Short and Sharp Versus Long and Blunt. A Comparison of two Collecting Techniques in Contrasting Chalk Grassland Habitats

by Alberdi, J., Beccaloni, J, Blumson, B., Clay, D., Colley, L., Eriksson, H., Fry, D., Grooms, M., Ings, T., Oberg, S., Read, H., Russell-Smith*, A., Selden, P., Shaw, E., Shaw, P., Smith, E., Thomas, E., & Wilde, I.

In a recent article in the Newsletter, Eric Duffey argued for the use of timed hand collecting in ecological studies on spiders, illustrating this with examples from a range of sand-dune habitats in Britain (Duffey, 2004). In particular he provided some evidence that concentrated hand collecting can sample a larger proportion of the total species richness of a particular habitat than pitfall trapping over a much longer period of time. For example, at Tentsmuir in Scotland, continuous pitfall trapping over 12 months collected 56 species of spiders, while 9 people hand collecting over 12 days collected 130 species. He pointed out that these comparisons are only approximate since the two surveys were done in two different years. Nevertheless, the difference is striking, and it would be interesting to know the reasons for it, a point that Duffey did not discuss.

During a course on spider biology and identification run at Juniper Hall Field Studies Centre in June 2003, we carried out a short exercise in adjacent areas of chalk grassland which may throw some light on the reasons for differences in diversity of samples collected by these two techniques. The first area of grassland had been under cultivation for a short period during World War II, but had since been left undisturbed and could therefore be approximately dated as 60 years old. This had a very uneven sward of mixed grasses and forbs averaging about 40 cm height, including such characteristic chalk grassland species as thyme and wild marjoram, as well as much moss and many mounds of the yellow ant (*Lasius flavus*). The second area was under cultivation until 1998, when it was placed in set-aside and was thus no more than five years old. Here the sward was almost entirely composed of grasses and, having recently been grazed by sheep, was less than 10 cm high. Forbs were uncommon and there were no mosses or ant nests.

Ten pitfall traps (plastic beakers 7 cm diameter) were set out in a row in each habitat, spaced at approximately two metres. The traps were half filled with a killing fluid consisting of ethylene glycol (40% in water) to which a small quantity of detergent was added. Traps were operated for four consecutive days between 1st and 4th June, giving an operating time of 40 trap/days in each habitat. On the 4th June, 15 participants in the course spent exactly 30 minutes collecting in each habitat, giving a total collecting time of 7.5 hours per habitat. Spiders were sorted and identified in the laboratory at Juniper Hall.

Table 1 shows the number of individuals and species of spider captured in the pitfall traps and by hand collecting in the two habitats of different age. In the five year old grassland, just over twice as many individuals were caught in pitfall traps as were captured by hand. By contrast, in the 60 year old grassland, only 30% more individuals were captured by pitfall traps as were captured by hand. Despite these differences, the number of species captured in the five year old grassland, by the two different techniques, were closely similar (17 and 15 respectively). However, in the 60 year old grassland, hand collecting gave more than twice the number of species than were collected by the pitfall traps (33 and 14 respectively). Clearly, in terms of species richness, hand collecting was a more successful collecting method in the older grassland, with a tall and well developed canopy, while their was little difference between the two methods in the young grassland with a short canopy. The larger number of species in the older, more floristically and structurally diverse grassland is certainly what would be expected from other studies, but why was this only detected by hand collecting and not by pitfall trapping?

Method & site	Pitfall Y.G.	Hand Y.G.	Pitfall O.G.	Hand O.G.
No. individuals	114	54	117	90
No. species	17	15	14	33

Table 1. Numbers of individuals and numbers of species of spiders captured by pitfall traps and hand collecting in young (5 y old) and old (*c.* 60 y old) chalk grassland at Juniper Hall, Surrey. Y.G. = young grassland, O.G. = old grassland.

An examination of the micro-habitat preferences of the species that were taken by hand collecting, but not in pitfall traps in the older grassland helps to explain the differences between the two techniques. Among the 23 species taken by hand, but not in the pitfall traps, 17 (75% of the total) were species characteristically associated with the field layer of grasslands rather than inhabiting the ground layer. 11 of these 17 were web-builders while the other 6 were cursorial hunters normally found in the field layer. Among these 17 web-building species, only two (*Metellina mengei* and *Mangora acalypha*) occurred in any numbers in the hand collections. Among the six ground-active species taken exclusively by hand collecting, none were represented by more than three individuals. In contrast, in the pitfall trap samples, nine species were taken only in the older grassland, but all of these were characteristic of the ground layer rather than the field layer. For readers interested in the composition of the fauna collected by the different methods a spreadsheet is available from the principal author at: RussellSmithM@aol.com

It appears that hand collecting includes a larger proportion of the species present in these grassland habitats, mainly because it samples the field layer and the ground layer, rather than the ground layer alone, as is the case with pitfall traps. However, some caution is needed in interpreting the data from this exercise. Firstly, because it was not a properly planned experiment so that it is not possible to say whether the differences in species diversity between the two methods, although large, were statistically significant. Secondly,

both the pitfall trapping and hand collecting were carried out over very short periods, and, had they been continued over a longer period (a year or more) the cumulative species numbers obtained by the two methods might be quite different. Clearly, in order to understand the influence of collecting methods on the species richness of spiders obtained, a properly planned experiment run over at least one year would be needed.

