

Spiders of acidic grassland at Silwood Park

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Summary

Up to date 134 species or 21.9% of the British fauna of spiders have been collected at Silwood Park. The occurrence of some rare species may be associated with the proximity of the area to the ancient forest of Windsor Great Park.

Between 1972-1977 the abundance of spiders within our study area (Site 4) fluctuated greatly within and between the seasons. Usually, numbers declined towards the end of May and in June and rose in August and September. In the prolonged drought and high temperatures of the 1976 season, numbers of spiders were drastically reduced. This was probably associated with the direct effects of weather and with the scarcity of insect prey in the parched grassland.

Grassland spiders are important predators of leafhoppers (Auchenorrhyncha, Homoptera).

Introduction

Collections of spiders were made on seven sites at Silwood Park, positions of which are indicated by numbers on the map in Fig. 1.

Our own collections and observations were restricted to Site 4. With the exception of Dr A. Gunn, who studied the ecology of spiders on Site 3, all the other collections (including our own) were made as parts of studies on leafhoppers and their natural enemies. Thus the choice of sites and the sampling dates were primarily determined by the occurrence of certain species of Auchenorrhyncha within the habitats.

The numerical order assigned by us to the sites follows an approximate soil moisture gradient, Site 1 being the wettest and Site 7 the driest.

Silwood Park

Silwood Park is situated at 51°21' N and 0°39' W at an altitude of 61 m, in that part of England which has the nearest approach to a continental climate, having relatively hot dry summers and cold winters. The area is about 97 ha and most of it at one time

was included within Windsor Great Park, to which it is now adjacent. The grounds mostly lie on sand and gravel of Bracklesham Beds (Eocene) and Bagshot Sands, much of the higher ground being capped with Plateau Gravel. The soil is mostly a sandy gravel, incorporating locally some clay, but nearly always very light. It dries out very rapidly and in summer the water table lies far below the surface and the vegetation tends to suffer during droughts. The greater part of the area is covered by acidic grassland of a uniform type dominated by *Agrostis tenuis* Sibth. and *Festuca rubra* L., with patches in which *Holcus mollis* L. forms close stands.

The woodland areas are mainly of beech (*Fagus*), oak (*Quercus robur* L.) and elm (*Ulmus*) with a number of exotics (*Quercus cerris* L., *Rhododendron ponticum* L., *Abies* etc.). This woodland, although now secondary, once formed part of the original Windsor Forest, and since then most of the Silwood area has been maintained as parkland throughout the centuries.

Small areas of *Calluna vulgaris* (L.) and *Erica cinerea* L. form true heathland, which once was probably more extensive.

Sites and collecting methods

The positions of the seven collecting sites are indicated on Fig. 1.

In Sites 2, 4, 5 and 6 spiders were collected with a D-vac suction sampler and supplementary samples were taken with a sweep net.

In Site 7 a modified version of the Johnson, Southwood & Entwistle (1957) suction sampler was used. These samples were also supplemented by those taken with a sweep net.

Other collecting methods were used on Sites 1 and 3 and these are enumerated under the descriptions of these sites.

Site 1 (Rothschild, 1966)

This site, located in the Pond Field, was a poorly drained area of 1059 m². Although little surface water was visible from May to September, the whole area was under several cm of water throughout the winter months. The wettest parts supported a uniform cover of *Juncus effusus* L. with some *J. articulatus* L. and *Stellaria alsine* Grimm. In the other parts

of this site rushes were interspersed with *Deschampsia caespitosa* (L.), *Holcus* spp., *Poa trivialis* L., *Cirsium palustre* (L.), *C. arvense* (L.), *Lotus uliginosus* Schkuhr and *Chenopodium album* L.

Collections of spiders were made from May to the end of August 1960 and 1961. Random 15 cm² blocks were cut from the rush area and each sample was placed on a tray and sorted in the field. Most predators were extracted in 20-30 minutes. Samples were taken fortnightly and identifications were made by G. A. L. Rothschild and A. M. Wild.

Site 2 (Tay, 1972)

This site, 1785 m² in area, lay on the northern side of Silwood Lake, continuous stands of *Juncus effusus* were interspersed with *Holcus mollis*, *H. lanatus* L., *Ranunculus repens* L., *Urtica dioica* L. and various species of *Rumex*.

Spiders were collected weekly between May and mid-October 1969-1971.

Identifications were made by A. Gunn.

Site 3 (Gunn, 1973)

This was an 840 m² plot of grassland, sloping 5° south on the northern part of the "Elm Slope". The western margin of the site was dominated by a large oak, *Quercus robur* L. The northern edge was bounded by a broom (*Sarothamnus*) plantation, the southern by a path and the eastern by grassland with many *Senecio jacobaea* L. plants. The area was dominated by *Dactylis glomerata* L. and *Holcus mollis*. The latter formed a sward in the shade of the large oak. Other plants included *H. lanatus*, *Veronica chamaedrys* L. and several oak saplings.

