

The stiletto flies (Diptera, Therevidae) of Norway

MORTEN FALCK

Falck, M. 2011. The stiletto flies (Diptera, Therevidae) of Norway. *Norwegian Journal of Entomology* 58, 131–163.

The Norwegian records of Therevidae are reviewed. A total of 18 species in 7 genera are found to belong to the Norwegian fauna; *Acrosathe annulata* (Fabricius, 1805), *Dialineura anilis* (L., 1761), *Dichoglana nigripennis* (Ruthe, 1831), *Pandivirilia eximia* (Meigen, 1820), *Psilocephala imberbis* (Fallén, 1814), *Spiriverpa lunulata* (Zetterstedt, 1838), *Thereva cinifera* Meigen, 1830, *Thereva fuscinervis* Zetterstedt, 1838, *Thereva handlirschi* Kröber, 1912, *Thereva inornata* Verall, 1909, *Thereva lanata* Zetterstedt, 1838, *Thereva marginula* Meigen, 1820, *Thereva microcephala* Loew, 1847, *Thereva nobilitata* (Fabricius, 1775), *Thereva plebeja* (L., 1758), *Thereva strigata* (Fabricius, 1794), *Thereva unica* (Harris, 1780) and *Thereva valida* Loew, 1847 Of these, seven are reported from Norway for the first time, *Thereva cinifera*, *T. handlirschi*, *T. inornata*, *T. marginula*, *T. microcephala*, *T. strigata* and *T. valida*, though five of these are mentioned as Norwegian by Lyneborg in his catalogue of palaeartic species (Lyneborg 1989). A key to the Norwegian species and distribution maps are given.

Key words: Diptera, Therevidae, Norway, identification key, distribution maps.

Morten Falck, Ulsrudveien 13, NO-0690 Oslo, Norway. E-mail: morfalck@online.no

Introduction

[The introduction given here is mostly based on the web-site "Stiletto flies of Australasia, by Winterton et al. (2005)]. The Therevidae comprises one of the remarkably little studied families of the lower Brachycera in Norway. Internationally, the family has been under revision for the last decades, due to the efforts of the late Dr. Leif Lyneborg and Dr. Mike Irwin, who, together with their coworkers, have published a series of works dealing with various parts of the family.

One of the reasons why this family, which on a world basis counts more than 1600 described species, is so poorly known, is the adult flies' seclusive life-style. They live in habitats not often visited by collectors, and they lead a secretive life, and are mostly not encountered in numbers. Yet this family is important for the functioning of arid and semi-arid areas inclusive of the agricultural and forest ecosystems in those areas.

The flies are found in a great variety of habitats, but are most diverse in arid regions, where the sandy soils provide a suitable habitat for their soil-dwelling larvae. The adult flies are nectar feeders, while the larvae are voracious predators of different soil arthropods. Some of the species have their larval stages in decaying wood.

The Therevidae are placed in the superfamily Asiloidea, together with the families Bombyliidae, Asilidae, Apioceridae, Mydidae and Scenopinidae, but the relationship between the families is still unclear.

Using male and female genital characters, Lyneborg (1976) and Irwin & Lyneborg (1981a) divided the Ethiopian and Nearctic therevid faunas into two subfamilies, the Therevinae and Phycinae. The major groups of the Therevidae have distinct distributional patterns. The Phycinae are distributed throughout the Afrotropical, Neotropical and Nearctic regions, while the Therevinae are distributed throughout the

Neotropical, Oriental, Australasian and Holarctic regions (Irwin & Lyneborg 1981, 1989, Lyneborg 1992) while the *Taenogera* Kröber, 1912 genus-group and *Agapophytinae* are endemic to Australasia.

Biology. *Egg.* The egg is 0,4–0,8mm long, ovoid milky white, and without reticulation. The number of eggs laid by each individual seems to vary from about twenty five to about a hundred. (Lyneborg 1992).

Larvae. As far as is known there are five larval stages, the last of which either pupates or goes into diapause. Therevids are usually univoltine, but instances where two or more years are needed to complete the life cycle are known. (Lyneborg 1992). The larvae are smooth and vermiform. The abdomen is secondarily divided into some 16 apparent segments, and terminates in a pair of tiny pseudopods (Woodley 1989). The snake-like larvae are very mobile and move with considerable speed through sand and loose soil (Lyneborg 1992) or tree mold. They are found mainly in sand or soil close to the surface (English 1950), or in rotting wood. Therevid larvae are voracious predators, feeding on a great variety of insect larvae and earthworms, but preferring Coleoptera larvae (Lyneborg 1992).

Pupae. In the prepupal stage the larva assumes a curved position in the soil, somewhat like the letter U, or almost in a circle (Lyneborg 1992). The pupal stage lasts for only a week or two and is especially vulnerable to desiccation and to attack by predators (Lyneborg 1992).

Adults are found in a wide variety of habitats, but have the greatest biodiversity in semiarid regions of the world (Irwin 1976, Winterton et al. 1999). A large proportion of species seem to be associated with coastal scrub and sandy beaches, habitats that are extensively exploited by therevids worldwide (Lyneborg 1992).

Adult therevids seems to be diurnal (Lyneborg 1992); however, there are many records of therevids from many genera, including mating pairs, being collected at light during the night.

Adult therevids appear to feed on honeydew, flower nectar and pollen. Many taxa inhabiting subtropical regions with winter rain, such as the Mediterranean region, often have an elongated,

projecting proboscis, and are recorded as visiting flowers, taking nourishment in the form of nectar (Lyneborg 1992). Therevids need to drink water regularly, and in semi-arid and arid environments, they are strongly attracted to water. Adult therevids are often found in sunny patches on trails and paths, or resting on sand, rock, leaves, stems and tree trunks. They have a rapid flight of short duration. The flying period for some of the more common species is usually 3–4 months (Lyneborg 1992). Males of some species form hovering swarms. The female enters a swarm and is caught by a male, and copulation takes place (Lyneborg 1992). Oviposition behaviour has been described by Irwin (1976).

There have not been many extensive studies on the ecology of Therevidae. The larvae, like most underground dwellers, are rarely encountered unless these soils are actively sieved. They twist violently when exposed and are extremely quick and agile in their attempts to escape. Even pupae when disturbed will wiggle vigorously in an attempt to scare away intruders. Adults have been described as secretive, and in most circumstances are rarely collected by hand. Many are caught in well-placed Malaise traps along flight paths near moisture. However, individuals captured this way provide very little information about their ecology. Adults may be found mating on the soil surface, and being thus encumbered and somewhat preoccupied, can be more easily observed and hand netted. Most published works include ecological observations that are more anecdotal than systematically gathered.

An American study of the bioecology of therevids (Hartman et al. 1995) showed no obvious correlation between any of the six therevid species collected and microhabitat. Females were much less abundantly collected and were present about a week after the males first appeared. Three species had single population peaks as would be expected of univoltine species and two species peaked twice. All species were present in the first population peak, which occurred in late May to early June. The two most numerous species then peaked again in late July and early August, suggesting a second generation

Therevids as Bioindicators. Xeric habitats

are destroyed at an alarming rate through a number of threatening processes such as land clearing, salinity and invasive species. Generalist predators feeding on subterranean herbivores are potentially good indicators of diversity, productivity, and heterogeneity, and in desert communities, they are at the top of the food chain (Ayal 1998). Because the larvae are non-specific predators in the soil, therevids have often been suggested as potential indicators of soil health. Furthermore, therevids may have potential for biological control because they suppress root-feeding pest larvae in sandy agroecosystems. Examination of the biocontrol and bioindicator possibilities is restricted by deficient taxonomy.

Ottesen et al. (1993) found the Norwegian fauna to probably consist of 15 species. Later works have consistently found these assessments too low. This is also the case with Therevidae. The Norwegian fauna has 18 known species, belonging to 7 genera.

Material and methods

The material on which this paper is based, is the collection of the Natural History Museum in Oslo (NHMO), and the author's private collection. There should be a considerable amount of specimens in the University Museum of Bergen, but these specimens were loaned to a foreign expert several years ago, and never returned. Also, the collections of Tromsø University Museum (TM) is of great value for the assessment of the fauna in the northern part of the country, and should be consulted for a complete overview. There may be important material in Trondheim (NTNU Museum of Natural History and Archaeology) and Rana (Helgeland Museum), and I apologize for not having consulted the museums there. However, I am rather confident, that though this paper will not show the full and complete distribution in our country, it will treat all the species found in Norway. My first aim is to present an identification key and a list of the Norwegian species, to inspire further work on this interesting group, and make the recording of new material easier. As early as in 1966, Dr. Lyneborg reviewed the old collection

of NHMO. However, his results were never published.

All the material has been determined anew using the key of Haarto & Winqvist (2006). The journal *Entomologica Fennica* kindly gave permission to use the original drawings by Dr. Antti Haarto. I have also had access to some of the material from the TM collection, mostly specimens of *Thereva fuscineris* Zetterstedt, 1838.

The records are referred to the grid zones of the European Invertebrate Survey (EIS) (Endrestøl 2006) and to A. Strand's Norwegian reference system, as revised by Økland (1981). Further, more precise records are not given, but can be obtained by contact with the author.

The species

Species new to the Norwegian fauna is marked with an asteriks (*). Where nothing else is noted the specimens is deposited in the author's collection (MF). Determinations are made by Morten Falck where nothing else is stated.

Acrosathe annulata (Fabricius, 1805)

(Figs 1B, 2, 11 and 26).

Material. 43 specimens have been examined. There are in all 50 specimens in the NHMO collection and the author's private collection. Recorded from EIS 1, 2, 3, 12, 19, 20, 27, 28, 37, 44, 46 and 71, reaching from the southernmost shore dunes to Laurgård in the northern part of Oppland, and from the inner reaches of Telemark to the Elverum area in Hedmark, close to the Swedish border. Material is in the NHMO collection where nothing else is not noted.

Records. Ø Hvaler: Vesterøy, Guttormsvauen (EIS 20), 7 August 1998, 1♀, leg. O. Sørlibråten; 1♂, coll. M. Falck; Kirkøy: Ørekroken, 2♀♀1♂, 16 July–15 August, leg. L.O. Hansen [malaise-trap A, east of stream]; Hvaler (EIS 12), 1♀, [no date], leg. Schøyen, det. Lyneborg; Halden: Fredriksværn, 1♀, [no date], leg. Siebke, det. Lyneborg; AK Nannestad: Tømte (EIS 37), 1♂, June 1992, leg. F. Midtgaard; HES Elverum: Starmoen S (EIS 46), 1♀, 27 July 2003, leg. L.O.

TABLE 1. Key to the Norwegian species of Therevidae. Slightly modified after Haarto & Winqvist (2006), with some few alterations after Stubbs & Drake (2001), and based on the author's own studies. Another usable key is provided by Van Veen (2005), but some of the pictures accompanying it are taken with the aid of yellow light, which distorts the colors. The key covers all of the known Norwegian species, and some few species that may be found in Norway.

1.	First antennal segment swollen and much thicker than the rest of the antenna (Figure 1A)	<i>Dialineura anilis</i> (L., 1761)
-	All segments of antennae equally thick (Figure 1B)	2
2.	Face hairy	3
-	Face bare	6
3.	Male silvery pollinose and with hairs of abdomen silvery white. Female without shining black frontal callus	4
-	Male more or less greyish or yellowish dusted, dusting often arranged in bands across the tergites. Hairs of abdomen mixed dark (black to brownish black) and light white to yellow. Female: Frons with a shining black callus, which may be narrow or divided into two, or is (most often) continuous and conspicuous	(<i>Thereva</i>) 13
4.	Knob of halteres light (check both)	(<i>Acrosathe</i>) 5
-	Knob of halteres dark (check both)	<i>Spiriverpa lunulata</i> (Zetterstedt, 1838)
5.	Male usually has 2 anteroventral bristles on middle femora (Figure 2). Female with all the erect hairs on tergites 5–8 black	<i>Acrosathe annulata</i> (Fabricius, 1805)
-	Male usually with at most only one anteroventral bristle on middle femora. Female with erect hairs on tergites 5–8 white. [Not yet discovered in Norway, though may possibly be found in the Oslofjord area]	<i>Acrosathe baltica</i> Andersson, 1994
6.	Males (eyes usually meeting on top of head)	7
-	Females (eyes widely separated)	10
7.	Frons broader than anterior ocellus (Figure 3A). Abdomen silvery dusted or black with silvery pattern	8
-	Frons narrower than anterior ocellus (Figure 3B). Abdomen covered in silvery white dusting	9
8.	Halteres black. Abdomen silvery white pollinose	<i>Dichoglena nigripennis</i> (Ruthe, 1831)
-	Halteres yellow. Abdomen black, tergites with weak silvery triangles	<i>Pandivirilia eximia</i> (Meigen, 1820)
9.	Femora completely black	<i>Psilocephala imberbis</i> (Fallén, 1814)
-	Femora yellow at apex. [Not yet discovered in Norway. There are two species in northern Europe which may eventually be found in our country, <i>C. ardea</i> (Fabricius, 1794) and <i>C. rustica</i> (Panzer, 1804). They are only discernible in the male sex, the male of <i>C. rustica</i> having a strongly S-shaped tip of aedeagus, which is rather straight in <i>C. ardea</i> (Figure 4)]	<i>Clorismia</i>
10.	Femora completely black in their entire length	11
-	Femora with yellow apices	<i>Clorismia</i>
11.	Tibiae and tarsi as dark as femora. Wing membrane with brownish border along veins	<i>Dichoglena nigripennis</i> (Ruthe, 1831)
-	Tibiae and tarsi yellowish-brown, contrasting with the dark femora. Wings clear, transparent	12
12.	Wings basally yellowish. Large species (12–18 mm)	<i>Pandivirilia eximia</i> (Meigen, 1820)
-	Wings completely hyaline. Smaller species (8–10 mm)	<i>Psilocephala imberbis</i> (Fallén, 1814)
13.	Males (eyes meeting in frons)	14
-	Females (eyes widely separated)	26
14.	All tergites completely dusted with grey or yellowish pollen	15
-	At least tergites 2–5 dark anteriorly	16
15.	Knob of halteres dark, brownish black. Tip of aedeagus short (Figure 5A)	<i>Thereva cinifera</i> Meigen, 1830
-	Knob of halteres yellowish brown. Tip of aedeagus long (Figure 5B) [A southern European species, not found in Norway]	<i>Thereva fulva</i> (Meigen, 1804)

