DYFED
INVERTEBRATE
GROUP

Dec 1990

NEWSLETTER N°. 19

ISSN 0952- 5327

Editor-IK Morgan, c/o NCC, Plas Gogerddan, Aberystwyth, Dyfed, SY23 3EE.

ARANEAE

SPIDERS RECORDED IN PEMBROKESHIRE (VC45) DURING AUGUST, 1987-1990 - S DOBSON

INTRODUCTION

In the three years 1987 to 1989, courses on spider collecting and identification were held at Orielton Field Centre, Pembroke, during the first half of August. These were primarily for beginners and six or eight people attended each, although in every year there were one or two more who were more experienced. In 1990 this venue was again used during the first week of August, but this time it was not a course but a Spider Study Week for members of the British Arachnological Society. There were fourteen participants, many of whom were experienced and expert arachnologists. This paper summarises data collected over these four years. There is no attempt at quantitative analysis apart from occasional comments and nor has there been any attempt at blanket coverage to map detailed distribution. In the time available, visits were made to known or suspected good arachnological sites. In the case of the courses, this was to ensure that a good range of species was encountered; in the case of the study week, it was to give the participants an overview of Pembrokeshire spiders since very few were familiar with the arachnofauna of south-west Wales.

COMMENTS ON THE RECORDS

Of the thirty-three families of spider currently recognised in the British Isles, twenty-seven have been recorded in Pembrokeshire during the period under discussion. The family order and nomenclature are those given in Merrett, Lockett & Millidge (1986). A list of places visited, together with grid references, is given in the Appendix.

Atypidae

Atypus affinis is the only mygalomorph spider found in Britain and it is of local occurrence, being found chiefly in the south where it constructs a burrow in friable soils. It is mapped for Pembrokeshire on the national distribution maps (Lockett, Millidge & Merrett 1974) and was recorded at Marloes in 1976 (Twissell 1990). It was discovered at Whitesands Bay in 1988 (Coker 1988) and these appear to be the only two known sites, although the colony at Marloes does not seem to have been checked subsequently. The Whitesands bay site was visited in August 1988 and 1990 and on each occasion the distinctive webs were found but no spiders were dug out of their burrows as the bank in which they are situated is quite fragile and not very extensive. In 1990, one person counted sixteen webs without changing position and there were others scattered about, so, compared with the 1988 count of twenty-seven webs, it would appear that colony-size is probably being maintained.

Amaurobiidae
The three British species seem well-represented in the vice-county. Amaurobius ferox has a patchy British distribution but is widespread in Pembs., being found even on spray-washed sea-cliffs such as those at Martins Haven.

Dictynidae
Poorly-represented in our records. The two Dictyna species noted, D. arundinacea and D. latens, are common in Britain. The only other member of the family recorded, Lathys humilis, is fairly common in the south of England but in Wales appears only to have been recorded from Denbigh and Anglesey. We found it twice, once on Skomer and once at West Williamston. **Oonopidae**
The two British members of this family are tiny and easily overlooked. Oonops pulcher is so common that it is bound to turn up when leaf-litter is being sorted, particularly in dry situations. O. domesticus almost certainly occurs but has not yet been recorded in Pembs. because it is only found in houses, coming out at night.

Dysderidae and **Segestriidae**
All three British dysderids and the one recorded segestriid, Segestria senoculata, occur, probably fairly commonly, particularly Harpactea hombergi, but adults tend to be found earlier in the year than our fieldwork was carried out.

Pholcidae
The sole species of the family, Pholcus phalangioides, which is found almost exclusively in buildings, is very common at the Field Centre.

Gnaphosidae
A large family with many uncommon species. The seven species we found are amongst the most frequently encountered, with the possible exception of Zelotes electus, a sand dune specialist found on Stackpole NNR. The record of Drassylus pusillus from Sawdern Point has extended its range into south-west Wales.

Clubionidae
Another large family, mainly in the genus Clubiona. All of the eleven species we recorded are common or fairly common.

Liocranidae
Recently seperated from the Clubionidae, the sole species recorded, Agroeca proxima is generally common and has previously been recorded from Skomer and Ramsey (Lockett, Millidge & Merrett 1974) but not the mainland.

Zoridae
A small family with one genus, the commonest species of which is Zora spinimana, the only member of the family we recorded.

Anyphaenidae
The only species in this family, Anyphaena accentuata, is locally common and is probably much commoner in the county than the few records so far suggest.

Thomisidae and **Philodromidae**
These two large families of crab-spiders are rather disappointing in the number of species recorded (twelve), although they tend to be adult earlier in the year; in August the majority found are immature and hence not identifiable with certainty. All the species recorded are fairly common with the exception of Thanatus striatus found at Freshwater West. This species has also recently been recorded from Ceredigion (Fowles 1990).

Salticidae
The jumping-spiders, too, are very disappointing in the number of species recorded (four) compared with equivalent areas in the south and south-west of England. Again, this may be partly due to their earlier season. An interesting observation is the number of melanistic individuals of Salticus scenicus found at coastal locations, some so dark as to cause confusion

with Heliophanus species. In some places, such as West Williamston, they may be considered to be colonial.

Lycosidae
The wolf-spiders are well-represented in our records with twenty species seen. They can be very abundant in places; witness, for example, Pardosa purbeckensis swarming on the tidal mud at West Williamston, or P. monticola and Xerolycosa miniata on the dry areas of Stackpole NNR. In wetter habitats, Pirata species are in evidence, although P. latitans occasionally occurs elsewhere; it was the only lycosid caught in pitfall-traps in the garden at Orielton, for instance. The largest Pirata, P. piscatorius, was found at Dowrog Common and this increases to three the known sites in the county for this scarce spider (Catley 1989). Arctosa leopardus has been found at several places and, in 1990, the only mainland Welsh record of Alopecosa cuneata, a predominately southern England species, was found at West Williamston. It has recently been recorded from Anglesey (Merrett 1989).

Pisauridae
The nursery-web spider Pisaura mirabilis is common and widespread.

Argyronetidae
In 1990, when water levels were low, the pools on Dowrog Common had shrunk to small ponds and the opportunity was taken to dip for the water spider Argyroneta aquatica amongst the masses of water plants. The first handful produced eight spiders, all immature, and subsequent attempts produced many more. This is apparently the first time that Argyroneta has been recorded from Pembs., but it is obvious that there is a thriving colony here.

Agelenidae, Hahniidae and Mimetidae
These small families only produced records of ten common and widespread species.

Theridiidae
A large family, producing twelve species in the period under discussion, but this is rather disappointing as many more species must be present in the vice-county. Species recorded in the genera Theridion, Robertus and Pholcomma are all reasonably common and call for no special comment but the genus Enoplognatha has proved of interest. Two common members are E. ovata and E. thoracica, both of which have been recorded. Some years ago, it was discovered that there was another spider, E. latimana, which was very similar to ovata but extremely local in distribution, mainly in the south. In 1987 it was found that latimana was turning up as frequently as ovata and this observation was repeated in subsequent years. Because of this, Dr RG Oxford of the University of York participated in the 1990 visit to study the populations of the two species and his results will be published in due course. In addition, a rare coastal species, E. crucifera, was found at high tide level at West Williamston.

Nesticidae
The single member of this family, Nesticus cellulanus, is not rare but, as it had not been recorded from the county, a specific search was made for it. In 1989 the manhole covers in the stable yard at Orielton were lifted and the spider was found under most of them! They were still present when a check was made in 1990.

Tetragnathidae
Four species were recorded, all of them common and widespread.

Metidae
Six species were recorded, including three widespread and common species of the genus Metellina. The two Zygiella species are also common in Pembs., particularly Z. x-notata inside and on the outside of buildings. Z. atrica can turn up in numbers, particularly on gorse bushes. It is also much in evidence on the sea-facing cliffs in the NNR at Stackpole. The cave spider Meta menardi was found at Hoyle's Mouth cave near Tenby. RM Lockley released some in the cellars at Orielton when he lived there and wrote that there was a thriving colony when he left (Lockley 1977), but recent searches have shown no sign.

Araneidae
Another large family which is not particularly well-represented in our records, with just eight species found so far. Neoscona adianta is the most interesting of the orb-weavers found as it is quite local in southern Britain. Bristowe (1931) recorded Neoscona on Skomer and Berman & Callow (1964) found it at Marloes. It was also recorded on the DIG field meeting to Whitesands Bay in 1988 (Coker 1988).

Linyphiidae
This family contains almost half the British species and is a collection of mainly small, easily- overlooked spiders, although they occur in such numbers at times that they force themselves onto one's attention. In August, however, there are not the masses of gossamer produced by 'ballooning' spiders, nor are the bushes covered in the webs of some of the larger species as happens at other times of the year. It is a matter of searching amongst the grass-roots, leaf-litter, etc. to find them. There were over eighty species recorded, most of them more or less common in the right habitat. The following is a quick run-down of some of the more noteworthy finds.

