

Wolf spider (Araneae, Lycosidae) fauna of an old abandoned agricultural village of Mutenia in Finnish Lapland

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The study was carried out in the Mutenia meadow area on the northern shore of Lokka reservoir in Finnish Lapland in the years 2000–2002. Mutenia is an old Lappish agricultural village, from which the last inhabitants moved away in the late 1960s. It has been kept as meadow by mowing. The material was collected with pitfall traps and window traps made of balcony flower pots situated on the ground. The total number of species was 17, including 1816 individuals. *Pardosa palustris* (Linnaeus) (35.6%) and *P. sphagnicola* (Dahl) (33.0%) were the two most abundant species. The next two in frequency were *Alopecosa aculeata* (Clerck) (14.4%) and *A. pulverulenta* (Clerck) (6.2%). *Pardosa lasciva* L. Koch and *P. atrata* (Thorell) represented the northern fauna element, while *P. fulvipes* (Collet) and *P. paludicola* (Clerck) belonged to a southern type. There were two new biogeographical records: *Pardosa fulvipes* and *P. pullata* (Clerck).

1. Introduction

The meadow area of Mutenia is an exceptional site in a landscape otherwise dominated by bogs, fens and coniferous forests in Forest Lapland. Vegetation in Mutenia is polymorphic due to its variable topography and long history of settlement. The area has been classified as an important traditional landscape of regional value (Kalpio & Bergman 1999). The origin of the village dates back to the 18th century, when the first permanent inhabitants arrived. At its prime, the village consisted of more than ten residential buildings. The management of meadows and fields subsided in the 1960s, when the last permanent inhabitants moved out of the village (Nenonen 2003). However, up till the 1990s, the most eutrophic meadows of the region were reaped for reindeer feed. Systematic habitat management was started in 1996, since when the whole area has been annually reaped in the late

summer. Reindeer graze in the area occasionally. Only some single saplings of Scots pine (*Pinus sylvestris*), Norwegian spruces (*Picea abies*) and a few Goat willows (*Salix caprea*) have managed to grow.

The invertebrate fauna, including wolf spiders (Araneae, Lycosidae), of northernmost Lapland is moderately well known thanks to the biological stations of Kilpisjärvi and Kevo, which have significantly promoted faunistic research (Kleemola 1962, Koponen 1975 and 1976). The biogeographical province of LKem has usually been overlooked in this respect. Palmgren (1965) studied the wolf spider fauna of Pallastunturi area in the western part of this province. When Vuotos, a prospective water reservoir area at Pelkosenniemi was thoroughly inventoried in 1994–1995, our knowledge of the wolf spider fauna of the eastern part increased remarkably. For instance, eight new provincial records were booked (Similä & Itämies

2000). The general habitat demands of various wolf spider species are well known due to the basic work of Palmgren (1939). Quite recently, Matveinen-Huju (2004) compiled the Finnish habitat affinity data of over 200 boreal spiders, including the family Lycosidae, which made it easier to find relevant information.

In 2000, the collection of ground-living invertebrates was started in Mutenia. In this article, we describe the fauna of wolf spiders (Araneae, Lycosidae).

2. Material and methods

Mutenia is located on the northern shore of Lokka reservoir in Finnish Lapland (Grid 27°E 754:351). It is close to the southwestern corner of Urho Kekkonen National Park. The whole area is 16 hectares in size. It consists of a sloping hillside that is open meadow throughout. There are still three buildings left, which are used as vacation homes for the personnel and visitors of Kemijoki hydropower company. Otherwise, only hares and reindeers move there.

The vegetation varies between drier and more humid types. In the drier parts, the following plants are worth mentioning: *Achillea millefolium*, *Antennaria dioica*, *Botrychium lunaria*, *B. multifidum*, *Deschampsia flexuosa*, *Diphasiastrum alpinum*, *D. complanatum* ssp. *montellii*, *Festuca ovina*, *Leucanthemum vulgare*, *Luzula multiflora*, *Lycopodium annotinum* ssp. *alpestre*, *Rhinanthus serotinus*, *R. groenlandicus* and *Solidago virgaurea*. The more humid parts are characterised by *Alchemilla glomerulans*, *Anthriscus sylvestris*, *Deschampsia cespitosa*, *Epilobium angustifolium*, *Filipendula ulmaria*, *Polemonium acutiflorum*, *Silene dioica*, *Trollius europaeus* and *Veronica longifolia*.

