

Arthropods from High Oak Branches – Comparison of Two Trap Types, with a Special Reference to Spiders

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Abstract: Arthropods were collected, using two different types of traps on large branches of oak (*Quercus robur*) at a height of 14-17 m, in Turku, Finland. The traps used were a “German” model (Simon, 1995) and a “Finnish” model (Koponen et al., 1997). In general, using the Finnish trap model than by the German one caught twice more individuals. The most striking difference was found in Heteroptera numbers: 11-fold (in percentage of the total catches) in Finnish traps. Also Lepidoptera (5.7-fold), Psocoptera, Homoptera, Insecta larvae, Diptera, and Coleoptera were more numerous in Finnish traps. On the other hand, Collembola (2.7-fold), Hymenoptera, including also Formicidae, Thysanoptera, and Araneae were proportionally more abundant in German traps. Spiders (Araneae) are dealt with in details as an example. The family Linyphiidae dominated in individual numbers, and two linyphiid species, *Hypomma cornutum* and *Moebelia penicillata* were abundant in both trap types. Some differences in catches were found, so hunting spiders (Gnaphosidae, Clubionidae and Anyphaenidae) were more frequent in the German traps.

Key words: *Quercus*, Arthropoda, Araneae, Finland, branch, trap types.

Introduction

Oak (*Quercus robur* L.) reaches its northern limit in southernmost Finland. The oak woodlands are small in area, and found in the southwestern archipelago and in the narrow coastal area of southernmost Finland. The largest oak forest in Finland, almost 90 hectares, is situated on the island of Ruissalo, in Turku. Many rare and threatened insect species have been found in Ruissalo (Karhu et al., 1995). Of these, two beetles are worth of mentioning, both having their only Finnish population in Ruissalo: *Osmoderma eremita* (Scopoli) and *Mesosa myops* (Dalman) (Landvik, 2000a, 2000b).

The arthropod fauna on large oak branches, at a height of ca 5 m, has been studied using a “new” trap in seven oak forests, SW Finland in 1994 (Koponen et al., 1997, Rinne et al., 1998). In the present paper, general data on arthropod groups living or moving on large horizontal branches of old oak trees on Ruissalo island, at a height of ca 15 m, are presented and results using two different trap types compared.

Study area and methods

The study site is on the island of Ruissalo in Turku, 60°27'N, 22°10'E (Fig. 1). The average diameter of the studied oaks was 90 cm. The branch traps were fitted on large (diameter 10 – 20 cm), more or less horizontal branches of old oak trees. The branches were covered by lichens and sometimes also by a moss layer.

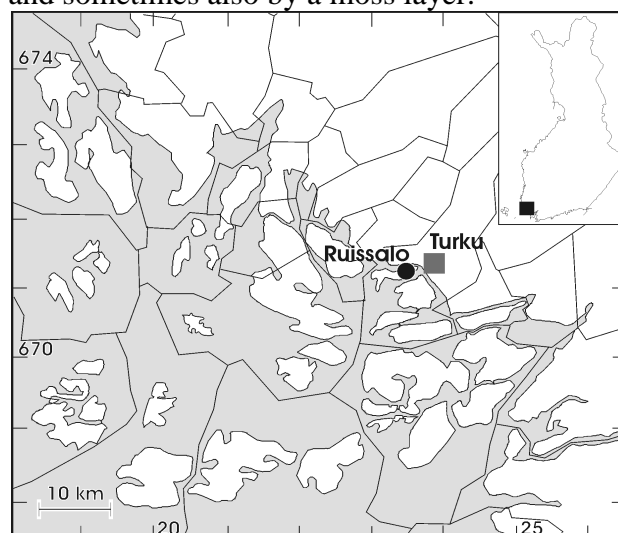


Figure 1. Location of the study site on the island of Ruissalo in Turku. The municipalities and 10 x 10 km squares of the Finnish uniform Grid 27°E system are shown.