TABLE 1. continued

16.	All tergites glossy black. [An eastern species, distributed throughout Russia from Siberia to St. Petersburg. Not found in Norway]	<i>Thereva atripes</i> Loew, 1847
-	At least part of the tergites with dull dusting	17
17.	At least one posteroventral bristle basally on hind femora	18
-	The basal part of hind femora has no posteroventral bristle	22
18.	At least 2 bristles on each side of Thorax. Basal part of hind femora with 3–4 anteroventral bristles, which usually are uniserial (Figure 6). Tip of aedeagus long and curved (Figure 5C)	<i>Thereva inornata</i> Verrall, 1909
-	Only 1 pair of bristles in the hind part of thoracic dorsum. Basal part of hind femora with bristles not arranged in one neat row, but several bristles outside the row	19
19.	Anterior part of tergites 4–5 narrowly dark (more than half the side of tergites 4–5 dusted with grey pollen)	20
-	Tergites 4–5 broadly dark anteriorly (not more than half the sides of tergites 4–5 covered in grey dusting)	21
20.	Tergite 6 completely covered in grey dusting, without any dark band. Wing membrane greyish, veins light brown and cross veins only faintly darkened. Hairs on the lower part of occiput and parafacial mixed white and black	<i>Thereva unica</i> (Harris, 1780)
-	Tergite 6 with dark band interiorly. Wing membrane whitish, veins dark brown and cross veins intensively darkened. Hairs on lower part of occiput and parafacial white	<i>Thereva marginula</i> Meigen, 1820
21.	Mesonotum greyish brown and usually with a clear, dark brown central line. Hairs on tergite 1 completely blackish. Tip of aedeagus short (Figure 5D)	<i>Thereva plebeja</i> (L., 1758)
-	Mesonotum bluish grey, and at most with a vague central line. Hairs on tergite 1 grey or yellowish medially. Tip of aedeagus long (Figure 5E)	<i>Thereva strigata</i> (Fabricius, 1794)
22.	Hairs on scutellum sparse, and completely black. Hairs on abdomen predominantly black. Usually 1 pair of bristles on Thoracic dorsum. Front femora without anteroventral bristles	<i>Thereva valida</i> Loew, 1847
-	Hairs on scutellum not completely black. Abdomen with yellow or white hairs	23
23.	Hairs on scutellum mixed yellow and black. Abdomen with yellow hairs laterally and black hairs dorsally	24
-	Hairs on scutellum and abdomen almost completely white	25
24.	Anteroventral bristles on hind femora multiserial (some of the bristles outside the straight row) (Figure 8B). Hairs on scutellum not exceptionally dense and mixed yellowish and black. Usually 1 pair of bristles on dorsum. Front femora with 1–4 anteroventral bristles	<i>Thereva nobilitata</i> (Fabricius, 1775)
-	Anteroventral bristles on hind femora uniserial (all placed in one neat row) (Figure 8A). Hairs on scutellum dense and almost completely yellow. 2 pairs of bristles on dorsum. Front femora with 2–7 anteroventral bristles	<i>Thereva handlirschi</i> Krober, 1912
25.	2–3 pairs of dorsocentral bristles (Figure 7). Mesonotum with more or less distinct longitudinal stripes. Wing veins narrowly bordered by dark membrane. Front femora without anteroventral bristles	<i>Thereva fuscinervis</i> Zetterstedt, 1838
-	Fore legs with tibia longer than femora. Head as broad as mesonotum (in dorsal view). Front femora with anteroventral bristles. Mesonotum with distinct, light longitudinal stripes	<i>Thereva microcephala</i> Loew, 1847
-	Foreleg with tibia and femora equally long. Head broader than mesonotum (in dorsal view). Front femora without anteroventral bristles. Mesonotum with indistinct, longitudinal stripes	<i>Thereva lanata</i> Zetterstedt, 1838
26.	Shining black frontal callus either forming a narrow transverse band or divided into two separate calli	27
-	One wide, usually large, shiny black frontal callus	28
27.	Frontal callus forms a narrow, transverse band, which may be separated medially into two distinct calli (Figure 9A). Anteroventral bristles on hind femora uniserial	<i>Thereva valida</i> Loew, 1847
-	Frontal callus always separated into two parts (Figure 9B). Anteroventral bristles on hind femora nearly uniserial, but irregularly arranged towards base of femur	<i>Thereva unica</i> (Harris, 1780)

TABLE 1. continued

28.	All tergites completely dusted, without dark band (If the specimen has been collected in liquid, as in a malaise trap, the difference between the dark dusting on the front end of the tergites, especially the 2 nd and 3 rd , and the light dusting on the hind end, may be destroyed, and the specimen may key out here. Look closely at the other tergites)	29
-	Dark band on the anterior edge of at least tergite 2–5	30
29.	Knob of halteres blackish. Tergite 7 dusted with greyish pollen. Frontal callus clearly separated from anterior ocellus (Figure 9C)	<i>Thereva cinifera</i> Meigen, 1830
-	Knob of halteres yellowish. Tergite 7 glossy black, only laterally grey dusted. Frontal callus extends to the anterior ocellus (Figure 9D) [A southern European species, not found in Norway]	<i>Thereva fulva</i> (Meigen, 1804)
30.	Frontal callus extends up around the ocellar tubercle	31
-	Frontal callus extends at most to the anterior ocellus	33
31.	Tibiae black. Wing membrane dark. [An eastern species, distributed throughout Russia from Siberia to St. Petersburg. Not found in Norway]	<i>Thereva atripes</i> Loew, 1847
-	Tibiae yellowish. Wing membrane only with dark areas adjacent to wing veins, mostly clear to translucent whitish-grey ..	32
32.	2–3 pairs of dorsocentral bristles. Fresh specimens with conspicuous longitudinal stripes on mesonotum. Wing veins narrowly bordered by dark membrane. Frons and frontal callus narrower than in <i>T. lanata</i>	<i>Thereva fuscinervis</i> Zetterstedt, 1838
-	1 pair of dorsocentral bristles. Wing veins not bordered by dark membrane. Frons and frontal callus wider. Mesonotum in fresh specimens with longitudinal stripes, but not equally conspicuous and well demarcated. Front callus as in Figure 9E	<i>Thereva lanata</i> Zetterstedt, 1838
33.	Anterior part of tergites 2–5 with broad dark band, extending to (or nearly so) posterior edge, thus the grey bands on posterior edge of tergites 2–4 may be broken. Front callus as in Figure 9F	<i>Thereva microcephala</i> Loew, 1847
-	Anterior part of tergites 2–5 with a dark band which extends medially nearly to the posterior edge of tergites, but without breaking the grey bands. Thus the posterior edges of tergites 2–4 have complete bands of grey dusting	34
34.	Frontal callus extends laterally to eye margin (Figure 9G)	35
-	Frontal callus separated from eye margin by a dull area	36
35.	Spines on tip of ovipositor broad and blunt (Figure 10A). Mesonotum dark, brownish grey with distinct light longitudinal stripes	<i>Thereva plebeja</i> (L., 1758)
-	Spines on the tip of ovipositor slender (Figure 10B). Mesonotum light, bluish grey with distinct light longitudinal stripes. Front callus as in Figure 9H	<i>Thereva strigata</i> (Fabricius, 1794)
36.	Knob of halteres yellowish brown. Anteroventral bristles of hind femora multiserial (with some of the bristles outside the anteroventral row). Frontal callus separated from anterior ocellus (Figure 9I). Wing membrane greyish brown and cross veins not bordered by dark membrane. Tergite 3 without contrasting line between anterior narrow brownish part and posterior, greyish part of the tergite	<i>Thereva nobilitata</i> (Fabricius, 1775)
-	Knob of halteres blackish	37
37.	Anteroventral bristles of hind femora multiserial (some of the bristles outside the anteroventral row). Frontal callus narrowly separated from anterior ocellus. Wing membrane whitish, veins dark brown and cross veins bordered by dark membrane. Tergite 3 without contrasting line between anterior dark part and posterior greyish part of the tergite	<i>Thereva marginula</i> Meigen, 1820
-	Anteroventral bristles of hind femora uniserial. Frontal callus separated from or extends to anterior ocellus. Wing membrane greyish brown, veins light brown and cross veins not bordered by dark membrane. Tergite 3 with contrasting line between broad blackish part and posterior greyish part of tergite	38

TABLE 1. continued

38.	Hairs in scutellum mixed black and yellow. Frontal callus separated from anterior ocellus (Figure 9J)	<i>Thereva inornata</i> Verrall, 1909
-	Hairs on scutellum all yellow. Frontal callus extends to the anterior ocellus (Figure 9K)	<i>Thereva handlirschi</i> Krober, 1912

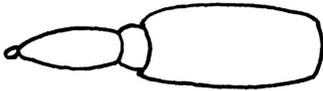


FIGURE 1A. 1st antennal segment. *Dialineura anilis* (L., 1761). All illustrations (Figures 1–10) rendered with the kind permission of Entomologica Fennica and Dr. Antti Haarto.



FIGURE 1B. 1st antennal segment. *Acrosathe annulata* (Fabricius, 1805).

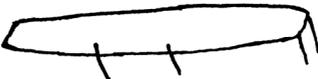


FIGURE 2. Middle femora. *Acrosathe annulata* (Fabricius, 1805).

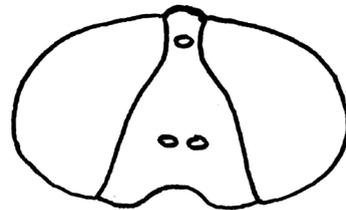


FIGURE 3A. Frons broader than anterior ocellus. *Dichoglena nigripennis* (Ruthe, 1831).

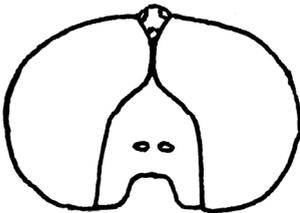


FIGURE 3B. Frons narrower than anterior ocellus. *Psilocephala imberbis* (Fallén, 1814).

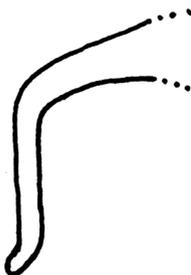


FIGURE 4A. Aedeagus. *Cliorismia ardea* (Fabricius, 1794).

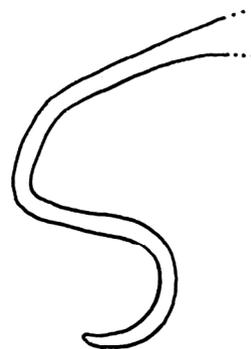


FIGURE 4B. Aedeagus. *Cliorismia rustica* (Panzer, 1804).

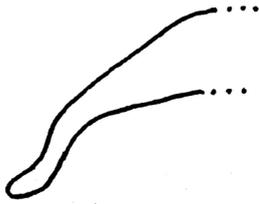


FIGURE 5A. Aedeagus. *Thereva cinifera* Meigen, 1830.

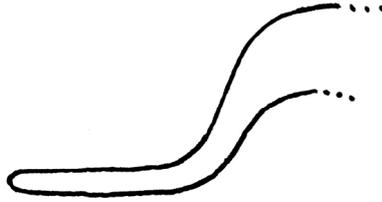


FIGURE 5B. Aedeagus. *Thereva fulva* (Meigen, 1804).

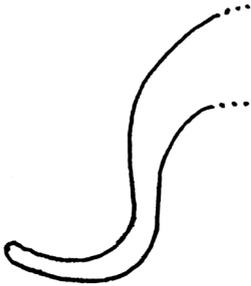


FIGURE 5C. Aedeagus. *Thereva inornata* Verrall, 1909.

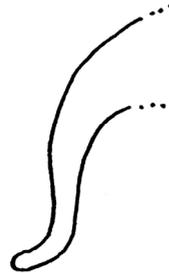


FIGURE 5D. Aedeagus. *Thereva plebeja* (L., 1758).

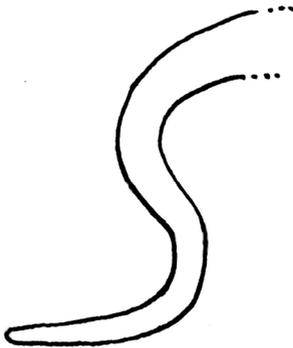


FIGURE 5E. Aedeagus. *Thereva strigata* (Fabricius, 1794).

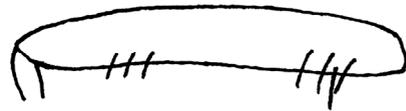


FIGURE 6. Hind femora. *Thereva inornata* Verrall, 1909..

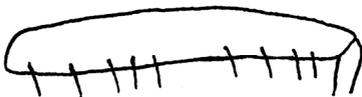


FIGURE 8A. Hind femora. *Thereva handlirschi* Krober, 1912.

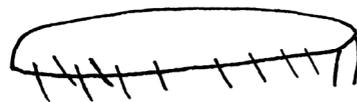


FIGURE 8B. Hind femora. *Thereva nobilitata* (Fabricius, 1775).

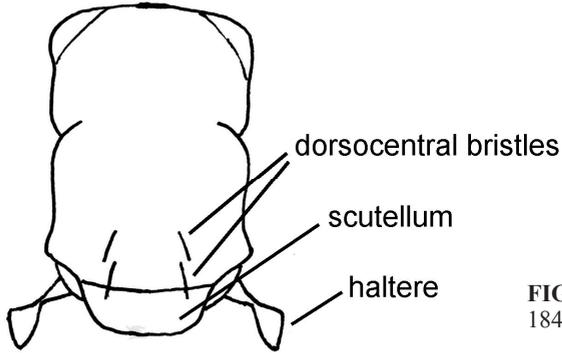


FIGURE 7. Thorax. *Thereva fuscinervis* Zetterstedt, 1838

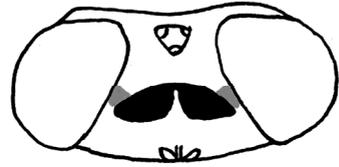


FIGURE 9A. Frontal callus. *Thereva valida* Loew, 1847

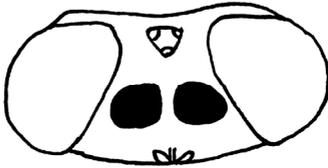


FIGURE 9B. Frontal callus. *Thereva unica* (Harris, 1780).

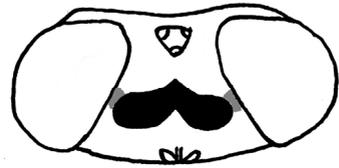


FIGURE 9C. Frontal callus. *Thereva cinifera* Meigen, 1830.

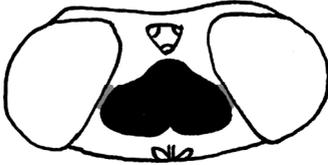


FIGURE 9D. Frontal callus. *Thereva fulva* (Meigen, 1804).

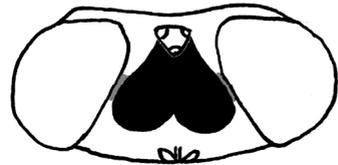


FIGURE 9E. Frontal callus. *Thereva lanata* Zetterstedt, 1838.



