eiksåsen (Helgøya). **HEN** (1 ♀) Stor-Elvdal: Stor-Elvdal (ZMO). **OS** (1 ♂) Ringebu: Ringebu (ZMO). **ON** (1 ♂) Dovre: Toftemo (ZMO). **OS / ON** (1 ♀) Nordseter (ZMO). **BØ** (1 ♂ 5 ♀♀) Drammen: Underlia; Kongsberg: Kongsberg; Hurum: Tofteholmen, Østnestangen. **BV** (1 ♂ 1 ♀) Nore & Uvdal: Grefsgard; «Hallingdal» (ZMO). **VE** (4 ♀♀) Sande: Kommersøya. **TEY** (2 ♀♀) Bamble: Krokhavn (Langesund). **AAY** (1 ♂) Iveland: Grosås. **VAY** (22 ♂♂ 28 ♀♀) Kristiansand: Oddernes; Mandal: Mandal, Kvisla (TM), near road to Valand; Marnardal: Sveindal Gård (Laudal), Flekkefjord: Store Eikås (Gausdal), Dragøy (Hidra), Dragøy, Lianstjern (Hidra), Råga (Hidra); Lindesnes: Jørgenstad (TRN Coll.). **VAI** (3 ♂♂ 2 ♀♀) Sirdal: Fidjeland, east of Suleskard (TRN Coll.). **RY** (3 ♂♂ 7 ♀♀) Sandnes: Austrått; Hå: Ogna; Finnøy: Sevheim, Sevheimsvågen; Tysvær: Kårstø; Karmøy: Våge, Grodvatn. **RI** (1 ♂) Hjelmeland: Fosså (Jøsnesset). **HOY** (5 ♂♂ 26 ♀♀) Bergen: Fløyen, Nedrediket, (Fana) Espegrend, Biological Station, (Åsane) Vollane, Kråmyrane Nature Reserve; Stord: Iglatjønn Nature Reserve; Samnanger: Høyseter, Ådland; Os: Sælelid; Askøy: Hegreneset; Vaksdal: Eksingedalen, Ekse; Osterøy: Fugledalen. **HOI** (34 ♂♂ 8 ♀♀) Etne: Brenneland; Odda: Solfonn hotel; Voss: Solbakken (Mjølfjell), Urdlandsstøl; Kvam: Geitaknottheiane. **SFY** (3 ♂♂ 1 ♀) Gaular: Hjelmeland; Jølster: Kjøsnes, Vassenden 200 M West. **SFI** (4 ♂♂ 3 ♀♀) Aurland: Flåmsdalen, Kårdal, Upsete; Stryn: Loen. **MRY** (1 ♂) Haram: Sethdammen (Løvøya). **MRI** (1 ♂ 5 ♀♀) Norddal: Fjørå; Romsdal, (ZMO). **STI** (1 ♂ 3 ♀♀) Trondheim: Korsvika, Leirbru; Oppdal: Lønset. **NSI** (1 specimen) Hemnes: Bjerka (KR Coll.).

EIS 1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 14, 19, 20, 23, 27, 28, 29, 30, 31, 32, 39, 40, 41, 43, 45, 58, 59, 63, 64, 68, 77, 79, 83, 92, 118.

Captured 10 June - 19 Sept, most specimens in July

Key to species

1. Both the two basal antennal segments and the first flagellomere lengthened. Arista arises from middle of first flagellomere .... *Loxocera* (*Platystyla*) *hoffmannseggi* Meigen, 1826
Not in Norway. Recorded from a couple of localities in southernmost Denmark.

– The two basal antennal segments short, only the first flagellomere lengthened. Arista arises from near base of the first flagellomere .... 2. *Loxocera* (s.str.)

2. Arista fairly thick. The hairs distinctly erect. Central part of face yellow. Thorax dorsally black, ventrally yellow, abdomen dorsally black. Legs yellow .... 3.

– Arista thinner than above, hairs not erect. Central part of face black .... 4.