The study on the ecology of grassland spiders made by A. Gunn on this site, extended between 1969 and 1972 and the following collecting methods were used:—

1. Beating of small oak trees.
2. Hand collecting on *Senecio jacobaea*.
3. Estimating numbers per m² on *Dactylis* and *Holcus* in quadrats.
4. Taking samples with a D-vac suction sampler.
5. Taking a standard number of strokes with a sweep net.
6. Pitfall traps were also used to monitor seasonal movements within and in and out of the litter. All identifications were made by A. Gunn.

Site 4 (Waloff & Hassell — present paper)

This open area of 1433 m² of grassland was bordered on the north by mixed woodland and a small copse of elms; it formed part of the Elm Slope facing south and sloping 6°. The dominant grass was *Holcus mollis* with some *H. lanatus* and patches of *Agrostis tenuis* Sibth. and *Festuca rubra* L.

In 1972-1977, weekly samples of the grassland fauna were taken with a D-vac suction sampler from April to September or October (Waloff, 1980; Waloff & Thompson, 1980). Spiders were removed from the samples and kept in 70% alcohol and the 1973-1976 collections were identified by Glynis M. Hassell. The 608 mature individuals were identified to species and the numerous immature individuals to family level.

Site 5 (Becker, 1975)

This was a plot of arable land ca 1440 m² in area situated on a gently sloping eastern aspect of the Pond Field. In March 1972-1974 the plot was sown with oats. Spiders were collected in the summer months of 1973 and 1974 and identified by F. R.

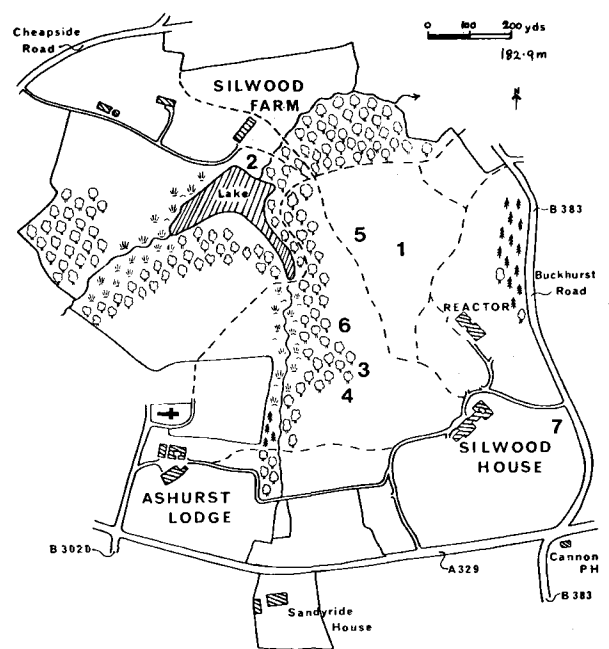


Fig. 1: Location of seven sampling sites (1-7) at Silwood Park. Broken lines indicate footpaths.

Wanless, British Museum (Natural History).

Site 6 (May, 1978)

This small area of 260 m², to the north of Site 3 (see Fig. 1) was on a gentle north-westerly slope. Vegetation was entirely graminaceous and dominated by tussocks of *Dactylis glomerata*, with an admixture of *Festuca ovina* L., *Lolium perenne* L. and *Agrostis tenuis*.

Sampling was carried out between June and November 1969 and June and October 1970.

All identifications were made by A. Gunn.

Site 7 (Solomon, 1973)

This site on "South Gravel" was a field of rough grassland, 5104 m² in area. In 1940 this area was a parade ground, it was covered with gravel and parts of it were cemented. Since then, it has not been maintained and it was recolonised by plants and its vegetation was more heterogeneous than on the other sites. It was dominated by grasses characteristic of acidic grassland, i.e. by *Agrostis tenuis* and *Festuca rubra*, with local admixtures of *Holcus mollis*, *Arrhenatherum elatius* (L.) and *Anthoxanthum odoratum* L. The area was enclosed on three sides: to the south by a row of wooden sheds, to the east by broom *Sarothamnus scoparius* (L.) Wimm. and *Betula pendula* Roth. with mixed woodland beyond, to the west by a beech wood with an undergrowth of *Rhododendron ponticum*. The northern boundary was a road through an open field.

Samples were collected between May and September 1968-1970 and identified by M. G. Solomon.

Number of species and families of spiders recorded at Silwood Park

The Silwood list compared with collections made by other authors

The full list of species, so far identified at Silwood is given in Appendix 1. Locket, Millidge & Merrett (1974) give a list of 26 families and 612 species in the British fauna. Silwood collections contained representatives of 17 families (15 given in Appendix 1 and two others, Anyphaenidae and Nesticidae which were found as immature stages on Site 4), and 134

identified species, i.e. 21.9% of the British fauna. Identifications of specimens to generic level only, could raise the present total to 150 species and there is no doubt that more species will be found in the future. The list in Appendix 1 follows the nomenclature of Locket, Millidge & Merrett (1974) and the new county records are marked with asterisks.

