

SPIDERS (ARANEAE) ON SANDY ISLANDS IN THE SOUTHWESTERN ARCHIPELAGO OF FINLAND

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Abstract

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Spiders were studied on two sandy islands in the outermost part of the SW archipelago of Finland: Korppoo Jurmo (59°50'N, 21°37'E) and Dragsfjärd Örö (59°50'N, 22°20'E). The main collecting method was pitfall trapping. Typical, and often locally abundant, species on sandy and/or gravel shores were e.g. *Arctosa cinerea*, *Alopecosa fabrilis*, *Pardosa agricola*, *Xerolycosa miniata*, *Zelotes longipes*, *Z. praeficus*, *Callilepis nocturna*, *Lasiargus hirsutus*, *Trichoncus hackmani*, *Microlinyphia impigra*, *Steatoda albomaculata*, *Philodromus fallax*, *Phlegra fasciata* and *Sitticus saltator*. On dry heath meadows the following species, in addition to many of the above-mentioned spiders, were typically caught: *Zelotes electus*, *Alopecosa cuneata*, *Pardosa agrestis*, *P. palustris*, *Trichopterna cito* and *Lepthyphantes decolor*. The material included three species listed in the Finnish Red Data Book, all in need of monitoring, i.e. *Zelotes electus* (abundant), *Metapanamomops kaestneri* (locally abundant) and *Acartauchenius scurrielis*. Also many other rare species, like *Jacksonella falconeri*, *Argenna subnigra* and *Pseudicius encarpatus*, were found.

Introduction

The southwestern archipelago of Finland consists of over 41 000 islands of different size. The spider fauna of this area has been studied by e.g. HACKMAN (1953), LEHTINEN, KLEEMOLA (1962), KLEEMOLA (1963), PALMGREN (1972), PALMGREN, LÖNNQVIST (1974), LEHTINEN et al. (1979).

A large area (19 000 km² and 8 400 islands or islets) of the southern part of the archipelago belongs nowadays to the joint working area of the Archipelago National Park, and investigation of fauna in the Park was carried out during the 1990s. In the present paper, data on the spider fauna on two rather large sandy islands are presented. The islands Jurmo and Örö are situated in the outer archipelago and facing the open Baltic Sea.

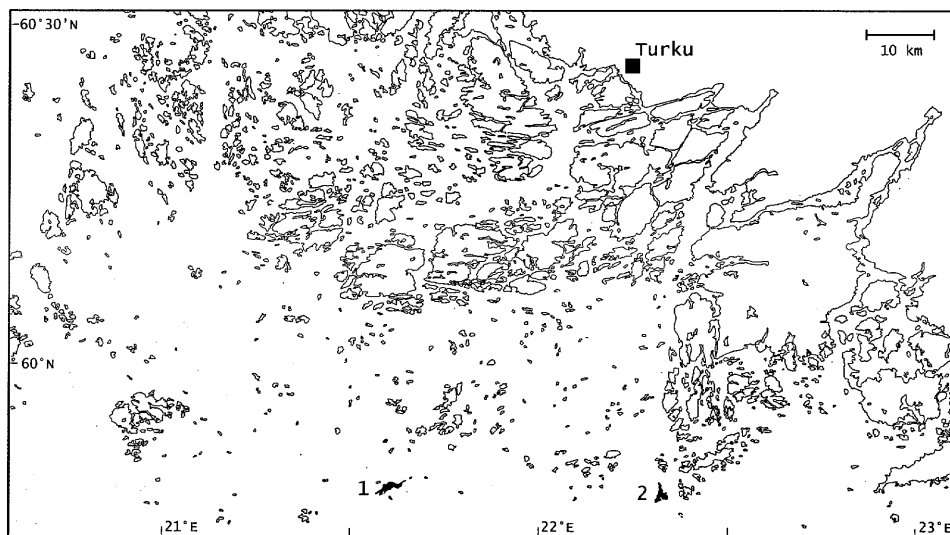


Fig. 1. The study islands in the southwestern archipelago of Finland; 1 = Jurmo, 2 = Öro.

Study area, material and methods

The islands Jurmo (in Korppoo/Korpo; 59°50'N, 21°37'E) and Öro (in Dragsfjärd; 59°50'N, 22°20'E) are rather isolated sandy islands (Fig. 1). The area of Jurmo is 2.7 and of Öro 2.0 km². The distance between the islands is about 35 km. In Öro there are forests of different types, with pine forests dominating naturally, whereas in Jurmo only a planted pine woodland can be found.