Two trap types were used 1) a “Finnish” described by Koponen et al. (1997) (Figure 2) and a “German” (Simon, 1995) (Figure 3). The main difference between traps used is that the Finnish trap has no cover, i.e. no dark or sheltered hiding place, which could either attract or repel branch dwellers. The Finnish trap collects arthropods moving on the branch from both directions (distal and stem-side), the German one only from one direction. The Finnish trap, as an open funnel, can also catch some flying and jumping arthropods.

The Finnish trap consists of a collar around the branch, a plastic funnel, and a container (Figure 2). The collar (water pipe, diameter 15 mm) is fitted tightly around the branch with lute and a cable tie. The collar is brushed with FLUON to give a Teflon-like slippery surface. The funnel (upper diameter 22 cm) is situated beneath the collar, at a distance of ca 5 cm, fastened with plastic strings. The container (0.5 l) has an overflow hole covered by gauze. The German trap consists of a large plastic tube (diameter ca 15 cm) around the branch (Figure 3) (see also Barsig, Simon, 1995; Simon 1995). The distal end is closed, and the trap is equipped with two containers. Saturated NaCl solution was used as preservation liquid in both trap types.

The comparison of the trap types (five German and five Finnish traps) was made at the height of 14-17 m. There were both one German and one Finnish trap on each of the five studied oak trees. The traps were fitted on branches using a crane-truck (sky-lift). The trapping periods were June 4 – July 8 and July 8 – August 4, 1997.

The total material comprised about 3000 arthropod specimens, which are deposited in the Zoological Museum, University of Turku.

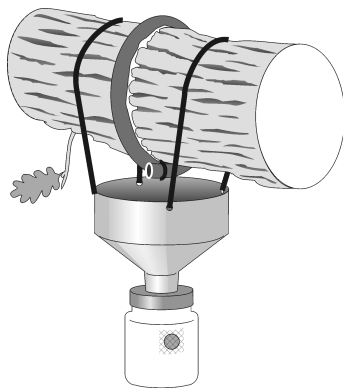


Figure 2. The “Finnish” branch trap used. For details, see the text.

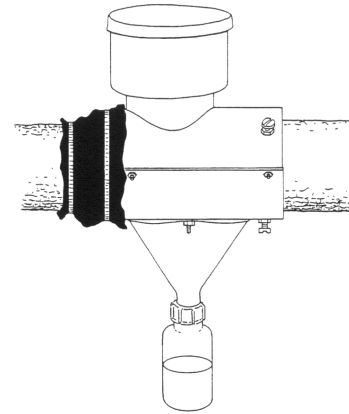


Figure 3. The “German” branch trap used (from Simon 1995). For details, see the text.

Results and discussion

Twice more arthropod individuals were caught by using the Finnish (open) trap than by using the German (closed) model at the same height (Table 1). The most striking difference was found in numbers of Heteroptera, 22-fold in individual number and 11-fold in percentage of the total catch in Finnish traps compared to the German model. This was caused by the mirid species, especially by *Rhodomiris striatellus* (Fabricius), a frequent species on oaks (cf. Koponen et al., 1997: as *Calocoris ochromelas*). Also Lepidoptera (5.7-fold in percentage), Psocoptera, Homoptera, Insecta larvae, Diptera and Coleoptera were more numerous in Finnish traps. On the other hand, some groups were proportionally more abundant in German traps. These included Collembola (2.7-fold), Formicidae, other Hymenoptera, Thysanoptera and Araneae. However, in individual numbers, more Araneae, Thysanoptera and Formicidae were in Finnish than in German traps (Table 1).

Significant differences between trap types were found e.g. in Heteroptera (Student’s t-test, $P = 0.007$), Psocoptera (0.011) and Coleoptera (0.044), but not e.g. in Araneae, Collembola and Formicidae.