The lower slope of the hillside bordering on water is partly open sand and gravel, while somewhat further from the water line, there is a more or less continuous *Carex aquatilis* belt. Around the buildings and around the old stone foundations of houses, there grows *Urtica dioica* and various Brassicaceae. The vascular plant nomenclature follow Field Flora of Finland (Hämét-Ahti *et al.* 1998).

The Mutenia hill is bordered on the eastern si-

de by a dry old pine forest, where the characteristic plants are *Vaccinium myrtillus*, *V. uliginosum* and *V. vitis-idaea*. *Empetrum* and *D. flexuosa* are also abundant. Northeast of the corner of the hilly area starts a large open bog. It begins as a pine bog and then turns into quite open fen. *Betula nana*, *Eriophorum vaginatum*, *Salix phylicifolia*, *S. lapponum* and *Carex* spp. are the most typical plants. On the shore meadows of Lake Lokka, there are even occasional *Pedicularis palustris* stands.

The material was collected with pitfall traps (nos. 1–16) in the years 2000–2002. The trap composition was as follows: normal pitfall traps made of one-liter plastic jars (with 44 cm edge length) and window traps (made of plastic balcony flower pot (symbol *a-g*; with 142 cm edge length) placed on the ground among the vegetation, which also collected wolf spiders. In the last year, the collecting was done with only 11 pitfall traps and five window traps. The pitfall traps 10–15 and the window trap *g* were not in use that year. The trap sites are characterised as follows: 1., 6. and 7. meadow with *D. cespitosa*; 2.–5. old stone foundations among old *Salix caprea* and with rich vegetation of *Epilobium angustifolium*; 8. a small “forest” patch with a few *P. abies* and *S. caprea*, with *V. myrtillus*; 9. and *c.* a forest-like zone with some *P. abies* and *Betula nana*, *Vaccinium vitis-idaea*. 10. and *d.* below a large *Salix lapponum*; 11. drier part of the meadow close to a heath-like area (*S. virgaurea*); 12–15. and *g.* a heath-like dry area with *P. sylvestris*, *V. vitis-idaea*, *V. uliginosum* and richly open ground; 16. and *e.* a grassy waste pit surrounded by meadow (*Silene dioica*, *Urtica dioica*); 17. and *b.* a small impression in the meadow; *f.* the middle part of the meadow.

The spiders were identified by JI. Only adult individuals were included. Some qualified samples are preserved in the collections of the zoological museum of the University of Oulu. The nomenclature follows Almqvist (2005).

3. Results

The total number of species was 17, including 1,816 individuals (Table 1). The yearly numbers of species varied from 10 (2001) to 14 (2000). Similarly, the total catches varied between the years from 723 exx. in 2000 to 432 exx. in 2001. *Par-*

Table 1. Yearly (2000–2001) wolf spider (Araneae, Lycosidae) catches at Mutenia, Finnish Forest Lapland (see Material and Methods).

Species	Total	2000	2001	2002
<i>Alopecosa aculeata</i> (Clerck)	265	115	104	46
<i>Alopecosa pinetorum</i> (Thorell)	4	3	–	1
<i>Alopecosa pulverulenta</i> (Clerck)	112	92	–	20
<i>Alopecosa taeniata</i> (C.L.Koch)	21	–	4	17
<i>Pardosa amentata</i> (Clerck)	71	19	1	51
<i>Pardosa atrata</i> (Thorell)	13	10	1	2
<i>Pardosa fulvipes</i> (Collet)	1	–	–	1
<i>Pardosa hyperborea</i> (Thorell)	26	15	1	10
<i>Pardosa lasciva</i> L.Koch	1	1	–	–
<i>Pardosa lugubris</i> (Walckenaer)	35	18	2	15
<i>Pardosa paludicola</i> (Clerck)	2	2	–	–
<i>Pardosa palustris</i> (Linnaeus)	655	273	274	108
<i>Pardosa pullata</i> (Clerck)	5	3	–	2
<i>Pardosa sphagnicola</i> (Dahl)	599	172	46	381
<i>Pardosa riparia</i> (C.L.Koch)	1	1	–	–
<i>Pirata piraticus</i> (Clerck)	4	3	1	–
<i>Pirata piscatorius</i> (Clerck)	1	–	1	–
Total of specimens	1,816	727	435	654
Total of species	17	14	10	12