Two main habitat types were studied: 1) sand/gravel sea shores 2) dry meadows and heaths. Two sea shores and a pond shore were studied in Jurmo and five sea shores in Öro. Three dry meadows or heaths were investigated in Jurmo and two in Öro island where, in addition, a man-made open sandy heath was studied.

The shores were characterised by sand or gravel, sometimes also by larger stones. In some places wrack (drift of *Fucus* etc) was found. The sparse vegetation was formed by *Leymus arenarius* and several plants that are rare in Finland, like *Elymus farctus*, *Crambe maritima*, *Isatis tinctoria*, *Salsola kali*, *Atriplex littoralis*, *Cakile maritima*, and *Honkenya peploides*. In addition, some species of *Carex*, as well as of Poaceae, and *Galium verum*, *Lathyrus japonicus*, *Thymus serpyllum*, *Tanacetum vulgare* and *Rosa rugosa* are locally typical plants.

In dry meadows and heaths e.g. *Juniperus communis*, *Calluna vulgaris*, *Potentilla subarenaria*, *Linum catharticum*, *Arctostaphylos uva-ursi*, *Thymus serpyllum*, *Empetrum nigrum*, *Antennaria dioica*, *Cardamine hirsuta*, *Artemisia campestris* as well as *Carex* and Poaceae species are typical and at least locally common.

The main collecting method was pitfall trapping. Plastic cups (diameter 70 mm) with covers against rainfall and litter, and with ethylene glycol and detergent as preservative, were used. The trapping period in Jurmo was 29 June - 26 August 1995, and in Öro 25 May - 13 September 1996.

The trapping sites (A-F), with characteristic plant species, were in Jurmo: 1) Shores (southern and southwestern side), A: sand shore, *Leymus*, *Empetrum*, *Galium verum*; B: sand shore, *Galium verum*, *Empetrum*, *Leymus*, *Juniperus*; C: silty shore of temporary ponds, *Agrostis stolonifera*; 2) Dry meadows & heaths, D: calcareous heath, *Festuca*, *Potentilla subarenaria*, *Antennaria*, *Linum*, *Juniperus*, lichens; E: dry meadow, Poaceae, *Juniperus*; F: thymus heath, Poaceae, *Thymus*, *Empetrum*, *Calluna*, *Juniperus*.

The trapping sites (A-H) in Örö were: 1) Shores (western side), A: sand dune, small pines, *Galium verum*, *Isatis*, Poaceae, *Rosa rugosa*, *Cladonia*; B: sand-gravel-stony shore, *Leymus*, *Thymus*, *Galium verum*, Poaceae; C: sand dune, *Leymus*, *Galium verum*, *Sedum*, *Rosa*, Poaceae; D: sand shore, *Thymus*, *Galium verum*, *Anthriscus*, *Allium*, *Crambe*, *Chamaenerium*, *Tanacetum*, *Sedum*, *Rosa*, *Juniperus*, Poaceae; E: sand-gravel-stony shore, *Leymus*, *Galium verum*, *Tanacetum*, *Crambe*, *Myosotis*, Poaceae; 2) Heaths, F: warm heath, *Thymus*, *Calluna*, *Cardamine hirsuta*, *Cirsium*, Poaceae; G: warm heath, *Calluna*, *Viola tricolor*, *Artemisia campestris*, Poaceae; H: edge of man-made sand field and dry pine forest, open sand, *Calamagrostis*.

The spider material from Jurmo and Örö consisted of about 1 600 and 3 800 identifiable specimens, respectively. The material is deposited in the Zoological Museum, University of Turku.

Table 1. The most abundant spiders caught by pitfall traps on sea shores (sites A-B) and on a pond shore (site C) in Jurmo. Numbers are given for each species as a percentage of the total catch at the respective site. Numbers in brackets denote that the species was not among the six most abundant ones, data for the dominant species are in bold; Aver- average percentage on sea shores. For description of the sites, see the text.