FIGURE 9F. Frontal callus. *Thereva microcephala* Loew, 1847.

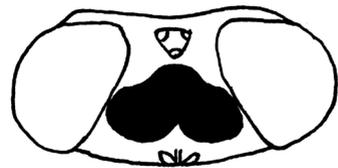


FIGURE 9G. Frontal callus. *Thereva plebeja* (L., 1758).

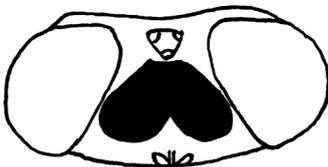


FIGURE 9H. Frontal callus. *Thereva strigata* (Fabricius, 1794).

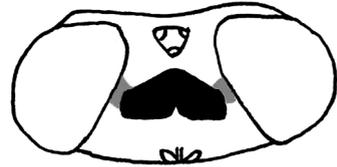


FIGURE 9I. Frontal callus. *Thereva nobilitata* (Fabricius, 1775).

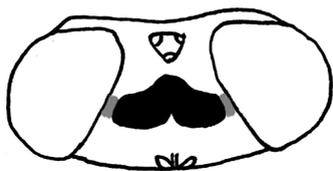


FIGURE 9J. Frontal callus. *Thereva inornata* Verrall, 1909.

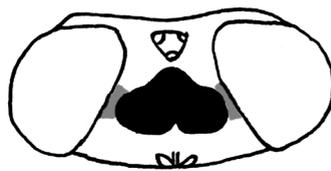


FIGURE 9K. Frontal callus. *Thereva handlirschi* Krober, 1912.

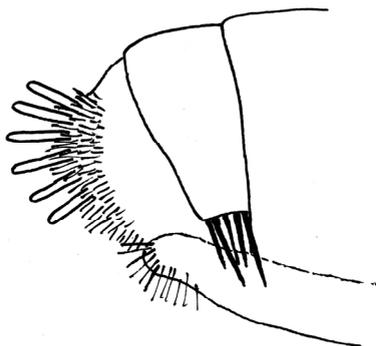


FIGURE 10A. Spines on tip of ovipositor broad and blunt. *Thereva plebeja* (L., 1758).

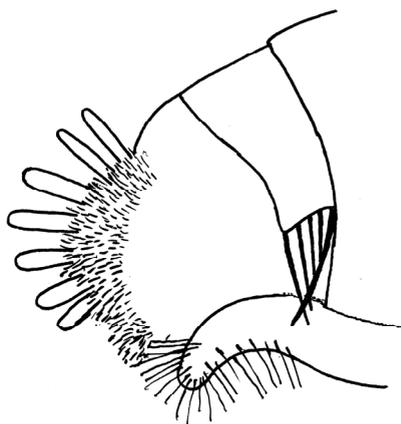


FIGURE 10B. Spines on the tip of ovipositor slender. *Thereva strigata* (Fabricius, 1794).

Hansen; 1♂1♀, 11 June–29 July 2004, leg. L.O. Hansen & E. Rindal [malaise-trap in sandy pine forest]; **TEI** Tinn: Sandvatn (EIS 27), 1♀, 16 July 2005, leg. O.J. Lønnve; **VAY** Farsund: Einarsneset (EIS 1), 1♀, 3–5 June 1995, leg. K. Berggren; 1♂, coll. M. Falck; Kristiansand: Hamresanden (EIS 2), 1♀1♂, 5 June 1995, leg./coll. M. Falck; 2ex., 3 June 1998; 3♂♂, 18 June 2001, coll. M. Falck; **VE** Tjøme: Hvasser syd (EIS 19), 1ex., 6 June 1992, leg. Ø. Berg; 1♀, coll. M. Falck; Sandøy, 1♂, 7 June 1992, leg. A. Fjellberg; 1♂, 30 May 1992; Nøtterøy: Mellom-Bolærne (EIS 19), 3♂♂7♀♀, 4–26 July 1995, leg. A. Fjellberg & L.O. Hansen [malaise-trap], coll. M. Falck; **BØ** Hurum: Verket (EIS 28), 1♀, 6 June–8 July 1995, leg. L.O. Hansen & O. Hanssen [malaise-trap in sandy slope], coll. M. Falck; Klokkearstua,

1♀, 3–7 July 2010, leg. L.O. Hansen [malaise-trap which faced sandy slope]; Kongsberg, 1♀, [no date], leg. Siebke (presumably); **BV** Nes: Nes i Hallingdal (EIS 44), 1♀, [no date], leg. Siebke, det. Lyneborg; **ON** Sel: Laurgård (EIS 71), 1♂, 9 July 1873, leg. Siebke, det. Lyneborg; 1♀, [no date]; **RY** Hå: Ognå (EIS 3), 1♂, [no date], leg. Schøyen, det. Lyneborg; Jæren [Jæderen], 1♀, 12 August 1939, leg. Fritz Jensen.

Remarks. The species is widespread in the southern part of Norway.

Siebke (1877) records this species (as *Thereva annulata* Fabr.) from “Frederiksværn, Hønefos, in par. Næs Hallingdalia, ad Grundset, et Laurgaard in par. Sell, Gudbrandsdal.” He records the dates as July, and states that the fly lives in *Artemisia officinalis*.



FIGURE 11. *Acrosathe annulata* (Fabricius, 1805). Photo: Karsten Sund.



FIGURE 12. *Dialineura anilis* (L., 1761). Photo: Karsten Sund.

also records from inland localities. This corresponds to the distribution in Finland, where the species is “found on dunes and in other sandy biotopes throughout the country”.

The collections at the NHMO contains the old material from the Siebke collection, and contains specimens from Frederiksværn, Laurård, and Nes in Hallingdal, but not from Hønefoss and Grundset. The last record is however covered by new material collected at Starmoen in Elverum. The species is not recorded north of Dovre.

***Dialineura anilis* (L., 1761)**

(Figs 1A, 12 and 27)

Material. 43 specimens have been examined. Records from EIS 1, 12, 19, 28, 35, 37, 38, 43, 44, 54, 55, 63, 71 and 79.

Records. Ø Hvaler: Kirkøy, Arekilen (EIS 12), 1♂, 8 July 1994, leg. M. Falck; Ørekroken, 4♀♀, 22 June–16 July 2003, leg. L.O. Hansen [malaise-trap east of stream], coll. NHMO; Moss: Jeløy, Kølabo, 1♂, 12 June 2007, leg. L. Aarvik; AK Ullensaker: Sessvollmoen (EIS 37), 2♂♂, 11–26 June 2007, leg. L.O. Hansen [malaise-trap B]; Oslo: Tøyen [Tøyen] (EIS 28), 1♂, [no date], leg. Siebke, det. Lyneborg; Bekkelaget, 1♂, 30 June 1847, leg. Siebke; 1♀, 30 June 1844; HES Kongsvinger (EIS 37), 1♀2♂♂, [no date], leg. Siebke; Vinger (EIS 38), 1♂, 11 June 1848; 1♂, 26 May 1851; Elverum: Grundset (EIS 55), 1♂1♀, [no date], leg. Siebke; 1♀, 30 June 1846; ON Fokkstua (EIS 71), 1♂, 14 July 1873, leg. Siebke; Dovre, 1♀, [no date], leg. Esmark, det. Lyneborg; Dombås, 2♂♂, 15 July 1916, leg. Münster

The species is associated with sandy shore dunes (Lyneborg 1965), and typically most records are from coastal areas, though there are

[labelled: *Tabula anilis* Soot-Ryen]; OS Øyer (EIS 54), 1♀, [no date], Ringebu (EIS 63), 1♀, [no date], leg. Schøyen; BV Rollag: Tråen saga

(EIS 35), 3♀♀, June 1994, leg. B.A. Sagvolden [malaise-trap]; Nes i Hallingdal (EIS 44), 1♀2♂♂, [no date], leg. Siebke; Gol (EIS 43), 1♂, [no date]; **VE** Larvik: Tjølling, Kaupang (EIS 19), 1♂, 8 July 1989 [no further data]; Borre: Adalstjern, 1♂, June 1997, leg. L.O. Hansen [malise-trap]; Tjøme: Moutmarka, 1♀, 30 May 1982; **VAY** Farsund: Einarsneset (EIS 1), 3♂♂, 23 May 1994, leg. K. Berggren; 1♂3♀♀, 3–5 June 1995; **STI**: Drivstua (EIS 79), 1♂, [no further data].

Remarks. This species has a wide distribution in the southern part of the country.

Siebke records it (as *Thereva anilis* L.) from Christiania (Oslo), Nittedal, Næs and Gol in Hallingdal, Vinger, Aamodt and Elverum, but not found at Fokkstua at Dovre, and Sarpsborg.

The NHMO collection holds specimen labelled “Siebke” that contradicts the words about Fokkstua, as well as old specimens collected by Münster from Dombås and Drivstua. There are specimens collected by Esmark from Dovre, Kongsvinger, Grundset, Gol and Nes in Hallingdal by Siebke, as well as old and new material from Oslo, and from the Oslofjord area, including the Hvaler archipelago on the Swedish border. The species is found on the northern slope of the Dovre Mountains, and seems to have a more widespread distribution in the mountains of Southern Norway. It is not as common on the sandy shores of the Holiday resorts in Southern Norway as the foregoing species, but it has been found at Tjøme, and the Hvaler archipelago.

Dichoglena nigripennis (Ruthe, 1831)

(Figs 3A and 28).

Material. 2 specimens have been examined. A very rare species, which has only been found twice in Norway (except for possible specimens in the University Museum of Bergen). Records from EIS 18 and 20, and an old record from EIS 173.

Records. Ø Fredrikstad: Onsøy, Hankø, Bloksberg (EIS 20), 1ex., 3–29 June 1995, leg. O. Hanssen & J.I.I. Båtvik, coll. MF; **TEI** Siljan (EIS 18), 1ex., 18 June 1994, leg. A. Bakke, coll. NHMO.

Remarks. Siebke records this species under the name *Psilocephala lapponica*, as “In trunco *Pini sylvestris* ad Bossekop Finnmarkiae prof.

Zetterstedt 5 Aug. 1840 feminam invenit.”

The localities at Bossekop and in Østfold are associated with the sea-shore, but the one at Siljan is an inland locality..

The species should obviously be placed on the red list.

Pandivirilia eximia (Meigen, 1820)

(Figs 13 and 29)

Material. 25 specimens have been examined. The species is recorded from the following EIS-squares: 19, 20, 28, 35, 38, 77, 127, 154 and 173. All specimens in Morten Falck’s collection if not noted. This is still a sparse material. But the most northerly record is thus removed to Alta: Eiby, Valsetmoen, and Alta: Detsika, Buolamalia, both leg. L.O. Hansen and H. Rinden, being the most northerly known records of the species.

Records. Ø Rygge: Telemarkslunden (EIS 20), 1♀, 19 May–17 June 1992, leg. G. Wahlberg & L.O. Hansen; Fredrikstad: Onsøy, Hankø, Bloksberg, 1♀, 3–29 June 1995, leg. O. Hanssen & J.I.I. Båtvik [malaise-trap]; **AK** Oslo: Oslo [Christiania] (EIS 28), 1♀, [no date], coll. NHMO; Østensjøvannet, Manglerud, 1♀, 24 June–9 July 1995, leg. M. Falck [malaise-trap]; Bærum: Borøya, 1♀, 28 June–9 September 1995, leg. L.O. Hansen; Nesodden: Skoklefall, 1♂, 11 May 2005, leg. O.J. Lønnve; 1♀, 15 May 2005; Ås: Ås, 1♀, 7 June 1984, leg. L. Aarvik; **HES** Kongsvinger: Dragonmoen (EIS 38), 1♀, 22 June–9 July 2005, leg. K. Sund [malaise-trap]; **BØ** Hurum: Verket (EIS 28), 2♀♀, 6 June–8 July 1995, leg. L.O. Hansen & O. Hanssen [malaise-trap]; **BV** Nore & Uvdal: Gvammen (EIS 35), 1♀, 10 June 1983, leg. J. Dammen; Rollag: Bråtåsen, 1♀, July 1994, leg. B.A. Sagvolden; Veggli, 1♀, 29 June 1995; Vårviken, 1♀, July 1994, leg. L.O. Hansen & B.A. Sagvolden; Tråen Saga, 2♀♀, July 1994; leg. B.A. Sagvolden [malaise-trap]; **VE** Larvik: Røysås (EIS 19), 1♂, 29 June 1990 [hatched 21 April 1992], leg. B. Borgersen; Borre: Veggefjellet, 1♀, June 1997, leg. L.O. Hansen [malaise-trap]; **MRI** Norddal: Fjora, Ytre Furuneset (EIS 77), 1♂, 5 May–11 June 2000, leg. K.J. Grimstad & D. Holtan, coll. University Museum of Bergen; **NSI** Saltdal: Saltdal (EIS 127), 1♀, [no date], leg. Schøyen, coll. NHMO;



FIGURE 13. *Pandivirilia eximia* (Meigen, 1820). Photo: Karsten Sund.

TRY Malangen: Lanes (EIS 154), 1♀, June 1961, coll. TM; 1♀, leg. Lanto, coll. NHMO; **FV** Alta: Detsika, Buolamalia (EIS 173), 1♀, 24 June–18 Junl 1996, leg. L.O. Hansen & H. Rinden; Eiby, Valsetmoen, 1♂, 6 June–6 July 1995.

Remarks. The NHMO collection also holds a specimen that is labelled Kr.ania (=Oslo), and a female that is labelled “Esmark”, both without further data.

According to Siebke, this species has been found in Christiania (=Oslo), and by Schøyen in Odalen. Reported as new to Norway by Lyneborg (1986), who must have overlooked the records by Siebke. Lyneborg based himself on a female specimen from AK, Ås, EIS 28, 7 June 1984, leg. L. Aarvik, in coll. NHMO.

Greve (2002) treated this species. However, as she recorded only ten specimens, she arrived at the conclusion that this species is extremely rare. I have had at my disposal 19 specimens, which alter this picture.

The species obviously leads a secretive life. It is most often caught in malaise traps and very seldom seen or hand netted. Haarto and Winqvist (2006) record it as “a rather common species found mostly in moist meadows in southern and central

Finland”. Whether the Norwegian distribution is continuous or splitted in the central part of the country, thus making the northern population an extension of a probable population in the northern part of Finland and Russia, remains to be seen. So far this large and conspicuous fly has been most commonly caught in the Oslofjord area, and always in single numbers, the only records that contains more than one specimen being from malaise traps that has been standing for more than a month. The dates are from the 11th of May and throughout July. Judging from this material, the female is much more frequent than the male.