3. Larger species, body-length 7 - 9 mm. Wings hyaline. Frons yellow on both sides of a black triangle. Postgena yellow. Front part of thorax dark, the rest yellowish or reddish yellow .... *Loxocera albiseta* (Schrank, 1803)

– Smaller species, body-length 5 - 7 mm body length. Frons as well as scutellum black. Postgena yellow. The whole body dark dorsally including dark postpronotal lobe, yellow ventrally. Wings with weakly, but distinctly shaded ribs .... *Loxocera nigrifrons* Macquart, 1835

4. Larger species, body-length 7 - 10 mm. No dorsocentral bristles, occasionally present in some specimens. Head black above, frons with a brownish triangle, genae somewhat brownish. Front part of thorax dorsally black, otherwise the thorax is reddish-brown or brownish, abdomen black .... *Loxocera aristata* (Panzer, 1801)

– Smaller species, 4 - 6 mm in body length .... 5.

5. Frons yellow on both sides of the long, black central triangle. Face below antennae yellow with black central part. Genae fairly broad and mostly yellow. Postgena always distinctly yellow. Front part of thorax dorsally black, otherwise mostly yellow. Postpronotal lobe («the shoulder» in Lyneborg (1964)) nearly always clear yellow .... *Loxocera sylvatica* Meigen, 1826

– Frons mostly all black. Face nearly all black, on dry specimens silvery bands can be seen. Genae narrower. Postgena always distinctly black. Postpronotal lobe dark to black .... *Loxocera fulviventris* (Meigen, 1826).

- first part of August, few in June, very few in September.

L. aristata is a common and widespread species in southern Norway. It seems to be the commonest *Loxocera* in this part of Norway. The northernmost locality hitherto is NSI Hemnes: Bjerka. One specimen in the collections of Tromsø museum: **TRY** Tromsø: Tromsø 24 July 1924 is identified as *L. aristata.* However, this specimen is unfortunately today defective, partly damaged by pests, and cannot be determined with certainty.

Highest altitude for *L. aristata* is the localities at **BV** Nore & Uvdal: Grefsgard 800 M asl, **VAI** Sirdal: Suleskard at 900 M asl, two other localities are at around 600 M asl in **SFI** Aurland: Flåmsdalen, Kårdal and **HOI** Voss: Urdlandstøl.

Loxocera fulviventris (Meigen, 1826)

Material: 73 ♂♂ 15 ♂♂

Records: **AK** (2 ♂♂ 3 ♀♀) Oslo: Hovind, Oslo, Tøyen (ZMO); Bærum: Ostøya. **HES** (2 ♂♂) Ringsaker: Sandvold (Furnes). **HEN** (1 ♂) Rendalen: Solbakken det. K. Rognes (ZMO). **BØ** (24 ♂♂) Hurum: Tofteholmen. **BV** (2 ♂♂ 3 ♀♀) Rollag: Tråen saga; Ål: «Storeteigen» (Venadokken). **VE** (5 ♂♂ 3 ♀♀) Våle: Langøya; Tjøme: Kynna, Sandøy. **TEY** (1 ♂) Porsgrunn: Sandøya, Solvang. **AAI** (2 ♂♂) Bygland: Kleivvollen gard (Vassenden). **VAY** (5 ♂♂) Kristiansand: Oddernes; Flekkefjord: Gausdal, Gyland; Marnardal: Laudal. **RY** (8 ♂♂ 3 ♀♀) Sokndal: Sokndal; Hå: Ogna. **HOY** (5 ♂♂ 1 ♀) Bergen (Åsane): Vollane; Bømlo: Kalvneset. **HOI** (6 ♂♂ 1 ♀) Kvam: Berge Nature Reserve; Ullensvang: Djønno. **SFY** (1 ♂) Naustdal: Naustdal. **SFI** (1 ♂) Balestrand: Målsnes. **MRI** (9 ♂♂) Norddal: Fjørå. **STI** (1 ♀) Trondheim: Rotvoll.

EIS 2, 3, 4, 9, 11, 19, 28, 30, 31, 35, 39, 41, 43, 45, 50, 58, 64, 77, 92.

Captured 21 June - 1 September. Most specimens in July-August.

L. fulviventris seems to have a wide distribution in southern Norway with the record from **STI** Trondheim: Rotvoll as the northernmost. The habitats are varying from open areas to forests. At Hurum: Tofteholmen 23 ♂♂ were collected in old spruce (*Picea abies)* forest. Many specimens have been collected in Malaise traps. In the collected material there are more males than females. Published material (Greve 1996) from **HOI** Voss: Solbakken has been revised to *L. aristata.*

L. fulviventris is distributed in North and Central Europe, former USSR and east to Japan (Iwasa 1992).

* *Loxocera nigrifrons* Macquart, 1835

Material: 7 ♂♂

Records: **HOI** (7 ♂♂) Kvam: Berge Nature Reserve, Gravdal, Geitaknottheiane near Svevatn, Samnanger: Ådland.