	A	B	Aver	C
<i>Lasiargus hirsutus</i> (MENGE)	31	4	18	–
<i>Trichoncus hackmani</i> MILL.	(3)	27	15	–
<i>Zelotes subterraneus</i> (C. L. K.)	29	–	15	–
<i>Alopecosa fabrilis</i> (CL.)	(1)	17	9	–
<i>Pardosa agricola</i> (TH.)	(2)	13	8	2
<i>Pardosa agrestis</i> (WEST.)	8	–	4	(2)
<i>Oedothorax fuscus</i> (BL.)	7	–	3	55
<i>Thanatus striatus</i> C. L. K.	4	(2)	3	–
<i>Pachygnatha degeeri</i> SUND.	–	5	3	(0)
<i>Pirata piraticus</i> (CL.)	3	–	2	(2)
<i>Oedothorax retusus</i> (WEST.)	–	(1)	.	15
<i>Oedothorax agrestis</i> (BL.)	(1)	–	.	7
<i>Erigone longipalpis</i> (SUND.)	–	–	.	6
Number of species	23	20	.	14
Number of individuals	258	114	.	454

Results and discussion

Altogether, about 190 species of spiders were found in Jurmo and Örö islands in 1995-96. The most species-rich families were Linyphiidae (s.lat.; 67 species), Lycosidae (24), Theridiidae (19) and Gnaphosidae (17).

Some species were frequently found both on shores and in dry meadow or heath habitats, i.e. they were common in all open areas. These include e.g. *Zelotes longipes* (L. KOCH), *Pardosa palustris* (LINNAEUS), *P. agrestis* (WESTRING) and *P. agricola* (THORELL) in Jurmo, and *Zelotes praeficus* (L. KOCH), *Z. electus* (C. L. KOCH), *Z. longipes*, *Callilepis nocturna* (LINNAEUS), *Phrurolithus festivus* (C. L. KOCH) and *Alopecosa fabrilis* (CLERCK) in Örö.

Spiders in shore habitats

The most abundant species on sandy sea shores and on the silty pond shore in Jurmo island are shown in Table 1. Two erigonine species, *Lasiargus hirsutus* (MENGE) and

Table 2. The most abundant spiders caught by pitfall traps on shores in Örö (sites A-E). Numbers are given for each species as a percentage of the total catch at the respective site. Numbers in brackets denote that the species was not among the six most abundant ones, data for the dominant species are in bold; Aver- average percentage on sea shores. For description of the sites, see the text.

	A	B	C	D	E	Aver
<i>Lasiargus hirsutus</i> (MENGE)	56	11	(1)	25	42	27
<i>Xerolycosa miniata</i> (C. L. K.)	12	(3)	76	13	(1)	21
<i>Zelotes electus</i> (C. L. K.)	5	(2)	4	11	(2)	5
<i>Pardosa agricola</i> (TH.)	3	(1)	(0)	(4)	18	5
<i>Alopecosa fabrilis</i> (CL.)	3	20	(0)	(3)	(0)	5
<i>Callilepis nocturna</i> (L.)	(1)	16	3	(1)	3	5
<i>Zelotes praeficus</i> (L. K.)	(2)	(5)	(2)	5	6	4
<i>Arctosa cinerea</i> (FABR.)	3	–	4	(2)	(2)	2
<i>Pardosa agrestis</i> (WEST.)	–	11	–	–	–	2
<i>Micaria nivosa</i> L. K.	–	10	(0)	(0)	–	2
<i>Zelotes longipes</i> (L. K.)	(0)	8	–	–	–	2
<i>Phrurolithus festivus</i> (C. L. K.)	(1)	(2)	2	(0)	(3)	2
<i>Trichoncus hackmani</i> MILL.	(2)	(2)	2	(1)	(2)	2
<i>Pachygnatha degeeri</i> SUND.	(1)	(1)	(1)	6	–	2
<i>Alopecosa pulverulenta</i> (CL.)	(0)	–	–	7	–	1
<i>Thanatus striatus</i> C. L. K.	(0)	(1)	(1)	(0)	5	1
<i>Zelotes subterraneus</i> (C. L. K.)	(0)	(2)	–	–	5	1
Number of species	37	34	24	46	26	.
Number of individuals	729	388	496	722	395	.

Trichoncus hackmani MILLIDGE dominated on sea shores, and *Oedothorax fuscus* (BLACKWALL) and *O. retusus* (WESTRING) dominated the silty pond shore. Other abundant species were e.g. *Zelotes subterraneus* (C. L. KOCH), *A. fabrilis* and *P. agricola*.