Ceratinella scabrosa, found once on Stackpole NNR, is uncommon; it has recently also been found in Ceredigion (Fowles 1990). Walckenaeria is a large genus and the three species recorded are common, W. vigilax, taken on Brynberian Moor, less so than the others. Hylyphantes graminicola is common but not in Wales! It has previously been recorded from Pembs. and more recently from Brecon (Merrett 1989). Baryphyma trifrons from Dowrog Common is not common. Cnephalocotes obscurus, found at Ty-canol NNR and Dowrog Common, is local. Both of the Ceratinopsis species are rare: C. romana was found at Freshwater West and C. stativa at West Williamston. Monocephalus castaneipes is not common, usually found in moss on trees, a habitat perfectly exemplified in the oakwood of Coed Ty-canol. Milleriana inerrans from Freshwater West is uncommon. Erigone arctica and E. longipalpis are typical of estuaries, they were both found at West Williamston (the former also at Angle Bay), as was Halorates reprobus which is much less common. Bathyphantes setiger is generally uncommon and has only been found twice in the county, the first time was at Dowrog Common where the web was spun across a small hoofprint on dried mud; the second time was at Brynberian Moor. Microlinyphia impigra is local and was found at Dowrog Common. Allomengea vidua is not uncommon generally but seems to be rare in the south-west; it was found at Dowrog Common and Marloes Mere. There were forty new county records from this family alone but this is not necessarily because the species are rare - some of them are very common - but because they are so small and inconspicuous.

DISCUSSION

I have not thoroughly researched the previous work on Pembrokeshire spiders, but I believe that little has been done systematically so far. The only published notes that I am aware of are - Bristowe (1929) which lists 63 species from Skomer and nineteen from the neighbouring mainland; Bristowe (1931) listing eleven species from Grassholm, a further ten from Skomer, and about forty from the mainland; Mackie (1962) where about forty species from the Dale area are mentioned; Berman & Callow (1964) adding four to this list; Wallace (1986) with a brief mention of Pholcus phalangioides; Catley (1988, 1989) and Coker (1988) mentioning rare and uncommon species found. Evans (1989) includes spider lists generated by pitfall-trapping on three lowland wet heath sites in Pembs. and the Welsh Peatland Invertebrate Survey (NCC) looked at many Pembs. sites in 1988, although their records are not yet available. The paucity of previous records can be judged by the number of new county records over the four years of the Orielton meetings. It is also interesting to see the effect of experience on the number of records. The relevant figures are: 1987 - 96 recorded, 19 new county records; 1988 - 97 recorded, 11 new; 1989 - 112 recorded, 13 new; 1990 - 181 recorded, 29 new. The total number of species recorded over the four years is exactly 200, of which 72 are regarded as new county records as they are not included on the distribution maps of Lockett, Millidge & Merrett (1974) or the subsequent updates (Merrett 1975, 1989). Six of these species - Pirata latitans, P. piscatorius, Enoplognatha crucifera, Neoscona adianta, Ceratinopsis romana, and C. stativa are considered to be nationally scarce.

The results are limited to a certain extent by the restriction of recording to the first week of August which, by and large, falls between two peaks of spider activity, one in late Spring and the other in early Autumn. Another apparent limitation in 1989 and 1990 was the extreme dryness, particularly in 1990. The small number of specimens collected was a matter of comment, as was the fact that many boggy areas, and even bodies of standing water, were completely dry; this makes the number of species recorded in these years, compared with the two previous years, quite incredible!

The sites visited were chosen to be within easy reach of the base at Orielton. None was outside Pembrokeshire; the furthest were Dowrog Common and Coed Ty-canol NNR. In the first year, lack of local experience meant that no good arachnological sites were known and the ones visited were chosen because they were existing nature reserves where good results might be expected. Many of these sites were revisited in subsequent years and others were tried on the advice of the NCC and the DWT.

Due to the nature of the arrangements at Orielton, it is virtually impossible to use the Centre at any time other than August. A course has been planned for 1991; this will run in the third week of August rather than the first, which might produce some small difference in what is recorded. However, studies carried out at completely different times of the year are needed now in order to fill in many of the gaps in the spider list of what is obviously a very rich area. The British Arachnological Society maintains a national record of spider distribution and has recently instigated a Spider Recording Scheme to map the distribution of species on a 10-km square basis. However, many local records never reach the national schemes and in order to improve the dissemination of information I have agreed to act as Spider Recorder for the vice-county. In a future issue of the DIG Newsletter I will publish an up-to-date list of the spider fauna of Pembrokeshire and will be pleased to receive any records from local naturalists or notice of any published sources not included in this article. Correspondence to - Stan Dobson, Moor Edge, Birch Vale, via Stockport, SK12 5BX

ACKNOWLEDGEMENTS

Much of the recording was done on reserves owned or managed by the Dyfed Wildlife Trust and the Nature Conservancy Council. I would like to thank these two bodies for permission to visit the reserves, and also for their help and co-operation, particularly Jean Haines at West Williamston DWT reserve and Bob Haycock (NCC) at Stackpole NNR. Much useful information regarding sites was provided by Stephen Evans (NCC).

REFERENCES

BERMAN, N & CALLOW, NA (1964) - Additions to the spiders at Dale Fort Field Centre. Flatford Mill Spider Group Bulletin *24:*3

BRISTOWE, WS (1929) - The spiders of Skomer Island (S. Wales). Proc. Zool. Soc., Lond. 1929: 617-622

BRISTOWE, WS (1931) - The spiders of the island of Grassholm, and some additions to the Skomer Island list (South Wales). Proc. Zool. Soc., Lond. 1931: 111-113

CATLEY, KM (1988) - Spider and harvestman recording in Dyfed, 1987. DIG Newsletter 9: 23-26

CATLEY, KM (1989) - Spider and harvestman recording in Dyfed, 1988. DIG Newsletter 12: 23-25

COKER, SJ (1988) - Field meeting: St. David's Head & Whitesands Bay (12/733277) VC45, 25 June 1988. DIG Newsletter 10: 16

EVANS, F (1989) - A review of the management of lowland wet heath in Dyfed, West Wales. Contract Surveys No. 42. Nature Conservancy Council, Peterborough.

FOWLES, AP (1990) - Spider and harvestman recording in Ceredigion, 1989. DIG Newsletter 16: 25-26

LOCKETT, GH, MILLIDGE, AF & MERRETT, P (1974) - British Spiders. Vol 3. Ray Society. LOCKLEY, RM

(1977) - Orielton. Andre Deutsch.
MACKIE, DW (1962) - Spiders collected at Dale Fort Field Centre. Flatford Mill Spider Group Bulletin 15: 1-3

MERRETT, P (1975) - New county records of British spiders. Bull. Br. arachnol. Soc. 3: 140-141

MERRETT, P (1989) - Twelve hundred new county records of British spiders. Bull. Br. arachnol. Soc. 8*:* 1-4

MERRETT, P, LOCKETT, GH & MILLIDGE, AF (1986) - A checklist of British spiders. Bull. Br. arachnol. Soc. 6: 93-98

TWISSELL, C (1990) - Unpublished letter to SB Evans (NCC)

WALLACE, ID (1986) - Three new vice-county spider records. Newsl. Br. arachnol. Soc. 46: 4 APPENDIX

Main sites visited or mentioned in text.

Angle Bay	SM8703	Orielton Field Centre	SR9599
Barafundle Bay	SR9895	Skomer Island	SM7209/7309
Brynberian Moor	SN1034	Stackpole NNR	SR9793/9794
Dowrog Common	SM7727	Sawdern Point	SM8803
Freshwater West	SR8899	Ty-canol NNR	SN0937
Gann Estuary	SM8107	Tre-rhos Common	SM9227
Hoyle's Mouth	SN1100	West Williamston	SN0205
Marloes Mere	SM7708	Whitesands Bay	SM7327
Martins Haven	SM7509		

NEUROPTERA & MECOPTERA

CARMARTHENSHIRE NEUROPTERA - IK MORGAN

The author, with the encouragement of Mrs MJ Morgan, has casually collected Neuroptera on a modest scale in Carmarthenshire since 1985 and this survey work, coupled with Joan Morgan's brief visit to the county in the summer of 1986 and the many other records she has assiduously collated, provides the basis for the following interim account.

The ancient Order Neuroptera comprises soft-bodied, predatory insects that are often brown or green in colour with delicately-veined wings and large, compound eyes. There are almost seventy species in Britain, of which thirty-three are already known from Carmarthenshire. The Order derives its name from the anastomosing network of veins that make up the wings (neuron = nerve (Greek)) and, on account of differences in the early stages, the alderflies and snakeflies are often placed into a different sub-Order (Megaloptera) to the lacewings (Planipennia). The larvae, like the adults, are carnivorous and, in the Megaloptera, possess strong, biting jaws, but only specialised sucking mouthparts are present in the lacewings. There is normally only one generation of alderflies and snakeflies a year, but there can be up to three generations of lacewings in warm seasons.

Sub-Order Megaloptera - alderflies and snakeflies

The brown-coloured alderflies are easily-distinguished by their transparent and hairless, veined wings, which are folded tent-like over their abdomens. They are familiar waterside insects in late Spring and early Summer, when the females lay batches of eggs on emergent aquatic

plants; the larvae are aquatic but pupation takes place in damp soil. The alderflies are inadequately surveyed in the county but Sialis lutaria is known from several water-bodies such as the Dinefwr oxbows (22/608223) and the Bishop's Pond, Abergwili (22/444209), whilst S. fuliginosa - which favours swifter-flowing upland waters - is currently only known from the Mynydd Du massif (22/61) (Jones 1948), though it is likely to be more widespread. S. nigripes, a much rarer species, has been recorded from the Afon Teifi at Alltyblacca (22/521453) in 1978 (Jenkins & Wade 1981).