Comparison of the Silwood list with those of other authors is only of limited interest, partly because not all the habitats at Silwood have been examined and partly because different workers have used different collecting methods in their studies. Murphy & Murphy (1973) recorded 281 species from the main habitats on Chobham Common, some 7 km from Silwood Park; 66 of these species have been recorded from Silwood. Duffey (1962a, b), and Turnbull (1960) worked on limestone grassland in Wytham Wood near Oxford. Duffey (loc. cit.) recorded 141 species, a total very close to the 134 collected on the acidic grassland of Silwood, with 81 species (60.0%) being common to both areas. Merrett (1967, 1968, 1969) in his studies on phenology and activity of spiders in the National Nature Reserves in Dorset recorded 166 species, with 76 common to Silwood.

According to Cherrett (1964), the fauna collected by him, in the Pennines at an altitude of 550 m at the Moor House National Nature Reserve, followed a general subarctic pattern, with a high percentage of Linyphiidae, i.e. with 73% of linyphiids compared with 43.9% in the British list of Locket *et al.* (1974).

Duffey (1962a, b; also Duffey *et al.*, 1974) emphasised the importance of structural components of grassland to spiders and considered that spiders are particularly characteristic of the ground zone, i.e. the first 15 cm above ground level.

Rare, uncommon and infrequent species at Silwood

These species formed 17.9% of the Silwood fauna (Table 1). This relatively high proportion may be associated with the diversity of microhabitats within the area and also with the proximity to Windsor Forest, with its ancient and relatively undisturbed woodland. Silwood is adjacent to, and at one time formed part of the Windsor Great Park.

Some species in Table 1 were found in locations which appear to be out of character with those listed

Rare		Uncommon		Infrequent	
Species	Site	Species	Site	Species	Site
<i>Scytodes thoracica</i>	3	<i>Thanatus striatus</i>	3 C	<i>Walckenaera unicornis</i>	3 C
<i>Dipoena inornata</i>	3 C	<i>Hypsosinga pygmaea</i>	3, 4 C	<i>Lophomma punctatum</i>	1 C
<i>Theridion instabile</i>	2	<i>Cercidia prominens</i>	3, 4, 6 C	<i>Leptorhoptrum robustum</i>	1
<i>Tetragnatha pinicola</i>	5 C	<i>Entelecara erythropus</i>	4 C	<i>Agyneta decora</i>	4
<i>Hypsosinga albovittata</i>	3 C	<i>Agyneta cauta</i>	3, 4, C	<i>Meioneta beata</i>	4 C
<i>Walckenaera melanocephala</i>	3 C	<i>Lepthyphantes obscurus</i>	4 C	<i>Centromerus expertus</i>	4 C
<i>W. furcillata</i>	3, 4 C			<i>Sintula cornigera</i>	3, 4 C
<i>Ceratinopsis stativa</i>	3, 4			<i>Kaestneria pullata</i>	2, 3, 4 C
<i>Taranucnus setosus</i>	2 C			<i>Floronia bucculenta</i>	1, 2

Table 1: Species at Silwood Park listed as rare, uncommon and infrequent by Locket & Millidge (1951-53). Numbers indicate sites in which the species were collected. C stands for Chobham Common, where collections were made by Murphy & Murphy (1973).

in Locket & Millidge (1951-53). Thus, *Scytodes thoracica*, which is said to be "seen in houses", was collected by A. Gunn in Site 3, which is some 250 m away from any building or shed. *Dipoena inornata*, recorded from "heather and detritus" by Locket & Millidge, was hand-collected by A. Gunn, also on Site 3; this species was also found by Murphy & Murphy (1973) on Chobham Common. *Tetragnatha pinicola*, usually found on trees (Locket & Millidge, 1953), was collected by M. Becker in Site 5, which was an oatfield. However, the northern margin of that field was less than 20 m from mixed woodland. Murphy & Murphy (loc. cit.) recorded this species as "common" on Chobham Common.

Agyneta cauta was common in Site 3 and occurred on Site 4. Locket & Millidge (1953) say that it occurs in "moss and grass in wet places". Although Sites 3 and 4 cannot be considered as wet places since both are on the Elm Slope, both are areas of rough grass and on Site 4 small indentations in the ground supported a few (4-5) clumps of *Juncus effusus* near the bottom of the slope.

Distribution of species between the sites (habitats) at Silwood

Species characteristic of wet habitats

Some habitat preferences of spiders may be inferred from their distribution between the sites (Appendix 1). In the wettest Sites 1 and 2 the percentage of species characteristic of damp habitats was 28.1, whereas in the driest Sites 6 and 7 it was only 6.7.