In Örö, *L. hirsutus*, *Xerolycosa miniata* (C. L. KOCH) and *A. fabrilis* were dominant species in shore trap series (Table 2). Other abundant species were *Z. electus*, *P. agricola*, *C. nocturna*, *Z. praeficus* and *Arctosa cinerea* (FABRICIUS).

The most typical and abundant sand/gravel shore species in Jurmo and Örö islands was *L. hirsutus*. The species is known in Finland only from the outer part of the archipelago; HACKMAN (1953) reported it for the first time in Finland from *Fucus* heaps in Jurmo and from a few other localities.

The shore material included many rare and interesting species: species on wide sandy shores were e.g. *A. cinerea*, *A. fabrilis*, *X. miniata*, *Philodromus fallax* SUNDEVALL, *Xysticus sabulosus* (HAHN), *Microlinyphia impigra* (O. P.-CAMBRIDGE), *Steatoda albomaculata* (DE GEER), *Phlegra fasciata* (HAHN) and *Sitticus saltator* (O. P.-CAMBRIDGE).

Typical species on shores in the SW archipelago, and many of them rare, were also *Erigone longipalpis* (SUNDEVALL), *T. hackmani*, *Linyphia tenuipalpis* SIMON, *Argenna subnigra* (O. P.-CAMBRIDGE), *Micaria nivosa* L. KOCH, *Z. electus*, *Clubiona similis* L. KOCH, *Aelurillus v-insignitus* (CLERCK), *Myrmarachne formicaria* (DE GEER), *Thanatus striatus* C. L. KOCH, *Segestria senoculata* (LINNAEUS), *Dipoena hamata* TULLGREN and *D. prona* (MENGE).

Spiders in dry meadows and heaths

Abundant spiders caught by pitfall traps in dry meadows and in heaths in Jurmo island are listed in Table 3. Dominant in different habitats were *Z. longipes*, *P. palustris* and *P. agrestis*, other common species e.g. *Drassodes lapidosus* (WALCKENAER), *Z. electus* and locally *Trichopterna cito* (O. P.-CAMBRIDGE).

Abundant species in dry heaths and in the man-made sandy heath in Öró island are given in Table 4. Dominant species in dry open heaths were *Z. praeficus* and *Alopecosa cuneata* (CLERCK), other common species were *Z. electus*, *Z. longipes* and *Metapanamomops kaestneri* (WIEHLE). *Lepthyphantes decolor* (WESTRING), *P. festivus* and *X. miniata* were the most abundant species in the man-made heath where also the habitat resembled both heaths and the nearby sandy shore.

Typical and abundant heath species in Jurmo and Öró islands were several species of the genera *Zelotes* (especially *Z. praeficus*, *Z. electus*, *Z. longipes*), *Alopecosa* (*A. cuneata*, *A. fabrilis*, *A. pulverulenta* (CLERCK)) and *Pardosa* (*P. agrestis*, *P. palustris*).

Table 3. The most abundant spiders caught by pitfall traps in dry meadows and heaths in Jurmo (sites D-F). Numbers for each species are given as a percentage of the total catch at the respective site. Numbers in brackets denote that the species was not among the six most abundant ones, data for the dominant species are in bold; Average percentage in studied habitats. For description of the sites, see the text.

	D	E	F	Aver
<i>Zelotes longipes</i> (L. K.)	31	24	23	26
<i>Pardosa palustris</i> (L.)	7	(4)	41	17
<i>Pardosa agrestis</i> (WEST.)	37	7	5	16
<i>Drassodes lapidosus</i> (WALC.)	7	7	5	6
<i>Zelotes electus</i> (C. L. K.)	2	8	4	5
<i>Trichopterna cito</i> (O. P.-C.)	(0)	13	–	4
<i>Pardosa agricola</i> (TH.)	(1)	11	–	4
<i>Metopobactrus prominulus</i> (O. P.-C.)	(0)	(1)	7	3
<i>Alopecosa pulverulenta</i> (CL.)	4	(1)	(1)	2
Number of species	25	29	15	.
Number of individuals	257	174	133	.

Table 4. The most abundant spiders caught by pitfall traps in dry heaths (sites F-G) and in the man-made sandy heath in Öró (site H). Numbers for each species are given as a percentage of the total catch at the respective site. Numbers in brackets denote that the species was not among the six most abundant ones, data for the dominant species are in bold; Average percentage in studied heaths. For description of the sites, see the text.