In contrast, the snakeflies Raphidia spp. (four British species) are completely terrestrial, with the powerfully-jawed, predatory larvae living under the bark of trees; these larvae are reputed to be quite agile. The adult females lay eggs in cracks of dead or dying trees or directly into the tunnels of various bark-beetle larvae. There is only one record of Raphidia in Carmarthenshire, when a larva (species unknown) was found under bark in Dinefwr Park, Llandeilo (22/61-22-) by AP Fowles and KNA Alexander in June 1986. The adults are considered to be normally rather elusive but sweep-netting around trees after strong winds is recommended, as is beating high branches - perhaps a possibility on steep slopes!

Sub-Order Planipennia - lacewings

Of these, the most familiar are the so-called 'green lacewings' of the family Chrysopidae, with normally green bodies and large, iridescent eyes, as befits their mainly nocturnal habits. Their larvae can be beaten from foliage, where they are voracious predators of aphids, and are interesting in that some species cover themselves with the skins of their dead victims and other detritus. Nine species of the genus Chrysopa are known from Carmarthenshire, with C. carnea, C. ciliata and C. perla being the most commonly recorded. In spite of the county's extensive dune systems there are no records of C. abbreviata (which haunts marram grass), even though specific searches have been made for it (Morgan 1989a). There are no records either of the diminutive genera Coniopteryx and Conwentzia, though these species are known from neighbouring Glamorgan (Hallet 1929), suggesting that they may be overlooked as these very small lacewings are covered with white waxy powder and thus resemble white- flies (Hemiptera: Aleyrodidae). In contrast, the family Osmylidae includes the largest British lacewing, Osmylus fulvicephalus, which attains a 50mm wing-span. There are several records of this species from widely-spread streamside localities in Carmarthenshire, where the adults can be beaten off foliage.

With twenty-nine British species the Hemerobiidae (or 'brown lacewings') is the largest neuropteran family, of which eight have been noted in the county. Hemerobius lutescens is apparently the most frequently encountered species. Conversely, H. nitidulus, H. pini and H. simulans are only known from the Rothamsted light-trap at Rhandirmwyn (22/782440) (Morgan 1990). Light-traps can be productive for the nocturnal lacewings, otherwise sweeping and beating techniques are the most profitable methods of survey.

Of the genus Micromus, all three species have been captured in the vice-county, including a very recent record of M. angulatus in a wet pasture near Rhandirmwyn (22/738465), where it was taken for the first time in South Wales. Another scarcity is the notable Psectra diptera, recorded near Llannon (22/549080) by the Welsh Peatland Invertebrate Survey (NCC) in 1989, and a 1990 record by the author in Pembrey Forest (22/408011). There is only a single record of Nothochrysa capitata in Carmarthenshire - one taken at the Rothamsted light-trap at Rhandirmwyn on 15 August 1977. Two species of Sympherobius have been noted, the tiny S. pellucidus (which is apparently a rare species in Wales) at Pumpsaint (22/65-40-) on 11 July 1975 (JD Bradley), and S. fuscescens, recorded three times at the Rhandirmwyn Rothamsted trap. There is only one other Welsh record of this latter species - at Margam Park, Glamorgan in 1927 (Hallet 1929). The genus Wesmaelius is represented in the vice-county by two common species, W. betulinus and W. subnebulosus.

Order Mecoptera - scorpion-flies

This Order includes, in Britain, the minute snow-flea Boreus hyemalis and three species of scorpion-fly Panorpa. All have the head bent downwards to form a beak and the reddish male genitalia at the end of the abdomen of the scorpion-flies are up-turned, hence their common

name. The tip of the genitalia is used for grasping the female during mating and its exact shape is the most reliable feature for identification. The three species of Panorpa, which usually frequent vegetation such as bramble brakes or other herbage, are mainly carnivorous, feeding mostly on already-dead insects. P. communis and P. germanica are both common in the county, whilst P. cognata is much more local and scarce. The snow-flea B. hyemalis has not yet been recorded in Carmarthenshire but it is known from several neighbouring counties (Miles 1990) and may be anticipated in upland districts on moss-patches.

NEUROPTERA & MECOPTERA RECORDED IN CARMARTHENSHIRE

Megaloptera
[Raphidia sp.]
Sialis fuliginosa
Sialis lutaria
Sialis nigripes

Planipennia
Chrysopa albolineata
Chrysopa carnea
Chrysopa ciliata
Chrysopa flava
Chrysopa flavifrons
Chrysopa perla
Chrysopa septempunctata
Chrysopa ventralis s.l.
Chrysopa vittata
Hemerobius humulinus
Hemerobius lutescens
Hemerobius marginatus
Hemerobius micans

Planipennia (cont.)
Hemerobius nitidulus
Hemerobius pini
Hemerobius simulans
Hemerobius stigma
Micromus angulatus
Micromus paganus
Micromus variegatus
Nothochrysa capitata
Osmylus fulvicephalus
Psectra diptera
Sympherobius fuscescens
Sympherobius pellucidus
Wesmaelius betulinus
Wesmaelius subnebulosus

Mecoptera
Panorpa cognata
Panorpa communis
Panorpa germanica

ACKNOWLEDGEMENTS
Sincere gratitude is due to Mrs Joan Morgan of UCNW Bangor for regular help in identification, generous provision of data, much encouragement over several years, and also for commenting on the draft of this provisional paper.

FURTHER READING
The Newsletter of the Neuroptera Recording Scheme, 'Neuro News', is strongly recommended as it holds papers on identification, distribution and advice on collecting techniques - Contact: CW Plant, Passmore Edwards Museum, Norman Road, London E6 4HN.

REFERENCES

HALLET, HM (1929) - The Neuroptera of Glamorgan. Trans. Cardiff Nats. Soc. 62: 67-69

JENKINS, RA & WADE, KR (1981) - A survey of the macro-invertebrate fauna of the River Teifi. Welsh Water Authority, Llanelli. Biol. Report 13/81.

JONES, JRE (1948) - The fauna of four streams in the Black Mountain district of South Wales. J. Anim. Ecol. 17: 51-65

MILES, PM (1990) - New Welsh records of Boreus hyemalis (L.) (Mecoptera). Ent. mon. Mag. 126: 153-155

MORGAN, MJ (1986) - Scorpion-flies and lacewings in Wales. DIG Newsletter 1: 2-3

MORGAN, MJ (1989a) - Recording in Wales, part 1. Neuro News 3: 6-8

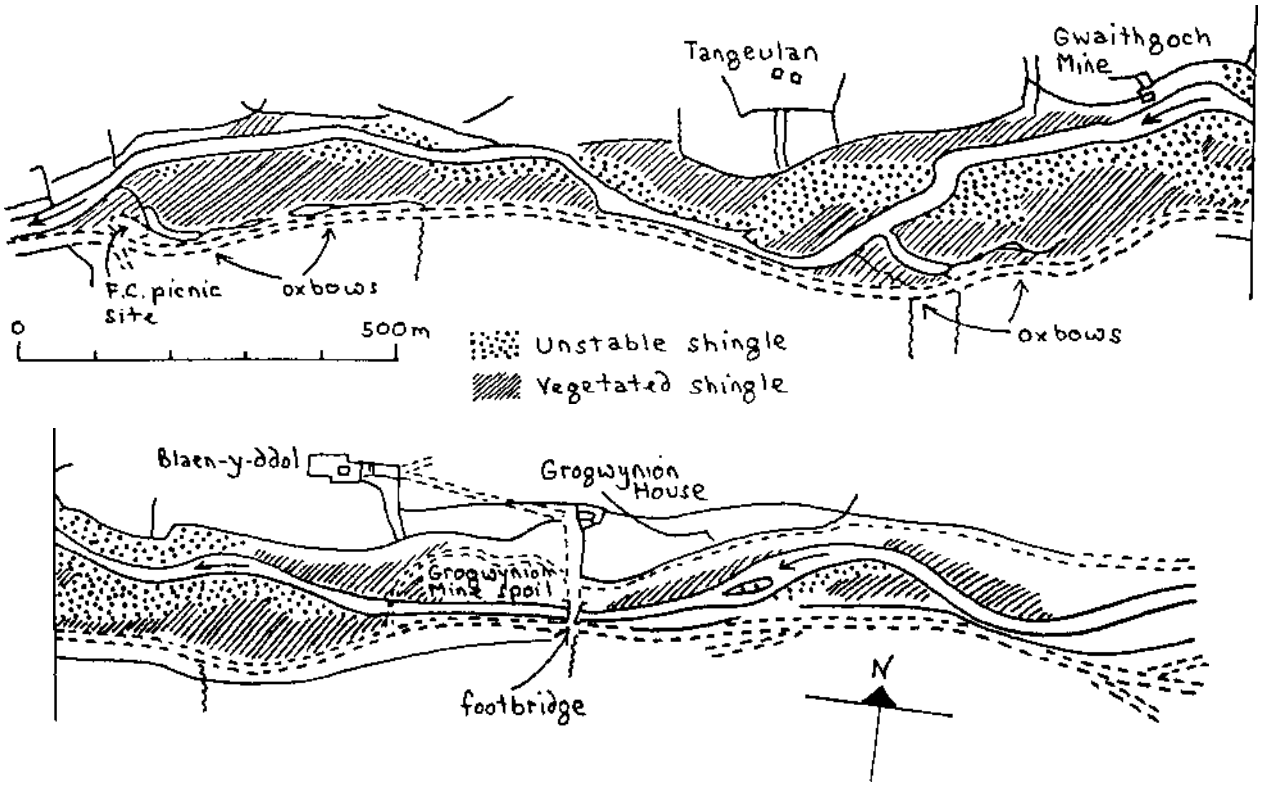
MORGAN, MJ (1989b) - Recording in Wales, part 2. Neuro News 4: 6-8

MORGAN, MJ (1990) - Recording in Wales, part 3. Neuro News 5: 6-8

MORGAN, MJ (In Press) - Recording in Wales, part 4. Neuro News 7.