Not found in Denmark or Britain, but in Sweden as far north as Dalarna, and in central Europe and the central parts of Russia (Lyneborg, 1986).

***Psilocephala imberbis* (Fallén, 1814)**
(Figs 14 and 30)

Material. 3 specimens have been examined. According to Siebke, this species has been found in Oslo at Tøyen, but also between Alta and Kautokeino in Finnmark by professor Zetterstedt.

Records. **AK** Oslo: Tøyen (EIS 28), 1♀1♂, [no date], leg. Siebke [♂ missing abdomen]; **HEN** Åmot: Åmot (EIS 55), 1♀, [no further data].

Remarks. This species has not been recorded from Norway for 150 years or so. Under “normal” collecting conditions, that would be a certain sign of extinction, but due to the very weak collecting efforts concerning Therevidae, and the elusiveness of these flies, it may still be thriving in the remote corners of the Norwegian forests. It was first described from the Swedish province of Östgötaland, and is distributed throughout Finland (though only three records for the last 30 years (Haarto & Winqvist, 2006)), and the northern part of Russia (Lyneborg, 1989). If this species is found anew in Norway, it will certainly have its place on the red list.



FIGURE 14. *Psilocephala imberbis* (Fallén, 1814). Photo: Karsten Sund.



FIGURE 15. *Spiriverpa lunulata* (Zetterstedt, 1838). Photo: Karsten Sund.

***Spiriverpa lunulata* (Zetterstedt, 1838)**

(Figs 15 and 31)

Material. 53 specimens were studied. The species is recorded from EIS 12, 36, 42, 46, 52, 55, 59, 71, 73, 76, 77, 81, 127, 155, 157, 159, 167, 173, 176, 177, 180, and 182.

Records. Ø Hvaler: Ørekroken (EIS 12), 1♀, 22 June–16 July 2003, leg. L.O. Hansen [malaise-trap A, east of stream]; HES Elverum: Grundset (EIS 55), 1♀1♂, [no date], leg. Siebke; Hamar: Vang (EIS 46), 1♂, July 1832, leg. Esmark; HEN

Rendalen: Øvre Rendal (EIS 73), 1♂, 5 July 2005, leg. M. Falck; ON Vang: Raudalen (EIS 52), 10♂♂, 18 July 1994; Sel: Laurgård (EIS 71), 1♂, [no date], leg. Siebke; 1♂, 15 July 2001, leg. L.O. Hansen; Vågå: Vågåmo, 1♀, 13 July 1853, 1♂, 11 July 1853; BØ Ringerike: Hønefoss (EIS 36), 1♂, [no date], leg. Schøyen; BV Hol: Ustaoset (EIS 42), 1ex., 5 July 1928, leg. Quelprud; MRY Fræna: Nerås (EIS 76), 1♂ [labelled MSN5], 8 July 1946, coll. TM; SFI Luster: Veitastrond (EIS 59) 1♂, 28 July 1993, 1♀, leg. O.J. Lønnve; MRI Romsdal (EIS 77), 1♂, [no date], leg. Siebke, det. D.W. Webb; STI Røros (EIS 81), 1♂, [no date], leg. Münster; NSI Saltdal: Saltdalen (EIS 127), 1♂, [no date], leg. Schøyen; TRI Storfjord: Skibotn (EIS 155), 4♂♂, 30 June 1997 [at seashore]; FI Karasjok: Buddasnjarga (EIS 159), 1♂, 6 July 1995, leg. K. Berggren & K. Myhr; 1♀, 14 July 1997; 7♂♂2♀♀, 5 July 1997; Valljåkka, Suola (EIS 167), 1♂, 14 July 1997; Kautokeino (EIS 157), 1♀, 1 July 1989; FV Måsøy: Rolvsøya (EIS 180), 1♂, 20 July 1992, leg. P. Tangen; Alta: Altagård (EIS 173), 1♂, 12 July 1997; 1ex., 12 July 1997; Buolamalia, 3♀♀, 24 June–16 July 1996, leg. L.O. Hansen & H. Rinden; FN Vadsø: Skallelv (EIS 177), 1♀, 27 July 1987, leg. G. Søli; Tana: Holmesund [2km south Tana bru] (EIS 176), 1♀, 9 July 1990, leg. Berg & Voith; Porsanger: Børselv, Børselvdeltaet (EIS 182), 1♀, 18 July 1997.

Remarks. The species shows a very northern and alpine distribution. It has several times been seen swarming by the author, both in the mountains of South-Eastern Norway and in riverbanks and shores of the northern provinces Troms and Finnmark. The one find that sticks out, is a single female specimen caught in a malaise trap at Ørekroken in the Hvaler archipelago by

Lars Ove Hansen in 2003, neither mountain nor northern, but a sandy shore close to the Swedish border in the southern county Østfold.

The species must be regarded one of the most common therevids of Norway. It has been found in Great Britain, Sweden and Finland. (Lyneborg, 1989).

Of this species, Siebke states that it was first found by Boheman in the Dovre Mountains, and then Dahlbom and Zetterstedt discovered it in Østre Næs in Verdalen, Thynæs and Levanger, where both sexes were rather rare, and that Mr. Grimsgaard had taken it at Sarpsborg. Bidenkap (1900) notes the record of 4 males and 1 female by Sparre Schneider at Storfjord, June 1898.

Bidenkap (1900) says that the male abdomen is covered in silvery white hairs, not tomentose, as Zetterstedt states, but that the fly otherwise conforms to his description.

The species was described by Zetterstedt from “Lapponia Norwegica” in 1838.

* *Thereva cinifera* Meigen, 1830

(Figs 5A, 9C, 16 and 32)

Material. 31 specimens studied. Recorded from the following EIS squares: 5, 6, 12, 19 and 28.

Records. Ø Råde: Åven (EIS 19), 1♀, 9–11 August 1990, leg. L.O. Hansen; Hvaler: Ørekroken (EIS 12), 1♂4♀♀, 16 July–15 August 2003, leg. L.O. Hansen; 1♂2♀♀, 22 June–16 July 2003; 1♀, 16 July 2003; BØ Hurum: Verket (EIS 28), 1♀, 6 June–6 July 1995, leg. L.O. Hansen & O. Hanssen; Hurum (EIS 19), 10♀♀, 17 June–10 July 2010, leg. L.O. Hansen [malaise-trap], coll. NHMO; Drammen: Underlia (EIS 28), 2♀♀, May 1994, leg. L.O. Hansen [malaise-trap]; VE Nøtterøy: Mellom-Bolærne (EIS 19), 2♀♀, 4–26 July 1995, leg. A. Fjellberg & L.O. Hansen [malaise-trap]; 3♀♀, 26 July–25 August 1995; Larvik: Kloppesand (EIS 19), 1♂, 13 June 1993, leg. Ø. Berg; AAY Birkenes: Birkeland (EIS 6), 1♀, 7 July 2004, leg. S. Svendsen; VAY Kristiansand: Hamresanden (EIS 5), 1♀, 19–30 July 1997, leg. K. Berggren.

Remarks. A small, greyish species with a clearly defined south-eastern distribution in Norway. Seems to be connected to sandy biotopes



FIGURE 16. *Thereva cinifera* Meigen, 1830. Photo: Karsten Sund.

near the coast, and is regarded by Haarto and Winqvist (2006) to be scarce. Found in most European countries, and throughout Siberia. (Lyneborg, 1989).

Thereva fuscinervis Zetterstedt, 1838

(Figs 7, 17 and 33)

Material. 17 specimens recorded from EIS 42, 71, 173, 176, 177, 181 and 186.

Records. ON Dovre: Dovre (EIS 71), 1♀, [no date], leg. Siebke; HOI Ulvik: Finse (EIS 42), 1♀, 30 June 1993, leg. O.J. Lønnve, coll. NHMO; FV Alta: Stokstadfjellet (EIS 173), 1♀, 22 July 1997, leg. H. Rinden; Måsøy: Rolvsøya, Gunnarnes (EIS 186), 1♀, 27 July 1992; FN Tana: Lisma (EIS 176), 1♀, 9 July 1990, leg. Berg & Voith; Porsanger: Stabburneset (EIS 181), 8♀♀, 15 July 1987; FØ Tana: Brannsletta (EIS 177), 4♀♀, 16 July 1987, leg. R. Bergersen, coll. TM.

Remarks. Clearly a Northern species, found in numbers at Stabburneset in Porsanger and Brannsletta in Tana by Robert Bergersen. There are however two records from the mountains in the south of Norway: One found by Siebke at Dovre (possibly his Fokkstua specimen), and one found at Finse in Hordaland by Ole Lønnve in 1993. This southern distribution must be regarded



FIGURE 17. *Thereva fuscinervis* Zetterstedt, 1838. Photo: Karsten Sund.

as a relict.

The species was described from “Lapponia Septentrionalis”, and the distribution is restricted to Norway, Sweden and Finland.

Siebke records this species both from Fokkstua in the Dovre mountains, and from Skåddavara and Bossekop in Alta in Finnmark.

*** *Thereva handlirschi* Kröber, 1912**

(Figs 8A, 9K, 18 and 34)

Material. 30 specimens studied. Recorded from EIS squares 9, 11, 12, 19, 27, 28, 36, 45, 62 and 77.

Records. Ø Hvaler: Kirkøy, Ørekroken (EIS 12), 1♂, 8 July 1982; Rygge: Sildebauen (EIS 19), 1♂, 26 July 2006, leg. L. Aarvik; AK Oslo: Ulsrudvann (EIS 28), 1♀, 28 July 1982, leg. M. Falck; Østmarka, Lutdalen, 1♂, 22 July 1983; 1♀, 6–22 July 1990; Trasop, 1♂, 24 July 1977; Østensjøvann, Slåttenga, 1♀, 22 August–ultimo September [malaise-trap]; Østensjøvann, Manglerud, 1♂, August 1996, leg. L.O. Hansen & M. Falck [malaise-trap]; Asker: Bjørkås, 1♀, 2–24 August 1995, leg. L.O. Hansen &

O. Hanssen [malaise-trap]; Oslo [Kristiania], 1♂, [no date], leg. Siebke, det. Lyneborg; Nesodden: Røer, 1♂, 6 August 2007, leg. L. Aarvik; HES Ringsaker: Helgøya (EIS 45), 1♂, [no date], leg. Siebke; OS Gausdal: Espedal (EIS 62), 1♀, 27 July 1984; BØ Modum: Drolsum (EIS 36), 1♀, 3 August 1982; Røyken: Hyggen, Kinnartangen (EIS 28), 1♂, 4 August–8 September 1991, leg. L.O. Hansen; Hurum: Verket, 4♀♀, 6 July–19 August 1995; leg. L.O. Hansen & O. Hanssen; 2♀♀, 19 August–1 October 1995; Drammen: Underlia, 1♀, August–September 1997; Modum (EIS 27), 1♂, [no date], leg. Esmark; VE Borre: Adalstjern (EIS 19), 1♀, July 1997, leg. L.O. Hansen [malaise-trap]; Larvik: Middagskollen, 2♀♀, 2 July–26 August 1997, leg. A Fjellberg [malaise-trap], coll. NHMO; TEI Drangedal: Skultrevassåsen (EIS 11), 2♀♀, 23 July–9 September 1997, leg. A. Bakke [malaise-trap]; AAI Bygland: Heddevika (EIS 9), 1♀, 28 July–5 August 1997, leg. K. Berggren [malaise-trap]; MRI Valldalen (EIS 77), 1♀, [no date], leg. Siebke.

Remarks. This large and golden-haired species has a clearly defined southern distribution, but it may be distributed in the fjords of the Western provinces, if Siebke’s record from



FIGURE 18. *Thereva handlirschi* Kröber, 1912. Photo: Karsten Sund.



FIGURE 19. *Thereva inornata* Verrall 1909. Photo: Karsten Sund.

Valldal (EIS 77) can be confirmed by more recent collecting. This specimen, which was determined by Lyneborg, must certainly be the one that Siebke reported as *T. nobilitata*. The species is recorded from most countries in ‘western Europe, but not from Ireland, Spain or Italy, nor the Balkan peninsula, but from Turkey.

*** *Thereva inornata* Verrall 1909**

(Figs 6, 9J, 19 and 35)

Material. 16 specimens studied. Recorded from the following EIS- squares: 12, 19, 24, 28, 45 and 165.

Records. Ø Rygge: Kurefjorden, Holm (EIS 19), 1♂, 10 July 2005, leg. L. Aarvik; Halden: Enningdalen (EIS 12), 1♀, 1 August 1997, leg. T.J. Olsen [erroneously labelled “*T. plebeja*” by T. Jonassen]; AK Asker: Bjørkås (EIS 28), 1♀, 2 July–24 August 1995, leg. L.O. Hansen & O. Hanssen [malaise-trap]; Semsvik, 1♂, 24 June–6 August 2005, leg. Ø. Gammelmo & L.O. Hansen; Nesodden: Skoklefall, 1♀, 28 August 2005, leg. O.J. Lønnve; Bærum: Ostøya, 1♂, 30 May–10 June 1984, leg. F. Midtgaard [malaise-trap]; Oslo: Hovedøya, 1♀, 22 July–26 August 2005, leg. Ø. Gammelmo & O.J. Lønnve [malaise-trap]; OS Søndre Land: Odnesberga (EIS 45), 1♀, 25 June–12 August 2010, leg. L. Aarvik & F.A. Grønset [malaise-trap in south faced slope on calcareous

ground]; BØ Drammen: Underlia (EIS 28), 1♂, June 1996, leg. L.O. Hansen [malaise-trap]; 3♀, July 1999; Hurum: Mølen (EIS 19), 1♀, 10 July–15 August 2010, leg. L.O. Hansen [malaise-trap], coll. NHMO; RI Suldal: Roaldkvam (EIS 24), 1♀, August 2002, leg. R. Voith [light-trap]; FV Alta: Mattisdalen S (EIS 165), 1♀, 11 August–26 September 1996, leg. L.O. Hansen & H. Rinden [malaise-trap in south faced slope]; Gargia, 1♀, 6 August–25 September 1996, leg. L.O. Hansen & H. Rinden [malaise-trap].

Remarks. A rather uncommon species, with two well defined areas of distribution, which seems to be needing much more research, as the northern population seems not to be connected to the Finnish or Swedish populations. The lack of interest in the Therevidae by Norwegian collectors shows by the seemingly “stray” record from EIS 24, Rogaland: Suldal, Roalkvam, which was found by Reidar Voith in August 2002. It does not take much fantasy to predict a connection between this and the distribution around the Oslofjord. The record from Ostøya by Fred Midgaard also sticks out as a fairly early date, compared to the rest, mainly from July and August.

Total distribution encompass most European countries, and reach into Russia.