	F	G	Aver	H
<i>Zelotes praeficus</i> (L. K.)	33	23	28	–
<i>Alopecosa cuneata</i> (CL.)	13	30	22	–
<i>Zelotes electus</i> (C. L. K.)	8	10	9	6
<i>Zelotes longipes</i> (L. K.)	6	11	9	(1)
<i>Metapanamomops kaestneri</i> (WIEH.)	(3)	7	5	–
<i>Callilepis nocturna</i> (L.)	7	(2)	5	–
<i>Alopecosa fabrilis</i> (CL.)	(2)	5	4	3
<i>Phrurolithus festivus</i> (C. L. K.)	6	–	3	18
<i>Lepthyphantes decolor</i> (WEST.)	(4)	–	.	36
<i>Xerolycosa miniata</i> (C. L. K.)	(1)	–	.	10
<i>Pardosa lugubris</i> (WALC.)	(0)	–	.	6
Number of species	36	23	.	18
Number of individuals	503	246	.	67

Worth mentioning are also *L. decolor* (found in Jurmo and Örö), *Porrhomma montanum* JACKSON (Örö), *M. kaestneri* (Örö), *Micrargus subaequalis* (WESTRING) (Jurmo), *T. cito* (Jurmo and Örö), *Tapinocyboides pygmaea* (MENGE) (Jurmo and Örö), *Typhochrestes digitatus* (O. P.-CAMBRIDGE) (Örö), *Walckenaeria monoceros* (WIDER) (Jurmo), *Zelotes pusillus* (C. L. KOCH) (Örö), *C. nocturna* (Örö), *Micaria silesiaca* L. KOCH (Örö), *Poecilochroa variana* (C. L. KOCH) (Jurmo and Örö), *Phaeoecelus braccatus* (L. KOCH) (Örö), *Pardosa nigriceps* (THORELL) (Jurmo and Örö), and *Xysticus erraticus* (BLACKWALL) (Jurmo and Örö).

In addition, the following noteworthy species were found in the field/shrub layer of dry heaths: *Achaearanea riparia* (BLACKWALL) (in Örö), *A. saxatile* (C. L. KOCH) (Jurmo and Örö), *Theridion pallens* BLACKWALL (Örö), *T. tinctum* (WALCKENAER) (Örö).

Endangered species and faunistic rarities

Three species amongst the present material have been included in the Finnish Red Data Book as species in need of monitoring (RASSI et al., 1992): *Z. electus*, *M. kaestneri* and *Acartauchenius scurrilis* (O. P.-CAMBRIDGE). All were found in Örö, and *Z. electus* also in Jurmo. *Z. electus* was the fourth most abundant species in Örö, and rather common also in dry heaths in Jurmo. *M. kaestneri* was also locally abundant in the dry heath in Örö. Only one specimen of *A. scurrilis* was found, also in dry heath in Örö. An interesting species is *Pseudicius encarpatus* (WALCKENAER), listed as extinct in Sweden (EHNSTRÖM et al., 1993) and which has also clearly declined in Finland during this century (cf. also PALMGREN, 1972); one specimen was found in Örö.

Three species have recently been reported for the first time from Finland (KOPONEN, 1999); two of them (*Jacksonella falconeri* (WALCKENAER) from the gravel-sand shore in Örö and *Enoplognatha thoracica* (HAHN) from dry *Thymus* meadow in Jurmo) are based on the present material, and the third one (*Ozyptila westringi* (THORELL) from Jurmo) on previous museum material.

Faunal comparisons

The fauna found in sandy islands of Jurmo and Örö resembled, in general, that reported from corresponding habitats in Scania (ALMQUIST, 1973) and Öland (KRONESTEDT, 1983), South Sweden, and from the northern coast of Germany (SCHULTZ, FINCH, 1996). However, many species common either on the North German coast or on dunes of Scania and in heaths of Öland are absent in the present area, probably due to the rather small size, marked isolation and northern latitude of Jurmo and Örö. On the other hand, several common or characteristic species of the present material are absent or rare at more southern Baltic Sea sites. Special characters of the present islands seem to be, for example, the great number of species and individuals of Gnaphosidae and the dominance of *Lasiargus hirsutus* (MENGE) on shores (cf. ALMQUIST, 1973; VILBASTE, 1974; KRONESTEDT, 1983; SCHULTZ, FINCH, 1996).

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