DYFED SITE REPORT (8): GRO TYNBEDW, CEREDIGION (22/693715 - 22/715720) - AP FOWLES & AO CHATER

The Ystwyth floodplain above Llanafan bridge stretches for two kilometres with the river channel historically having swept across the valley floor and is of considerable geomorphological interest as the only substantial example of an actively braiding river system in Wales. Studies indicate that the gravel-bed sediments are of natural origin, although toxic sands and silts within the matrix probably originated from mining wastes at Grogwynion. Available maps suggest that the river has, at least for the last 150 years, occupied two main channels, essentially either following its present course or flowing along the line of the backwaters on the south side next to the road (Lewin, Davies, & Wolfenden 1977). These points are important in understanding the development of natural or semi-natural habitats at Gro Tynbedw and hence the availability of conditions suitable for the establishment of the fauna found there today. The implications from geomorphological studies are that gravel-bed sediments have always been widespread on the valley floor and that it is quite possible that the central block of shingle heath has remained intact for at least a century. The area of unvegetated gravels varies annually but, on average, about eighteen hectares are occupied by unstable shingle and river course. The remaining land (approximately seventeen hectares) is dominated by a mixture of shingle heath, purple moorgrass tussocky grassland, and gorse scrub. The shingle heath is a complicated mosaic of cryptogam-dominated stabilised shingle and dry, gravel heath with abundant heather and carpets of moss. Floodplain topography strongly influences this mosaic, with raised terraces and ridges chiefly supporting open heathy communities and lower-lying hollows containing rank grassland. Lichens are an abundant and conspicuous feature of the stabilised shingle habitats with forests of Cladiona prominent amongst the heather and a rich diversity of saxicolous species occupying the pebbles and bare ground. Although most of the lichen species are typical of moorland habitats in northern and western Britain, there are also a number of species which are characteristically associated with metalliferous deposits. Some of these are extremely rare and constitute an outstanding assemblage, including the national rarities Absconditella trivialis, Vezdaea acicularis, V. leprosa and Arthrorhaphis fuscireagens.



Several features at Gro Tynbedw are of invertebrate interest - the backwater ponds, willow carr, or the aquatic habitats of the river itself, for example - but two aspects are of especial importance and jointly contribute to make this a site of national significance for invertebrate conservation. These features - the unvegetated gravels of the river margin and the extensive shingle heath - are both well-developed and are excellent examples of their habitat-type. Indeed, the shingle heath at Tynbedw is probably the largest example in Britain. Sediment toxicity may have played a role in shaping these habitats and their faunas but, that aside, neither has been subjected to any significant measure of artificial disturbance and to all intents and purposes can be regarded as performing as natural ecosystems.

The history of invertebrate recording

Tynbedw first came to the attention of the entomological world when the Rev C E Tottenham visited the site in 1949 and made two outstanding discoveries. Of principal interest was the finding of several specimens of the pselaphid beetle Brachygluta pandellei, the first British record for almost one hundred years (Pearce 1953). Secondly, he collected a specimen of the wolf-spider Arctosa cinerea (Cloudsley-Thompson 1950) which, at the time, was the southernmost British locality for this impressive species, one of Britain's largest spiders (it has subsequently been found on the Tywi in Carmarthenshire). Pearce (1975) revisited the site many years later and refound B. pandellei in some abundance on the riverbank. There are no further records until the late 1970's/early 1980's when Ieuan Williams and Tony Fox surveyed the butterflies and dragonflies. Ieuan Williams noted the presence of a small colony of graylings Hipparchia semele on the heath but the dragonflies only contained a representative selection of running water or acid pool species.

Interest in Cardiganshire's river shingle invertebrates took a new direction in 1987 (Fowles 1989) and several visits to Tynbedw have shown the high quality of its fauna. This has been corroborated by additional surveys from AO Chater (Molluscs, woodlice, ants), KM Catley (spiders) and DC Boyce (beetles). In August 1988 Prof J A Owen briefly sampled the river shingle aleocharine rove-beetles whilst in July 1989 Dr P Kirby and SJJ Lambert recorded the Hemiptera and Coleoptera.

The river shingle fauna

The invertebrate fauna of river shingle has been unfortunately neglected by conservationists and ecologists in Britain. There is a scatter of species-records in the literature but there has been no attempt to evaluate river systems and their conservation in the past has largely relied upon the concerns of fish biologists or, rarely, ornithologists. The Ystwyth has luckily escaped the worst ravages of canalisation that have afflicted so many of Britain's rivers but there are probably only three stretches of biologically-rich shingle along its length - Tanybwlch, Tyn-yr-helyg and Tynbedw. Tynbedw differs from the other two sites in its upland setting and, although only at 75 metres a.s.l., recording effort to date indicates that it has a slightly different fauna which complements the two lower sites.

The absence of systematic recording nationally on gravel-bed rivers undoubtedly hampers assessment of the value of Tynbedw for invertebrate conservation. However, sufficient is known of the structure of entomologically-important shingle banks to be able to appreciate that Tynbedw has all the right ingredients. Furthermore, on current knowledge of the structure of other gravel-bed rivers in Wales it is clear that there are remarkably few equivalent sites. Scotland unquestionably has many valuable river systems but evidence from northern England suggests that there are very few undamaged sites. Given that a river bed is not canalised, and hence able to deposit sediments under natural conditions, the following characteristics are of chief importance -

(1) the presence of a broad hinterland of scrub or unimproved grassland providing shelter for invertebrates during floods or for hibernation;

(2) the absence of grazing stock, whose trampling damages the 'armour layer' beneath which so many shingle invertebrates live and breed; and

(3) a variety of particle sizes within the shingle matrix, creating niche-opportunities for a range of species with different adaptations for burrowing or surface-mobility.

Tynbedw fulfills each of these requirements and can reasonably be expected to support a valuable fauna, a hypothesis which is clearly borne out by the results.

To date, ten species of invertebrates recorded on the bare river shingles at Tynbedw are regarded as nationally scarce by the Nature Conservancy Council. One of these, the 5-spot ladybird Coccinela 5-punctata, is listed in the British Red Data Books (Shirt 1987) and although there have been recent advances in knowledge of its ecology and distribution (Majerus & Fowles 1989) it is still a highly-localised species and has retained its Red Data Book status in a recent assessment (M Parsons, pers. comm.). Two other species are currently classified as having Notable A status, that is, they are thought to occur in less than 30 ten-kilometre squares in Britain. They are the pselaphid Brachygluta pandellei mentioned above and the money-spider Caviphantes saxetorum. Both of these species are presently only known from a small number of rivers in Britain but they could be overlooked to some extent as they are both about 2mm long. This is particularly true of Caviphantes as it chiefly lives on the underside of boulders embedded in river shingle. B. pandellei, however, is a relatively active diurnal beetle which is usually fairly abundant on suitable shingle banks. It is common on the Ystwyth and Rheidol but the only other modern record is from the Lune in Cumbria and repeated searches on the Teifi and the Tywi have been unsuccessful. This species could feasibly be upgraded to Red Data Book status.

The remaining seven species are classed Notable B - thought to occur in 30-100 ten-kilometre squares in Britain. Clivina collaris (Col., Carabidae), Deleaster dichrous, Hydrosmecta thinobioides, Hydrosmectina subtilissima (Col., Staphylinidae) and Arctosa cinerea (Ara., Lycosidae) are all widely-distributed but local in suitable localities. The pselaphid Bibloplectus minutissimus and the staphylinid Thinobius strandi are both tiny subterranean beetles which can easily go undetected but are presently rarely recorded and Tynbedw is apparently their only known site in Wales. It is, of course, just as important to conserve typical communities of invertebrates as well as rare species and other characteristic shingle arthropods represented at Tynbedw include the beetles Bembidion atrocoeruleum, B. andreae, B. decorum, Zorochros minimus, Hydrosmecta eximia and Atheta incognita, the bugs Cryptostemma alienum and Saldula scotica, and the wolf-spider Pardosa agricola. A. incognita has a northern distribution and is not known elsewhere in Wales at present.

The shingle heath fauna

Less attention has been paid to this aspect of Tynbedw's invertebrates and further surveys of the cursorial arthropods would be of value. Shingle heath is extremely localised in Britain and as heathlands are globally-restricted it may be said with some conviction that Tynbedw is perhaps one of the best examples of the habitat-type in the world. The occurrence of such a distinctive biotope has only recently been acknowledged and hence there is no background of knowledge on which to base current assessments or to predict what constitutes a representative invertebrate fauna. Perhaps the closest approximation is with the dry, sandy heaths of southern and eastern England but there are no Welsh examples of such heaths and we could expect, therefore that such a geographically-isolated site has a depauperate fauna. There are, however, important differences with the English heaths - most noticeably the fact that Tynbedw is periodically inundated. Such conditions would not normally be experienced by dry heath invertebrates and it is therefore most unlikely that any highly-specialised heathland species could survive the floods.