***Thereva lanata* Zetterstedt, 1838**

(Figs 9E, 20 and 36)

Material. 17 specimens studied. Records from the following EIS-squares: 9, 27, 35, 36, 37, 46, 63, 71, 79, 160, 165, 173 and 183. This covers most of the country. The species is widespread, but not encountered very often.

Records. AK Ullensaker: Sessvollmoen (EIS 37), 1ex., 11–26 June 2007, leg. L.O. Hansen [malaise-trap]; Sessvollmoen, Aurtjern, 1♀, 1 May–30 June 2008, leg. L.O. Hansen [malaise-trap in sandy pine forest], coll. NHMO; Jessheim (EIS 36), 1♂, 25 July 1853, leg. Siebke, det. Soot-Ryen 1943; HES Elverum: Starmoen (EIS 46), 3♀, 11–29 July 2004, leg. L.O. Hansen



FIGURE 20. *Thereva lanata* Zetterstedt, 1838. Photo: Karsten Sund.



FIGURE 21. *Thereva microcephala* Loew, 1847. Photo: Karsten Sund.

[malaise-trap in sandy pine forest]; **ON** Dovre: Dovre (EIS 71), 1♀1♂, [no date], leg. Siebke; **OS** Ringebu: Ringebu (EIS 63), 1♀, 29 June 1877, leg. Schøyen, det. Lyneborg; **BV** Rollag: Tråen Saga (EIS 35), 1♀, June 1994, leg. B.A. Sagvolden; **TEI** Notodden: Lisleherad (EIS 27), 1♀, 30 May–7 July 1995, leg. A. Bakke [malaise-trap in fire area]; **STI** Oppdal: Kongsvoll (EIS 79), 1♀, [no date], leg. Schøyen; **FV** Alta:

Bæskades (EIS 165), 1♂, 29 June 1989, leg. A. Fjellberg, coll. TM; Altagård (EIS 173), 1♂, 3 July 1997, leg. M. Falck; **FI** Kautokeino: Masi (EIS 165), 1♀, 5–10 July, leg. B. Sagvolden & S. Svendsen; **FN** Tana: Vestertana (EIS 183), 1♂, 9 July 1989, leg. A. Fjellberg; **FØ** Pasvik (EIS 160), 1♀, 1966, leg. R. Mehl [ZMO Pasvikeksp. 1966].

Remarks. In Finland it is regarded as “one of the commonest species of the genus”. The world distribution covers The Czech Republic, Germany, The Netherlands, Poland, Sweden, Finland, Norway and Russia.

According to Siebke, this species was collected by Zetterstedt at Bjørkvik and Evenes in Nordland.

* *Thereva marginula* Meigen, 1820 (Figure 37)

Material. 2 specimens have been examined. Only two records from Norway. Both records from EIS 28.

Records. **AK** Oslo (EIS 28), 1♀, 21 July–26 August 2005, leg. Ø. Gammelmo & O.J. Lønnve [malaise-trap], coll. NHMO; **BØ** Drammen: Underlia, 1♀, June–July 1998, leg. L.O. Hansen [malaise-trap], coll. NHMO.

Remarks. The world distribution is given as Austria, The Czech Republic, Spain, Hungary, Italy, Poland, Romania, Sweden and the former Yugoslavia.

* *Thereva microcephala* Loew, 1847 (Figs 9F, 21 and 38)

Material. 9 specimens studied. Recorded from the following EIS-squares: 1, 11, 21 and 28.

Records. **Ø** Aremark: Tjøstøl (EIS 21), 1♂, 15 July–25 August, leg. A. Bakke [malaise-trap]; **AK** Oslo: Østmarka, Lutdalen (EIS 28), 1♀, 4 July 1988, leg. M. Falck; Østensjøvannet,

Manglerud, 1♀, 9 July–1 August; Asker: Semsvik, 3♀♀, 24 June–3 August 2005, leg. Ø. Gammelmo & L.O. Hansen [window-trap]; **BØ** Hurum: Verksøya (EIS 28), 1♀, 6 June–8 July 1995, leg. L.O. Hansen & O. Hanssen [malaise-trap]; **TEY** Drangedal: Skultrevassåsen (EIS 11), 1♂, 23 July–September 1998, leg. A. Bakke [malaise-trap]; **VAY** Farsund: Einarsneset (EIS 1), 1♂, 23 May 1994, leg. K. Berggren.

Remarks. This seems to be a species that is confined to the central Oslofjord region and southern landscapes of Norway, just as in Finland it is strictly associated with the coast. The small head, which is not as broad as *Thorax*, makes this species easy to recognise, at least in pinned material. Flight period from the end of May till the beginning of August.

The world distribution is more or less forming an axis through central Europe: Austria, Switzerland, The Czech Republic, Germany, Denmark, Italy, Norway, Poland, Rumania, Sweden and Finland.

Thereva nobilitata (Fabricius, 1775)

(Figs 8B, 9I, 22 and 39)

Material. 16 specimens examined. Recorded from the following EIS-squares: 6, 11, 12, 19, 20 and 28.

Records. **Ø** Hvaler: Kirkøy, Ørekroken (EIS 12), 2♀♀, 22 June–16 July 2003, leg. L.O. Hansen; 1♀, 8 July 1994, 2♀♀, 19 July 1995; 1♂, 21 July 1995; Rygge: Sildebauen (EIS 19), 1♀, 22 June 2006, leg. L. Aarvik; Fredrikstad: Onsøy, Slevik, Merrapanna (EIS 20), 1♂, 14 June 2004, leg. O.J. Lønnve; **AK** Oslo: Hovedøya (EIS 28), 1♀, 30 July 1995, leg. Ø. Berg; **BØ** Nedre Eiker: Krokstad, Brekke (EIS 28), 1♂, 2–6 June 2010, leg. L.O. Hansen [yellow pan-trap in calcareous meadow]; Hurum: Ranvikholmen (EIS 19), 1♀, 9 July–22 August 2010, leg. L.O. Hansen [malaise-trap in old lime forest], coll. NHMO; **VE** Nøtterøy: Mellom-Bolærne (EIS 19), 1♀, 4–26 July 1995, leg. A. Fjellberg & O.



FIGURE 22. *Thereva nobilitata* (Fabricius, 1775). Photo: Karsten Sund.

Hanssen [malaise-trap]; 1♂, 26 July–25 August 1995; **TEY** Bamble: Langesundtangen (EIS 11), 1♀1♂, 3 July–7 August 1995, leg. L.O. Hansen & O. Hanssen [malaise-trap]; **AAV** Tvedestrand: Gjeving (EIS 6), 1♀, 17 July 1997, leg. M. Falck.

Remarks. All the records are from dry sandy beach-localities, which corresponds to the records in Finland, where this rare species has been found only four times. It has commonly been mixed up with *T. handlirschi*, and, the specimens should be checked before the distribution of any of the species is given. Literature records like the old ones of Siebke and Bidentkap, are unreliable. The species is found in most European countries, and both in Denmark and Britain it is deemed to be one of the most common species of therevids, widespread over the countries, though elusive. However, Stubbs and Drake states that “in northern parts, it seems to be restricted to the coastal lowlands.” (Stubbs & Drake, 2001). Siebke (1877) states that the species has been captured in Christiania (Oslo) at Grefsen in July and August, and in Sunnmøre near Valldal in July 1864. According to Bidentkap (1900), it is common in the birch (*Betula*) forests of Nordland and Finnmark, as far north at Nordkapp from the 27th of June till the 17th of August.



FIGURE 23. *Thereva plebeja* (Linnaeus, 1758). Photo: Karsten Sund.

***Thereva plebeja* (Linnaeus, 1758)**

(Figs 5B, 9G, 10A, 23 and 40)

Material. 24 specimens examined. Recorded from the following EIS-squares: 1, 11, 12, 19, 28, 35, 38, 62, and 71.

Records. Ø Hvaler: Kirkøy, Ørekroken (EIS 12), 1♀, 15 May 1993, leg. Ø. Berg; **AK** Oslo [Christiania] (EIS 28), 1♂, [no date], leg. Siebke; Bekkelaget, 1♀, 8 June 1843, leg. Siebke; Nordseter, 1♂, 12 July 1853, det. Lyneborg; Asker: Bjørkås, 1♀, 4 June–2 July 1995, leg. L.O. Hansen & Hanssen; Nesodden: Knardal, 1♀, 24 June 1961, leg. G. Taksdal; **HES** Kongsvinger: Dragonmoen (EIS 38), 1♀, 28 May–22 June 2005, leg. K. Sund [malaise-trap]; **ON** Nord-Fron: Vinstra (EIS 62), 1♀, 25 May–30 June 1992, leg. K. Myhr & L.O. Hansen [malaise-trap]; Dovre: Dovre (EIS 71), 2♂♂, [no date], leg. Siebke; 1♂, [no date, lacking abdomen]; **BØ** Hurum: Verksøya (EIS 28), 1♂, 6 June–8 July 1995, leg. L.O. Hansen & O. Hanssen [malaise-trap]; Nedre Eiker: Mjøndalen, Hagetjern, Rygsetra, 1♀, June 1994, leg. Y. Berg & L.O. Hansen [malaise-trap]; Drammen: Underlia, 1♀, May 1996, leg. L.O. Hansen [malaise-trap]; Østnestangen (EIS 19), 1♀, 5 June 1995, leg. L.O. Hansen; Hurum: Mølen, 1♀, 1–30 June 1999, leg. L.O. Hansen [malaise-trap in *Tilia/Ulmus* forest], coll. NHMO; **BV** Rollag: Tråen Saga (EIS 35), 2♂♂, June

1994, leg. B.A. Sagvolden [malaise-trap]; Bråtåsen, 1♂, June 1994, leg. B.A. Sagvolden [malaise-trap]; **VE** Borre: Veggefjellet (EIS 19), 1♂, June 1997, leg. L.O. Hansen [malaise-trap]; **TEY** Kragerø: Barlandskilen (EIS 11), 1♀, 9 June 1995, leg. M. Falck; Bamble: Langøya, 1♂, 3–31 July 1995, leg. L.O. Hansen [malaise-trap]; **VAY** Farsund: Einarsneset (EIS 1), 1♂, 23 May 1994, leg. K. Berggren; 1♂, 3 June 1995.

Remarks. The NHMO-collection holds two male specimens from Dovre, being the most northerly record in the material. They have both been determined by Lyneborg. Apart from some scattered inland

records (Kongsvinger: Dragonmoen, Rollag: Bråtåsen, Nord-Fron: Vinstra), most records seems to be from coastal areas. In England it seems to be associated with disturbed and usually sandy soil (Stubbs and Drake, 2001). It is recorded from practically every country in Europe, and into Siberia and Turkey.

Sibeke records this species from Christiania (Oslo), Hønefoss, Moen in Fron, Grudbrandsdal, near Aamodt but not at Jerkinn in the Dovre mountains. He also says that in Sarpsborg Mr. Grimsgaard has taken it from June until August. Bidenkap records it as “rare” in his survey of Diptera from Jarlsberg and Laurvig in the summer of 1891. In his treatise from 1900, he states that he has found it at Tromsø in the autumn of 1897, and that Sparre Schneider had found it at Storjord in Saltdalen in 1898.

*** *Thereva strigata* (Fabricius, 1794)**

(Figs 5E, 9H, 10B and 41)

Material. 6 specimens studied. Recorded from EIS 12, 19, 20, 28 and 37.

Records. Ø Hvaler: Kirkøy, Ørekroken (EIS 12), 1♀, 12 July 1992, leg. T.J. Olsen; Fredrikstad: Onsøy, Hankø, Bloksberg (EIS 20), 1♂, 3–29 June 1995, leg. O. Hanssen & J.I.I. Båtvik; **AK** Ullensaker: Sessvollmoen, Aurtjern (EIS 37), 1♀, 1 May–30 June 2008, leg. L.O. Hansen [malaise-

trap on sandy ground at pine forest edge], coll. NHMO; **BØ** Drammen: Underlia (EIS 28), 1♂, July 1994, leg. L.O. Hansen [malaise-trap]; Hurum: Verket, 1♂, 6 June–8 July 1995, leg. L.O. Hansen & O. Hanssen [malaise-trap on sandy shore]; **VE** Nøtterøy: Mellom-Bolærne (EIS 19), 1♀, 4–26 July, leg. A. Fjellberg & O. Hanssen [malaise-trap].

Remarks. This species is associated with warm climate and sandy biotopes in one of the most used recreational areas of Norway. In Finland it has not been taken since 1943, and is assessed as possibly extinct, and in Norway it must certainly be placed on the red list.

The world distribution covers most of the Palaearctic region. The Norwegian dates are June through July.

Thereva unica (Harris, 1780)

(Figs 9B, 24 and 42)

Material. 14 specimens studied. EIS-squares 2, 6, 19, 20, 28, 29, 35, 38, 165.

Records. **Ø** Fredrikstad: Onsøy, Hankø, Bloksberg (EIS 20), 1♂, 3–29 June 1995, leg. O. Hanssen & J.I.I. Båtvik [malaise-trap]; Moss: Jeløy, Hvittingbukta (EIS 19), 1♂, 3–31 June 1995, leg. L.O. Hansen & G. Hardeng [malaise-trap]; **AK** Oslo: Østensjøvann, Abildsø (EIS 28), 1♂, June 1997, leg. M. Falck [malaise-trap]; Oppgård: Svartskog, Rødstein, 1♀, 4 June–4 July 2004, leg. O.J. Lønnve [malaise-trap]; Bærum: Kjaglidalen, 1♀, 8 June 1994, leg. M. Falck; Fet: Fetsund, Bjanes (EIS 29), 1♀, 19 June 2005, leg. M. Falck; **HES** Kongsvinger: Abborhøgda (EIS 38), 1♀, 22 June–10 July 2003, leg. K. Sund [malaise-trap], coll. NHMO; **BØ** Hurum: Verksøya (EIS 28), 1♂, 6 June–8 July 1995, leg. L.O. Hansen & O. Hanssen [malaise-trap]; Drammen: Underlia, 1♂, June 1996, leg. L.O. Hansen [malaise-trap]; **BV** Rollag: Tråen Saga (EIS 35), 2♂♂, June 1994, leg. B.A. Sagvolden [malaise-trap]; **AAV** Birkenes:



FIGURE 24. *Thereva unica* (Harris, 1780). Photo: Karsten Sund.

Birkeland, Nordåsen (EIS 6), 1♀, June 2003, leg. S. Svendsen [malaise-trap]; **VAY** Kristiansand: Hamresanden (EIS 2), 1♂, 5 June 1998; **FV** Alta: Mattisdalen (EIS 165), 1♂, 21 June–4 August, leg. L.O. Hansen [malaise-trap].

Remarks. The species is associated with sandy localities, both coastal and inland. Most common on the coastal localities. In Finland it is restricted to three localities. Internationally it is recorded from most European countries, and its range extends into Siberia.