EIS 31, 40.

Captured 5 June - 6 August. Most specimens in June-July.

Loxocera nigrifrons is here reported as new from Norway. The best character to distinguish *L. nigrifrons* from the other Norwegian species of *Loxocera* is the weakly, but clearly infuscated wing ribs. The hind tibia can also often be coloured brown in the middle parts (Hennig 1941). *L. nigrifrons* has also a very dark thorax compared to other *Loxocera.* Our material was compared with material from England borrowed from The Hope Collections, Oxford. The material, males only, has been collected from a fairly small area in one Norwegian county: Hordaland. All specimens have been collected in Malaise traps between 5 June and 6 August. Some of the Malaise traps were open before and after these dates. The habitats were varying, at Berge in a mingled forest of old oaks (*Quercus* sp.) and Norwegian pine (*Pinus sylvestris* L.), at Geitaknottheiane in mingled forest of deciduous and coniferous trees and at Ådland at the edge of a deciduous forest.

The distribution of *L. nigrifrons* in Europe is given as West- and Central-Europe (Soós 1984). It has been recorded from Sweden (Wahlgren 1919) and Finland (Hackman 1980), but not from Denmark (Lyneborg 1964). *L. nigrifrons* is recorded from the British Isles (Collin 1944) and Ireland (Speight et al. 1986). According to Speight (1990) it is probably a rare species in the whole of the distributional area. This view is confirmed by the fact that *L. nigrifrons* is represented by very few specimens from Middle Europe in the large Diptera collection in Zoologische Staatsammlung in München, Germany (W. Schacht, München, pers. comm.).

Loxocera sylvatica Meigen, 1826

Material: 51 ♂♂ 52 ♀♀, 3 specimens not sexed.

Records: **Ø** (1 ♂ 2 ♀♀) Halden: Prestbakke; Råde: Tasken. **AK** (2 ♂♂ 4 ♀♀) Oslo: Lysaker (ZMO); Frogn: Håøya; Bærum: Ostøya. **HEN** (1 ♂) Folldal: Atna, Vollom. **OS** (2 ♂♂) Nordre Land: Dokka. **BØ** (2 ♂♂ 1 ♀) Drammen: Underlia; Hurum: Østnestangen. **BV** (1 ♂ 2 ♀♀) Flå: Langtjern; Rollag: Rollag. **RY** (1 ♀) Finnøy: Sevheimsheia. **HOY** (16 ♂♂ 7 ♀♀) Bergen: Fløyen, Skansen, (Fana) Sedal, Store Milde, Geitaneset (Store Milde); (Åsane): Eidsvåg, Vollane; Tysnes: Ånuglo; Samnanger: Ådland; Os: Drange, near Notavadlo; Sund: Sæle; Osterøy: Haus, near church, Marikovane; Vaksdal: Gullbrå. **HOI** (2 ♂♂ 2 ♀♀) Kvam:

Geitaknottheiane, near Svevatn. **SFY** (2 ♀♀) Naustdal: Naustdal. **SFI** (3 ♂♂ 1 M) Vik: Fresvik; Luster: Fåbergstølgrandane. **MRI** (2 ♀♀) Norddal: Fjørå. **MRY** (3 ♀♀) Hareid: Hareidlandet near Kråkholen. **NTI** (3 ♀♀) Verdal: Garnes and Suul (MZLU); Høylandet: Skiftesåa, Tveråa. **NSI** (1 ♀) Rana: Granhei. **NNØ** (1 ♀) Sørfold: Kobbvatn (TM). **TRY** (2 specimens) Tranøy: Senja, Ånderdalen (Senja) (TM); Skjervøy: Hacksten (MZLU). **TRI** (3 ♂♂ 9 ♂♂ 1 specimen) Målselv: Dividal, Høgskardhus (TM); Sletta. **FV** (9 ♂♂ 15 ♀♀) Alta: Eiby, Valsetmoen (ZMO), Gargia, Mattisdalen, Kåfjord, Møllernes, Vinamoen. **FØ** (3 ♂♂ 2 ♀♀) Sør-Varanger: Svanvik, Mellesmo (Svanvik).