Acknowledgements
We wish to thank John Bebbington, warden of Juniper Hall Field Centre, for permission to carry out the work and his staff for their assistance in making the field course such a success.

Reference

Duffey, E. (2004) The efficiency of timed hand-collecting combined with a habitat classification versus pitfall trapping for studies of sand-dune spider faunas. *Newsl. Br. arachnol. Soc.* **99**: 2–4.

*1, Bailiffs Cottage, Doddington, SITTINGBOURNE, Kent ME9 0JU.

A Palaeoarachnological Trip to Paris

by David Penney

During September 2004, I undertook a research trip to the Muséum National d'Histoire Naturelle (MNHN) in Paris to study fossil spiders. France has a rich and diverse fossil spider fauna, with both the oldest known mesothele (Selden, 1996) and mygalomorph (Selden & Gall, 1992) spiders originating from French sediments. Early reports of French fossil spiders include those of Gourret (1888) and Berland (1939) who described araneomorph Tertiary fossil spiders in sediments from Aix en Provence. These specimens were assigned to extant families and even genera but I have not examined any of the described specimens. Whilst at the museum I had the opportunity to examine numerous fossil spiders from this locality and it is my opinion that it is not possible to place any of them in extant taxa because they do not show enough morphological detail (e.g. Fig. 1).

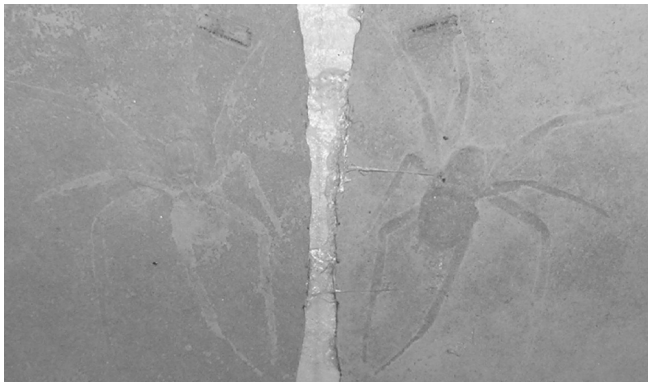

Figure 1. Part and counterpart of a fossil spider from the Tertiary of Aix en Provence.

Spiders in Cretaceous ambers from France have been known for some time (e.g. Schlüter, 1978; Néraudeau *et al.*, 2002) but these have yet to be described. The specimens from Archingeay reported by the latter authors are currently under study by Dr Alain Canard (Université de Rennes). More recently, Nel *et al.* (2004) identified a new source of fossil amber spiders from the Lowermost Eocene of Le Quesnoy in the Paris Basin, which are held in the Muséum National d'Histoire Naturelle. None of the fossil spiders from this locality had been studied so this was the main purpose of my research trip. The collection contained many spider specimens, but as with most amber collections many of the individuals were immature. The well preserved and mature specimens have been brought back to the University of Manchester for further research and these will be reported on following a detailed investigation of this material.

Figure 2. Dr André Nel with the collection of amber from the Lowermost Eocene of Le Quesnoy held in the Laboratoire d'Entomologie.

During a visit to the palaeontological gallery of the museum, I was delighted to see on display original Baltic amber spider slide preparations (Fig. 3) that had been made by the famous twentieth century palaeoarachnologist Dr Alexander Petrunkevitch. Also in this gallery was a fossil from the Cretaceous of Lebanon (Fig. 4) labelled as an opilione. However, it certainly looks like a fossil spider to me and also to Dr Paul Selden (University of Manchester), who is currently making arrangements to study the specimen in detail. I am particularly grateful to Dr André Nel of the Laboratoire d'Entomologie, MNHN for his hospitality and to the Leverhulme Trust for funding the visit.

References

Berland L. (1939) Description de quelques araignées fossils. *Revue fr. Ent.* **4**: 1–9.

Gourret M. P. (1888) Recherches sur les arachnides Tertiaires d'Aix en Provence. *Recl. zool. suisse* **1888**: 431–496.