However a wide tolerance of conditions by a number of species was also noted, and five of them occurred in all the sites and three in six of the seven.

Species invading arable land

Site 5 was an oatfield and as arable land was open to annual invasions. Its fauna has many more common and widespread species (after Locket & Millidge, 1951-53) than an area of permanent grassland, such as Site 4. Table 1 shows that only one of the 48 species (2.1%) in Site 5 could be ranked as "rare", whereas in the grassland of Site 4 twelve of the 70 species (17.1%) were ranked as "rare", "uncommon" or "infrequent".

Another difference, which is probably connected

	No. spp.	No. mature individuals	Individuals as % of total (608)
Linyphiidae	36	451	74.2
Tetragnathidae	5	39	6.4
Salticidae	4	32	5.3
Theridiidae	5	28	4.6
Araneidae	4	24	3.9
Lycosidae	6	18	3.0
Thomisidae	4	6	1.0
Pisauridae	1	3	0.5
Clubionidae	2	2	0.3
Zoridae	1	2	0.3
Dictynidae	1	2	0.3
Mimetidae	1	1	0.2
Total	70	608	100.0

Table 2: Numbers of species per family and percentages of mature spiders collected on Site 4 in 1973-1976.

with the activity and methods of dispersal of hunting and web-spinning spiders, is in the higher percentages of Lycosidae and Clubionidae and a lower incidence of Linyphiidae in the oatfield. Thus the fauna on arable land had 12.5% lycosids, 12.5% clubionids and only 27.1% linyphiids, whereas the corresponding percentages in the grassland of Site 4 were 8.6, 2.1 and 51.4.

Turnbull (1973) says that the web-spinning spiders are poor pedestrians and probably seldom walk far, whereas vagabond spiders are good walkers, can run fast and range over substantial areas. Hallander (1967) found that *Pardosa chelata* covered straight line distances of up to 100 m. Also, Merrett (1968) points out that the dispersal phase before egg-laying in lycosids is perhaps more obvious than in other species.

Seasonal changes in abundance of spiders in Site 4, an area of grassland dominated by *Holcus*

Our own observations (1972-1977) were confined to Site 4, where the greatest densities of 280-290 spiders per m² were reached in August and September 1973 (see Fig. 2). These densities are far below the *annual* means recorded by Duffey (1962a) for the three sections of limestone grassland in

Wytham Wood, near Oxford, where they reached 623 per m² (with a maximum over 800) in *Festuca*, 248 in *Brachypodium* and 163 in Coral Rag.

Immature spiders

These were identified to family levels only. In Site 4, generally the totals of Linyphiidae were greater than the combined totals of all the other families in April, May, September and October. In June and July the numbers of immature linyphiids declined and those of Theridiidae began to increase. By July, the combined total of Theridiidae, Thomisidae and Lycosidae exceeded that of Linyphiidae, as it did in August, when Araneidae became more numerous. In late August, September and October the number of linyphiids increased again and exceeded that of all the other families.

Mature spiders

In Site 4, generally the numbers of mature linyphiids exceeded the combined total of all the other families throughout the whole period from April to October.

In 1973-1976, 608 mature spiders were identified to species. They fell into 12 families, of which the first 6 listed in Table 2 formed 97.4% of the total.

	Totals per season				Total 1973-1976
	1973	1974	1975	1976	
<i>Pocadicnemis juncea</i>	10.2	0	41.1	59.2	110.5
<i>Lepthyphantes tenuis</i>	20.4	47.0	40.3	0.8	108.5
<i>Centromerus dilutus</i>	0	22.7	11.1	2.4	36.2
<i>Meioneta rurestris</i>	0	3.7	11.8	15.6	31.1
<i>Lepthyphantes mengei</i>	23.8	1.0	5.6	0	30.4
<i>Meioneta saxatilis</i>	3.4	0	22.3	0	25.7
<i>Linyphia triangularis</i>	13.6	9.0	0	0	22.6
<i>Sintula cornigera</i>	0	2.7	16.6	1.0	20.3
<i>Pachygnatha degeeri</i>	1.3	11.7	4.0	1.0	18.0
<i>Cercidia prominens</i>	0	1.0	16.3	0	17.3
<i>Theridion bimaculatum</i>	4.0	1.0	8.3	1.8	15.1
<i>Meta segmentata</i>	4.0	8.0	2.0	1.0	15.0
<i>Cnephalocotes obscurus</i>	0	2.0	9.9	1.8	13.7
<i>Hypososinga pygmaea</i>	0	0	11.6	1.0	12.6

Table 3: Site 4. Totals of 14 most common species taken in 4* sampling occasions per month; June-October 1973, April-October 1974-1976.