There is no way of knowing what kind of vegetation predominated on this mid-channel area prior to the activities of the Cardiganshire leadmines. Shingle heath may possibly be artificially maintained by the high input of toxic heavy metals and comparison with the Scottish examples would be interesting. Tiny fragments of shingle heath alongside rivers draining the Cheviots in Northumberland which are not influenced by mining show that the habitat can occur in the absence of toxic repression of plant growth. Whatever its origins, we can be reasonably certain that heath has been established here for over a hundred years and that the current fauna represents a relatively stable community.

The structure of the Tynbedw heath is ideal for invertebrate conservation and is an example of the kind of habitat composition that conservationists strive for on the English heaths. The mosaic of mature heather on mossy carpets, pockets of tussocky grassland, and open stretches of lichen-rich ground is a perfect combination for heathland invertebrates. The pioneer stages of plant colonisation, those sparsely-vegetated sandy areas with scattered stones, are particularly important as many of the scarcer heathland invertebrates are thermophilous and require a warm substrate for adult and larval development. It is interesting, therefore, that the two rare species of invertebrates (both ground-beetles) recorded from the shingle heath so far are associated with sandy ground on the English heaths. Amara equestris is recorded from a handful of Welsh localities but the nearest site for Pterostichus lepidus is on Cannock Chase, Staffs, and its discovery at Tynbedw marks a major westward extension of range (Boyce 1989). Both of these species are classed as Notable B by the Nature Conservancy Council. Another notable species, the money-spider Walckenaera incisa, has possibly been recorded although there is some confusion surrounding the record. In K M Catley's card index the details state that it was taken at Tynbedw in 1987 but on the same day he visited the shingle heath downstream at Wenallt and his field notes to NCC state that it was taken there. W. incisa is a widespread but scarce inhabitant of heathlands generally in southern Britain.

A few casual searches have taken place on the area of shingle heath at Tynbedw but a representative species list is probably only available for the Hemiptera and the small Orders of molluscs, woodlice and ants. Forty-four species of Hemiptera are recorded but all of these are generally common in Britain. Many are typically found in dry grassland habitats whilst Macrodema micropterum, Orthotylus ericetorum and Ulopa reticulata are closely-associated with ericaceous communities. Amongst the other invertebrate species recorded are several which are characteristic members of the heathland fauna - the ground-beetles Cicindela campestris, Notiophilus germinyi, Bradycellus ruficollis, and Olisthopus rotundatus; the heather ladybird Coccinella hieroglyphica; the heath-feeding beetles Lochmaea suturalis and Micrelus ericae; the parasitic fly Servilla ursina; the spiders Zelotes apricorum and Walckenaera monoceros; the centipede Lithobius calcaratus; the mottled grasshopper Myrmeleotettix maculatus; and the grayling butterfly Hipparchia semele.

The management implications of invertebrate conservation

With very few exceptions, the heathlands of lowland Britain are anthropogenic; they have been created, and are sustained at the desired successional phase, by Man's activities in preventing a progression to scrub woodland. Heaths are probably the major source of consternation to local Wildlife Trusts as land-managers for they demand a commitment to a regular input of labour and financial resources to maintain their wildlife importance. Fortunately, Tynbedw seems to be one of those rare exceptions to the rule and one of its major advantages is the absolute minimum of management effort it seems to require to preserve its importance for nature conservation.

The essential requirement is to maintain a balance between the stands of mature heather and the patches of open, lichen-dominated, sand and shingle. Topography, heavy-metal toxicity and periodic inundation all seem to play a role in shaping the habitat-mosaic of Tynbedw and at present there seems to be little need for Man's intervention. It may be possible that, over a long time-scale, heavy metals may be leached from the substrate and this may allow birch scrub to develop and Molinia to spread over the bare ground of damper hollows. However, analysis shows that very high levels of lead and zinc are locked into the sediments and it would need a prolonged series of flood-events of considerable ferocity to re-work the deposits. It is most unlikely that the sediments will ever become sufficiently benign to permit full vegetational succession, although the possibility should be borne in mind and a monitoring strategy developed to check for this. In the event that management of the heath is ever required, patchy controlled burns will suffice to restore habitat quality.

Unvegetated river shingle is a dynamic and unstable habitat that is sustained by natural processes of erosion and sedimentation. Providing that there are no changes to the flow-characteristics of the Afon Ystwyth there is no need for any positive management of the system. The major threat to the invertebrate interest of the shingle features (excluding

the unlikely possibility of gravel extraction) is the disruption of the 'armour layer' by excessive trampling. Stock access to the riverbanks should therefore be prevented. Tynbedw is popular during the summer months with picnickers and bathers. Recreational activities are generally low-key and there is no reason why there should be any conflict of interests, provided that the degree of tourist pressure does not accelerate. Developments in the surrounding neighbourhood which might lead to increased usage of Tynbedw for recreation should be viewed with caution. The opening of trekking centres nearby or the establishment of local grass-track circuits might entail the need for contingency plans to restrict access by horses, motorbikes or mountain-bikes onto the heath. With these caveats in mind the future of Gro Tynbedw as an exceptional contribution to nature conservation in Dyfed should be ensured.

Gro Tynbedw is currently in private ownership but negotiations are in hand by the Dyfed Wildlife Trust to lease the entire area as a nature reserve. Parking is available at the Forestry Commission picnic site at Coed Tyn-y-bedw (22/693715) and this provides the best point of access onto the site, parking is difficult elsewhere along the Llanafan-Pontrhydygroes road which forms the southern boundary of the site.

BIBLIOGRAPHY;

BOYCE, D C (1989) - Coleoptera recording in Ceredigion during 1988. Dyfed Invertebrate Group Newsletter 12: 15-18.

CLOUDSELY-THOMPSON, J (1950) Notes on Arachnida, 15. Further County Records. Entomologist's Monthly Magazine 86: 319.

FOWLES, A P (1989) - The Coleoptera of shingle banks on the River Ystwyth, Dyfed. Entomologist's Record 101:209-221.

LEWIN, J, DAVIES, B E, & WOLFENDEN, P J (1977) - Interactions between channel change and historic mining sediments. In: GREGORY, K J (Ed.) - River channel changes. Wiley-Interscience, Chichester.

MAJERUS, M E N & FOWLES, A P (1989) - The rediscovery of the 5-spot ladybird Coccinella 5-punctata L. (Col., Coccinellidae) in Britain. Entomologist's Monthly Magazine 125:177-181.

PEARCE, E J (1953) - The rediscovery of Brachygluta cotus Saulcy (Col., Pselaphidae) in Great Britain. Entomologist's Monthly Magazine 89: 94.

PEARCE, E J (1975) - Collector's instinct: "imaginative insight" in collecting. Entomologist's Monthly Magazine 111: 116.

SHIRT, D B (Ed.) (1987) - British Red Data Books. 2: Insects. Nature Conservancy Council, Peterborough.

ORTHOPTERA

A COLONY OF THE SPECKLED BUSHCRICKET AT NANTGAREDIG, CARMARTHENSHIRE - NR MATTHEW

During the past summer I was employed on the National 'Bats and Habitats Survey' and one of the kilometre squares I had to cover was at Nantgaredig (22/4721). On my first two nocturnal visits I had been pleased to hear the dark bushcricket Pholidoptera griseoaptera chirping at the lower edge of the wood on the southern side of Pen-yr-allt. It could be heard easily enough with the unaided ear. However, on my third visit, August 5, I was mystified by a strange sound on the bat detector. At first I thought it was a social call given by a stationary bat but the frequency range was somewhat different. It could be heard from 30khz to 45khz, whereas pipistrelle social calls are usually most audible at 22khz. The quality of the sound was similar,

mostly a single chirp, but sometimes it sounded longer with a slight after-sound - almost a double chirp. This was below the southern edge of the wood above Dan-yr-allt farm (22/478217). After some time spent in vain trying to spot the 'bat', I decided I had better continue with my survey! My route took me down past the farm and along the track going towards the Afon Tywi. The same sound was heard by the side of the A40 and outside the farmyard and I was haunted by it all along the track and along a hedgerow going eastwards. By this time it was obvious that bats were not responsible and I suspected bushcrickets, but I was quite unable to see any even though I scrutinized the hedge with my torch.