EIS 12, 14, 19, 23, 28, 30, 31, 35, 39, 40, 41, 45, 50, 58, 60, 63, 75, 77, 107, 123, 134, 153, 154, 165, 169, 173

Captured from middle part of May untill early September, many specimens in May-June-early July.

We have not seen Zetterstedts material (Zetterstedt, 1847), but Roy Danielsson has controlled the material from Verdal: Garnes & Suul in Lund. The material from Skjervøy: Hacksten is uncertain.

L. sylvatica is the most widespread of the species of *Loxocera* recorded from Norway. It is the only *Loxocera* species with records from all the three northern counties. At Mathismoen in Alta high number of specimens were collected which must represent a population of fairly high density. There are not any alpine or subalpine records.

L. sylvatica is distributed in entire Europe except the southern parts (Soós 1984).

Loxocera ichneumonea Fallén.

The name *Loxocera ichneumonea* (L. 1761) is a synonym for *L. albiseta* (Schrank, 1803) as well as for *L. aristata* (Panzer, 1801). Published material: *Loxocera ichneumonea* (1 ♂) NSY Meløy: Holandsfjord 7 Aug. 1950, coll. Lewis Davies (Davies 1955). As we have not seen this material we can not confer it to either species. On account of the localization it is most likely *L. aristata* (Panzer) see above. However, Davies (1955) names Fallén, no year given, as autor and not Linné.

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Arne Semb-Johansson (1919-2001) in memoriam

Professor Arne Semb-Johansson passed away on 22 February 2001. With him, Norwegian entomology and biology has lost one of its most distinguished and central persons. He was born in 1919, and had reached the age of 81 when he died. Semb-Johansson was a broad-minded zoologist and ecologist, although he began with an interest for insects, and in spite of all his other activities, the insects remained his prime interest. He became a member of the Norwegian Entomological Society in 1939, and participated frequently in its activities.

In addition to his own scientific career, his work at the University of Oslo and at the Norwegian Academy of Science and Letters have been of great importance to other biologists and to Norwegian science in general. His achievements were described during a symposium in honour of his 70th birthday, and the lectures (in Norwegian) were all published in 1980 in Fauna (Oslo), Vol. 42 (4). After retirement he remained active and could be seen daily at his office at the University up to a few weeks before he died.

From 1946 Semb-Johansson was initially engaged as a research assistant and later as associate professor (amanuensis) at the Zoological Laboratory, University of Oslo. At this time the Laboratory had two divisions with a total of four scientific positions. An entomologist was required for a new position as research assistant, and Semb-Johansson got the job although he had not finished his MSc degree (cand. real.) at that time. In 1959 he was appointed full professor in ecological zoology at the University of Oslo, a position in which he remained until he retired at an age of 70.

2nd World War

In 1940 Semb-Johansson was a student, but his studies were discontinued due to the German occupation of Norway. Throughout the entire war, Semb-Johansson was strongly engaged in the resistance movement, both in the secret military organisation (Milorg.) and as a courier for the leaders of the movement. His book «Five years for peace and freedom» (1995, in Norwegian) gives an engaged and comprehensive description of the dramatic work of the resistance movement during the occupation. The years of war left their marks. Fast and independent decisions often had to be made, and this also proved to be useful for his administrative work after the war. For his activities during the war he was awarded the Norwegian «Medal of Participation» and the British «The King's Medal for Courage in the Cause of Freedom».

Basic research on insect physiology

As a young boy, Semb-Johansson started the collection of butterflies in a nearby park in Oslo. To his mother's anguish, his room was filled with all kinds of crawling larvae, which he wanted to feed and rear to adults. To his confusion, hymenopteran parasites emerged in large numbers from larvae of white butterflies before they pupated. When Semb-Johansson returned to the University in 1945 after the war, he decided to choose the parasites of the large white butterfly larvae (*Pieris brassicae*) as a topic for his MSc thesis.