dosa palustris (646 exx.) and *P. sphagnicola* (598 exx.) were the two most abundant species. The next two were *Alopecosa aculeata* (265 exx.) and *A. pulverulenta* (112 exx.). After these, the catches of individuals decreased remarkably. Four species were represented by only one specimen: *Pardosa fulvipes*, *P. lasciva*, *P. riparia* and *Pirata piscatorius*.

The different species were mostly distributed unevenly between the traps (Table 2). *A. aculeata* clearly favoured the sites with some trees. The tree species did not seem to be so crucial, because the traps 11–15 were surrounded by sparse growth of Scotch pines (*P. sylvestris*), the traps 2–4 by single willows (*S. caprea*) and the traps 8 and 9 slightly further away by Norwegian spruces (*P. abies*). *A. pulverulenta* was collected more or less with the same traps as the above-mentioned species, but some individuals were also found in the traps 4–7 and the window trap *b*. It hence also seemed to thrive on proper meadow. *Pardosa amentata* was strictly limited to the trap group (2–5) around the willow trees surrounded by the meadow. *Pardosa hyperborea* had a small peak in trap 9 in a narrow forest zone not so far from the lake shore. *P. lugubris* favoured the same traps as *A. aculeata*,

but within a narrower area. *Pardosa palustris* and *P. sphagnicola* were found abundantly in almost every trap. The last-mentioned species avoided to some extent the traps 11 and 12 located in rather open terrain near the wet impression. The only *Pardosa lasciva* and the two *P. paludicola* individuals were caught by the trap 10 located in open pine heath-like terrain. The only *Pirata piscatorius* individual was found in trap 13 rather close to the lake shore. The few individuals of *P. piraticus* instead were collected in the middle of the meadow.

4. Discussion

Fauna

Alopecosa aculeata (Clerck)

This species occurs throughout Finland, favouring forests where it can be found in open dry places (Holm 1947, Immonen & Itämies 1994, Similä & Itämies 2000). In northern areas, it is found in birch and pine forests (Koponen 1975), and it has been collected even on *Sphagnum* bogs (Kronstedt 1990). It occasionally even occurs on meadows close to forests (Itämies & Ruotsalainen

Table 2. Wolf spider (Araneae, Lycosidae) catches in the pitfall traps (1–17) and window traps (a–i) at Mutenia, Finnish Forest Lapland (see Material and methods). 1 = *Alopecosa aculeata*, 2 = *A. pinetorum*, 3 = *A. pulverulenta*, 4 = *A. taeniata*, 5 = *Pardosa amentata*, 6 = *P. atrata*, 7 = *P. fulvipes*, 8 = *P. hyperborea*, 9 = *P. lasciva*, 10 = *P. lugubris*, 11 = *P. paludicola*, 12 = *P. palustris*, 13 = *P. pullata*, 14 = *P. sphagnicola*, 15 = *Pardosia riparia*, 16 = *Pirata piraticus*, 17 = *P. piscatorius*.