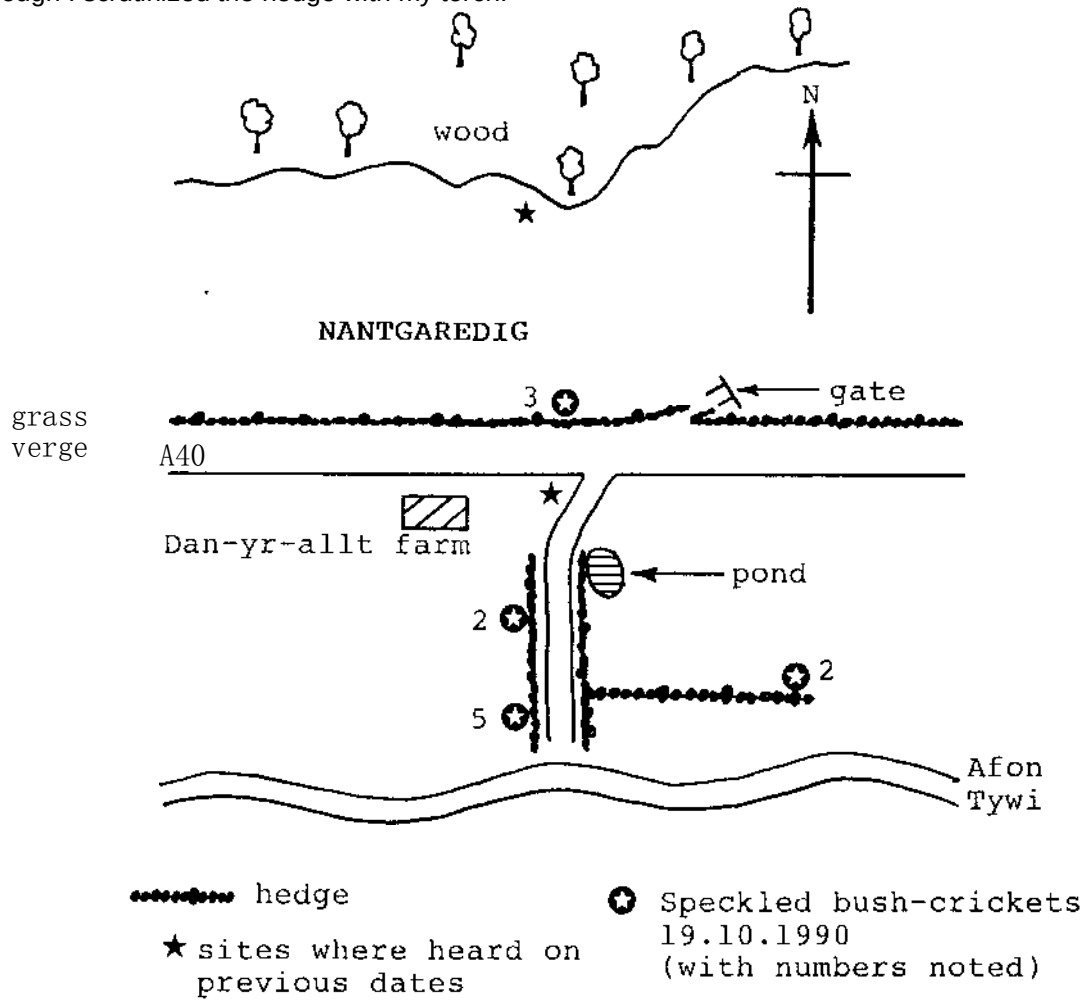


Fig 1: Outline of Speckled Bush-cricket sites around Nantgaredig

After the end of my fourth nocturnal survey, I decided to devote some more time to the matter. Because of traffic noise along the A40 I conducted my searches along the track, where these calls were issuing all along the hedgerows. The hedges are both high and thick and I had to 'home' in on the sound quite carefully with the detector, trying initially to find the height and then searching with the light. The source of the chirps proved to be speckled bushcrickets Leptophyes punctatissima but I only spotted one as, fortunately, it was right at the top of the hedge, next to a gate, and was therefore quite visible. The others were probably deep inside the hedge or not moving so much. This one, a male, didn't move much either, only its long antennae were weaving slowly and its short wings moved as it stridulated. No sound could be heard except when the bat-detector was turned on.

I returned to the site on October 19 with the aim of attempting a count. I didn't spend much time by the A40 because of the traffic but I estimated at least three here. A total of seven individuals were heard along the track and two along the eastward hedge. Only the last one did I see; again, probably because it was at the top of the hedge. It was a male, as I assume that all the chirpers were. A total of twelve were noted on this date, therefore, but there may have been more along the A40 (a particularly good roadside verge which also had two glow-worms Lampyris noctiluca in June) and also up in the wood above. There seemed to be far more in August so I suppose some of the insects must have already died off by the time of this October visit.

The stridulation of the speckled bushcricket is almost entirely inaudible but many naturalists find that, as they grow older, they can no longer hear the chirps of several species of grasshoppers and bushcrickets. The value of bat-detectors to locate singing individuals has only recently been appreciated but this method is now becoming more popular amongst Orthopterists. Once the operator is familiar with the sounds produced on the detector by different species it is a relatively easy task to carry out detailed surveys of the distribution and abundance of our more retiring species. Repeatable transects can provide significant information on the number of adults in a population and hence enable species-fluctuations to be monitored annually. There are few records at present of the speckled bushcricket in inland situations in Carmarthenshire but wider surveys with bat-detectors might show that the species is more generally distributed.

OPILIONES

NOTES ON THE ECOLOGY AND BRITISH STATUS OF THE OPILIONID Sabacon viscayanum ramblaianum - IK MORGAN

The distinctive harvestman Sabacon viscayanum ssp. ramblaianum was first discovered in the British Isles during September 1980 in woodland on the Gower (21/58), Glamorgan, where it was found "in deep leaf-litter in a mixed woodland" (Abbot 1981). Sabacon is now known from fifteen localities (in thirteen 10km squares) in the southern half of Wales, from Gwent in the east westwards to Ceredigion (Fig. 1). This species will probably prove to be a widespread, if scarce, harvestman in South Wales now that some aspects of its habitat preferences are known. It has been suggested that Sabacon is an introduction to the British fauna (Merrett jn: Hillyard & Sankey 1989), based on the proximity of two of the earliest records to industrial workings. However, these two derelict industrial sites also include old, damp woodland and other semi-natural habitats, whilst simple geological and economic locational factors independently account for the presence of industrial workings (lime-kilns etc.) at the same localities.

Martens (1983) considers Sabacon viscayanum to be a 'Tertiary relict species', i.e. a taxon whose range was once more extensive but which has since become fragmented. 'Relict species' are considered by biogeographers to be in 'evolutionary decline', exhibiting a contraction in geographical range after an initial period of origin, range expansion and stabilisation. Indeed, the relictual phase may closely preceed extinction. Relict taxa do not show the ecological tolerance and colonisation vigour necessary for range expansion. If S. viscayanum is truly a relict species in Europe, it seems unlikely that it could establish and thrive after being introduced into Britain. It is more likely that its distribution forms part of its fragmented natural range.

Martens (1988) suggests that populations of Sabacon survived the last southward transgression of glaciation, when it is believed that ice-free pockets of land existed in the Pyrenees (the only other area outside Wales where the sub-species rablaianum is known to occur), and proposes that the south Gower Sabacon site was similarly unaffected. However, Gower was right on

the boundary of the late Devensian maximum ice-limit (Campbell & Bowen 1989) and, even if the site was not ice-covered, then the harsh peri-glacial conditions (including a lack of substantial vegetative cover) must have been singularly unsuitable. In any case, the remainder of the Welsh Sabacon localities were well within the confines of the last major glaciation which ended c.13,300 years ago. Presumably Sabacon subsequently colonised Wales from ice- free glacial refugia to the south-west of Britain, on land which is now covered by the sea.

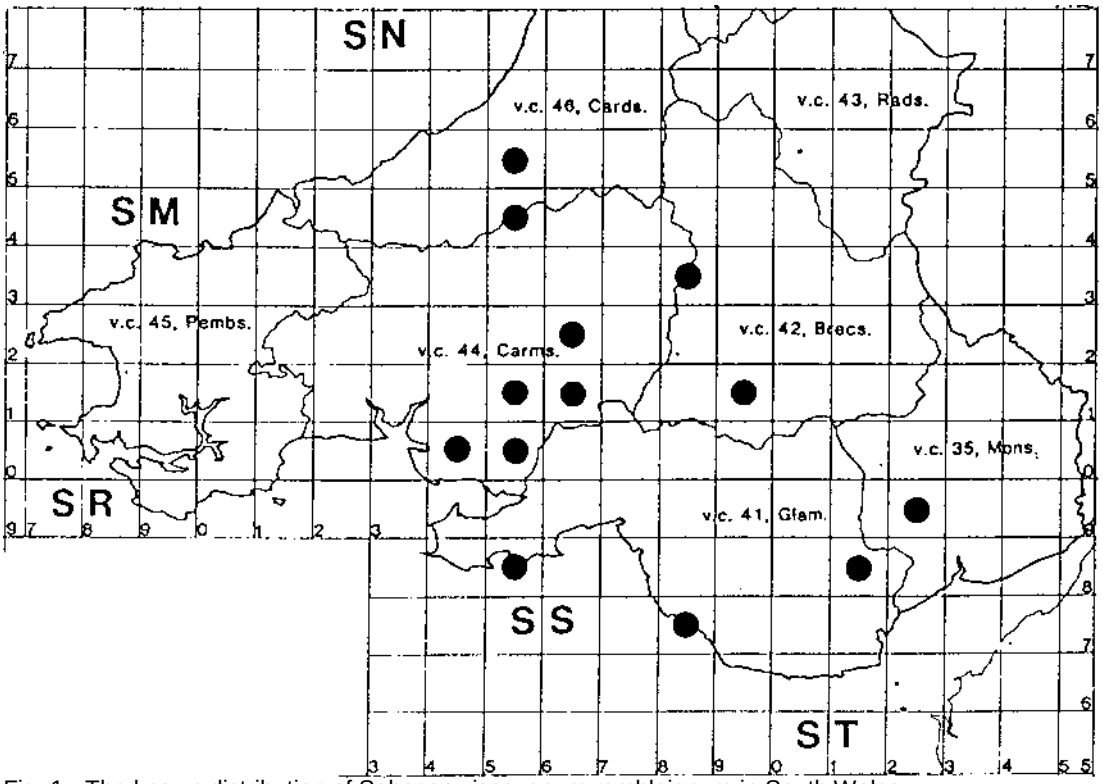


Fig. 1.- The known distribution of Sabacon viscavanum ramblaianum in South Wales.