Semb-Johanssons doctoral thesis was published in the Norwegian journal «Nytt Magasin for Zoologi» in 1958. Part of the work had been performed during his visit to Bertha and Ernst Sharrer at the University of Colorado. In the milk weed bug *Oncopeltus fasciatus*, Semb-Johansson showed that the corpus allatum of the central nerve system is activated by feeding, but remains inactive if female bugs are starved. This activation occurs when substances secreted from neurosecretorial cells reach the corpus allatum via specialised nerve fibres. In fed bugs, the corpora allata increases in size and produce a hormone which is responsible for the production of egg yolk in the ovaries. As Semb-Johansson wrote: «It struck me that this is a chain of events, in which the corpora allatum can be compared to an electric switch. Following impulses from the environment, the switch can be used to stop egg production and in this way save energy for the survival of the individual.» To obtain his results, Semb-Johansson performed the microscopic dissection of the brains of 2,500 bugs.

The work on *Oncopeltus* has been one of the most cited papers within this field, and became a «Citation Classic» in Science Citation Index in 1981. Within natural sciences, this was the first Norwegian paper that achieved such a status. It shows that it is not always necessary to publish in the most prestigious journals to be read. The «Magasin for Zoologi» was a rather modest journal, but important papers are likely to be discovered by the scientific community.

Alpine research

During the International Biological Programme (IBP) in the 1960ies, Semb-Johansson headed a group of zoologists working on the fluctuations of lemming populations in Norwegian mountains. Thanks to his initiative, a new field research station was build at Finse in 1971 as a joint project of the Universities of Oslo and Bergen. The activities of research and teaching at the station have increased steadily. In particular, the work on small rodents became an important topic of research at the Department of Biology, University of Oslo. Colonies of lemmings were kept in Oslo, and a series of publications on their fundamental biology appeared from Semb-Johansson and his co-workers. His very latest publication from 2000, also with several co-authors, concerns growth and development in lemmings.

In 1970, Semb-Johansson was also responsible for the initiation of a new professorship (dosentur) in entomology at the University of Oslo, which resulted in increased research on alpine and polar terrestrial arthropods.

«Father of the Biology-building»

At the University of Oslo, different biological institutes were located in various parts of the city. The marine institutes were located down-town, while in the 1930ies the Botanical and Zoological Laboratories had been temporarily located in the building for physics and chemistry at Blindern. In Semb-Johansson's opinion, a new building was urgently required for the development of biology at the University. For several years he headed the building committee, and in 1971 the Biology-building (Kristine Bonnevies Hus) was finished. Twelve smaller institutes moved into the building, and later formed the Department of Biology.

Nordic co-operation

In co-operation with Professor Per Brinck in Lund, Semb-Johansson launched the idea of a «Nordic Collegium for Terrestrial Ecology». They received support from ecologists in other Nordic countries and started a collaboration of great importance. The group arranged advanced courses for graduate students and started the journal Oikos.

Ecology in Africa

Due to Semb-Johansson's numerous activities, he had little time for research on insects. But the insects were his favourites, and they were not forgotten. In the early 1970s, the Norwegian Academy of Science was contacted regarding a new institute for insect research in Africa, and Semb-Johansson became strongly engaged in its activities. He was a member of the governing board (for some years as head of the board) of the International Centre for Insects Physiology and Ecology (ICIPE) in Nairobi for 25 years. One of his goals was to find a small boat for use at the institute's field station at Lake Victoria. The boat, «The Viking Dragonfly», came from Fredrikstad and was transported all the way from Norway to Kenya. A building at the field station is named after Semb-Johansson. He also participated in the research on tsetse flies, which were brought to the laboratory on Oslo and fed on blood from rabbits.

Semb-Johansson was engaged in other research projects in Africa, e.g. on the increase of the desert in Turkana in Kenya, but the project had to be abandoned due to political difficulties.