*If sampling occasions deviated from 4, the totals were adjusted to 4: this is the reason for decimal points.

	April		May		June		July		August		September	
	1	2	1	2	1	2	1	2	1	2	1	2
1973	7.1	52.9	11.9	63.6	15.4	75.5	15.7	87.1	17.3	48.6	14.3	60.7
1974	8.0	16.3	11.3	24.8	14.2	75.5	16.2	38.3	15.0	72.9	11.8	151.3
1975	8.4	53.0	9.9	60.3	15.1	11.9	17.7	38.5	18.4	27.8	13.4	118.7
1976	7.9	7.1	12.4	13.1	17.7	11.2	18.6	24.9	17.3	13.8	12.5	132.7

Table 4: Silwood temperature and rainfall records. 1 = Average monthly temperatures ($^{\circ}\text{C}$); 2 = Rainfall per month (mm).

Fourteen of the most common species in Site 4 are listed in Table 3. The number per season is the cumulative total of mature individuals taken on 4 sampling occasions per month (April to October). When the number of sampling dates deviated from the usual 4, it was corrected and this adjustment accounts for the decimal points in Table 3. In 1973 the April and May samples were not retained for identification, but in spite of this the 1973 data are included, since they clearly show that *Lepthyphantes mengei* and *Linyphia triangularis* were more abundant than in any subsequent year. By far the most abundant species in Site 4 were *Lepthyphantes tenuis* and *Pocadicnemis juncea*, but even their numbers fluctuated greatly between the years.

Reduction of spider populations in 1976 in Site 4

The exceptionally dry and warm season of 1976 (Tables 4, 5), presented an interesting situation. The parched and stunted grasses failed to grow and to flower in the prolonged drought and high temperatures lasting from April to the last week of August. The numbers of spiders declined drastically throughout the season (see Fig. 2) and mature individuals became scarce by August and September. The number of immature spiders in samples between April and September, which was 4515 in 1975, fell to 1286 in 1976 and was particularly low in

September. Among the mature individuals there was a great reduction in the numbers of *L. tenuis*, *M. saxatilis*, *S. cornigera*, *C. prominens*, *H. pygmaea* and *T. bimaculatum* (see Table 3). It was interesting that the numbers of *P. juncea* and *M. rurestris* which were high in 1975, continued to increase in 1976.

The numbers of grassland Homoptera, Auchenorrhyncha, on which spiders prey, also declined drastically in 1976 (Waloff & Thompson, 1980) and this may have contributed to the fall in abundance of spiders. Populations of spiders remained low in 1977 and began to recover only by August and September of that year (Fig. 2).

Spiders as predators of leafhoppers (Cicadellidae and Delphacidae, Auchenorrhyncha, Homoptera)

At Silwood, studies by Rothschild (1966), Tay (1972), Solomon (1973), Gunn (1973), Becker (1975), May (1978) and Waloff (1980) included assessments of predation by spiders on grassland leafhoppers. Rothschild, Tay, Solomon and Becker used serological methods, i.e. the precipitin test (see Boreham & Ohiagu, 1978) and identified 31 species of mature spiders and the immature Linyphiidae as predators of grassland leafhoppers in the field. A further 19 spider species were seen to feed on these insects, either directly in the field or in the laboratory. Thus about 50 species of Araneae are known to

	April		May		June		July		August		September		Total	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2
1972	0	0	0	1	0	0	0	19	0	19	0	5	0	44
1973	0	0	0	5	0	19	0	16	4	23	0	14	4	77
1974	0	0	0	4	0	14	0	14	0	21	0	2	0	55
1975	0	2	0	1	0	20	4	28	10	25	0	10	14	86
1976	0	0	0	9	9	22	8	30	2	29	0	8	19	98
1977	0	0	0	7	0	4	2	18	0	13	0	5	2	47

Table 5: Silwood temperature records. 1 = Number of days with average temperature $\geq 20^{\circ}\text{C}$; 2 = Number of days with maximum temperature $\geq 20^{\circ}\text{C}$.

feed on leafhoppers and no doubt there are many more. This is not surprising, since Cicadellidae and Delphacidae form an important component of the phytophagous fauna of temperate grasslands; locally and at the times of their hatching their numbers may exceed 1,000 individuals per m². Grassland spiders do not feed on leafhoppers only, but these insects are an important part of their diet. Conversely, the most important and numerous predators of grassland leafhoppers are spiders. It was shown by Rothschild (1966) and Solomon (1973) that spider predation on leafhoppers increases in the second half of summer and in autumn when the numbers of spiders rise considerably (Fig. 2).