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
Total	265	4	112	21	71	13	1	26	1	35	2	655	5	599	1	4	1	1,816
1	4	–	3	–	–	3	–	2	–	–	–	86	–	24	1	–	–	123
2	23	–	2	2	9	2	–	1	–	5	–	63	–	50	–	1	–	158
3	34	–	4	3	47	2	1	–	–	8	–	11	–	163	–	–	–	273
4	9	–	3	–	4	–	–	–	–	–	–	41	–	27	–	–	–	84
5	–	–	2	2	9	–	–	–	–	–	–	9	2	37	–	2	–	63
6	7	–	6	3	1	–	–	1	–	2	–	83	–	19	–	1	–	123
7	1	–	2	–	1	1	–	2	–	1	–	30	–	39	–	–	–	77
8	35	–	5	1	–	–	–	–	–	18	–	14	2	6	–	–	–	81
9	30	2	6	4	–	2	–	15	–	–	–	27	–	18	–	–	–	104
10	6	–	3	–	–	–	–	–	1	–	2	12	–	13	–	–	–	37
11	29	–	–	–	–	–	–	–	–	–	–	64	–	3	–	–	–	96
12	19	–	–	–	–	–	–	–	–	1	–	18	–	–	–	–	–	38
13	13	–	7	–	–	–	–	–	–	–	–	36	1	29	–	–	1	87
14	23	–	1	1	–	–	–	–	–	–	–	22	–	7	–	–	–	54
15	10	–	35	1	–	1	–	–	–	–	–	23	–	18	–	–	–	88
16	–	–	6	1	–	–	–	–	–	–	–	7	–	18	–	–	–	32
17	–	–	–	–	–	–	–	1	–	–	–	16	–	2	–	–	–	19
a	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1
b	13	2	17	1	–	–	–	1	–	–	–	23	–	12	–	–	–	69
c	2	–	4	–	–	–	–	3	–	–	–	6	–	10	–	–	–	25
d	1	–	–	–	–	2	–	–	–	–	–	3	–	4	–	–	–	10
e	2	–	4	1	–	–	–	–	–	–	–	47	–	22	–	–	–	76
f	–	–	2	1	–	–	–	–	–	–	–	6	–	76	–	–	–	85
g	3	–	–	–	–	–	–	–	–	–	–	8	–	–	–	–	–	11
h	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1
i	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1

1985). The present observations fit well with that mentioned above, but they also show how even very small “forests” i.e. stands of 5–6 small trees, are enough to create a suitable habitat for this species. In all of the present “forests”, the ground vegetation had features typical of real forests, which may explain the “goodness” of the sites.

A. pinetorum (Thorell)

In the Kevo area, *A. pinetorum* occurred in pine and birch forests (Koponen 1976). Immonen & Itämies (1994) collected it from forests, slightly over half of the individuals coming from EVT forest. It is said that the habitat must be humid with dense vegetation (Dahl 1927, Koponen 1975). This is clearly a forest species, with the few individuals found on the Mutenia meadow obviously coming from the nearby pine heath.

A. pulverulenta (Clerck)

The species is eurytopic and has some preference to meadow-like sites and bogs (Palmgren 1939, Holm 1947, Koponen 1978, Itämies & Ruotsalainen 1985, Itämies & Jarva-Kärenlampi 1989). On the Ulkokrunni island and at Simonkylä it also occurred on meadows (Caselius & Itämies 1993). At Mutenia it seemed to avoid the traps located on the northeastern hillside area with features of dry pine heath. Instead, it occurred in the central area evenly, though sparsely.

A. taeniata (C.L.Koch)

The optimum habitat of *A. taeniata* is more shady than that of *A. aculeata*, and the species clearly thrives in damper, cooler places (Kronstedt 1990). Caselius & Itämies (1993) found it in forests. Almost all the specimens at Mutenia were

observed in traps around the “central forest”, in other words around the old willow trees, which obviously suggests that the optimum habitat even here lies in the nearby forest.

Pardosa amentata (Clerck)

This wolf spider species is one of the most common members of its family, and it thrives in various habitats. It is especially common on shore meadows and stony shores, but also abundant on pastures and meadows (Holm 1947 and 1983, Itämies & Ruotsalainen 1985, Caselius & Itämies 1993). It is not found on bogs (Palmgren 1939), but in the northern Pallastunturi fell area it has been found around the tree line both from fell bogs and stony shores (Palmgren 1965). It did not occur at all in the material from Kevo innorthernmost Finland (Koponen 1976). At Mutenia it mostly occurred in the traps located around old stone foundations surrounded by old willows (*Salix caprea*) and thick vegetation of *Eriophorum angustifolium*. Somewhat surprisingly, it was not found elsewhere in the study area. Is it possibly a weak competitor compared to *Pardosa sphagnicola* and *P. palustris*, or possibly needs something solid to bask on, because it is said to favour sites exposed to sunshine (Roberts 1985). In this case, the old stone foundations would provide such a site.