A step-child in Norwegian zoology

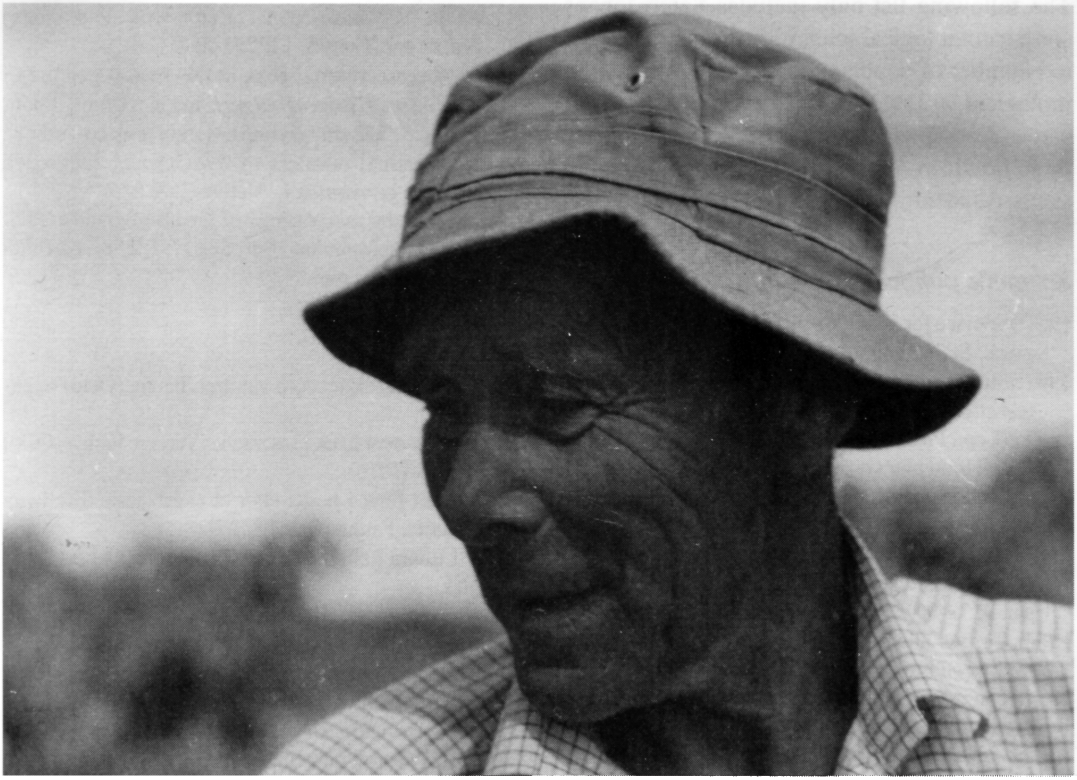
In 1966 Semb-Johansson started yearly observation on the populations of toads at the Hvaler Islands south of Oslo. For the inhabitants and summer guests at the islands he was known as the "toad-man". His long-term studies up to 2000 gave results of great biological interest, especially since this species had not previously been extensively studied in Norway. A step-child in Norwegian zoology, he called it. Parts of his research were published in Fauna (Oslo), Vol. 42 (4) in 1989, and up to his last days he worked on a comprehensive publication, which unfortunately was not finished.

Popular science

Semb-Johansson will be remembered for his work to popularise biological science. He wrote numerous articles both large and small, and edited a series of hand-books and encyclopaedia in zoology. His list comprises 42 large volumes. The most important ones include Norges Dyr Vol. 1-6 (1969-1972 and a new edition 1980-1982), Cappelens Dyreleksikon Vol. 1-6 (1979-1981), Verdens Dyr Vol. 1-13 (1985-1988) and revised editions of Norges Dyr on mammals, bird and fishes (1990-1992). To his great disappointment, the publisher did not want to revise the volumes on invertebrate animals, among them the insects, in spite of the great importance of these animal taxa. In addition to editing these series, he wrote articles in zoology for Norwegian encyclopaedia such as Familieboka, Aschehougs leksikon, Refleks, Verden idag, Tidens leksikon, Media, Store Norske, Cappelens leksikon og Caplex.

Other activities

In addition to his professorship at the University of Oslo, Semb-Johansson was the General Secretary of the Norwegian Academy of Science and Letters from 1975-1985. Through his initiative, the Statoil Research Fond was formed, and the Academy's support to scientific projects was greatly increased. Semb-Johansson was a member of the Norwegian national committee for UNESCO, and had numerous other engagements in



Arne Semb-Johansson in Mali, Africa.

Norway and abroad. He was awarded the Fridtjof Nansen award for scientific achievements and the St. Olavs Medal of first class for his contributions to science in Norway.