A full list of Araneae predacious on Auchenorrhyncha is given in Waloff (1980) and it includes *Clubiona reclusa*, *Xysticus cristatus*, *Tibellus oblongus*, *Evarcha falcata*, *Pardosa pullata*, *P. prati-*

vaga, *Alopecosa pulverulenta*, *Trochosa ruricola*, *Pisaura mirabilis*, *Theridion bimaculatum*, *Enoplognatha ovata*, *Pachygnatha degeeri*, *Meta segmentata*, *Lepthyphantes tenuis*, *Linyphia triangularis* and many others.

Densities of spiders and leafhoppers on Site 4, in the months of July, August and September 1972-1977 were strongly correlated (Waloff, 1980). Spiders either showed a numerical and aggregative response to prey density, or as was shown by Turnbull (1962) for *Linyphia triangularis*, there was enhanced spider reproduction in years of high prey density. It is interesting that Hassell (1978) considers that in either event this apparent density-dependent predation may lead towards stability of the prey populations.

The importance of spiders as predators of Auchenorrhyncha has been recognised in Poland by Andrzejewska (1971) and in Japan in the rice paddies by Kiritani *et al.* (1972, 1975). In Japan the chief predators of rice pests, the cicadellid *Nephotettix cincticeps* and the delphacid *Nilaparvata lugens* were shown to be spiders, *Lycosa annulata*, *Oedothorax insecticeps*, *Tetragnatha* spp. and *Enoplognatha japonica*.

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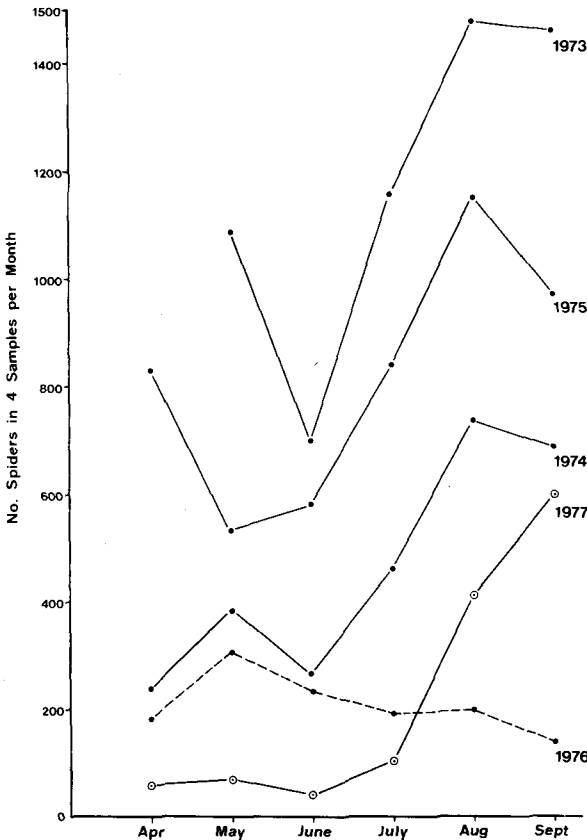


Fig. 2: Site 4. Fluctuations in numbers of spiders (i.e. totals in samples per month), 1973-1977.

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Appendix 1: List of species of spiders at Silwood. Dampest sites are 1 and 2, driest 6 and 7. Asterisks denote new county records.

Sites	1	2	3	4	5	6	7
Source	Rothschild (1966)	Tay (1972)	Gunn (1973)	Waloff & Hassell	Becker (1975)	May (1978)	Solomon (1973)
Area of Silwood	Pond Field (before drainage)	Rush Meadow	Elm Slope	Elm Slope	Top of Pond Field	Gunness Hill	South Gravel
Dominant plant(s)	<i>Juncus effusus</i>	<i>J. effusus</i>	<i>Holcus, Dactylis</i>	<i>Holcus mollis</i>	Oat Field	<i>Dactylis glomerata</i>	<i>Festuca, Agrostis</i>
Dates of collections	1960-61	1969-71	1969-72	1973-76	1973-74	1969-70	1968-70
Identification by	G. H. L. Rothschild	A. Gunn	A. Gunn	G. M. Hassell	F. R. Wanless	A. Gunn	M. G. Solomon