Recent knowledge of the habitat requirements of Sabacon in South Wales - with one interesting and important exception - is in concord with the requirements elucidated by Abbot (1981): "the species of Sabacon are found in moist, cool habitats, high altitudes or temperate climates. They prefer woodland and can be found under decaying logs and in leaf-litter. They are sometimes found in caves." Nearly all of the Carmarthenshire sites where the species has been found recently fit these categories. Indeed, even in the exceptionally hot weather of the 1990 summer, these sites provided the consistent coolness and high humidity seemingly required by Sabacon. Todd (1949) has analysed the humidity and temperature preferences for several common opilionids but no such work has been done on Sabacon. If Sabacon was originally introduced into Britain, the method of introduction would have had to maintain the required coolness and high humidity. Importation in the soil of cultivated plants could possibly have presented such an opportunity for colonisation of Britain and there are species of invertebrates established in Britain which are thought to have arrived by this means, such as the slug Boetgerilla pallens (which has spread spectacularly over the country in the last two decades) and the harvestman Dicranopalpus ramosus (Hillyard & Sankey 1989). Whilst such alien species may eventually colonise semi-natural habitats, such as ancient woodland, they are invariably found in a larger number of synanthropic situations, particularly in the early stages of their spread. Synanthropic habitats have been very well worked by the author during investigations of the myriapod and isopod faunas of South Wales and no records of the distinctive and easily-recognised Sabacon have been forthcoming.

Most of the localities from which Sabacon is known are wooded (including the rather atypical dune-slack site at Merthyr Mawr, Glamorgan (21/852773) which is clad in willow carr), and many are from woodland showing some degree of base-enrichment due either to bed rock

(Carboniferous Limestone) or flushing; most sites or micro-sites could be considered to be cool and moist. There is a preponderance of recent records from damp, flushed situations but this could well be partly due to observer-bias as the author regularly searches such situations for the 'ancient woodland indicator' snails that they frequently support. Four sites at least are on the Carboniferous Limestone outcrop (the Gower site (21/58), Pentyrch (31/118829), the Pistyll Quarry near Llandybie (22/624167) and Carmel Woods (22/591163)). On the limestone outcrop, areas of wooded block scree (either natural scree caused by peri- glacial frost-shattering and normal weathering processes or man-made scree from old quarrying activities) hold numerous interstices or larger humus-filled cavities, generally overlain by thick growths of moss or leaf-litter. These inter-connected cavities provide safe routeways and living areas for moisture-sensitive invertebrates such as Sabacon or the 'old woodland' snail Acicula fusca, allowing them to descend to damper, more equable, conditions in periods of intense cold or drought. Shading by an overhead canopy of ash-hazel woodland also helps to maintain general shelter and coolness. Sabacon is also frequently found on the steep, flushed sides of streams in deep woodland dingles, where there is constant moisture and an abundance of ferns, bryophytes and opposite-leaved golden saxifrage. Hart's-tongue and soft shield ferns or some calcicolous angiosperms suggest base-enrichment at these sites. The overhanging woodland again provides general shade and shelter.

The record of a 'young instar of S. viscayanum in an isolated clump of willow carr on a flooded dune-slack at Merthyr Mawr is of interest. Certainly the location is not far (<0.25km) from woodland (an ashwood on limestone) from which, perhaps, the carr was colonised, but there is an intervening area of unsuitable habitat (dune grassland and dry calcicolous scrub). Clearly, Sabacon has the ability to colonise new sites close to existing populations, perhaps with individuals dispersing on damp nights? Certainly the observations of KM Catley (1989), who noted an individual wandering over Polytrichum moss tussocks at a woodland site in Ceredigion, suggests that Sabacon leaves its diurnal micro-site under stones or logs to wander, perhaps in search of sustenance, to mate or to disperse. Other observations show that Sabacon is not limited to the wet, flushed habitats that are familiar to the present author, as AP Fowles recorded an adult under a log in a dry sessile oakwood in Ceredigion and Catley noted another under fallen timber in a Gwent beechwood (Catley 1988).

The overwhelming majority of Welsh Sabacon records are from wooded localities but recent information suggests that the species is able to exploit other habitat types. In 1989, twenty- two individuals were caught in traps operated by the Nature Conservancy Council's Welsh Peatland Invertebrate Survey (W.P.I.S.) on the extensive valley mire just east of Gelli'r-wydd, Llannon (22/545085, VC44). Thirteen of these were caught amongst rank poor-fen dominated by purple moorgrass and another nine were taken in an area of neglected wet heath with mature clumps of heather and cross-leaved heath. This site, which once formed part of a large expanse of mire known as Llannon Bog, is not in close proximity to semi-natural woodland, although much of its periphery is flanked by conifer plantation. Sabacon has previously been recorded 3kms downstream at Cil-ddewi Fawr (22/543055) in a shaded oak dingle.

This significant discovery shows that Sabacon is not confined to woodland habitats but it remains to be seen how widespread the species is in acidic grassland/wet heath sites. Llannon is the only locality sampled by W.P.I.S. that has produced Sabacon so far but much material remains to be identified and perhaps it will be found to occur in other peatland localities. Many British harvestmen have wide habitat tolerances and this is particularly true in western Britain where the wet climate allows invertebrates typical of humid woodlands elsewhere in their range to occupy more open environments. The harvestman Anelasmocephalus cambridgei is an example (Catley 1989, Fowles 1990).

Sabacon has been found in all months of the year except February and May, though future recording will probably reveal individuals in those months also. Most British harvestmen overwinter as eggs, hatching in Spring and developing to maturity in late Summer/Autumn. On the basis of available records, Sankey (1989) postulated that Sabacon may have a similar life-cycle to the common harvestman Rilaena triangularis, which overwinters as a nymph and matures in late Spring. However, to date adult Sabacon have only been found between August and December, whilst immature specimens have been recorded from January to July. Sankey (pers, comm., 1990), referring to a young instar taken on 5 Jan 1990, estimates that it was a third instar and one collected on 13 July 1990 to be a fourth or fifth instar. The records

which indicate the age of specimens are still relatively few but, at present, it appears that Sabacon is unique amongst the British opilionid fauna. Current evidence suggests that eggs hatch in mid-Winter and the nymphs then have a long maturation period before reaching adulthood in late Summer. Sabacon can be identified in the field at a very early stage by the unmistakeable palps and the younger instars are also distinctively coloured with the legs, palps and margins of the cephalothorax and abdomen a light blue-grey and the dorsal surface of the body a dull brick-red. At adulthood this latter area takes on a dark grey hue.

It seems that Sabacon only occurs at low densities even in favoured habitats and, whilst an appreciation of its habitat requirements can allow one to find it quite quickly, one can also unsuccessfully search apparently appropriate habitat without results. At one extreme, I found Sabacon at a new locality within seconds of starting to search for it, whilst conversely I have failed to find it at a site where I had found it only a week previously. In the wet, shaded woodland dingles, the habitat where the author has most experience of the species, it is most often found under flat, loose stones, on or near flushes. In view of its general scarcity it should only be collected with restraint and there is a need for further observations on the life-cycle and ecology of this fascinating harvestman, both in the wild and in laboratory conditions.

ACKNOWLEDGEMENTS

Thanks are due to John Bratton (NCC, Chief Scientist's Directorate), Brian Eversham (Biological Records Centre, Monks Wood), Peter Holmes (NCC, Welsh Peatland Invertebrate Survey) and John Sankey for providing information. Messrs Bratton and Sankey also kindly commented on the initial script and offered welcome amendments.

BIBLIOGRAPHY

ABBOT RHR (1981) - A new opilionid to Great Britain. Newsletter Br. arachnol. Soc. 30_: 4

CAMBELL, S & BOWEN, DQ (1989) - Geological Conservation Review: Quaternary of Wales. Nature Conservancy Council, Peterborough.

CATLEY, KM (1988) - Spider and harvestman recording in Dyfed, 1987. DIG Newsletter 9: 23-26

CATLEY, KM (1989) - Spider and harvestman recording in Dyfed, 1988. DIG Newsletter 12: 23-25

FOWLES, AP (1990) - Spider and harvestman recording in Ceredigion, 1989. DIG Newsletter 16: 25-26

HILLYARD, PD & SANKEY, JHP (1989) - Harvestmen (Second Edition). Synopses of the British Fauna (New Series) No. 4. Linnaean Society, London.

MARTENS, J (1983) - Europäische Arten der Gattung Sabacon Simon 1879. Arachnida, Opiliones: Sabaconidae). Seckenberg Biol. 63: 265-296

MARTENS, J (1988) - Species boundary problems in Opiliones. Newsletter Br. arachnol. Soc. 52: 2-4

MERRETT, CM (1984) - Further discovery of the harvestman Sabacon in Glamorgan. Newsletter Br. arachnol. Soc. 40: 2

MORGAN, IK (1990) - Harvestmen and spiders in Carmarthenshire, 1989. DIG Newsletter 16: 25

SANKEY, JHP (1989) - Harvestmen in south-west Wales. DIG Newsletter 14: 1-2

TODD, V (1949) - The habits and ecology of the British harvestmen (Arachnida, Opiliones), with special reference to those of the Oxford district. J. Anim. Ecol. 18: 209-229

THE MID-WINTER INVERTEBRATE FAUNA OF A RED KITE'S NEST - AP FOWLES & DC BOYCE

Birds' nests are known to support an extensive fauna of invertebrates, some of which are entirely restricted to these micro-sites and others are more generally distributed, occurring widely in situations which offer similar conditions, such as accumulations of leaf-litter, compost heaps and flood-debris. Numerous short notes and articles have been published in the entomological literature regarding various aspects of the fauna (chiefly the Coleoptera, Siphonaptera and Diptera) but there is still much to be learnt about nest inhabitants. The opportunity to sample red kite nests during the breeding season has given some indication of the range of beetle species present in raptor nests in Mid-Wales (Fowles, Boyce & Cross 1989; Fowles & Owen 1990). Most of these species are either directly dependent upon the resident birds for food in the form of carrion-debris, feather-scale etc., or else are predators of the numerous mites, springtails and insect larvae which also inhabit the nest. However, substantial birds' nests, including those of most raptors, also provide a suitable environment for winter shelter and it is quite likely that many additional species occupy a nest during the winter months to escape the worst of our climate.