Spiders (Araneae) are used as an example group (Table 2, 3). Slightly more individuals, species and families were collected by the Finnish traps. The family Linyphiidae dominated in both traps: 66.4% and 48.9% of individuals caught by Finnish and German traps respectively. The

families Gnaphosidae (especially *Haplodrassus cognatus*), Clubionidae (*Clubiona pallidula*) and Anyphaenidae (*Anyphaena accentuata*), all hunting spiders, were more abundant in German traps and Tetragnathidae (especially *Tetragnatha dearmata*) and Salticidae (*Salticus cingulatus*) in Finnish traps (Table 2). Two linyphiid species, *Hypomma cornutum* and *Moebelia penicillata* were abundant in both traps, comprising together 50.0 and 38.9 percentages of identifiable individuals in Finnish and German traps respectively. The large-sized orb-weaver, *Nuctenea umbratica* was collected rather equally by both traps. Altogether, 28 species of spiders were found; of these 11 (39.3%) were collected by both trap types. Of the rest (17 species) nine were caught

only as singletons. The eleven jointly occurring species comprised as much as 84.7% of all identifiable specimens. In general, the fauna caught at ca 15 m height included the same abundant species as were found previously at lower level (ca 4 m) in Ruissalo (Koponen, 1996, Rinne et al., 1998); however, *Clubiona pallidula* and *Dipoena torva* were absent in the previous material (at 4 m). For general discussion on oak trunk/branch spiders in northern and central Europe, see Koponen (1996).

The Finnish simple and inexpensive trap was shown to be suitable for this kind of foliage studies. However, different animal groups and species were collected by different efficiency, compared to the German trap.

Table 1. Arthropods caught using five "German" (G) and five "Finnish" (F) branch traps on oak trees in Ruissalo, at 14-17 m height.

Taxa	German		Finnish		Ratio F:G	
	Inds.	%	Inds.	%	Inds.	%
Araneae	96	9.5%	113	5.6%	1.2	0.6
Pseudoscorpiones	0		1			
Diplopoda	3		2			
Chilopoda	3		12			
Collembola	174	17.3%	129	6.4%	0.7	0.4
Psocoptera	38	3.8%	219	10.9%	5.8	2.9
Heteroptera	8	0.8%	178	8.8%	22.3	11.0
Homoptera	23	2.3%	121	6.0%	5.3	2.6
Thysanoptera	115	11.4%	119	5.9%	1.0	0.5
Lepidoptera	10	1.0%	114	5.7%	11.4	5.7
Trichoptera	1		20			
Coleoptera	43	4.3%	163	8.1%	3.8	1.9
Diptera	54	5.4%	242	12.0%	4.5	2.2
Formicidae	217	21.5%	263	13.1%	1.2	0.6
Hymenoptera	184	18.3%	172	8.5%	0.9	0.5
others						
Insecta larvae	30	3.0%	139	6.9%	4.6	2.3
Diverse	8		7			
Total	1007			2014	2.0	

Table 2. Spider catches by the "German" and "Finnish" traps on oak trees in Ruissalo.

	German	Finnish
Species found	17	22
Families found	9	11
Specimens found	96	113

Linyphiidae	48.9%	66.4%
Gnaphosidae	17.7%	3.5%
Clubionidae	11.5%	2.7%
Theridiidae	6.3%	3.5%
Araneidae	5.2%	7.1%
Anyphaenidae	4.2%	0.9%
Tetragnathidae	-	4.4%
Salticidae	3.1%	7.1%

Table 3. The most abundant spider species in “German” and “Finnish” traps on oak trees (total numbers and percentages of identifiable specimens).

Species	German		Finnish	
	ind.	%	ind.	%
<i>Hypomma cornutum</i> (Blackwall)	21	23.3	19	22.1
<i>Haplodrassus cognatus</i> (Westring)	16	17.8	2	2.3
<i>Moebelia penicillata</i> (Westring)	14	15.6	24	27.9
<i>Clubiona pallidula</i> (Clerck)	11	12.2	3	3.5
<i>Nuctenea umbratica</i> (Clerck)	5	5.6	7	8.1
<i>Anyphaena accentuata</i> (Walckenaer)	4	4.4	1	1.2
<i>Salticus cingulatus</i> (Panzer)	3	3.3	8	9.3
<i>Tetragnatha dearmata</i> Thorell	0	-	4	4.7
<i>Dipoena torva</i> (Thorell)	2	2.3	1	1.2
<i>Micaria subopaca</i> Westring	1	1.2	2	2.3
<i>Xysticus lanio</i> C.L. Koch	1	1.2	2	2.3

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