	1	2	3	4	5	6	7		1	2	3	4	5	6	7
Fam. Dictynidae															
<i>Dictyna arundinacea</i> (L.)	+		+	+				<i>P. prativaga</i> (L. Koch)	+	+	+				
Fam. Scytodidae															
<i>Scytodes thoracica</i> Latreille			+					<i>P. lugubris</i> (Walckenaer)							+
Fam. Gnaphosidae															
* <i>Drassodes lapidosus</i> (Walckenaer)			+					<i>Pardosa</i> sp.					+	+	+
<i>Drassodes</i> sp.	+							<i>Xerolycosa nemoralis</i> (Westring)				+			
<i>Zelotes latreillei</i> (Simon)			+		+			<i>Alopecosa pulverulenta</i> (Clerck)	+		+	+	+		+
Fam. Clubionidae															
<i>Clubiona reclusa</i> O. P.- Cambridge		+	+		+	+		<i>Alopecosa</i> sp.							+
<i>C. terrestris</i> Westring		+		+	+			<i>Trochosa ruricola</i> (Degeer)	+		+		+		
<i>C. compta</i> C. L. Koch						+		<i>Trochosa</i> sp.							+
* <i>C. subtilis</i> L. Koch	+	+	+	+	+			<i>Arctosa perita</i> (Latreille)				+			
<i>Clubiona</i> sp.	+	+			+	+	+	<i>Pirata hygrophilus</i> Thorell		+	+		+		
<i>Cheiracanthium erraticum</i> (Walckenaer)		+	+		+			<i>P. uliginosus</i> (Thorell)				+			
<i>Agroeca proxima</i> (O. P.- Cambridge)			+		+			Fam. Pisauridae							
<i>Phrurolithus festivus</i> (C. L. Koch)			+					<i>Pisaura mirabilis</i> (Clerck)	+	+	+	+	+	+	+
Fam. Zoridae															
<i>Zora spinimana</i> (Sundevall)	+	+	+	+	+	+		<i>Dolomedes fimbriatus</i> (Clerck)	+						
Fam. Thomisidae															
<i>Misumena vatia</i> (Clerck)							+	Fam. Agelenidae							
<i>Xysticus cristatus</i> (Clerck)	+	+	+	+	+	+	+	<i>Agelena labyrinthica</i> (Clerck)			+				
<i>X. kochi</i> Thorell					+			Fam. Mimetidae							
<i>X. lanio</i> C. L. Koch	+	+			+			<i>Ero cambridgei</i> Kulczynski	+	+	+	+	+	+	
<i>Oxyptila atomaria</i> (Panzer)		+			+			Fam. Theridiidae							
<i>Philodromus aureolus</i> (Clerck)	+	+			+			<i>Episinus angulatus</i> (Blackwall)			+				
<i>P. cespitum</i> Walckenaer					+			<i>Dipoena inornata</i> (O. P.- Cambridge)			+				
<i>Philodromus</i> sp.					+	+		<i>Crustulina guttata</i> (Wider)			+		+		
* <i>Thanatus striatus</i> C. L. Koch			+		+			<i>Theridion sisyphium</i> (Clerck)	+		+				
<i>Tibellus maritimus</i> (Menge)			+		+			<i>T. impressum</i> L. Koch							+
<i>T. oblongus</i> (Walckenaer)	+	+	+	+	+	+	+	<i>T. melanurum</i> Hahn		+		+			
Fam. Salticidae															
<i>Heliophanus flavipes</i> C. L. Koch					+			* <i>T. instabile</i> O. P.-Cambridge		+					
<i>Ballus depressus</i> (Walckenaer)				+				<i>T. bimaculatum</i> (Linnaeus)	+	+	+	+	+	+	+
<i>Neon reticulatus</i> (Blackwall)			+					<i>T. pallens</i> Blackwall				+			
<i>Euophrys frontalis</i> (Walckenaer)		+	+	+	+			<i>Theridion</i> sp.				+			
<i>Evarcha falcata</i> (Clerck)		+	+		+	+		<i>Enoplognatha ovata</i> (Clerck)	+	+	+	+	+	+	+
<i>E. arcuata</i> (Clerck)				+	+			<i>Enoplognatha</i> sp.					+		
Fam. Lycosidae															
<i>Pardosa palustris</i> (Linnaeus)			+			+		<i>Robertus lividus</i> (Blackwall)	+		+		+		
<i>P. pullata</i> (Clerck)	+		+	+		+	+	<i>Pholcomma gibbum</i> (Westring)				+			
<i>P. amentata</i> (Clerck)	+	+	+		+			Fam. Tetragnathidae							
<i>P. nigriceps</i> (Thorell)	+		+	+	+			<i>Tetragnatha extensa</i> (L.)		+	+	+	+		
								* <i>T. pinicola</i> L. Koch							+
								<i>T. montana</i> Simon	+		+				
								<i>Pachygnatha clercki</i> Sundevall	+		+	+	+	+	+
								<i>P. degeeri</i> Sundevall		+	+	+	+	+	+
								<i>Meta segmentata</i> (Clerck)		+	+	+	+	+	+
								Fam. Araneidae							
								<i>Araneus diadematus</i> Clerck			+	+			+
								<i>A. quadratus</i> Clerck			+		+		+
								<i>A. (probably) cornutus</i> Clerck	+						
								<i>A. redii</i> (Scopoli)		+	+				+
								<i>A. cucurbitinus</i> Clerck			+				
								<i>Araneus</i> sp.	+				+	+	