P. atrata Thorell

This species is a typical Lappish species, which thrives at humid sites (Palmgren 1939, Holm 1947) and shores (Palmgren 1965), but it has also been found in southern Finland (Koponen 1968). In the Vuotos area it mainly occurred on bogs (Similä & Itämies 2000). The minimal catch from the present traps does not allow far-reaching conclusions, but the two traps where it was found were close to the shore. Better habitats presumably occur in the bog area NE from the study site.

Pardosa lugubris (Walckenaer)

One of the most common and abundant of wolf spiders distributed throughout Finland (Palmgren 1939) and Sweden (Almquist 2005). The habitat demands seem to be quite wide as can be seen from the survey below. In the Peljekaise National Park the species occurred most abundantly in heath birch forest with *Vaccinium myrtillus* as main

dominant and in meadow birch forest with tall herbs (*Trollius europaeus*, *Geranium silvaticum*, *Lactuca alpina*, *Aconitum septentrionale* etc.) (Holm 1983). Holm (1947) has described the habitat of *P. lugubris*: “the species is common especially in sunny and dry spots of deciduous and coniferous forests”. Other authors stress its forestall nature, too (Palmgren 1965, Itämies & Jarva-Kärenlampi 1989, Immonen & Itämies 1994). At Hämeenkyrö it occurred clearly in traps located in a forest area and on a meadow close to the forest, some individuals coming also from a field (Itämies & Ruotsalainen 1985).

P. fulvipes (Collet)

Huhta & Raatikainen (1974) found *P. fulvipes* on leys at three sites in Southern Finland. Itämies & Ruotsalainen (1985) also reported it to be more abundant on fields than on meadow-like clearings. Lehtinen *et al.* (1979) found sand dunes one of the optimal habitats of this species. The fact that only one specimen was caught here shows that either the habitats were not suitable, or the distribution area of the species is more southern.

P. hyperborea Thorell

This is a typical inhabitant of northern bogs, which lives especially on Sphagnum turfs (Holm 1947, Palmgren 1965, Itämies & Jarva-Kärenlampi 1989). In the material from Kevo it was the most abundant wolf spider, favouring open birch forest and bog (Koponen 1975). On the southern fells of Norway, it has also been found in the birch forest belt (Hauge & Refseth 1979). Obviously, the connection with bogs becomes more loose towards the north, because in the Vuotos area in northeastern Forest Lapland, the species occurred in a variety habitats (Similä & Itämies 2000). In southern Finland, it is strictly limited to bogs and fens (Palmgren 1939). At Mutenia we found it rather sporadically, which suggests that these habitats were not so suitable to it. A small aggregation was seen in the traps 9 and c, which were located in a moist and very narrow forest zone. Quite obviously, the real habitats of this species are located some hundreds of metres NE, where the large bog and fen area starts. The specimens found in the course of this study were obviously accidental scouters from there.

P. lasciva (L. Koch)

Similä & Itämies (2000) collected this species in the Vuotos area mostly from forests. In the Pallastunturi area Palmgren (1965) found it living on lake shores and at the borderline of a bog and a heath forest. In Sweden Holm (1947) reported it from coniferous forests predominated by spruce. Only one specimen was caught here, which must mean that the habitat was not suitable – maybe the coniferous forest east of the Mutenia hill area would support it more.

P. paludicola (Clerck)

P. paludicola has a southern distribution pattern in Finland, inhabiting wet waterside meadows (Palmgren 1939). Similä & Itämies (2000) did not record any occurrences in the Vuotos area, while one specimen was found on Ulkokrunni, an island in northern Bothnian Bay (Caselius & Itämies 1993). At Pulkkila in Central Finland, Itämies & Jarva-Kärenlampi (1989) found it to be a rare bog species. Only two individuals were caught here in trap 10 close to a wet depression, which clearly indicates that the habitats of our study area were not suitable for this species.