Semb-Johansson's students will remember him as an excellent lecturer who was able to explain important details without loosing the general principles. He had a great sense of humour, and his April the first jokes were famous, for example a whole lecture on the order of «the nose mammals» that did not exist.

He had numerous friends, and he always had time to listen to the problems of others, and offer some good advice. In meetings and discussions he had an exceptional ability to find the correct, diplomatic solutions on difficult questions. His colleagues will miss him as a good friend and an inspiration for our scientific work.

Publications

The following list only includes Semb-Johansson's entomological scientific papers, and a selected number of popular papers. Most of his entomological writings are from the early part of his career. A complete list of publications is published by A. Løvlie in Årbok 2001 for Det norske Videnskaps-Akademi, Oslo.

Scientific publications

1951: A device for simultaneous washing of small specimens. Stain Technol. 26, 138

1951: Studies on the relation between *Apanteles glomeratus* L. (Hym., Braconidae) and *Pieris brassicae* L. (Lep., Pieridae). Norsk ent. Tidsskr. 8, 145-186.

1951: The food plant preferences of the larvae of *Pieris brassicae* L. Lep., Pieridae). Norsk ent. Tidsskr. 8, 187-195.

1953: Diapause and pupal morphology and colour in *Pieris brassicae* L. (Lep., Pieridae). Norsk ent. tidsskr. 9, 79-86.

1954: Corpus allatum and egg production in starved milkweed bugs. Nature 174, 89.

1954: The relationship between corpora allata and reproductive organs in starved female *Leucophaea maderae* (Blattaria). Biol. Bull. 108, 40-44.

1957: The functional anatomy of the metathoracic scent glands of the milkweed bug, *Oncopeltus fasciatus* (Dallas) (Heteroptera: Lygaeidae). Norsk ent. Tidsskr. 10, 95-109.

1957: Neurosecretion and metamorphosis in the milkweed bug, *Oncopeltus fasciatus* (Dallas). Experientia 13, 410-411.

1957:The nervous system of the milkweed bug, *Oncopeltus fasciatus* (Dallas) (Heteroptera, Lygaeidae). Trans. Amer. Ent. Soc. 83, 119-183.

1958: Hormonal regulation of reproduction in the milkweed bug, *Oncopeltus fasciatus* (Dallas). Nature 181, 198-199.

1958: Neurosecretion in the milkweed bug, *Oncopeltus fasciatus* (Dallas). Zweites Intern. Symp. Neurosekretion, Lund 1-6 July 1957, pp. 98-101. Springer Verlag.

1958: Relation of nutrition to endocrine-reproductive functions in the milkweed bug *Oncopeltus fasciatus* (Dallas) (Heteroptera, Lygaeidae. Nytt mag. zool. 7, 1-132.

1960: Nutritional-endocrine regulation of insect reproduction. Pp. 133-136 in Ontogeny of insects. Praha.

1964: Feeding and nutrition in reproductive processes in insects. Pp. 43-55 in Insect reproduction, Symposium No.2, Royal Entomol. Soc., London.

1964: A gynandromorph of the milkweed bug, *Oncopeltus fasciatus* (Dallas) (Hemiptera, Heteroptera) Norsk ent. Tidsskr. 12, 251-258.

1965: Neurosecretorial cells in the ventral ganglia of the lobster, *Homarus vulgaris* L. Gen. Comp. Endocrinol. 5, 558-567 (with B. Screiner as co-author).

1966: Intestinal tumours in the German cockroach *Blatella germanica* L. Nature 212, 845.

1970: Cuticular morphology of the scent gland area of some Heteropterans. Ent. Scand. 1, 158-162 (with T. Bråten as co-author).

Popular science

1953: Sommerfugler som vandrer. Fauna (Oslo) 6, 28-39.

1953: Hauk over hauk i insektenes verden. Fauna (Oslo) 6, 142-152.

1955: Med fluer i hodet eller et enestående tilfelle av myiasis. Fauna (Oslo) 8, 27-28.

1958: Litt om fjellets insektfauna. Fauna (Oslo) 11, 86-103.

1959: Selvregulerende mekanismer i populasjoner. Fauna (Oslo) 12, 101-119.

1960: Hvordan greier insektene vinteren. Universitetsforlagets kronikktjeneste.

1961: Undervisningen i entomologi ved Universitetet i Oslo i dag og planene for fremtiden. Fauna (Oslo) 14, 88-91.