Siebke (1877) records this species (as *Thereva lugubris* Fabr.) from Christiania, near Vestre Aker, Sarpsborg, Toftemoen, but not in Fokkstua and Jerkinn in the Dovre mountains. He gives the time as July. He also records it as *Th. bipunctata* from Christiania, and as *Th. albipennis* Meig. from Grytten in Romsdal 9. Aug. 1864. Bidenkap (1900) records it from Fløifjeld (Tromsø) in June 1897, a female taken by Sparre Schneider. All these names were synonymised under *T. unica* Harris by Lyneborg.

Bidenkap (1900) says that the female specimen from Tromsø has strongly infuscate veins in the wings, and a distinct dark patch in the bifurcation of the third longitudinal (Median) vein. The tibiae and metatarsi are dark blackish brown with black

apexes. This seems to be a specimen of *T. fuscinervis*, though the actual specimen must be studied to settle that question.

* *Thereva valida* Loew, 1847

(Figs 9A, 25 and 43)

Material. 14 specimens studied. EIS squares: 6, 12, 20, 28, 29, 35, 127 and 155.

Records. Ø Hvaler: Kirkøy, Ørekroken (EIS 12), 1♀, 8 July 1994, leg. M. Falck; Sarpsborg: Råkil in Tune (EIS 20), 1♀, 15 June 2006, leg. T.J. Olsen; AK Lørenskog: Losbydalen (EIS 29), 1♂, 9 June 1997, leg. O. Sørlibråten; Asker: Bjørkås, 2♂♂, 2 July–2 August 1994, leg. L.O. Hansen & O. Hanssen [malaise-trap]; Oslo: Østensjøvannet, Manglerud (EIS 28), 1♂, 9 July–4 August 1995, leg. M. Falck [malaise-trap]; Oslo [Christiania], 1♀, [no date], leg. Schneider, det. Lyneborg; Grefsen, 1♀, 12 July 1851, [no leg.], det. Lyneborg; BV Rollag: Tråen Saga (EIS 35), 1♀, June 1994, leg. B.A. Sagvolden [malaise-trap]; AAY Grimstad: Fevik (EIS 6), 1♀, 28 June 1983, leg. M. Falck; NSI Saltdal: Saltdalen (EIS 127), 3♂♂, 8 July 2006, leg. M. Falck; TRI Storfjord: Paras (EIS 155), 1♂, 19 July 1997, leg. M. Falck.

Remarks. In the old NHMO collection there is a specimen labelled “Grefsen” and dated 12. July 1851, this seems to point at Siebke. Probably this is the specimen that Siebke recorded as *T. nobilitata*. The specimen has been determined by Lyneborg.

A common and widespread species recorded from almost every country in Europe.

Discussion

Seven of the species, all in the genus *Thereva*, are here reported new to Norway. None of them has been treated in any survey printed on Norwegian Diptera species. However, five of them, viz. the species *T. cinifera*, *T. handlirschi*, *T. inornata*,



FIGURE 25. *Thereva valida* Loew, 1847. Photo: Karsten Sund.

T. microcephala and *T. valida*, are recorded as Norwegian by Lyneborg (1989). This leaves *T. marginula* and *T. strigata* as never mentioned from Norway. Lyneborg has also not noticed that *T. unica* is a Norwegian species.

There are several additional species occurring in, but there is little chance that they will show up in Norway. The two *Clorismia* species, *C. ardea* and *C. rustica*, is a vague possibility, the first one being caught in Sweden (Gotland), the second one in Denmark, Great Britain and the Netherlands. So is the rare species *Acrosathe baltica*, described from the Baltic islands in Sweden in 1994. If this species occurs in Norway, the islands in the Oslofjord area would probably be the place to look for it, both because they are calcareous and because of the warm climate. The same holds for *Thereva atripes*, an eastern species reaching the St. Petersburg area. All these are treated in the key. The only other possibility seems to be *Thereva fulva*, a southern species occurring in the southern European countries and reaching the southern part of Great Britain. However, they most probably will not be found in our country. However, we have a fair amount of therevid species in our country because the northern species also occur here, for instance *T. fuscinervis*. The distribution of the Norwegian species are poorly known,

however, and calls for diligent work by amateurs and professional dipterists alike. Especially the western and northern part of the country seems to be in need of investigation.

Apart from some few species that are known to swarm, the therevids seem never to be very numerous. Judging by the number of catches in malaise traps in the material, there are surprisingly few catches of more than one specimen.

Acknowledgements. I am greatly indebted to the late Dr. Leif Lyneborg, who treated me so friendly when I visited The Zoological Museum in Copenhagen many years ago, and provided me with prints of his many works on Therevidae. Among them were none on the Palaearctic fauna, which may be one of the reasons why it has taken so many years for this treatise to be completed. My sincere thanks are also due to Dr. Geir E. E. Søli (The Natural History Museum in Oslo), and to Arne C. Nilsen (Tromsø University Museum), for letting me borrow precious material in their care, to Lita Greve Jensen (University Museum of Bergen) for never failing support and information, to Karsten Sund for taking the magnificent photographs of several of the species, to Øivind Gammelmø for making the maps, to all the colleagues who have supplied me with specimens through the years, none mentioned, none forgotten, except Lars Ove Hansen, who has let me take part of his extensive collecting during the last decades, and to Dr. Antti Haarto for the kind permission to use his original illustrations.

References

- Ayal, Y. 1998. Arthropod communities in deserts are top-down controlled: An example from the central Negev, Israel. *Israel Journal of Zoology* 44, 68–92.
- Bidenkap, O. 1892. Undersøgelser over Diptera Brachycera i Jarlsberg og Laurvigs amt sommeren 1891. *Entomologisk tidsskrift* 13, hefte 4, p. 15–22.
- Bidenkap, O. 1900. Foreløbig oversikt over de i det arktiske Norge hidtil bemærkede Diptera Brachycera. *Tromsø Museums Aarshefter*, pp. 13–109.
- Endrestøl, A. 2005. Ny versjon av EIS-systemet for Norge. Fauna (Oslo) 58, 92–97.
- English, K. 1950. Notes on the morphology and biology of *Anabarrhynchus fasciatus* Macq. and other Australian Therevidae. *Proceedings of the Linnean Society of NSW* 75, 345–359.
- Greve, L. 2002. *Pandivirilia eximia* (Meigen, 1820) (Diptera, therevidae) in Norway. *Norwegian Journal of Entomology* 49, 49–50.
- Haarto, A. & Winqvist, K. 2006. Finnish flies of the family Therevidae. *Entomologica Fennica* 17, 46–55.
- Hartman, M., Irwin, M.E. & Kampmeier, G.E., 1995. *Habitat partitioning by therevids at Sand Ridge State Forest*. January Report. Illinois Natural History Survey, Champaign-Urbana.
- Irwin, M. 1976. Morphology of the terminalia and known ovipositing behaviour of female Therevidae (Diptera: Asiloidea), with an account of correlated adaptations and comments on phylogenetic relationships. *Annals of the Natal Museum* 22, 913–935.
- Irwin, M. & Lyneborg, L. 1981a. The genera of Nearctic Therevidae. *Bulletin of the Illinois Natural History Survey* 32, 193–277.
- Irwin, M.E. & Lyneborg, L. 1981b. Therevidae. Manual of Nearctic Diptera. (ed. by B.V.P. J.F. McAlpine, G.E. Shewell, H.J. Teskey, J.R. Vockeroth & D.M. Wood) 1, pp. 51–523. Research Branch, Agriculture Canada Monograph, Ottawa.
- Irwin, M.E. & Lyneborg, L. 1989. *Family Therevidae*. In N.L. Evenhuis (ed.), Catalog of Diptera of the Australasian and Oceanian Regions, pp 353–358, Bishop Museum Special Publication. Bishop Museum Press, 86, 1–1154.
- Lyneborg, L. 1965. Danmarks Fauna vol. 70: *Tovinger IV. Humlefluer, Stiletfluer, Rovfluer m.fl.* G. E. C. Gads forlag, København. pp. 40–77.
- Lyneborg, L. 1976. A Revision of the Therevidae stiletto flies (Diptera: Therevidae) of the Ethiopian region, *Bulletin of the British Museum (Natural History) Entomology* 33, No. 3, London.
- Lyneborg, L. 1986. The Palaearctic species of *Pandivirilia* Irwin & Lyneborg, 1981 (Insecta, Diptera, therevidae). *Steenstrupia* 12, 85–98.
- Lyneborg, L. 1989. *Therevidae*, in Soós & Papp (ed.): Catalogue of Palaearctic Diptera, vol 6, Therevidae-Empididae, Akademia kiado, Budapest. pp. 11–35.
- Lyneborg, L. 1992. Therevidae (Insecta: Diptera). *Fauna of New Zealand/ Ko te Aitanga Pepeke o Aotearoa* 24, pp. 139. DSIR Plant Protection/ Te Wahanga Manaaki Tupu, Auckland.
- Økland, K.A. 1981. Inndeling av Norge til bruk ved biogeografiske oppgaver – et revidert Strand-system. *Fauna (Oslo)* 34, 167–178.
- Ottesen, P. (ed.): *Norske insekter og deres artsantall*. Trondheim, 1993
- Power, N. 1998. *Temporal and spatial diversity of Therevidae in South East Queensland (Diptera: Therevidae)*. Honours thesis, University of Queensland.
- Siebke, H. 1877. Enumeratio Insectorum Norve-

- gicorum, Fasc. IV, Catalogum dipterorum continentem. Ed. J. Sparre Schneider. Christiania. P. 13 f.
- Stubbs, A. & Drake, M. 2001. *British Soldierflies and their Allies*. British Entomological and Natural History Society. Pp. 385–401.
- Winterton S.L. and Irwin M.E. 2001. Phylogenetic revision of *Agapophytus* Guérin (Diptera: Therevidae: Agapophytinae). *Invertebrate Taxonomy* 15, 467–526.
- Winterton, S.L., Irwin, M.E. & Yeates, D.K. 1999. Phylogenetic revision of the *Taenogera* Kröber genus-group (Diptera: Therevidae) with descriptions of two new genera. *Australian Journal of Entomology* 38, 274–290.
- Winterton, S.L., Skevington, J. & Lambkin, C.L. 2005. *The stiletto-flies of Australasia*. http://www.cdfa.ca.gov/phpps/ppd/Lucid/Therevidae/Austherevid/key/Austherevid/Media/Html/introduction_page.html (20 February 2011).
- Woodley N. 1989: Phylogeny and classification of the „Orthorrhaphous“ Brachycera. *Manual of Nearctic Diptera*. (ed. by J. McAlpine, Wood, DM) 3, pp. 1371–1395. Research Branch Agriculture Monograph No. 32. Canadian Government Publishing Centre, Hull.

Received: 20 February 2011

Accepted: 24 October 2011

Appendix. Distribution maps of all 18 species of Therevidae recorded from Norway. The distribution is given as EIS-grid maps (European Invertebrate Survey).

FIGURE 26. Distribution of *Acrosathe annulata* (Fabricius, 1805) in Norway.

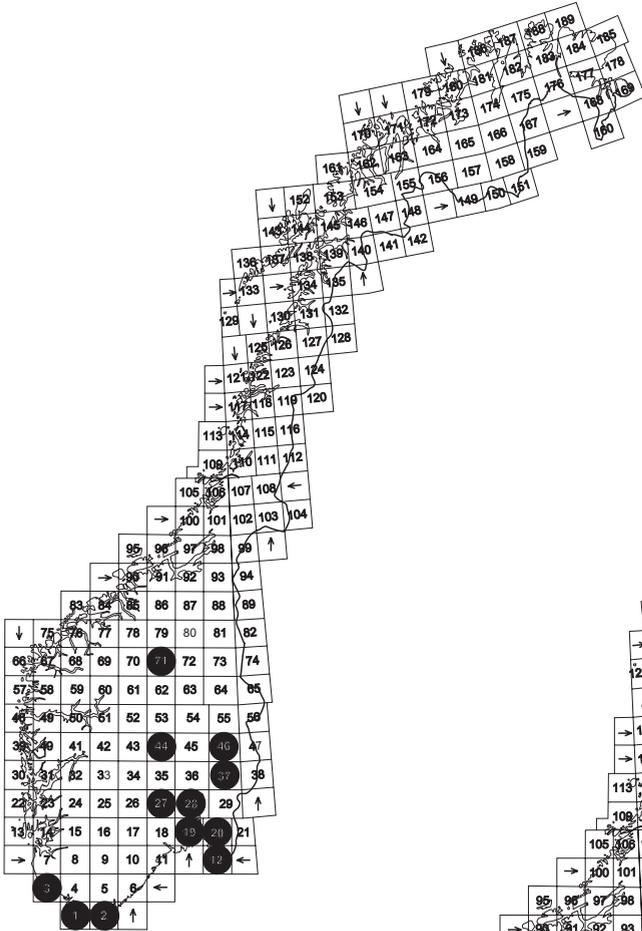


FIGURE 27. Distribution of *Dialineura anilis* (L., 1761) in Norway.

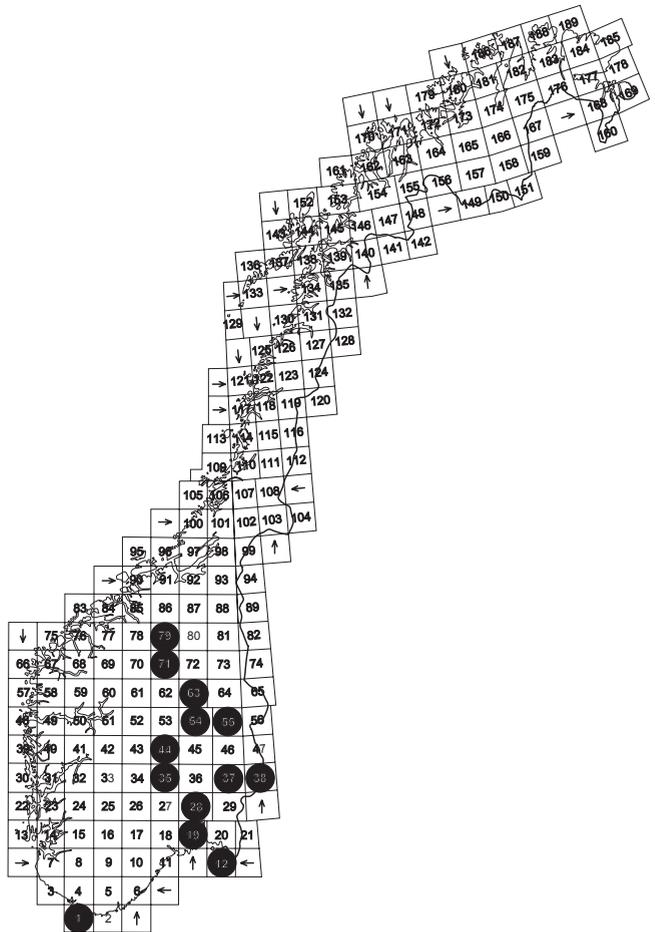


FIGURE 30. Distribution of *Psilocephala imberbis* (Fallén, 1814) in Norway.