	1	2	3	4	5	6	7		1	2	3	4	5	6	7
<i>*Hypsosinga albovittata</i> (Westring)			+				+	<i>Syedrella innotabilis</i> (O. P.- Cambridge)							+
<i>H. pygmaea</i> (Sundevall)			+	+	+	+		<i>*Agyneta subtilis</i> (O. P.- Cambridge)		+		+			
<i>Cercidia prominens</i> (Westring)			+	+		+		<i>*A. decora</i> (O. P.-Cambridge)							+
<i>Mangora acalypha</i> (Walckenaer)			+	+	+			<i>*A. cauta</i> (O. P.-Cambridge)				+	+		
<i>Cyclosa conica</i> (Pallas)			+					<i>Agyneta</i> sp.,							+
Fam. Linyphiidae								<i>Meioneta rurestris</i>							+
<i>Walckenaera acuminata</i> Blackwall			+					(C. L. Koch)							
<i>W. antica</i> (Wider)			+		+			<i>M. saxatilis</i> (Blackwall)		+	+	+			+
<i>W. melanocephala</i> O. P.- Cambridge			+					<i>*M. beata</i> (O. P.- Cambridge)				+			
<i>*W. nudipalpis</i> (Westring)			+					<i>Microneta viaria</i> (Blackwall)					+	+	
<i>W. furcillata</i> (Menge)			+	+				<i>Centromerus sylvaticus</i> (Blackwall)			+			+	
<i>W. unicornis</i> O. P.- Cambridge			+					<i>*C. expertus</i> (O. P.-Cambridge)						+	
<i>*Dicymbium nigrum</i> (Blackwall)			+					<i>C. dilutus</i> (O. P.-Cambridge)			+	+			
<i>Entelecara erythropus</i> (Westring)					+			<i>Sintula cornigera</i> (Blackwall)			+	+			
<i>*E. flavipes</i> (Blackwall)					+			<i>Oreonetides abnormis</i> (Blackwall)		+	+				
<i>Entelecara</i> sp.					+			<i>Macrargus rufus</i> (Wider)				+			
<i>Dismodicus bifrons</i> (Blackwall)	+	+	+	+				<i>Bathypantes approximatus</i> (O. P.-Cambridge)		+				+	
<i>Hypomma bituberculatum</i> (Wider)	+	+	+					<i>B. gracilis</i> (Blackwall)	+		+	+	+		
<i>Gonatium rubens</i> (Blackwall)		+	+	+	+	+		<i>B. parvulus</i> (Westring)			+	+	+	+	
<i>Maso sundevalli</i> (Westring)				+	+	+	+	<i>Bathypantes</i> sp.					+		
<i>Pocadicnemis juncea</i> Lockett & Millidge	+	+	+	+				<i>Kaestneria dorsalis</i> (Wider)					+		+
<i>Oedothorax gibbosus</i> (Blackwall)	+	+	+				+	<i>K. pullata</i> (O. P.- Cambridge)		+	+	+			
<i>Trichopterna thorelli</i> (Westring)					+			<i>Poecilometes globosa</i> (Wider)			+				
<i>Cnephalocotes obscurus</i> (Blackwall)		+	+	+				<i>Floronia bucculenta</i> (Clerck)	+	+					
<i>Ceratinopsis stativa</i> (Simon)				+	+			<i>Taranucnus setosus</i> (O. P.- Cambridge)			+				
<i>Tiso vagans</i> (Blackwall)							+	<i>*Lepthyphantes nebulosus</i> (Sundevall)							+
<i>Tapinocyba praecox</i> (O. P.- Cambridge)				+				<i>L. obscurus</i> (Blackwall)							+
<i>Monocephalus fuscipes</i> (Blackwall)				+	+			<i>L. tenuis</i> (Blackwall)	+		+	+	+		
<i>Lophomma punctatum</i> (Blackwall)	+							<i>L. zimmermanni</i> Bertkau		+					+
<i>Gongylidiellum vivum</i> (O. P.- Cambridge)				+	+		+	<i>L. mengei</i> Kulczynski						+	
<i>Micrargus herbigradus</i> (Blackwall)	+		+					<i>L. tenebricola</i> (Wider)					+		
<i>Savignya frontata</i> (Blackwall)	+							<i>L. ericaeus</i> (Blackwall)		+	+	+			
<i>Erigone dentipalpis</i> (Wider)			+	+				<i>L. pallidus</i> (O. P.-Cambridge)		+	+				
<i>E. atra</i> (Blackwall)	+		+	+	+			<i>Lepthyphantes</i> sp.					+		+
<i>*Leptorhoptrum robustum</i> (Westring)	+							<i>Linyphia triangularis</i> (Clerck)	+	+	+	+			+
								<i>L. hortensis</i> Sundevall						+	
								<i>Linyphia (Neriene) montana</i> (Clerck)	+			+			+
								<i>Linyphia (Neriene) clathrata</i> Sundevall	+	+	+		+	+	
								<i>Linyphia</i> sp.					+	+	+