1963: Insektene, s. 92-226 i Tanums store dyrebok.

Tanum, Oslo.
1965: Hvordan orienterer insektene seg? Naturen 89, 195-206.
1966: Entomologien som en del av biologien. Norsk ent. Tidsskr. 13, 364-370.
1971: Insektene, s. 212-217, Gresshoppene, s. 230-237, Saksedyret, s. 237-239, Kakerlakkene, s. 239-242. Norges Dyr, Bind 4. Cappelen, Oslo.
1980: Forskning for utviklingsland. Erfaringer fra Akademiets arbeid i Afrika. DNVA Årbok 1980, 187-195.
1981: Insektene, s. 250-255, Gresshoppene, s. 270-277, Saksedyret, s. 278-280, Kakerlakkene, s. 280-284. Norges Dyr, Bind 4. Cappelen, Oslo.

Lauritz Sømme

VIIth European Congress of Entomology

7-13 October 2002 in Thessaloniki, Greece

The European Congresses of Entomology take place with four years intervals. The VIIth Congress is organised by the Hellenic Entomological Society and the Aristotle University of Thessaloniki. The Organizing Committee and the entire Entomological and Plant Protection Community of Greece will make every effort to ensure a scientifically interesting Congress.

The meeting will take place in Thessaloniki from Monday, 7 October to Sunday, 13 October 2002 and will be held at the International Congress Centre of HELEXPO, close to the campus of the Aristotle University of Thessaloniki. Thessaloniki is located in Macedonia, Northern Greece, about 500 km north of Athens. The official language of the conference will be English.

Sections: 1. Morphology and physiology, 2. Genetics and developmental mechanisms, 3. Behaviour, ethology and neurology, 4. General and applied insect pathology, 5. Ecology of pesticides, resistance and toxicology, 6. Insect evolution and taxonomy, 7. Biogeography and faunistics, 8. Life histories, 9. Bi- and tritrophic interactions, 10. Ecology and population dynamics, 11. Biodiversity and conservation, 12. Agricultural entomology, 13. Urban and stored product entomology, 14. Medical and veterinary entomology.

Web-site: http://www.helexpo.gr/ece

The web-site includes information about the Congress, the city of Thessaloniki and a registration form.

Instructions to authors
with extended information on electronic submittance

Manuscripts

The language is English or occasionally Norwegian with an extended English summary.

Manuscripts, double 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. All manuscripts will be considered by referees before acceptance.

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.

Running title. Please extract a running title from the original title. This will occur as a top text on each left page of the article.

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.

Nomenclature. Scientific names of genera and species should be written in italics. The name of the author and year of description (if appropriate), separated by a comma, should be included the first time the name of an insect or another terrestrial arthropod is mentioned in the text, e.g. *Rhyacophila nubila* (Zetterstedt, 1840). Names of authors should be written in full.

Localities. In faunistic papers the names of Norwegian localities should be according to K.A. Økland (1981), *Fauna (Oslo)* 34, 167–178, and preferably the EIS number should be added in brackets.

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Figures must be numbered consecutively and all figures must be referred to in the text. Write «Figure» in full. Names(s) of the author(s) should be written in the margin of each figure. The size of the figure must not exceed 210 x 290 mm (standard A4). The author should take into consideration that most figures have to be reduced. Please take in considerations that the text block is 142 x 205 mm, and the column with is 68.5 mm. In *line drawings* the line thickness should not be less than 0.25 mm after reduction, and capital letters not smaller than 2.0 mm. Choose contrasting patterns and avoid fine tone rasters. Maps and morphological illustrations, e.g. pictures of insects, should include a scale bar.

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Norwegian Journal of Entomology

Volume 48 • 2001

Articles

Short communications

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CONTENTS

Norw. J. Entomol. 48 (2) 2001

ISSN 1501-8415.

Articles

Short communications

The present journal is a continuation of **Fauna norvegica Series B** (Norwegian Journal of Entomology). With Volume 45 (1998) the publication of this journal by the Foundation for Nature Research and Cultural Heritage Research (NINA-NIKU) has been discontinued. Starting with Volume 46, the journal is published as **Norwegian Journal of Entomology** by the Norwegian Entomological Society. Editor is Professor Lauritz Sømme, University of Oslo.