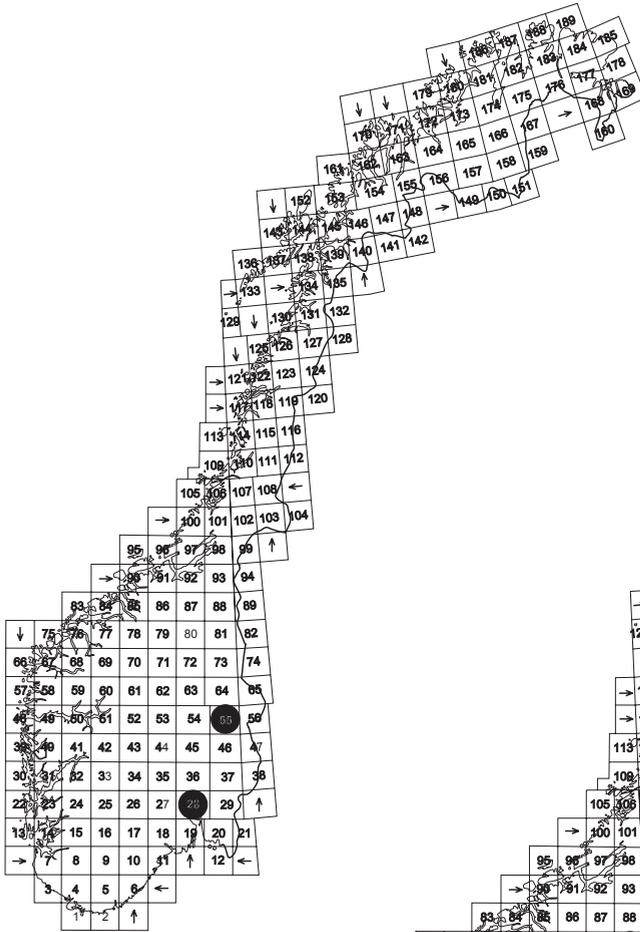


FIGURE 31. Distribution of *Spiriverpa lunulata* (Zetterstedt, 1838) in Norway.

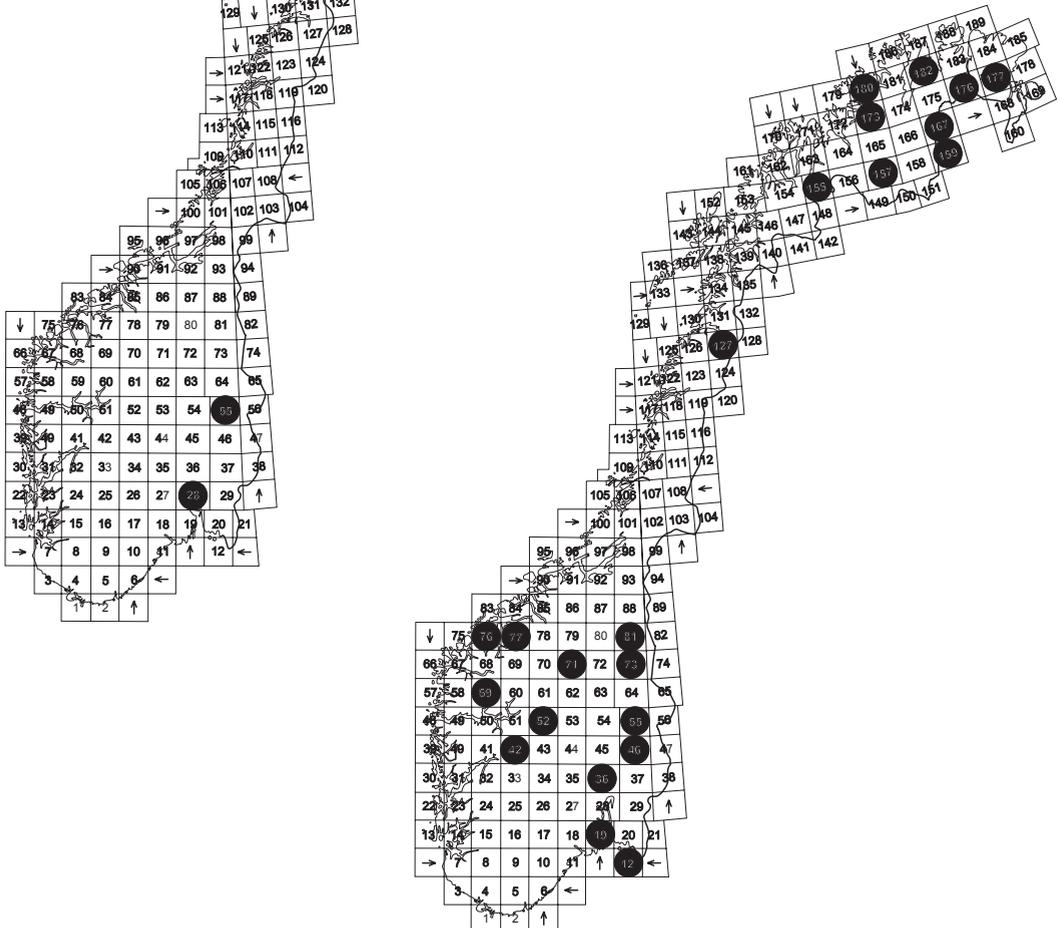


FIGURE 32. Distribution of *Thereva cinifera* Meigen, 1830 in Norway.

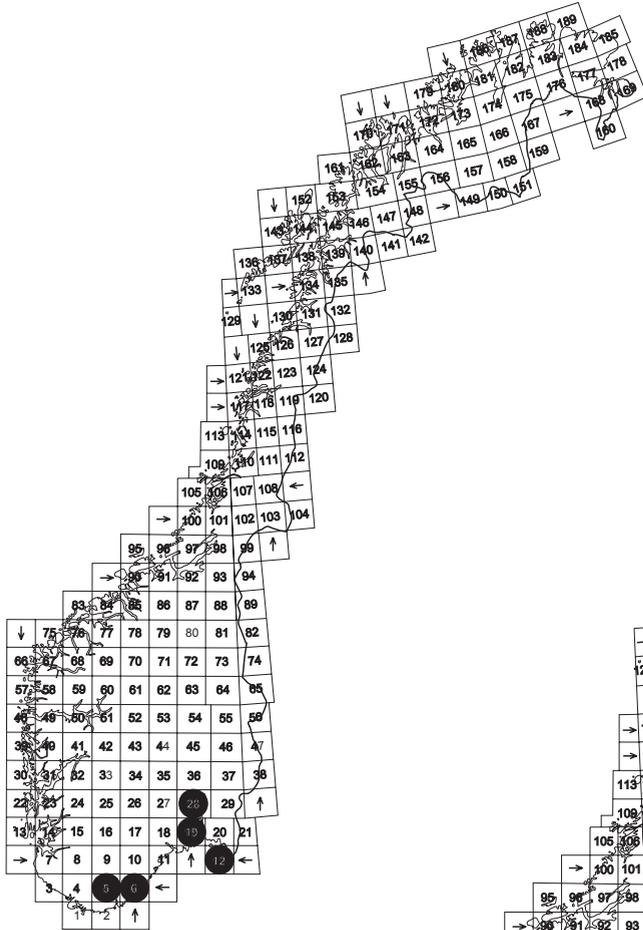


FIGURE 33. Distribution of *Thereva fuscinervis* Zetterstedt, 1838 in Norway.

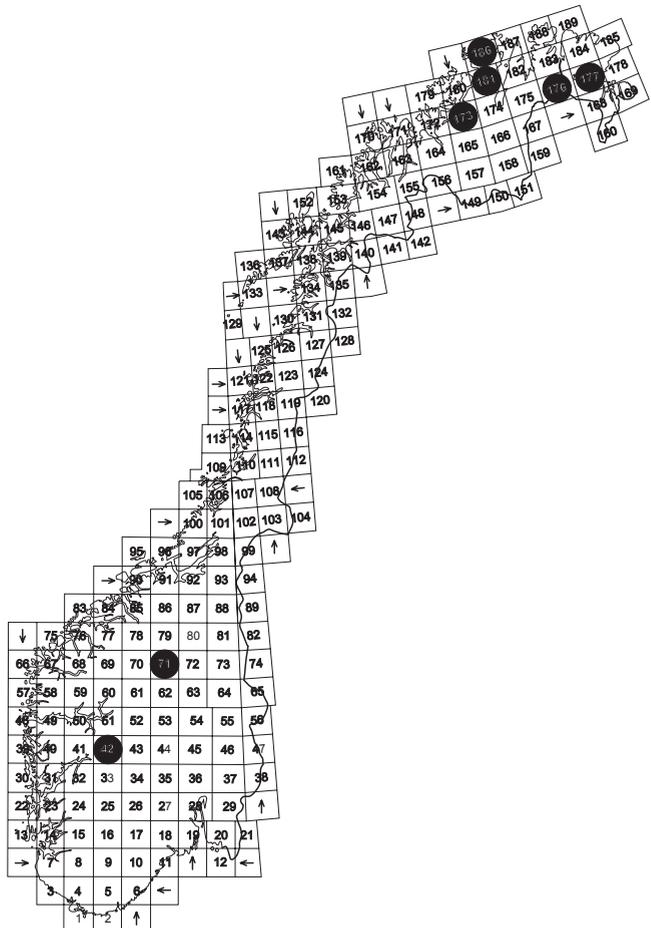


FIGURE 34. Distribution of *Thereva handlirschi* Kröber, 1912 in Norway.

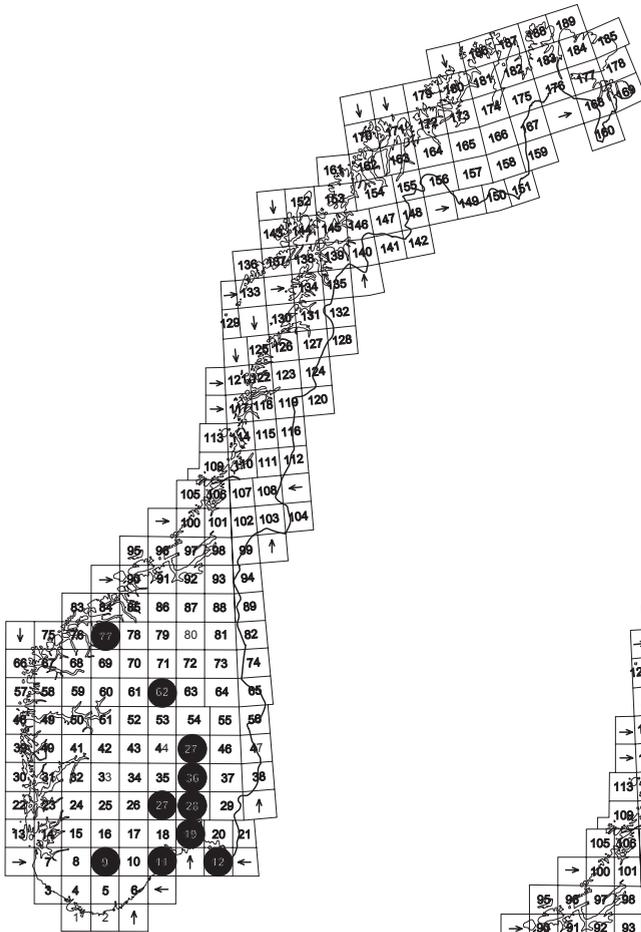


FIGURE 35. Distribution of *Thereva inornata* Verrall, 1909 in Norway.

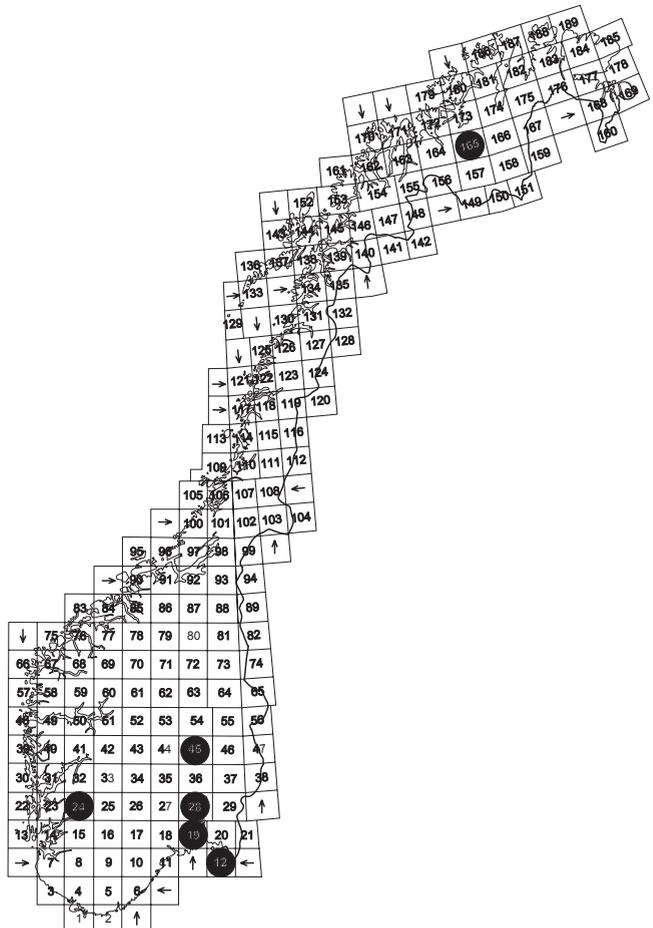


FIGURE 36. Distribution of *Thereva lanata* Zetterstedt, 1838 in Norway.