The effect of the recent destructive gales on woodland ecology in southern Britain has still to be fully determined but at least they gave rise to the rare chance to examine the invertebrate fauna of a complete red kite's nest. The gales of January 1990 brought down an oak tree inside a narrow strip of deciduous woodland in Carmarthenshire; kites had built a nest in a fork of this tree in 1988 and had successfully reared a brood in 1989. As the tree fell, the nest remained virtually intact and was held a couple of feet above the ground until it was collected a few weeks later. The framework of the nest (which consisted chiefly of oak and birch twigs between 5 and 35 cms long, AO Chater, pers. comm.) was then carefully pulled apart and all invertebrates collected. This left the inner core, or nest-cup, which was composed of a dense mass of matted grass, humus, moss, feathers, wool, bones and small twigs. Sections of this 'core' were then placed in washing-up bowls which had a hole cut in the floor at one corner. A funnel leading to a jar filled with preservative was attached to this hole, the top of the bowl was sealed with a cloth-covering held in place by elastic bands, and the equipment was then left next to a radiator. This rather crude version of a Tullgren Funnel acted on the principle that, as the nest-material dried-out and conditions became too warm, the nest invertebrates would wander out and, on encountering the funnel, tumble into the preservative. Surprisingly, this worked extremely well and after a fortnight it seemed that all invertebrates had been collected. However, out of curiosity the basins were left jn situ and, after a week or so with no further catches, small numbers of invertebrates began to be caught again. The equipment was then left in place for another 4-5 weeks and the nest-material was then immersed in water (cf. Fowles, Boyce & Cross 1989), revealing a few extra aleocharines. It seems likely that many of the individuals caught in the later stages of this 'experiment' were actually breeding in the nest. This must certainly have been the case with the micro-Lepidoptera and the abundant (as yet unidentified) Diptera (mainly Scatopsidae), but perhaps some of the Coleoptera may have merely avoided capture in the first 2 -3 weeks or may have been relatively tolerant of the desiccating conditions.

By chance, this particular kites' nest had been one of eighteen sampled for invertebrates during the previous summer (Fowles *&* Owen 1990) but unfortunately the small amount of nest-lining removed for that study only contained a single beetle, the staphylinid Haploglossa picipennis. This species is a specialist of raptors' nests and adults have been found commonly in osprey nests in Scotland during the breeding season (Owen & Taylor 1989) and have also been recorded in November (Welch 1979). Joy (1930) reports the occurrence of Microglossa (= Haploglossa) picipennis in buzzard nests in July and August and states "M. picipennis evidently resorts to the nest at an early stage to breed" but what he means by this is unclear. Coleoptera larvae were not identified during our winter study but no H. picipennis were recorded and presumably, unlike many nidicolous aleocharines, the beetle is only adult during the summer months.

A total of thirty-seven invertebrate species have so far been identified from the winter kite- nest material, involving 133 beetle specimens, 72 micro-moths, 32 spiders, 1 pseudoscorpion, 1 ant and numerous woodlice, centipedes and millipedes. The Diptera await determination but springtails, mites, slugs and Parasitic Hymenoptera were not retained for identification. Of the 37 species, only a small number can be regarded as nest-specialists: Trox scaber, Atheta harwoodi, A. nigricornis and Monopis laevigella. Several other species, such as Cryptophagus dentatus, Philonthus subuliformis, Aleochara sparsa, Endrosis sarcitrella and .Neobisium muscorum are regularly found in birds' nests but also occur widely in other micro-sites. The most interesting species recorded was the rove-beetle Quedius aetolicus (two specimens); it is a rare species in Britain, known chiefly from squirrel dreys and bird nests in areas of old woodland and is regarded as an indicator-species of ancient woodlands (Harding & Rose 1986). A number of the beetles recorded are usually found under the bark of dead and dying trees, including Rhizophagus blpustulatus, Cerylon ferruglneum, Leptusa fumlda and L. ruficollis. although the latter two species were also found in red kite nests collected in September 1988 (Fowles, Boyce & Cross 1989). The money-spider Monocephalus castaneipes is chiefly arboreal in southern Britain and other invertebrates, such as the myriapods Proteroiulus fuscus and Lithobius melanops and the woodlouse Porcelllo scaber, often occur under flakey bark on tree trunks. Many of the remaining species are generalists of decaying

vegetation but how many of these were only able to exploit the nest matrix because it had been brought close to ground level is unknown. Owen (1976) devised an 'artificial nest' to assist the study of nidicolous invertebrates and it is probably only with extensive trials with such equipment that a qualitative assessment of the allegiances of different species to birds' nests can be made. The legislative protection afforded to breeding birds ensures that nidicolous invertebrates are unlikely to require specific conservation measures apart from preventing loss of habitat. Raptor nests in particular enjoy the widest protection but it is nonetheless of interest to identify which invertebrates are potentially safeguarded. Opportunities to examine a complete nest are rare and hopefully the information derived from this study adds to the overall understanding of the diversity of birds' nest invertebrates.

INVERTEBRATES RECORDED FROM A RED KITES' NEST COLLECTED IN FEB 1990, CARMARTHENSHIRE. [Emboldened numerals refer to the total number of specimens of each species identified. Numbers in brackets refer to specimens captured during the second phase of extraction, possibly having developed in the nest.]

Coleoptera
Hister merdarius - 3
Acrotrichis sp. - 2
Catops morio - 1
Dropephylla vilis - 1
Hapalaraea pygmaea - 1 (1)
Stenus impressus - 1
Philonthus subuliformis - 23 (5)
Qeudius aetolicus - 2
Quedius fumatus - 1
Quedius mesomelinus - 13 (9)
Leptusa fumida - 5 (2)
Leptusa ruficollis - 1 (1)
Amischa cavifrons - 1
Geostiba circellaris - 8
Atheta harwoodi - 1
Atheta nigricornis - 51 (6)
Mocyta fungi - 1
Aleochara lanuginosa - 1
Aleochara sparsa - 1
Trox scaber - 8 (7)
Rhizophagus bipustulatus - 1
Cryptophagus dentatus - 1
Cryptophagus sp. - 1
Cerylon ferrugineum - 2
Lithostygnus serripennis - 1
Aridius nodifer - 1

Lepidoptera
Monopis laevigella - 65 (64)
Endrosis sarcitrella - 7 (7)

Hymenoptera
Lasius niger - 1

Isopoda
Porcellio scaber - Many

Diplopoda
Proteroiulus fuscus - Several
Chilopoda
Lithobius melanops - Several

Pseudoscorpiones
Neobisium muscorum - 1

Araneae
Harpactea hombergi - 1
Clubiona brevipes - 1
Labulla thoracica - 1
Monocephalus castaneipes - 27
Savignya frontata - 1
Lepthyphantes minutus - 1

ACKNOWLEDGEMENTS Thanks are due to the following for their assistance with this study: Tony Cross for collecting the nest; Peter Davis for details of its history; Arthur Chater for information on the nest structure; Cynthia Merrett for identifying the spiders; Ian Morgan for identifying the myriapods; John Owen for identifying the aleocharines; and Tony Simpson for identifying the micro-Lepidoptera.

REFERENCES:

FOWLES, AP, BOYCE, DC & CROSS ,AV (1989) - Insects recorded from nest-linings taken from red kite nests in Ceredigion, VC46. DIG 13: 20

FOWLES, AP & OWEN, JA (1990) - Haploglossa picipennis (Gyllenhal) (Col.: Staphylinidae) in the nests of Red Kites. Ent. Rec. 102: 186-187

HARDING, PT & ROSE, F (1986) - Pasture woodlands in lowland Britain. Institute of Terrestrial Ecology, Huntingdon.

JOY, NH (1930) - Coleoptera in birds' nests, including a species of Microglossa new to Britain. Ent. mon. Mag. 66: 41-42

OWEN, JA (1976) - An artificial nest for the study of birds' nest beetles. Proc. Brit. Ent. Nat. Hist. Soc. 9: 34-35

OWEN, JA & TAYLOR, S (1989) - Haploglossa picipennis (Gyllenhal) (Col.: Staphylinidae) in ospreys' nests. Ent. Rec. 101: 53-57

WELCH, RC (1979) - Haploglossa picipennis (Gyll.) (Col.: Staphylinidae), Cryptophagus badius Sturm and C. lapponlcus Gyll. (Col.i Cryptophagldae) from a sparrowhawk's nest near Aviemore, Inverness. Ent. mon. Mag. 114: 240