P. palustris (Linnaeus)

This species occurs on meadows and shores and in fell areas even above the tree line (Holm 1947), and it reaches the highest summits in Finland (Palmgren 1965). In the material of Koponen (1975) it was the second most abundant wolf spider, favouring especially open areas, such as fell heaths. In southern Norway it has been found on oligotrophic bogs (Hauge *et al.* 1978). In other words, it is rather eurytopic, thriving in open, but not bare surroundings (Caselius & Itämies 1993, Similä & Itämies 2000). At Mutenia it occurred throughout the study area. There was some accumulation in the traps 1 and 6, which were perhaps located in the most pure and typical meadow habitat of the area, pointing out the importance of this kind of habitat.

P. pullata (Clerck)

The habitats of this species consist of various grasslands, but it is also found on bogs (Holm & Kronestedt 1970). It has, however, a southern distribution pattern in Finland (Palmgren 1939),

which may mean that the present study area is too far north for this species, which is also confirmed by the fact that only one specimen was caught.

P. sphagnicola (Dahl)

This wolf spider species is very stenotopic, and it can only be found on sphagnum bogs (Koponen 1968 and 1978, Holm & Kronestedt 1970, Itämies & Jarva-Kärenlampi 1989) throughout the country (Koponen 1968 and 1978). In the Vuotos area, nn km NE of Mutenia, it was the most abundant species, concentrating on bogs and fens, but also occurring in meadow habitats (Similä & Itämies 2000). It also occurred on moist shore meadows on the islands in the northern parts of the Bothnian Bay (Caselius & Itämies 1993) and inland on lake shores at Kuhmo (Immonen & Itämies 1994). The observations from Mutenia are in line with the above-mentioned pattern. The species was missing from trap 12, and only three individuals were caught in trap 11, which was located in open dry heath-like surroundings. The fact that window traps also collected this species may point to its habits of climbing.

P. riparia (C.L.Koch)

The habitats of this species consist of mossy and grassy areas alongside forests (Holm 1947, Immonen & Itämies 1994). In southern Finland it has been found on meadows and cultivated habitats (Itämies & Ruotsalainen 1985). It is most abundant in Central Finland (Palmgren 1939). Only one individual was collected by our traps, which means that either the habitats were wrong for this species, or the area was too far in the north.

Pirata piraticus (Clerck)

P. piraticus is the most common and most widely spread *Pirata* species in Finland (Palmgren 1939). It is generally known to favour humid habitats (Holm 1947, Caselius & Itämies 1993, Roberts 1995). Nørgaard (1952) pointed out the importance of open water for this species (see also Immonen & Itämies 1994). The small catch in our case indicates that the traps were not located optimally for this species. Closer to the water line might have been a more optimal habitat, and probably also the nearby bog (see also Similä & Itämies 2000).

P. piscatorius (Clerck)

What was said above about the other species also holds true of this spider species. This *Pirata* species is said to live on bogs and fens (Palmgren 1939, Similä & Itämies 2000), which means that the present habitats did not meet the demands of the species.

General remarks

General knowledge about the wolf spider fauna in Finland is good as far as the southern and northernmost parts of the country are concerned (see references). The area of Forest Lapland has so far remained rather unstudied, and we must admit that the present research shed only some light on this, because the habitat selection we had was so limited. However, our findings included some faunistically interesting finds. The two new biogeographical records show that there still is some demand for research in these areas. By widening the habitat selection, it would surely be possible to fill some new distributional gaps.

The habitats we found at Mutenia for the different species mostly agreed well with the previous observations, summarised from the Finnish point of view by Matveinen-Huju (2004). In some cases, however, we noticed exceptional habitat distributions. For instance, *Pardosa amentata* should have occurred all over the area, but it was actually limited to quite a small patch. This may be due to the northern conditions. Here, a species must find the most optimal sites to survive. The old stone foundations provided a suitable site. The *Alopecosa aculeata* finds show how the characteristics of the field layer may be the most important determinants of why a given species settles down at a site. This species was found in patches with only a few single trees, in other words, the sites were not at all like forest, which is basically the main habitat for the species (Matveinen-Huju 2004) The ground layer vegetation, however, had some typical forest characteristics.

To sum up, we can say that the Mutenia meadow area makes an exceptional patch in this northern area, where bogs, fens and coniferous heaths dominate. The fauna has both southern and northern elements. It would be very desirable to continue the mowing yearly, and the most useful

way might be to mow the area in patches or sectors, which differ from year to year.

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