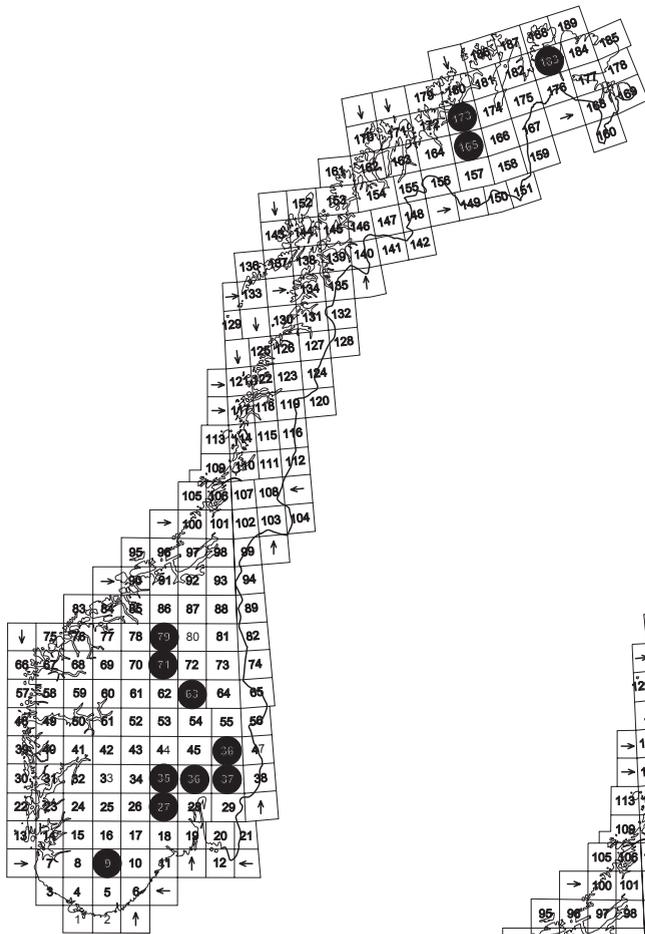


FIGURE 37. Distribution of *Thereva marginula* Meigen, 1820 in Norway.

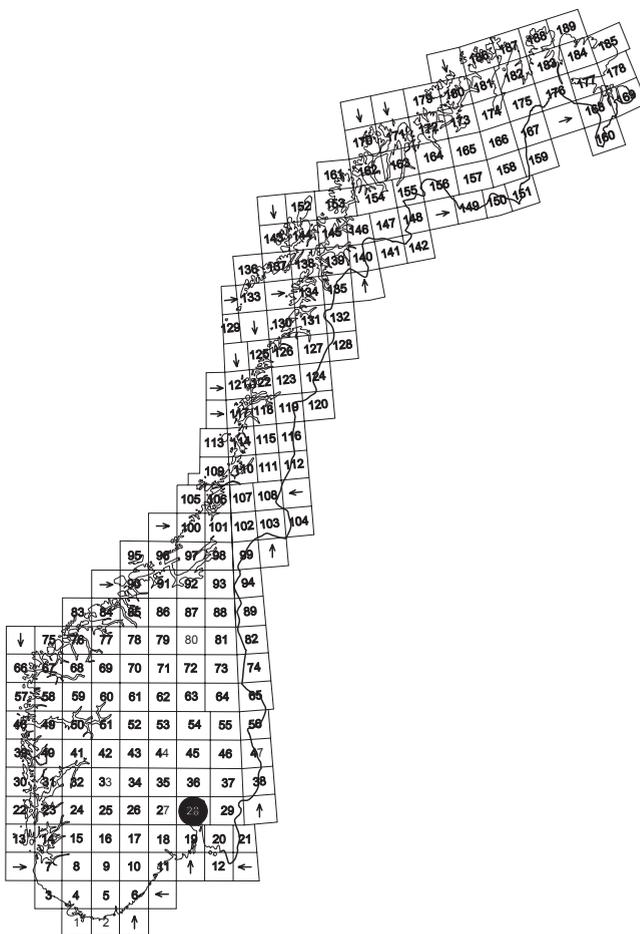


FIGURE 38. Distribution of *Thereva microcephala* Loew, 1847 in Norway.

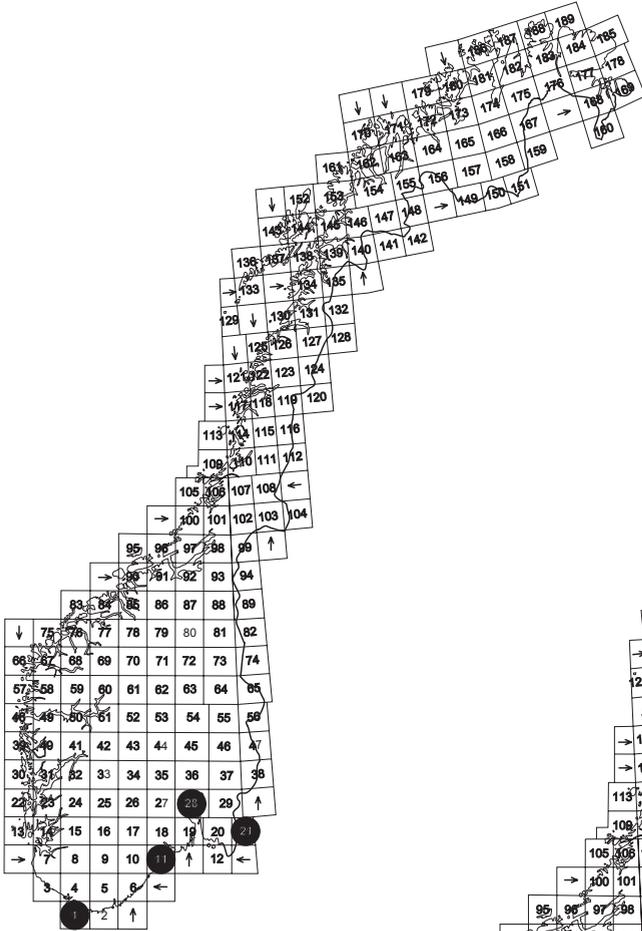


FIGURE 39. Distribution of *Thereva nobilitata* (Fabricius, 1775) in Norway.

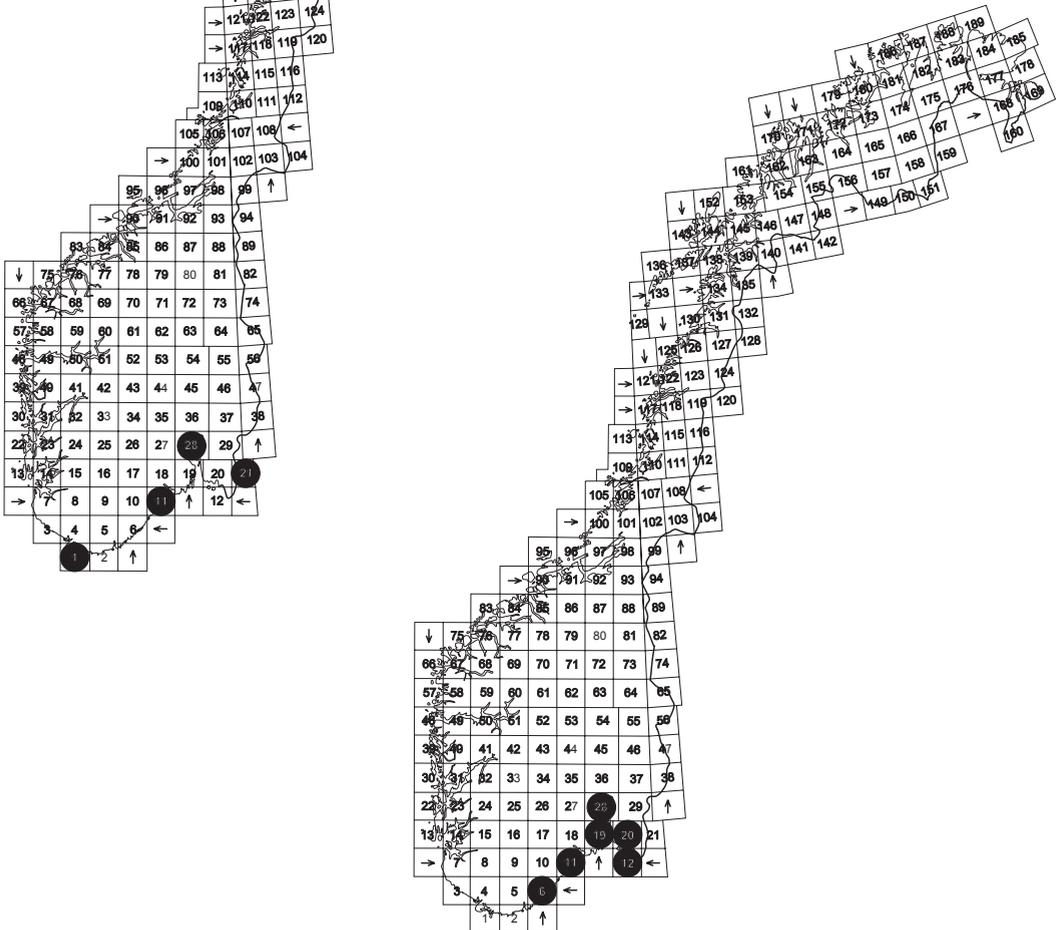


FIGURE 40. Distribution of *Thereva plebeja* (L., 1758) in Norway.

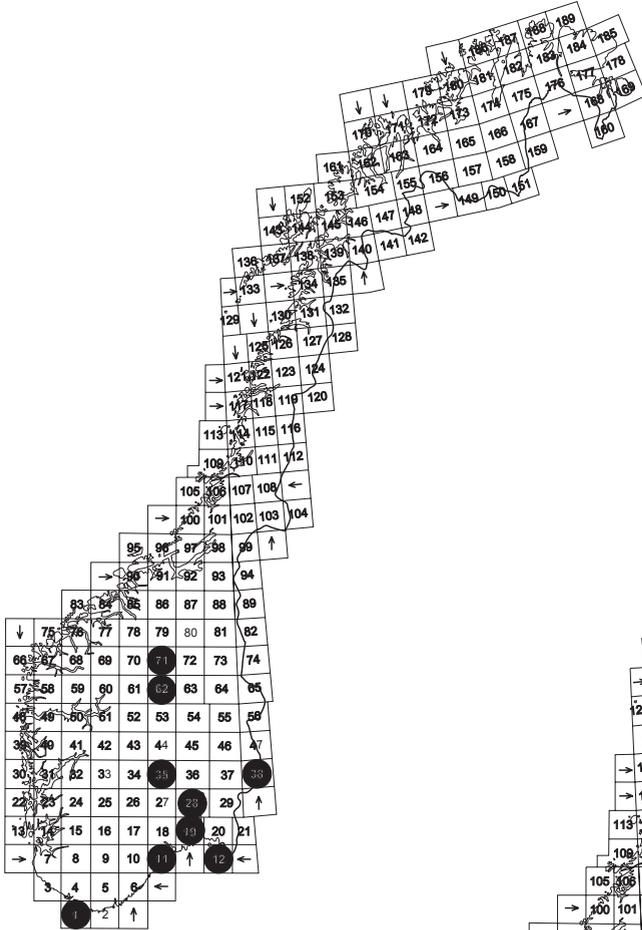


FIGURE 41. Distribution of *Thereva strigata* (Fabricius, 1794) in Norway.

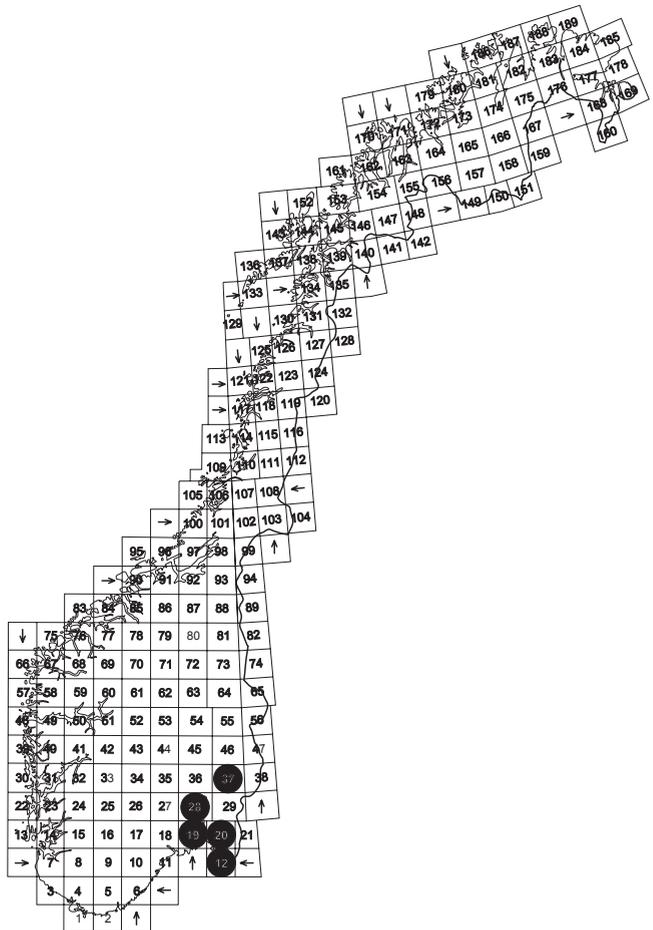


FIGURE 42. Distribution of *Thereva unica* (Harris, 1780) in Norway.

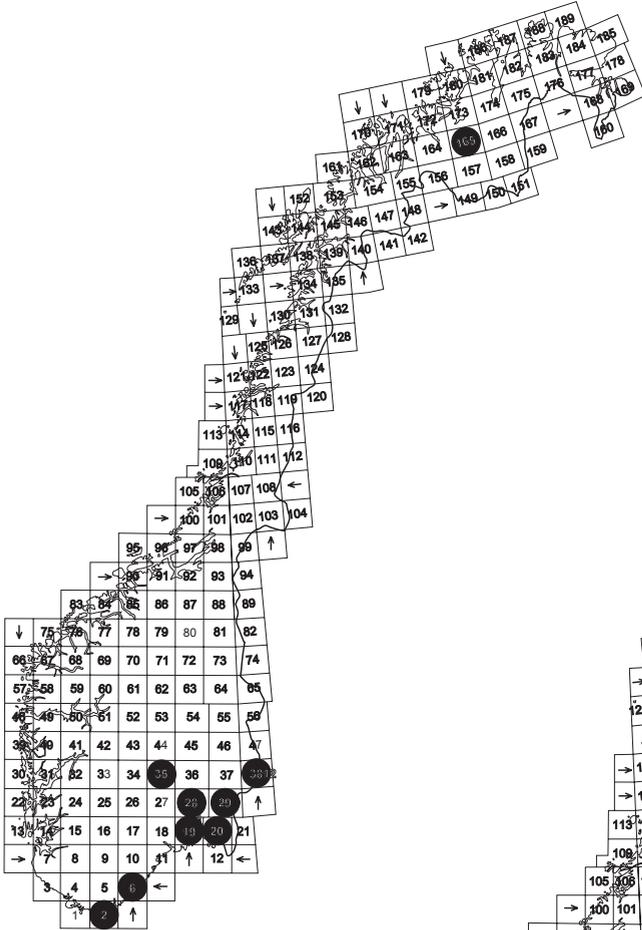


FIGURE 43. Distribution of *Thereva valida* Loew, 1847 in Norway.

